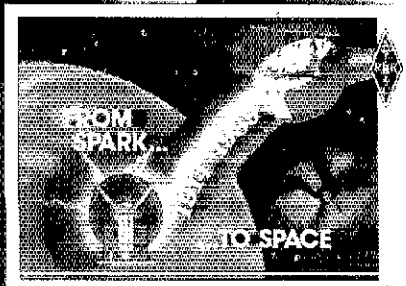
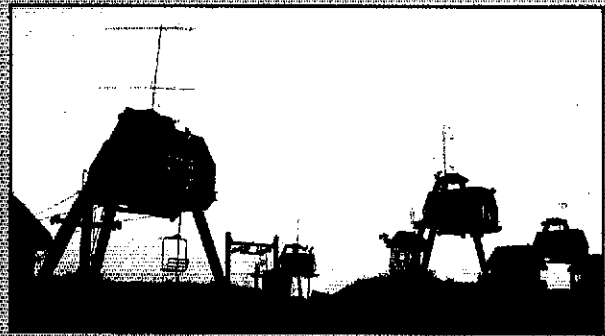
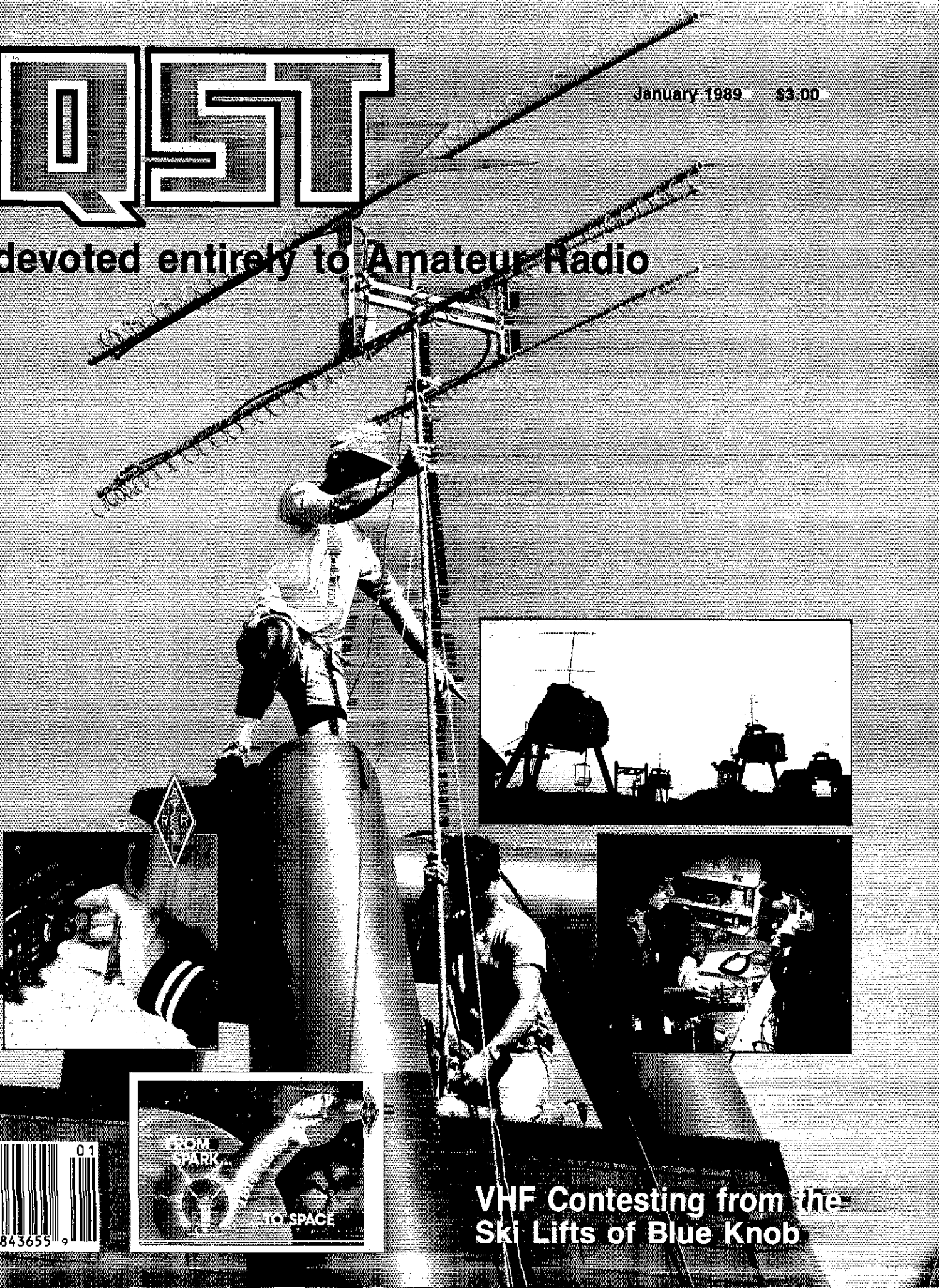


# QST

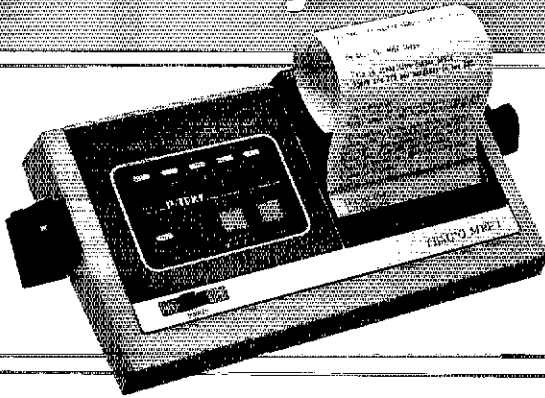
January 1989 \$3.00

devoted entirely to Amateur Radio



VHF Contesting from the  
Ski Lifts of Blue Knob

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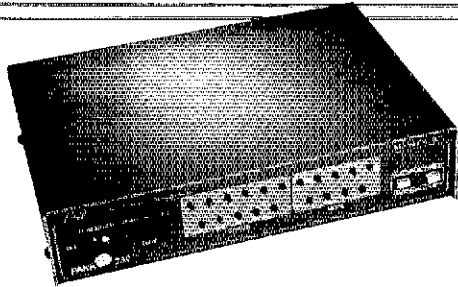
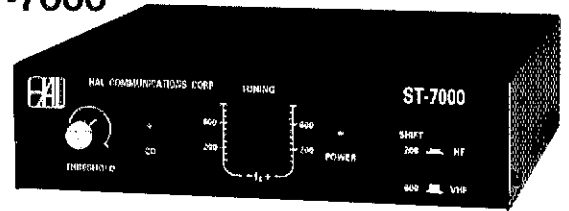


## The TEMPO MPP1

... a unique new mobile data printer, includes a packet controller and a 13.6 VDC printer that interfaces with any mobile radio, in a recent user test it proved to have about twice as much audio level range tolerance as other TNCs. It is also an ideal unit for emergency work and a commercial version is perfect for dispatching service, emergency and police vehicles.

## HAL Communications' ST-7000

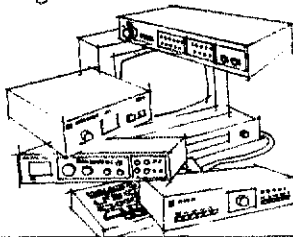
HF-Packet Modem... a high performance modem designed specifically for 300 baud HF-Packet. It offers no-compromise performance to assure optimum operation under the most demanding signal conditions. Techniques developed for government and military use are used in the ST-7000. AGC-controlled AM signal processing provides a wide dynamic range. All filters and detectors are optimized for 300 baud HF-Packet. It offers the 200 Hz shift mode and a wider 600 Hz shift mode, each supported by separate 6-pole input filters and a 40 db AGC system.



## The PK-232 by AEA

... the only controller offering Morse Code, Baudot, ASCII, AMTOR, Packet, and facsimile Transmission & Reception plus the ability to monitor the new Navtex marine weather and navigational system... 7 modes in one controller. The PK-232 makes any RS-232 compatible computer or terminal the complete amateur digital operating position. All decoding, signal processing and protocol software is on ROM. Only a simple terminal program (like those used with telephone modems) is required to interface the PK-232 with your computer. **Watch for the new and exciting AEA FSTV-430. Have fun on amateur TV!**

*Obviously, we can fill in a system that you have already started. Or we can furnish a complete system to fit your needs and budget. For example, here's some suggestions for the amateur just entering the exciting field of data communications, or: for the amateur who wants the best available.*



**NO. 1** For the fun (and very affordable) mode, VHF Packet, AEA PK-88 with personal mailbox, 8K programmable memory and TCP-1P compatibility. For serious 20 M world-wide DXing on Packet, 200 or 600 Hz shift... add the superb HAL ST-7000.

**NO. 2... top of the line!** The HAL ST-8000 or HAL ST-6000 and AEA's PK-232... the winning combination. You can't do better for all-mode, all-band enjoyment of hi-speed data communications.

**If you have any questions concerning these units, or would like to discuss your requirements with a knowledgeable specialist, please call and ask for George Sanso, AB6A. We also carry a large selection of excellent commercial products for data communications and emergency systems as well as a complete inventory of amateur equipment and linear power amplifiers.**



# Henry Radio

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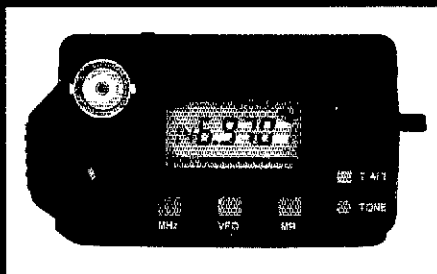
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TH-55AT  
1200 MHz  
Here Now!

## Compact Breakthrough!



### TH-25AT/45AT

#### New Pocket Portable Transceivers

The all-new TH-25 Series of pocket transceivers is here! Wide-band frequency coverage, LCD display, 5 watt option, plus...

- Frequency coverage: **TH-25AT:** 141-163 MHz (Rx); 144-148 MHz (Tx). (Modifiable for MARS/CAP. Permits required.)  
**TH-45AT:** 438-450 MHz.
- Automatic Power Control (APC) circuit for reliable RF output and final protection.
- 14 memories; two for **any** "odd split" (5 kHz steps).
- Automatic offset selection (TH-25AT).
- 5 Watts from 12 VDC or PB-8 battery pack.
- Large multi-function LCD display.
- Rotary dial selects memory, frequency, CTCSS and scan direction.
- T-ALERT for quiet monitoring. Tone Alert beeps when squelch is opened.
- Band scan and memory scan.
- Automatic "power off" circuit.
- Water resistant.
- CTCSS encoder /decoder optional (TSU-6).
- **Supplied accessories:** StubbyDuk, PB-6 battery pack for 2.5 watts output, wall charger, belt hook, wrist strap, water resistant dust caps.



#### Optional accessories:

- PB-5 7.2 V, 200 mAh NiCd pack for 2.5 W output • PB-6 7.2 V, 600 mAh NiCd pack • PB-7 7.2 V, 1100 mAh NiCd pack • PB-8 12 V, 600 mAh NiCd for 5 W output • PB-9 7.2 V, 600 mAh NiCd with built-in charger • BC-10 Compact charger • BC-11 Rapid charger • BT-6 AAA battery case • DC-1/PG-2V DC adapter • HMC-2 Headset with VOX and PTT • SC-14, 15, 16 Soft cases • SMC-30/31 Speaker mics. • TSU-6 CTCSS decode unit • WR-1 Water resistant bag

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Complete service manuals are available for all Kenwood transceivers and most accessories. Specifications, features, and prices are subject to change without notice or obligation.

ICOM

Dual Band Mobile & Handheld



Kim Bottles K7IM

# DOUBLE YOUR PLEASURE DOUBLE YOUR BANDS

## Dual Band Radios from ICOM!

Double your operating pleasure with Icom's new dual band IC-3210 mobile and IC-32AT handheld FM transceivers. Each unit incorporates a wealth of special features and options designed to move you into the forefront of today's expanded 2-meter and 440MHz activity. Icom dual banders: the FM enthusiasts dream rigs!

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**Powerful!** The IC-3210 delivers 25 watts output on both bands. The IC-32AT is five watts output on both bands. Selectable low power for local use on both units.

**Programmable Band and Memory Scanning.** Includes easy lockout and recall of various memories. Exceptional flexibility!

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**Priority Watch.** Monitor any channel for calls while continuing operation on another frequency.

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All stated specifications are subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions. 321032AT668

# QST

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## OUR COVER

VHF contesting from a mountaintop is especially attractive during September's warm days and cool nights. These photos show the W1XX contest team in action at the Blue Knob ski area in rare grid square FN00. Turn to page 97 for complete results of the ARRL September VHF QSO Party. (photos by David Love, KA3JRI)

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## OPERATING

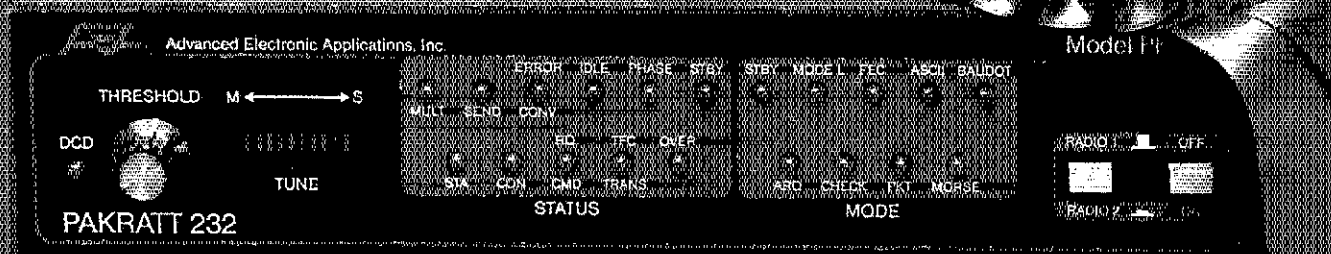
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Others May Try to Imitate, But...

# Only One Can Be The Best



Morse Code - Baudot - ASCII - AMTOR - Packet - Facsimile - Navtex

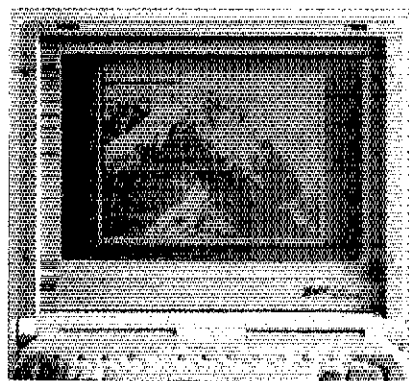
Amateur Net Price \$319.95

It's a lesson you learn very early in life. Many can be good, some may be better, but only one can be the best. The PK-232 is the best multi-mode data controller you can buy.

## 1 Versatility

The PK-232 should be listed in the amateur radio dictionary under the word Versatile. One data controller that can transmit and receive in six digital modes, and can be used with almost every computer or data terminal. You can even monitor Navtex, the new marine weather and navigational system. Don't forget two radio ports for both VHF and HF, and a no compromise VHF/HF/CW internal modem with an eight pole bandpass filter followed by a limiter discriminator with automatic threshold control.

The internal decoding program (SIAM<sup>tm</sup>) feature can even identify different types of signals for you, including some simple types of RTTY encryption. The only software your computer needs is a terminal program.



Facsimile Screen Display

## 2 Software Support

While you can use most modem or communications programs with the PK-232, AEA has two very special packages available exclusively for the PK-232....PC Pakratt with Fax for IBM PC and compatible computers, and Com Pakratt with Fax for the Commodore 64 and 128.

Each package includes a terminal program with split screen display, QSO buffer, disk storage of received data, and printer operation, and a second program for transmission/reception and screen display of facsimile signals. The IBM programs are on 5-1/4" disk and the Commodore programs are plug-in ROM cartridges.

## 3 Proven Winner

No matter what computer or terminal you plan to use, the PK-232 is the best choice for a multi-mode data controller. Over 20,000 amateurs around the world have on-air tested the PK-232 for you. They, along with most major U.S. amateur magazines, have reviewed the PK-232 and found it to be a good value and excellent addition to the ham station.

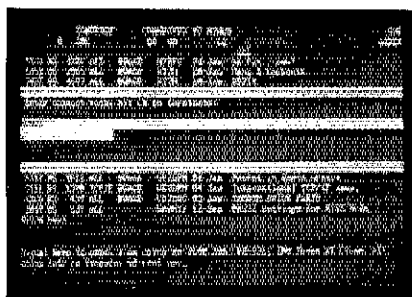
No other multi-mode controller offers the features and performance of the PK-232. Don't be fooled by imitations. Ask your friends, or call the local amateur radio store. We're confident the PK-232 reputation will convince you that it's time to order your very own PK-232.

Call an authorized AEA dealer today. You deserve the best you can buy, you deserve the PK-232.

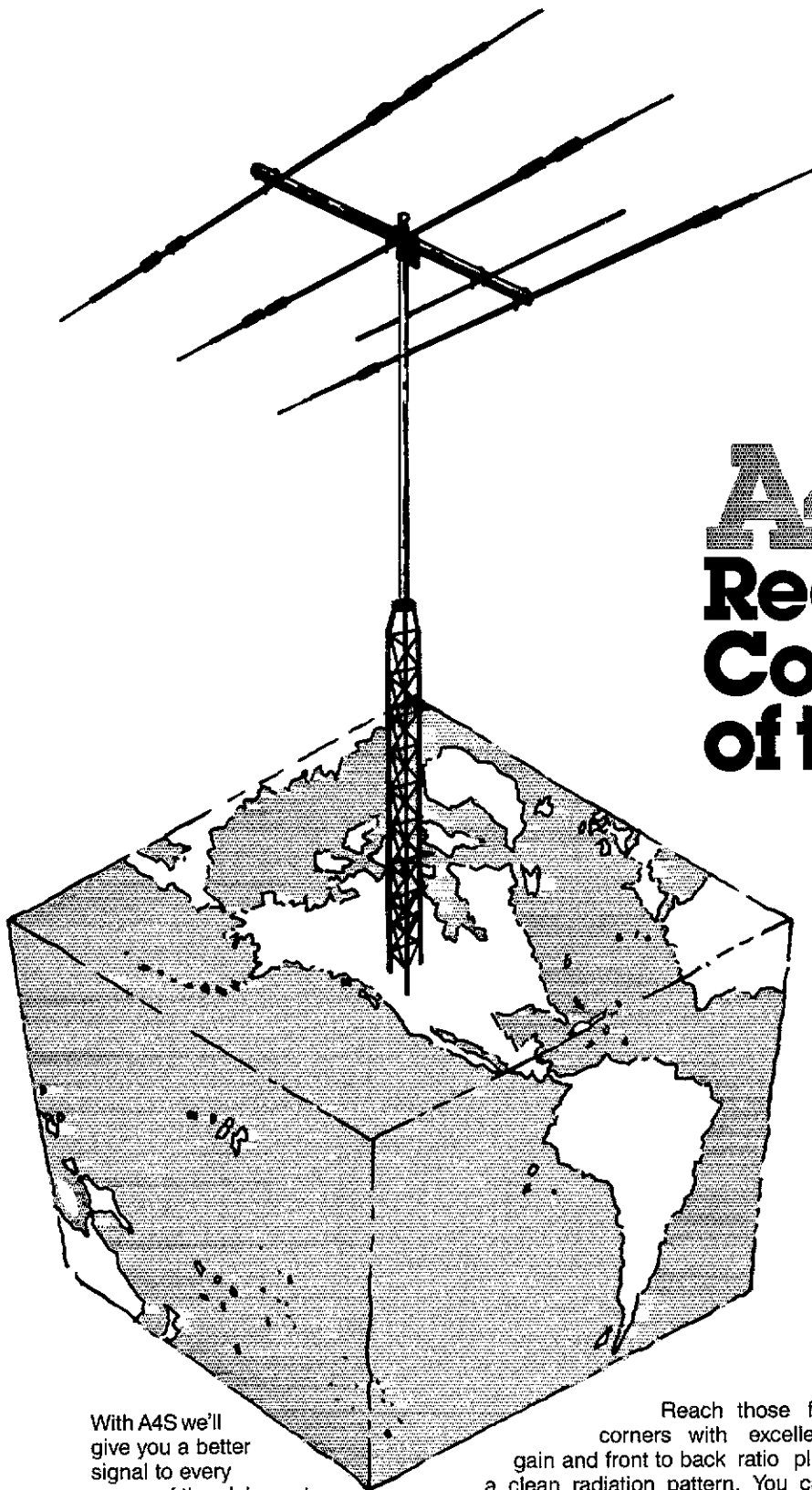
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### TS-440S Compact high performance HF transceiver with general coverage receiver

Kenwood's advanced digital know-how brings Amateurs world-wide “big-rig” performance in a compact package. We call it “Digital DX-citement”—that special feeling you get every time you turn the power on!

• **Covers All Amateur bands**

General coverage receiver from 10 kHz—30 MHz. Easily modified for HF MARS operation.

• **Direct keyboard entry of frequency**

• **All modes built-in**  
USB, LSB, CW, AM, FM, and AFSK. Mode selection is verified in Morse Code.

• **Built-in automatic antenna tuner (optional)**

Covers 80-10 meters.

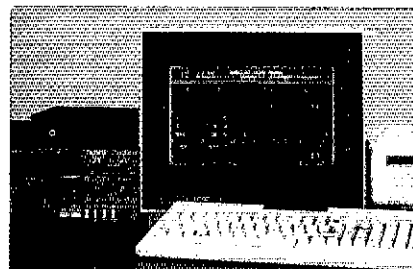
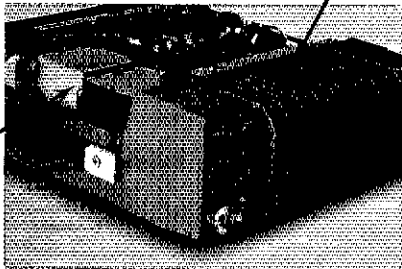
• **VS-1 voice synthesizer (optional)**

• **Superior receiver dynamic range**

Kenwood DynaMix™ high sensitivity direct mixing system ensures true 102 dB receiver dynamic range. (500Hz bandwidth on 20m)

• **100% duty cycle transmitter**

Super efficient cooling permits continuous key-down for periods exceeding one hour. RF input power is rated at 200 W PEP on SSB, 200 W DC on CW, AFSK, FM, and 110 W DC AM. (The PS-50 power supply is needed for continuous duty.)



• **Adjustable dial torque**

• **100 memory channels**

Frequency and mode may be stored in 10 groups of 10 channels each. Split frequencies may be stored in 10 channels for repeater operation.

• **TU-8 CTCSS unit (optional)**

• **Superb interference reduction**

IF shift, tuneable notch filter, noise blanker, all-mode squelch, RF attenuator, RIT/XIT, and optional filters fight QRM.

• **MC-43S UP/DOWN mic. included**

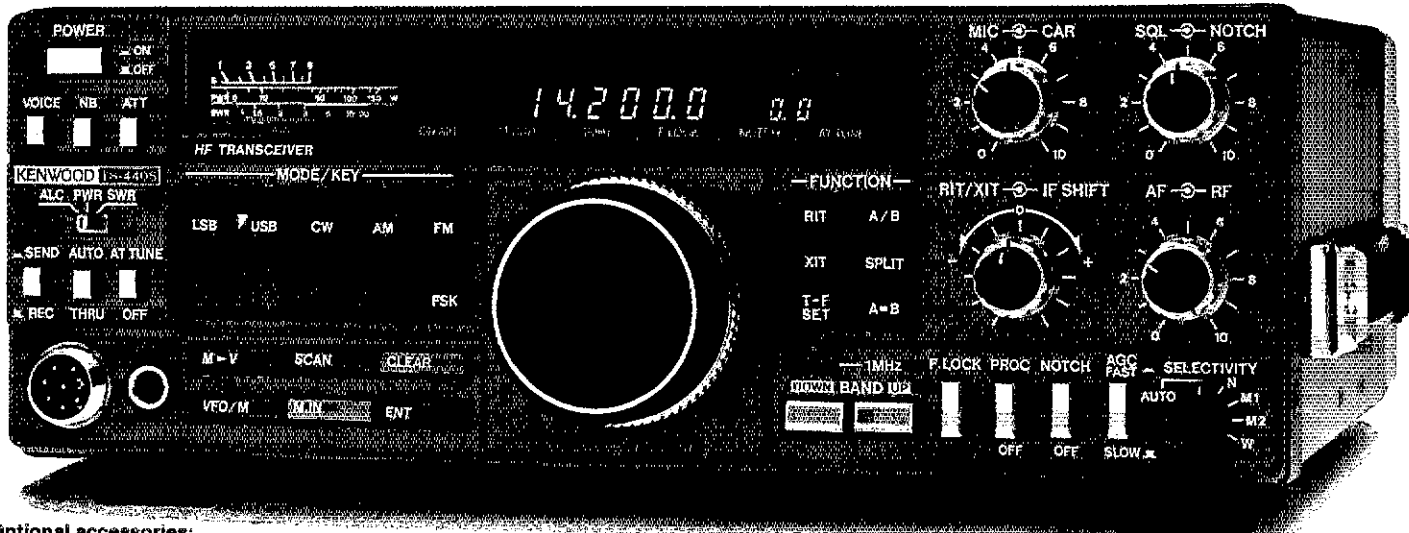
• **Computer interface port**

• **5 IF filter functions**

• **Dual SSB IF filtering**  
A built-in SSB filter is standard. When an optional SSB filter (YK-88S or YK-88SN) is installed, dual filtering is provided.

• **VOX, full or semi break-in CW**

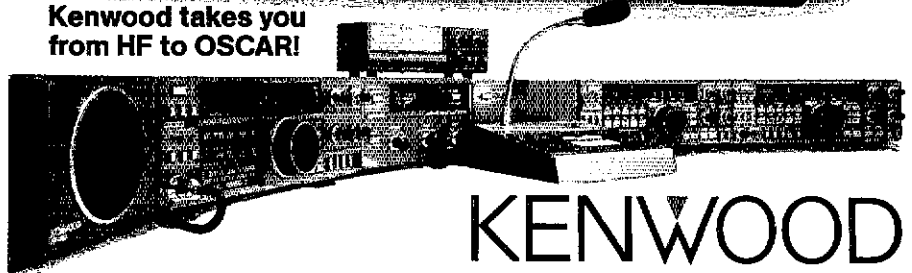
• **AMTOR compatible**



**Optional accessories:**

- AT-440 internal auto. antenna tuner (80 m—10 m)
- AT-250 external auto. tuner (160 m—10 m)
- AT-130 compact mobile antenna tuner (160 m—10 m)
- IF-232C/IC-10 level translator and modem IC kit
- PS-50 heavy duty power supply
- PS-430/PS-30 DC power supply
- SP-430 external speaker
- MB-430 mobile mounting bracket
- YK-88C/88CN 500 Hz/270 Hz CW filters
- YK-88S/88SN 2.4 kHz/1.8 kHz SSB filters
- MC-60A/80/85 desk microphones
- MC-55 (8P) mobile microphone
- HS-5/6/7 headphones
- SP-40/50B mobile speakers
- MA-5/VP-1 HF 5 band mobile helical antenna and bumper mount
- TL-922A 2 kw PEP linear amplifier
- SM-220 station monitor
- VS-1 voice synthesizer
- SW-100A/200A/2000 SWR/power meters
- TU-8 CTCSS tone unit
- PG-2S extra DC cable.

**Kenwood takes you from HF to OSCAR!**



Complete service manuals are available for all Kenwood transceivers and most accessories. Specifications and prices are subject to change without notice or obligation.

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**DX-cellest!**

## #1 Rated HF!



### TS-940S

#### Competition class HF transceiver

TS-940S—the standard of performance by which all other transceivers are judged. Pushing the state-of-the-art in HF transceiver design and construction, no one has been able to match the TS-940S in performance, value and reliability. The product reviews glow with superlatives, and the field-proven performance shows that the TS-940S is "The Number One Rated HF Transceiver!"

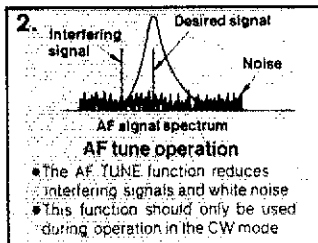
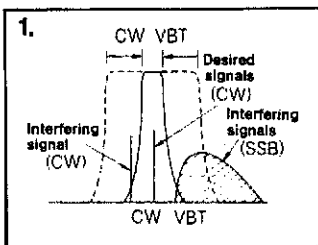
- 100% duty cycle transmitter. Kenwood specifies transmit duty cycle **time**. The TS-940S is guaranteed to operate at full power output for periods **exceeding one hour**. (14.250 MHz, CW, 110 watts.) Perfect for RTTY, SSTV, and other long-duration modes.
- **First with a full one-year limited warranty.**
- **Extremely stable phase locked loop (PLL) VFO.** Reference frequency accuracy is measured in **parts per million!**

#### Optional accessories:

- AT-940 full range (160-10m) automatic antenna tuner
- SP-940 external speaker with audio filtering
- YG-455C-1 (500 Hz), YG-455CN-1 (250 Hz), YK-88C-1 (500 Hz) CW filters
- YK-88A-1 (6 kHz) AM filter
- VS-1 voice synthesizer
- SO-1 temperature compensated

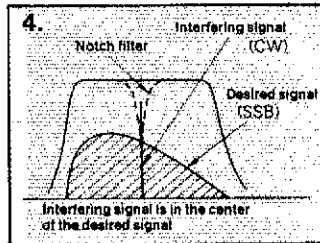
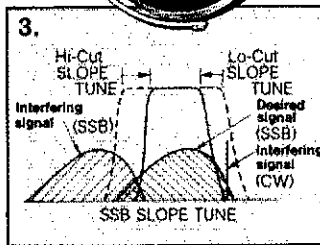
- crystal oscillator
- MC-43S UP/DOWN band station mic.
- MC-60A, MC-80, MC-85 deluxe base station mics.
- PC-1A phone patch
- TL-922A linear amplifier
- SM-220 station monitor
- BS-8 pan display
- SW-200A and SW-2000 SWR and power meters
- IF-232C/IF-10B computer interface.

Complete service manuals are available for all Kenwood transceivers and most accessories. Specifications, features, and prices are subject to change without notice or obligation.



1) **CW Variable Bandwidth Tuning.** Vary the passband width continuously in the CW, FSK, and AM modes, without affecting the center frequency. This effectively minimizes QRM from nearby SSB and CW signals.

2) **AF Tune.** Enabled with the push of a button, this CW interference fighter inserts a tunable, three pole active filter between the SSB/CW demodulator and the audio amplifier. During CW QSOs, this control can be used to reduce interfering signals and noise, and peaks audio frequency response for optimum CW performance.



3) **SSB Slope Tuning.** Operating in the LSB and USB modes, this front panel control allows independent, continuously variable adjustment of the high or low frequency slopes of the IF passband. The LCD sub display illustrates the filtering position.

4) **IF Notch Filter.** The tunable notch filter sharply attenuates interfering signals by as much as 40 dB. As shown here, the interfering signal is reduced, while the desired signal remains unaffected. The notch filter works in all modes except FM.

• **Complete all band, all mode transceiver with general coverage receiver.** Receiver covers 150 kHz-30 MHz. All modes built-in: AM, FM, CW, FSK, LSB, USB.

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• **One-touch frequency check (T-F SET) during split operations.**

• **Unique LCD sub display indicates VFO, graphic indication of VBT and SSB Slope tuning, and time.**

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• **Other vital operating functions.** Selectable semi or full break-in CW (QSK), RIT/XIT, all mode squelch, RF attenuator, filter select switch, selectable AGC, CW variable pitch control, speech processor, and RF power output control, programmable band scan or 40 channel memory scan.

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# THE AMERICAN RADIO RELAY LEAGUE, INC



The American Radio Relay League, Inc. is a noncommercial association of radio amateurs, organized for the promotion of interest in Amateur Radio communication and experimentation, for the establishment of networks to provide communications in the event of disasters or other emergencies, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

ARRL is an incorporated association without capital stock chartered under the laws of the State of Connecticut, and is an exempt organization under Section 501(c)(3) of the Internal Revenue Code of 1986. Its affairs are governed by a Board of Directors, whose voting members are elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is noncommercial, and no one who could gain financially from the shaping of its affairs is eligible for membership on its Board.

Of, by, and for the radio amateur, ARRL numbers within its ranks the vast majority of active amateurs in the nation and has a proud history of achievement as the standard-bearer in amateur affairs.

A bona fide interest in Amateur Radio is the only essential qualification of membership; an Amateur Radio license is not a prerequisite, although full voting membership is granted only to licensed amateurs in the US.

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# "It Seems to Us ..."

## Why Morse Code?

In mid-November, a number of members spotted press reports of the planned demise of Morse code in the Maritime Service. At a meeting in London, the International Maritime Organization decided to bring its long-awaited Global Maritime Distress and Safety System on line during the upcoming decade. By 1999, ships worldwide will be so equipped as to permit any member of the crew to send a distress signal at the press of a button. Ship owners are expected to use this development to phase out their shipboard Morse radio operators, and to rely on satellites and maritime telex to keep in touch with their vessels.

Except for those among us who earn their daily bread as maritime radio operators, this has nothing directly to do with us. Still, it's only natural to look for analogies to our own Amateur Radio Service, where similar technological changes have taken place. Now that there are so many ways of communicating by radio that don't depend upon the skill of the operator in sending and receiving Morse, will we soon see the end of Morse Code in Amateur Radio?

We think not, for there's a fundamental difference between the two services. For the commercial services, radio is a means to an end. In this context there are only two reasons for doing, or not doing, something: safety and economics—and even safety considerations can be regarded cynically as exercises in minimizing insurance premiums. You and I may feel safer on board a ship with a skilled radio operator on board, because we think we know something about radio and about how things can go wrong with sophisticated devices; but unless that can be translated into dollars and cents on some statistical basis, shipboard Morse will follow the landline telegraph into the annals of history and legend.

Amateur Radio is different. We're hams because we want to be; we operate because we enjoy it. We can't offset the cost of an investment in hardware with reduced personnel expenses because, by definition, our personnel expenses are zero. Besides, the invention of the steamboat may have doomed the sail as a means of commercial locomotion, but if you think that meant the death of sailing, just look in any marina and think again.

There's joy to be had in doing something well, and hundreds of thousands of radio amateurs the world over have felt that joy through their skill at Morse. We also note the rediscovery by the military services that the high-frequency spectrum, unlike a satellite network, is invulnerable to being put permanently out of commission by hostile action. There are 13 letters in this month's "Correspondence" column that say it better than we can. Interestingly, our pro-code correspondents average just 38 years old—about ten years younger than the average American radio amateur!

Commercially viable or not, Morse code's future in Amateur Radio is assured. But this doesn't end the discussion of a related, yet

somewhat different, issue: whether there isn't some place in American Amateur Radio for people who, for whatever reason, don't choose to learn the code. We say "American Amateur Radio" because the ITU Radio Regulations require Morse proficiency to operate below 30 MHz, but no such international requirement exists for VHF and above; in many other countries, VHF privileges are available without passing a code test. Leading amateurs in those countries have seen both positive and negative effects of a no-code license, but in no case have they reported it led to "the end of Amateur Radio as we know it." Indeed, at international meetings we have found some to be as ardent in boosting the concept of a no-code amateur license to us as we have been in promoting the American concept of a Novice license to them.

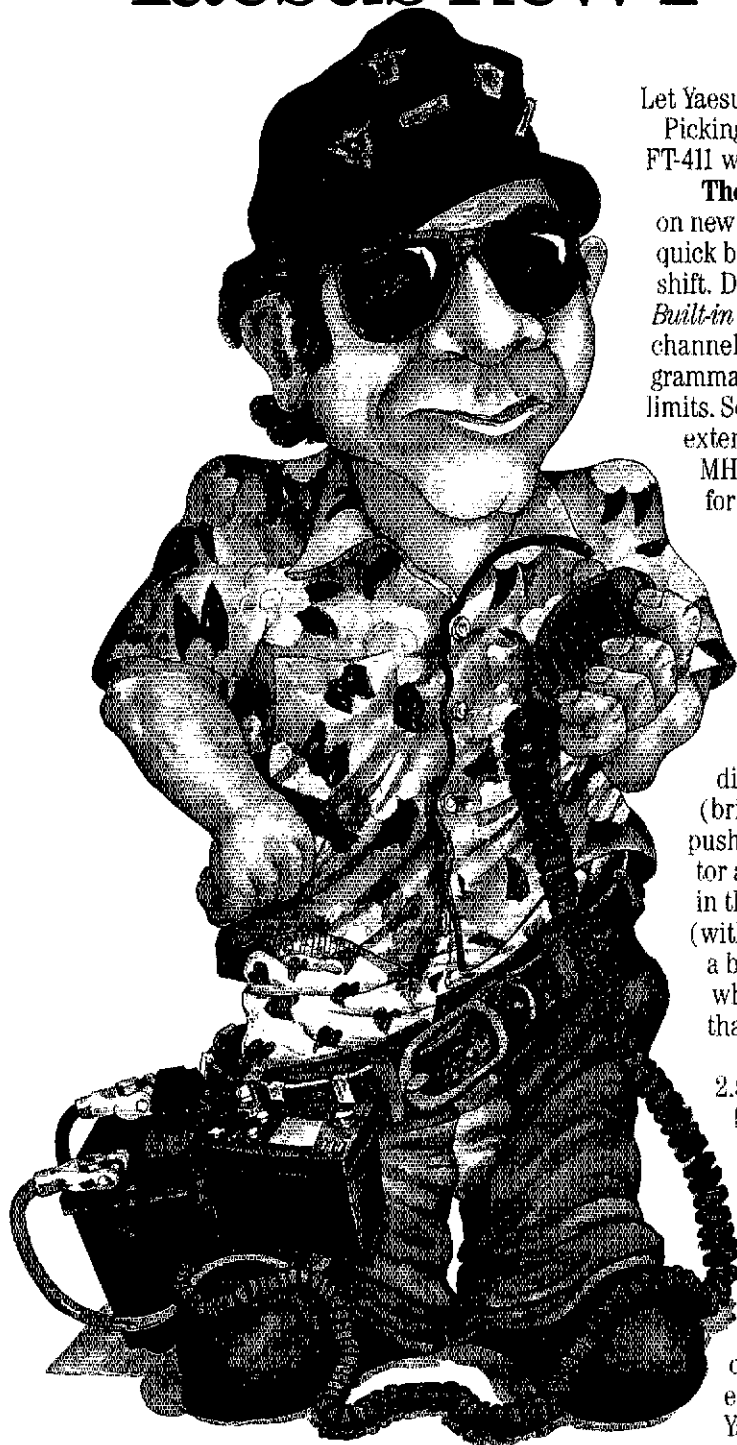
If it believed the public interest would be served, the FCC could create such a class of amateur license here. But the last time it tried, in 1983, public comments ran about 25 to one against an inartfully crafted, schizophrenic FCC proposal. As a democratic organization, the League's position reflected that overwhelming sentiment. ARRL leaders were criticized at the time about equally from both sides: from one side for not opposing the proposal more quickly, and from the other for being too eager to shoot it down. We suppose this means we had it just about right!

The subject is bound to be raised again, sooner or later. Will the sentiment be different? That will depend upon the particular proposal, and upon how well the no-code proponents state their case. And there may well be a case to be made; for, while no one wants unqualified, unmotivated people joining our ranks, a casual tune across the bands shows that the past and present entry-level filters have been far from perfect. Should basic Morse code ability be a requisite for each and every radio amateur, irrespective of their interests? Do the present Morse requirements separate the sheep from the goats, or do they simply let in fewer of each? Reasonable people can differ on these and similar questions.

As for the League's position, as always it will be determined by the Board of Directors that you members elect—a Board that has shown itself to be very responsive to members' desires. And every member has a voice in shaping that position. That is exactly as it should be.

One thing is certain. In an organization as large as the ARRL, there will always be differences of opinion. It is not enough simply to tolerate differences that arise from divergent views of what is best for Amateur Radio. Rather, they must be welcomed as a healthy and necessary part of any representative democracy. As we toast the New Year, let us resolve to remember that everyone who has the best interests of Amateur Radio at heart, whether they agree with us or not, has a place in our League.—Larry E. Price, W4RA, and David Sumner, K1ZZ

# You'll be hard-pressed to beat the performance of Yaesu's new FT-411 handheld.



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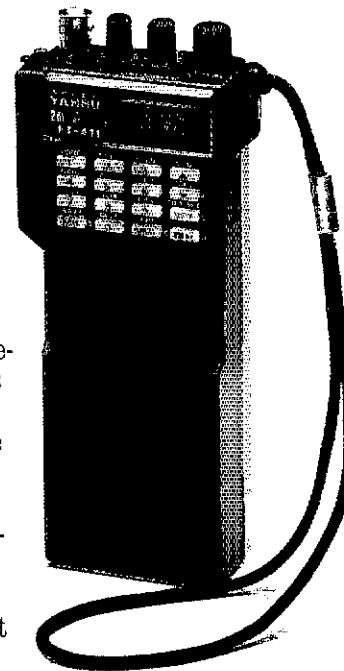
Not bad for a handheld measuring just 55(w) x 32(d) x 139(h) mm (the same size as our FT-23R Series HTs)!

**Friendly operation.** For operating convenience, the FT-411's keypad features a "do-re-mi" audible command verification. Both the display and keypad can be backlit (brightly!) for night operation at the push of a button. A rotary channel selector allows fast manual tuning. Or key in the frequency directly. Operate VOX (with YH-2 headset option). Plus you get a battery saver to conserve power while monitoring. And a (defeatable) automatic power-off feature that shuts down your radio if you forget to turn it off!

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**Swap options with Yaesu's FT-23R Series.** Our rugged best-seller's chargers, batteries, and microphones are fully compatible with the FT-411. The FT-23R is the perfect companion for the FT-411, and at a great price!

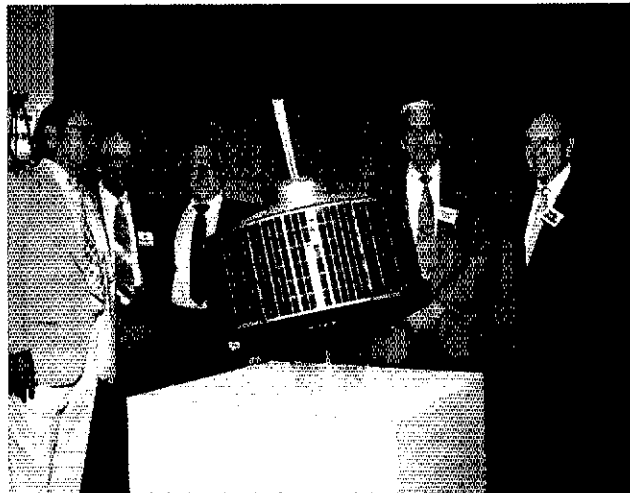
**Try out an FT-411 today.** Ask for it now at your local Yaesu dealer. Or call 1-800-999-2070 for a free brochure. And experience the legendary Yaesu HT performance!



## YAESU



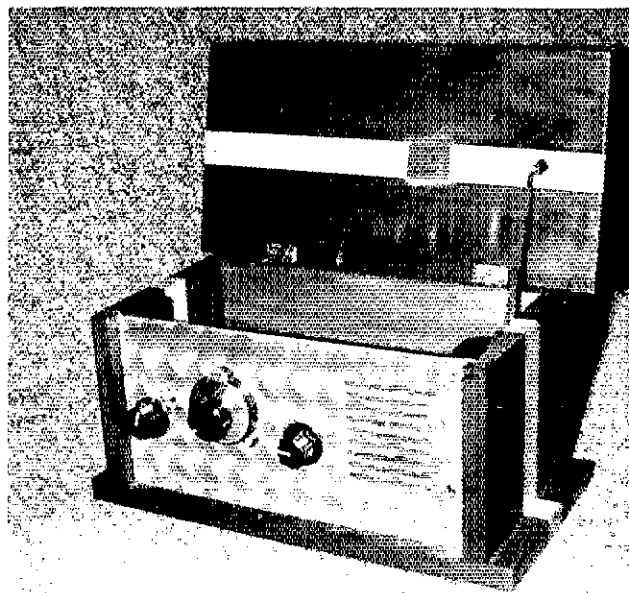
**Another Life Member:** ARRL President Larry Price, W4RA (l), and ARRL Central Division Director Edmond Metzger, W9PRN (r), caught up with Bill Henry, K9GWT, president of HAL Corp, to present him with his new Life Member plaque at the ARRL National Convention in Portland last September.



**Happy 25th:** The 25th anniversary of the first successful synchronous-orbit communications satellite, SYCOM, was celebrated in Los Angeles in August. Among the amateurs who were involved in this communications technology milestone and were there to relive some memories were (l-r) Frank Carver, K6KR; Tom Hudspeth, W6LHN; John Swancara, WA6LOD; Meredith Eick, K6QEC; and Paul Arndt, WB6JOI. (photo courtesy WA6LOD)



**The land down under:** Amateur Radio can be very exciting. Richard Stuart, WF7A, of Lynnwood, Washington, is living proof—his chair collapsed as he was working a VK, his first DX QSO. His wife was in the right place at the right time to catch the event. (photo courtesy WF7A)



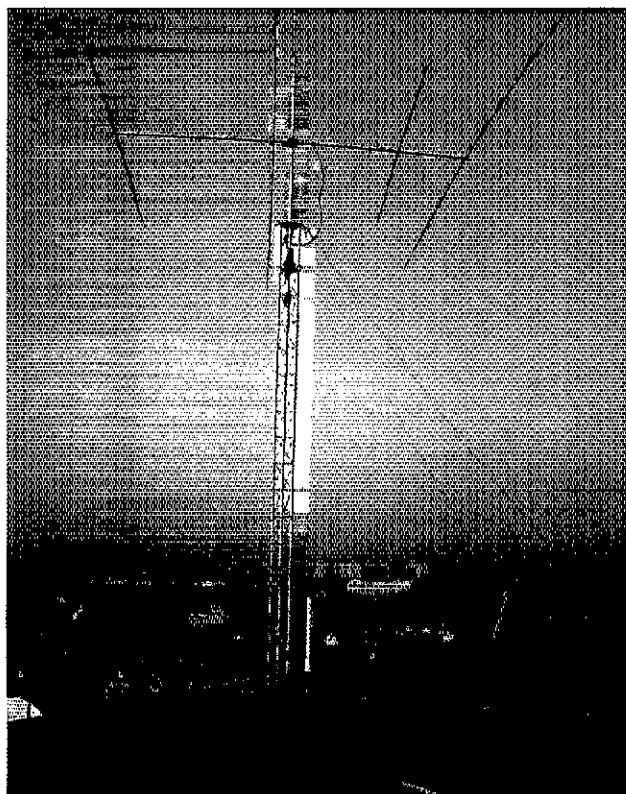
**On the panel...** The Neophyte Receiver (Feb 1988 QST, p 14) served as an excuse for Chuck Wilson, N6MVI, of Baywood Park, California, to build an old-fashioned engine-turned front panel. It certainly lends an attractive look to this popular receiver. (photo courtesy N6MVI)



**Attic ashes:** Chuck Bender, W1WPR, Chief Operator of W1AW, inspects damage to an air-conditioning duct in the Maxim Memorial Station's attic caused by a minor fire on Nov 15. Strong sunlight focused by one of the attic's circular windows ignited the aged duct tape. The Newington Volunteer Fire Department responded and damage was minimal. The W1AW Fund Drive continues to grow. Please be sure you're one of the supporters of this important project. For details on how to contribute, turn to page 42. *(photo courtesy KC1MP)*



**From the mountains to the sea:** Kent Powloski, N7KPN, of Portland, Oregon, talked to his non-ham friends in Portland from the 12,276-foot summit of Mt Adams in Washington via phone patch last summer. "The phone calls were a complete surprise," said Kent. "They had no idea you could do this with ham radio." Kent was able to hit the Portland repeater using ½ W. Kent also made good use of 2 meters from his floating QTH off the Pacific coast of Vancouver Island, Canada last summer. He talked to local VE hams via the Barkley Sound repeater, and found that "those plastic hand-held transceiver bags really are waterproof." *(photos courtesy N7KPN)*



**The beam on the hill:** Richmond Hill High School in New York City sports a 4-band beam at 185 feet above street level and a group of students who are active amateurs. Three of the students are Robert Savocha, KB2EUM (l), Louis Mistrini, KB2EUK, and Michelle Ortega, KB2EUY. Bob Weinstein, KE2FE, who is science chairperson at the school, teaches Amateur Radio classes there. *(photo courtesy KA2NRR)*

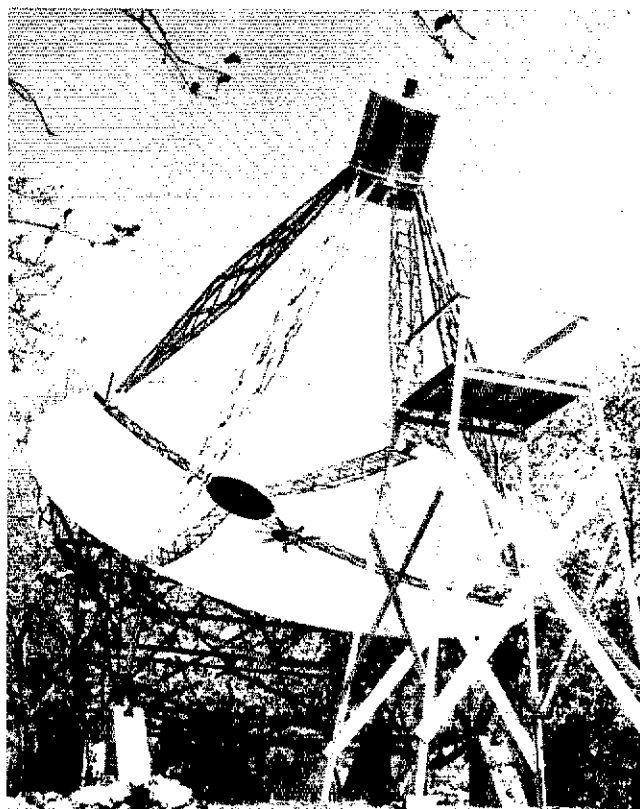


**Cheering for the home team:** Our 1987 Hiram Percy Memorial Award recipient, Stacey L. Garner, KA9WDE, of Harshaw, Wisconsin, brought her whole family and cheering section when she received her \$1000 check and plaque. Central Division Director Edmond Metzger, W9PRN (l), presented the award at the Illinois State Convention on October 2 in Rockford. Wisconsin Section Manager Richard Regent, K9GDF (r), was also present.

### Texas-Style EME

Just what is the limit for a 2-meter EME array? It may be larger than you thought, as demonstrated by W5UN. For the scoop on Dave's very impressive

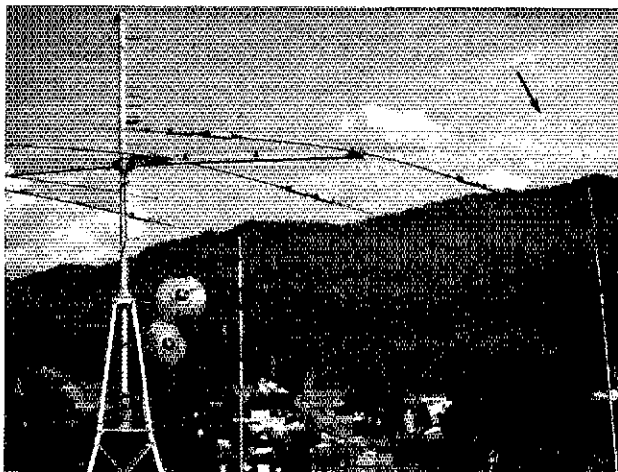
array, as well as a tantalizing glimpse of its capabilities, check out his article, which begins on page 15 of this issue.



**Listening for the ultimate DX:** Radio astronomy got its start with this dish, designed by Grote Reber. Grote built the dish, which is 10 meters in diameter, in 1936. For the story on the first radio astronomer and his continuing work, see the story on page 58 of this issue. (photo courtesy National Radio Astronomy Observatory)



**Amateur Radio genetic?:** Amateur Radio seems to run in some families. Jo Anne, KB9BMD (l), and Jennifer, KB9BHR, Gustafson, of Arion, Illinois are 16-year-old twins who are active amateurs. Their grandparents, Leslie and Mary Conrad, NO9X and KA9WAG, of Lynn Center, Illinois, are also active hams. Jo Anne and Jennifer are seen here at their grandparents' station. (photo courtesy NO9X)



**The eyes have it:** Or don't, as the case may be. Shizuka Ohki, JA3RTU/9, of Fukui, Japan, suffered from antenna loading problems—of the crow variety, that is. (Notice the arrow at right: crows had completely bent his 6-meter ground-plane antenna!) Taking a cue from Japanese farmers, he mounted two big "eyes" near his tribander—his antenna is no longer an attraction for local birds. (photo courtesy JA3RTU/9)

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# League Lines

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**ARRL election results:** Incumbents defeated challengers this year, except for one Vice Director race. However, since one Director retired and several Vice Directors chose not to run or, instead, ran for Director, there will be a number of new faces present at this month's Board meeting. See the Happenings column on page 62 for complete details.

**The ARRL Board of Directors will meet in Hartford January 20-21.** Now is the time to express your views to your Director. An updated list of Board members can be found on page 8.

**ARRL has filed extensive comments with the FCC in response to the FCC's proposed reorganization of the Amateur Radio rules, PR Docket 88-139.** Annexed to the League's comments was a complete rewrite of the rules developed by a committee of the ARRL Board of Directors.

The League's rewrite was developed over a seven-month period of intensive study by an ARRL Working Group consisting of Vice President George Wilson, W4OYI, and Directors Steve Mendelsohn, WA2DHF, Marshall Quiat, AGØX, and Rod Stafford, KB6ZV, with support from the ARRL HQ staff. The final document was reviewed and approved by the ARRL Board of Directors by mail vote.

The Working Group noted that a common thread in many of the comments filed early by individual radio amateurs was that the proposed rules should allow for "due process of law" rather than FCC administrative sanctions taken without judicial hearings. The ARRL rewrite took these comments into account and strengthened "due process" provisions of the rules. The ARRL version of its rewrite of the amateur rules is styled as "Part 96," a number not previously assigned to any portion of the FCC rules, to prevent confusion between old and proposed new rules. Next month's issue will carry this story in detail.

Copies of the ARRL rewrite and our comments to the FCC are available from the Regulatory Information Department for a 9- x 12-inch SASE with \$1.25 postage.

**FCC proposes to expand the 6-meter repeater subband to include 51-52 MHz.** For further details, see this month's Happenings column.

**Job opening at HQ:** HQ has an immediate opening for an Assistant Contest Manager. The Assistant Contest Manager works with the Contest Manager in administering the League's contest program, including the scoring of logs, preparing *QST* results, and conducting the Special Events and Contest Corral columns in *QST*. Applicants should be thoroughly interested and knowledgeable in the League's varied contest program. An amateur license, PC familiarity and some writing skills preferred. Accuracy is a must. The starting salary range is \$15,418-16,960. For further information, contact Billy Lunt, KR1R, at HQ.

**ARRL outgoing QSL service rates increase.** Effective February 1, the rates for the ARRL outgoing QSL service will increase to \$2 per pound (approximately 150 cards). The \$1 rate will continue for packages of 10 cards or less. This is the first increase in rates for this important membership service since it began in 1976!

**New DXCC country:** The ARRL Awards Committee has unanimously accepted the DX Advisory Committee majority-decision recommendation to add Malaj Vysotskij Island to the DXCC Countries List beginning with the July 1988 4J1FS operation. DXCC credit will be issued starting March 1, 1989. QSL cards submitted before that date will be returned without credit. This raises the total number of current countries on the DXCC list to 320. See DXCC Notes on page 76 for details.

**A New Year's Resolution:** Join the ARRL Field Organization! Take a moment right now to write or phone your Section Manager (see page 8) and apply for appointment as an Official Relay Station, Official Emergency Station, Assistant Technical Coordinator, Official Observer, Official Bulletin Station or Public Information Assistant. Give something back to Amateur Radio, help your fellow radio amateurs and have fun all at the same time! And to those of you who have toiled as League volunteers this past year—a hearty thanks for a job well done!

**Contests:** Remember the First ARRL RTTY Roundup on January 7-8 (see November *QST*, page 88 for details), VHF Sweepstakes, January 14-16 (see December *QST*, page 104) and Novice Roundup, January 28-February 5 (details on page 102 of this issue). Then, of course, for noncontesters, there's Straight Key Night, held New Years Eve and Day (see December *QST*, page 105). Get out your straight key and start practicing for the "best fist" award!

**Interested in being host to a visiting foreign amateur** for a short time? How would you like to visit foreign amateurs while you travel? Join the International Travel Host Exchange (ITHE) program! For further details, write ARRL HQ and enclose an SASE.

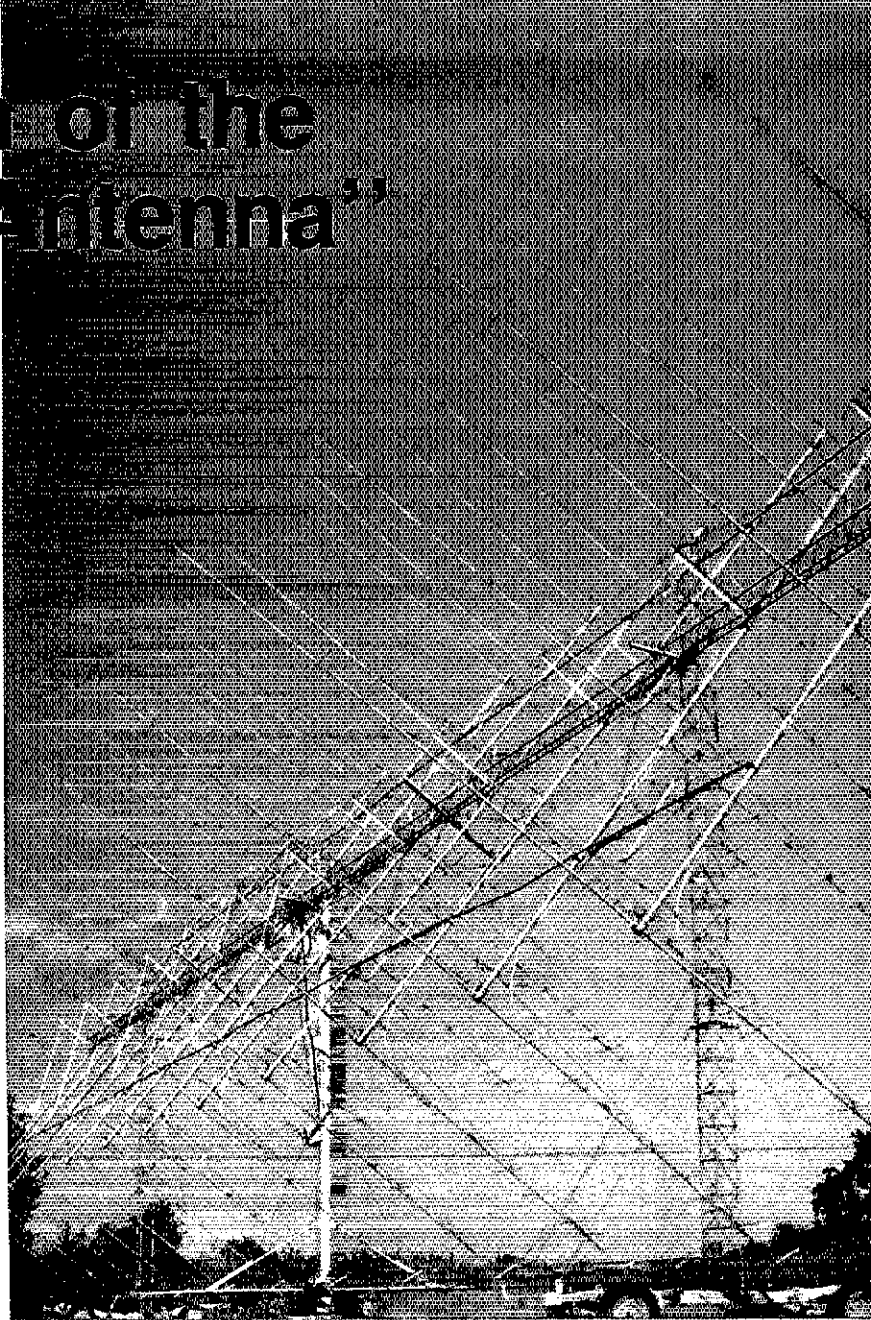


# The Evolution of the "Mighty Big Antenna"

Even a decade ago, EME was out of reach for all but a few amateurs. Today, with even a modest 2-meter signal, you can work some of the bigger stations off the moon—W5UN, for one! Here's a look at Dave's antenna system.

By Dave Blaschke, W5UN  
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Manvel, TX 77578

*Dave Blaschke, W5UN, is a truly ambitious man. He designed and built one of the world's largest 2-meter EME (earth-moon-earth) arrays—32 Yagis—at his home in Texas. He later expanded the array to 48 Yagis. In this article, Dave describes the history of the array, how he built it, and some of his operating achievements with his EME array, or—as he calls it—the "Mighty Big Antenna."*



I first got the idea of building a large 2-meter EME array—a "Mighty Big Antenna" (MBA), as I have come to call it—while I was driving to the Dayton HamVention® in 1984. I stopped to pick up my friend Lance Collister, WA1JXN, at the airport in St Louis, Missouri; then we drove to Dayton. A large part of the next few hours was spent discussing two of our favorite subjects: 2-meter EME and large antennas. We discussed how we might overcome the physical support limitations that seemed to make a 4 × 4-Yagi 2-meter EME array the maximum practical size that a ham could build without having it fall down in the first high wind.

Even though our discussion was based on one of those wild dreams we hams sometimes have during convention season, it was during the trip to Dayton that we first discussed the design methods that I

would ultimately use in the construction of the MBA. I couldn't build anything larger than the 16-quagi array that I was using then, because I lived on an average-size city lot. My dream would have to wait.

After the convention, we went home, time passed and our discussion about big antennas was pretty much forgotten. Two months later, I learned that I was to be transferred to a new job assignment in Houston, Texas. This would happen, I was told, sometime in early 1985. In the meantime, I would be spending three months in Anaheim, California, on a temporary job assignment. The time in Anaheim gave me the opportunity I needed to think about, design, and plan construction of the MBA—a 32-Yagi 2-meter EME array.

During late 1984, I began to locate, collect and assemble all the hardware needed to build such an array. One of the

major decisions I made during this time was to purchase special long-boom Yagi antennas designed by Mike Staal, K6MYC, and made available through KLM. Mike had heard of my interest in constructing a super-large EME array while he was developing a new antenna similar to, but larger than, the popular KLM 16LBX. Mike and I discussed the properties of the special Yagis, and I decided to use them. The gain of this Yagi over the 16LBX seemed worthwhile, and the volume price discount for 32 antennas made the overall cost a little more reasonable. Mike modified the feed points of the new beams to allow the use of 75-Ω CATV Hardline, which I planned to use for phasing lines. While waiting for the Yagis to arrive, I started to assemble the power dividers and the other parts.

Upon finishing the Anaheim job assign-

ment in September, my wife and I went to Houston to begin looking for suitable real estate on which to build our new home. Of course, there would have to be enough room for the antenna farm! We finally found the right spot: about 25 miles south of Houston, near the small community of Manvel.

While our new house was being built, I got down to the serious business of preparing the antenna farm. Concrete foundations were poured for all the antennas that I planned to build. (These antennas included 20, 15 and 10-meter Yagis on a self-supporting tower, a 40-meter beam on a 200-foot guyed tower, 80- and 160-meter antennas, and—last but not least—the 2-meter MBA.) In all, about 20 cubic yards of concrete were poured for tower foundations and guy supports.

### Building the “Mighty Big Antenna”

I must admit that building the MBA was a massive project to undertake. Its design and construction tested all the skill and knowledge that I had gained from constructing large arrays in the past. Building the MBA totally consumed all of my spare time during the four months from April through August 1985 (that was when the preliminary project was completed and the MBA was first put on the air.) The array construction also kept me in good physical condition—once I got over the initial soreness from the intensive physical activity, that is! I owe a lot of credit to my son Mark. He came home from college in May, just in time to help me with some of the heavier construction work. Mark spent quite a few hours assembling the Yagis. Even though Mark is not an Amateur Radio operator, he contributed without complaint.

One of the more difficult aspects of this project was making the adjustment to doing a lot of outdoor work in Manvel's summer climate. Humidity is almost always high here—usually greater than 75%—even during the heat of a summer day. Often the humidity is above 90%, and temperatures above 90°F are common. These conditions can extend past sunset. (Of course, that's exactly the way it was most evenings while I was outside working on the antenna!) I lost a few pounds and learned to tolerate a lot of perspiration, but looking forward to hearing those often-dreamed-of loud echoes returning from the moon far outweighed such minor sacrifices!

### The MBA Support Structure

I originally built the MBA as a 32-Yagi antenna, with plans in the beginning to perhaps expand the array to 48 Yagis at some time. I made design allowances that would permit this upgrade without major structural changes. I built the 32-Yagi array around what I call a fish-spine-frame support structure. This structure was expanded to hold 48 Yagis in 1987 (see Fig 1).

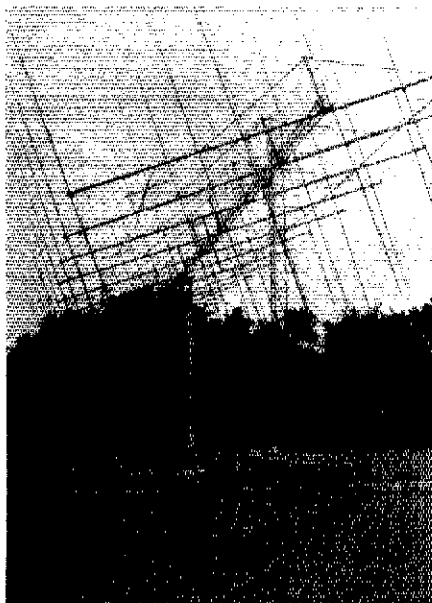


Fig 1—End view of W5UN's 48-Yagi 2-meter EME array. The array was originally built as a 32-Yagi antenna and was expanded to its present size in 1987. (All photos by W5UN)

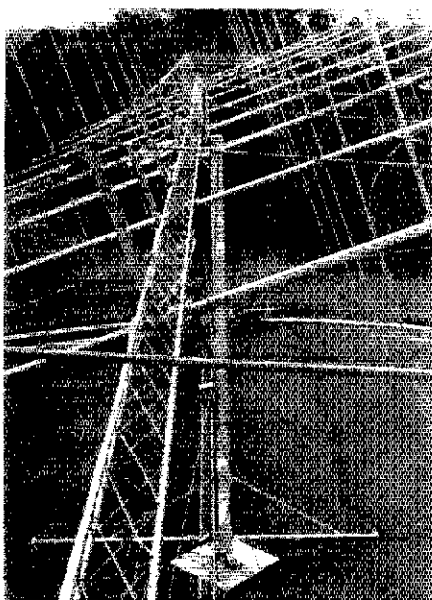


Fig 2—The main boom of W5UN's 48-Yagi 2-meter EME array is made of 152 feet of Rohn 25 tower. This photo was taken from atop one of the mobile-platform support masts, about 35 feet above the ground.

The main boom, visible in the title photo and Fig 2, is made of 152 feet of Rohn 25 galvanized steel tower. It is supported and held in place on the mast and end supports by hinges (see Fig 3). The Yagis mounted on the frame each have 31-foot-long, 1¼-inch-diam tapered-aluminum booms. The frame structure also supports all the coaxial phasing lines, power dividers and other related components.

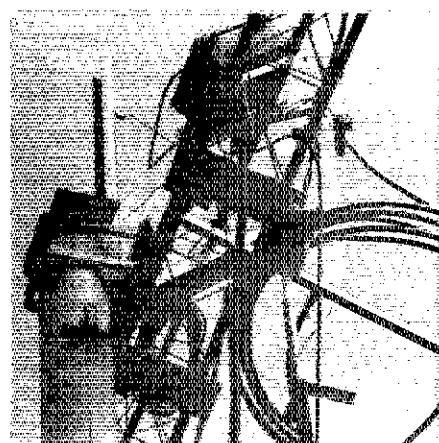


Fig 3—The main boom attachment point to the rotating mast of the MBA. The Rohn 25 boom is attached to the mast via a home-made hinge and is elevated by a winch system. Part of the cable and pulley system is visible above the boom.

Twelve 3-inch-diameter, 38-foot-long aluminum cross arms are attached to the main boom. Four Yagis are fastened to each of these arms—two above and two below the main boom on each arm, all equally spaced. I purchased the cross-arm tubing from a local irrigation-tubing supplier. The arms are very lightweight, and have a wall thickness of 0.050 inches. Each cross arm is supported with ¾-inch EMT-conduit braces. For additional strength, 1/8-inch-diam cables extend to the ends of the cross arms from above their centers. I added the extra supports to keep the cross arms from sagging from the weight of the Yagis mounted on them, and to prevent wind-induced flexing of the cross arms. During the first three years that the antenna has been in place, it has survived winds as high as 100 mi/h with no structural damage, but the long booms of the Yagis do flex somewhat in such strong winds.

Before I started to design the array, I determined that it was essential for this array to have adequate physical strength to survive high winds. Because Manvel is located in “hurricane alley,” high winds can occur during the late summer and early fall. Tie-down anchors were designed and installed to keep the array from rotating or swaying in the wind. Even so, on several occasions, the array has remained untied and in use when winds were over 40 mi/h. During these conditions, I've been able to hold the array on target, with no sign of drifting or windmilling.

### The Rotating Mast

The main support mast is constructed from a 33-foot length of 5/16-inch-wall 8-inch ID pipe, as shown in Fig 4. The bottom of this mast rotates inside a six-foot length of 10-inch ID steel pipe that is embedded in a concrete foundation capped at the bottom with a flat steel plate. A

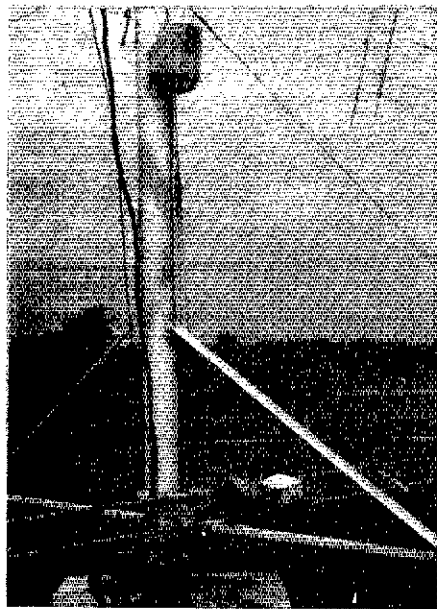


Fig 4—The lower part of the rotating main mast used in the MBA. The trash can covers the winch used in the elevation-rotation system. Part of the cable and pulley arrangement used for elevation positioning is visible above the mast strut.

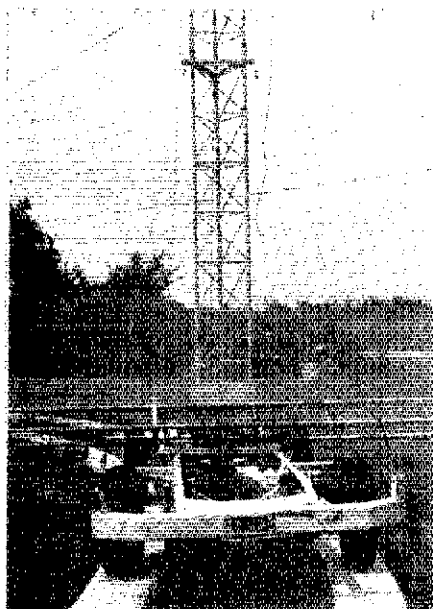


Fig 5—The 1947 Ford pickup chassis used as one of the two mobile platforms in W5UN's 2-meter EME array.

Teflon® sheet between the bottom of the mast and this flat plate acts as a bearing surface for rotation. A split-sleeve collar on the concrete foundation holds the lower part of the rotating mast in a vertical position. This collar is covered with sheet Teflon to provide a bearing surface for smooth mast rotation.

Once the rotating mast pipe was installed in the foundation, I filled the space between the 10-inch pipe and the 8-inch mast with automotive antifreeze. This provides additional lubrication and keeps rain water and condensation out of the bearing. The concrete foundation for the rotating mast is 5 feet square and 7 feet deep.

### The Mobile Support Platforms

The mobile support masts are each constructed from 30 feet of Rohn 45 tower mounted on mobile platforms. The mobile platforms are the key to the success of the MBA's mounting and rotating system. They are stripped-down chassis from two junked pickup trucks: a 1947 Ford (see Fig 5) and a 1951 International. Any old automobile frames would probably have worked in this application, but construction was simplified by using vehicles with solid front axles. Most modern automobiles have independently suspended front wheels, which would make them unstable in this application. [In this case, there's something to be said for "old" technology!—Ed.]

I bought the old pickups at one of the local wrecked-car yards, brought them home, stripped them down and equipped them for their new roles. The Ford is now



Fig 6—Side view of the 1947 Ford pickup chassis that drives the array. The drive motor is attached to the truck's modified drive shaft and stock rear differential. A 360° azimuth rotation takes over six minutes, but precise antenna aiming is possible with this system.

powered by a 400-inch-pound-torque reversible electric motor equipped with a friction-plate brake that engages when power is removed from the motor. This brake holds the antenna in position when it is not being rotated, and stops the antenna "on a dime"—a requirement for precise aiming. The motor is visible in Fig 6. The International truck chassis is

unpowered—it's just pulled "along for the ride." In the original 32-Yagi MBA version, I used only the Ford pickup chassis for support and rotation duty. The second mobile platform was added during the expansion to 48 Yagis.

The array azimuth-rotation motor is connected via a short drive shaft and a flexible coupling to the Ford's rear differential gears. "Driving" the array in this manner permits smooth and precise azimuth rotation. Both of the pickup chassis are kept on the track by two 56-foot lengths of Rohn 25 tower that extends outward from the rotating mast. Guys connected between the rotating mast and the truck chassis hold them at a constant position with respect to the rotating mast. The guys also minimize flexing of the Rohn 25 arms during array rotation.

The rear axles of the trucks are not exactly perpendicular to their respective chassis—they've been offset slightly to permit perfect front- and rear-wheel tracking along the circular track. (I had to make this modification to the truck chassis shortly after the system was first tested. Without it, the rear wheels slipped sideways as the array turned.) Many people have asked me how steering of the front wheels is done. The truth is, I let the wheels go where they want to—without locking them into place. Experience has shown that the front wheels will go where they need to go: right on track.

### The Track

The track on which the mobile platforms roll has a circumference of 355 feet. This circular track is centered on the rotating mast. At first, the track was unsurfaced. This was okay in dry weather, but when it rained, the track turned to mud, causing the mobile platform tires to slip and slide. Azimuth rotation of the antenna became all but impossible under such conditions. At times, in fact, rotation was impossible.

After about a year of frustrating operation with the unsurfaced track, I decided to install a concrete surface. Ed Stallman, N5BLZ, my son Mark and I poured 24 cubic yards of concrete for the track in the summer of 1987. The concrete track has two 16-inch-wide, 4-inch-thick concentric circular strips that match the wheel spacing of the mobile platforms. The track handles the weight of the mobile platforms without difficulty; the weight from each platform wheel is less than 150 pounds.

### System Mechanical Workings

The turning radius for the MBA is approximately 76 feet, which means that almost a full acre is necessary for 360° azimuth rotation. The time required for a full rotation is about 6½ minutes. This works out to less than one degree of angular movement per second (about 11 inches along the track), which is slow enough to permit positioning the array

## Moon Tracking with the MBA

To measure array azimuth and elevation positions, I use precision potentiometers driving A/D converters and LED displays in the shack. Because the MBA has an azimuth-plane beamwidth of only  $2.4^\circ$ , good positioning accuracy is essential. For the azimuth system, a chain-driven gear set with a 5:1 ratio rotates a 10-turn potentiometer (see Fig A). (One  $360^\circ$  revolution of the mast causes the potentiometer to make five revolutions.) This arrangement permits the mast to travel a few degrees outside the 0 to  $360^\circ$  range without hitting the potentiometer stops. The potentiometer has a worst-case linearity error of less than 0.25%, so azimuth direction can be resolved to within less than one degree. Elevation angle is read using a single-turn precision potentiometer mounted into the boom with a pendulum attached to the potentiometer shaft.

Both the azimuth and elevation rotation systems are controlled by an HP-41CX calculator. The calculator does moon-position computations, reads the antenna position and turns the az/el positioning motors on and off. This makes moon tracking at W5UN fully automatic. When using this system, I usually turn on the HP-41 and control circuit power when the moon rises and let the calculator do the positioning until the moon sets.

For anyone contemplating using a similarly automated tracking system, I strongly urge that az/el limit switches be installed on the array to prevent rotation past the stops, just in case the computer or some other component in the system fails.—*Dave Blaschke, W5UN*

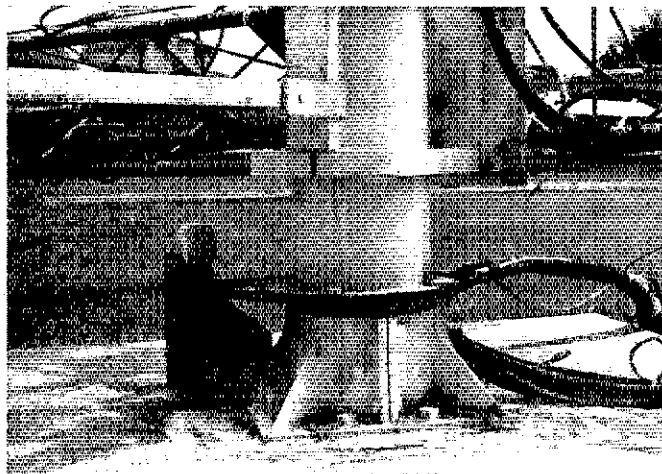


Fig A—The lower end of the rotating mast shows details of the reduction-gearred azimuth-position-reading system. Also visible are the homemade split-sleeve collar that keeps the mast in place, and the brackets holding the radial-arm supports.

within  $1/10^\circ$  of its target (usually the moon). That is about as close as I can accurately measure with the position indication system I use (see the sidebar, "Moon Tracking with the MBA"). Elevation positioning is accomplished by using a winch-and-hinge system, as shown in Fig 4.

I was concerned from the beginning of this project about the design of the winch elevation-rotation method. After all, it had to be capable of uniformly raising and lowering a 152-foot-long boom, with all the cross arms and Yagis attached, and it had to do this without causing any twisting or misalignment. As it turns out, the method I use works very well. The heart of the elevation-rotation system is a winch mounted on the center mast, with cables routed through a pulley system to lift arms on the boom at the center and both ends of the array. When power is applied to the winch, cable tension is applied equally, via the pulleys, to the lift arms, causing the boom to pivot on its mounting hinges. The only mechanical limitation imposed by this type of elevation system is that the Rohn 25 boom must be rigid enough to resist twisting as the array is elevated. It works fine, even with 48 Yagis.

### "Smoke Testing" the MBA

After assembling the original 32-Yagi array, I immediately tested it to make sure all was well. Initial testing of the array gave results that were encouraging and disappointing. With the array feed point over 200 feet from the shack, a low-loss

feed line is essential. When the array was completed, however, I did not yet have the 1-5/8-inch Hardline that I planned to use, so I temporarily connected 250 feet of RG-8 coax, knowing full well that the feed-line loss would be significant. I discovered—much to my surprise—that the loss of the RG-8 was almost 9 dB! That meant that my 1500-W amplifier was delivering only 200 watts to the array feed point! The received signals were also affected, but a GaAsFET preamp at the antenna kept the received-signal attenuation from crippling the system.

My echo testing method consisted of sending single long dashes and then observing the signal strength of the returning echoes on an HP-400 ac voltmeter connected to my receiver audio output (with the AGC off, of course). Even with 9 dB of feed-line loss, my first echo tests produced reflected signals 2 to 4 dB above the noise level.

### The First QSO

Shortly after connecting the coax to the array, I called Lance, WA1JXN, on the telephone and set up a schedule with him. Moonrise at his QTH would occur in a few minutes. My first QSO using the MBA was a 2-way SSB contact with Lance on 144.105 MHz, at 0500 UTC on August 5, 1985.

During the first week of operation, I replaced 175 feet of the RG-8 with  $3/4$ -inch, 75- $\Omega$  CATV Hardline. This reduced the cable losses to only 3.5 dB. Even though it wasn't 1-5/8-inch Hardline, it sure was an improvement over the previous feed

line! With this arrangement, the strength of returning echoes was measured at 5 to 10 dB above the noise level. Occasionally I observed signal peaks that were more than 20 dB out of the noise. (The 1-5/8-inch Hardline has since been installed, and feed-line losses are now less than 1 dB.)

For reference purposes, I routinely monitor noise levels from the sun and other noise sources using the array. The MBA typically yields about 14.5 dB of quiet sun noise (as compared to the noise from a 50- $\Omega$  reference resistor—the reference resistor generates about 1.1 dB more noise than the quietest spot in the sky). The MBA gives about 12 dB of noise from Sagittarius, in the Milky Way, and about 10 dB when pointed toward Cassiopeia. Making extra-terrestrial noise source measurements on frequencies as low as 144 MHz is difficult and somewhat imprecise, but by making and logging these measurements on a regular basis, I can determine if the array performance is degrading over time.

The gain of the 48-Yagi MBA, by my estimation, is about 32.5 dBi. I determined this from the following information: The gain of each of the 32 Yagis is approximately 17 dBi (14.85 dBd), and the array gain increases by about 2.8 dB each time the number of Yagis is doubled. When phasing-line losses are considered, this 32.5-dBi figure agrees closely with gain computations based on the azimuth- and elevation-plane beamwidths that I have measured.

With the original 32-Yagi MBA, I worked a lot of stations. Many who

answered my random CQs were using single Yagis and low power (less than 200 W). When conditions were excellent I could work stations running 150 W to good, single 14-dBd-gain Yagis. I was often able to work stations running less power and smaller antennas when schedules were prearranged. Stations using small and medium-sized OSCAR-type antennas have reported hearing my echoes from the moon, but very few such stations were worked with the original array.

I ran some tests with the 32-Yagi system to characterize the minimum receiving setup required to hear my echoes, and I found that while running 1500 W output, I could copy my own echoes using my ICOM IC-251, without a preamplifier, and with a 6-dB attenuator in the feed line between the array and the receiver. This encouraged me, because the front-end sensitivity of my IC-251 is poor. Since upgrading the array to 48 Yagis, results have been even better. I've occasionally heard my own echoes from the moon while running less than 1 W output!

#### Operating Highlights

When the 32-Yagi MBA first went on the air in 1985, I hoped that I could meet several operating goals. My main objective was to work stations not specifically equipped for EME communications. The MBA has allowed me to meet that goal quite often. I've worked many stations running low power to single antennas—the first of which was W2RS (Ray Soifer). Ray was running 150 W to a single 3.2-wavelength-boom, 19-element Yagi. Ray had never made an EME contact before working me. (Incidentally, since that initial contact, Ray has become an enthusiastic "QRP" EME operator and has worked several other well-equipped stations on 2-meter EME. Look for Ray's article on "QRP" 2-meter EME in an upcoming issue of *QST*.) I have since worked Ray on random calls (he has answered my CQs) several times.

Other operating highlights during the

past three years include giving many stations their first EME contact. During this time, over 1,000 different stations in 75 countries have been worked. I've had a great deal of fun on 2-meter EME, logging more than 2700 QSOs since first firing up the MBA. I can truthfully say that I have enjoyed every single contact.

The most thrilling contacts for me have been the ones with stations in rare places that I least expected to hear. Memorable contacts include TI2BEV, OX3AX, UL7BAT, VP9IB, ZS4TX/A22, T70A, EA6FB, EI7M, OY9JD, LA6HL/TF, and KC3RE/TA3. All of these contacts represented new countries for me on 2 meters. I was honored to be the first to establish EME contact with stations in these countries. An interesting thing about EME: The distance is about equal, no matter what the call or country. I like to think of all EME QSOs as the *ultimate* DX.

My long-range goal is to work DXCC on 2-meter EME. Most people probably don't realize just how difficult this goal will be to achieve. At my current new-country-worked rate, it will take me several lifetimes to get to DXCC, so things will need to speed up.

I hope that a new interest is sparked in 2-meter operators in far-off lands when they hear about the W5UN MBA. I often receive comments and questions about EME from DX stations that I work on the HF bands, so it appears that many of them may be considering giving EME a try (let's hope so!). Perhaps there is a chance to get that DXCC!

#### Summary

Since the MBA was expanded to 48 Yagis in 1987, small stations who had trouble working me before have become much easier for me to hear. Single-Yagi stations running 150 W are able to routinely hear and work me without prior scheduling. I believe that some stations with good-performing OSCAR antennas are also now within EME range.

I'd like to hear from any and all who are

interested in trying to make 2-meter EME contact. I can usually be found on the 14.345-MHz EME net (beginning around 1700 UTC) on Saturdays and Sundays. I can be reached at my home address (given at the beginning of the article). Also, I often call CQ on 144.008 MHz when my time and moon conditions permit.

The best time for those of you with smaller stations to listen and call is at your local moonrise or moonset, depending on whether you are east or west of me. (Stations to the east have best conditions around local moonset, and those to the west have peak times around local moonrise.) When the moon is just above the horizon (as you view the moon), ground gain can help increase reflected signal strength from the moon by as much as a few decibels under some conditions. When the moon is more than 12° above the horizon, ground-gain enhancement rarely occurs, so moon position plays an important role in the success of smaller stations attempting EME communications.

#### Acknowledgments

I want to extend my thanks to all who have worked W5UN via the moon. Special thanks to Lionel Edwards, VE7BQH, who faithfully continues his role as net control for the 2-meter EME net, making station scheduling easy. I also thank WA1JXN. Lance conspired with me to locate and obtain critical materials used in both of our EME antenna systems. Thanks to Ed, N5BLZ, and my son Mark, who gave many hours of their time and effort helping me build and upgrade the MBA system.



Dave Blaschke was first licensed as W5WZQ, and has been active for 36 years. Before taking up 2-meter EME, Dave spent most of his ham time DXing and contesting (he finished first and second twice each in the 1960-63 ARRL CW November Sweepstakes contests). He has earned DXCC, SBDXCC and WAZ awards, is on the DXCC Honor Roll, and is a life member of ARRL. Dave still needs only Albania to have worked them all—anybody in ZA-land want to try EME? QST

#### W5UN Mighty Big Antenna: Vital Statistics

Array type: 48 Yagis (4 high, 12 wide); approx 32.5 dBi gain.

Beamwidth (azimuth × elevation plane): Approx. 2.4 × 6°.

Dimensions (H × W × D—not including mast): 38 × 152 × 31 feet.

Yagi type: 17-element, 31-foot boom, 14.85-dBd gain.

Total volume: Approx 179,000 cubic feet.

Main boom: 152 feet of Rohn 25 steel tower.

Array weight (not including mobile platforms or radial-arm tower sections attached to platforms): Over 1200 pounds.

Main mast section: 33-foot-high, 8-inch ID pipe; 5/16-inch wall.

Concrete track: 110-foot-diam; two 16-inch-wide, 4-inch thick strips.

Mobile platforms: Two stripped pickup truck chassis.

Mobile platform boom supports: Two 30-foot sections of Rohn 45 steel tower.

Feed line: 200 feet of 1-5/8-inch air-dielectric Hardline; <1 dB loss.

# A Speaker Amplifier for Hand-Held Transceivers

Does background noise make it difficult for you to hear your hand-held talking to you? By spending a couple of enjoyable hours at the workbench, you can build this simple amplifier to boost your transceiver's audio output.

By Leonard Van Prooyen, K8KWD  
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**M**y introduction to 2-meter mobile operation (many years ago) was with a converted GE Progress Line transceiver. This was a popular tube-type, trunk-mounted commercial radio that was available on the surplus market. Together with its control head, speaker and cables, it was quite a "boat anchor." That radio had one feature I really enjoyed: a transistorized speaker/amplifier that could boost the receiver audio level above traffic or vehicle noise.

When I got rid of the Progress Line radio, I missed that speaker/amplifier. Most hand-held transceivers and portable radios in use today supply 200 to 300 milliwatts of audio, which doesn't quite cut it under high background noise conditions. While looking over some linear IC application notes, I spotted a device that I could use to build a replacement for my old GE speaker/amplifier—the National Semiconductor LM383.

The LM383 is an audio-power amplifier IC. Only four resistors, five capacitors and a couple of homemade parts need be used with this chip to build a high-performance speaker/amplifier that is capable of producing up to 8 W of audio output. The project is simple to build, and it can be completed on a weekend afternoon.

## Circuit Notes

The amplifier circuit (Fig 1) follows that shown in National Semiconductor's application notes for the LM383. The LM383 is a fairly high-gain device: Too much audio drive will destroy the LM383 (as a couple of friends of mine who made copies of this amplifier found out). I added R1 and R2 to protect the IC. R1 is essentially a load resistor for the hand-held transceiver's audio output. R2 can be composed of two fixed resistors in a 10:1 divider

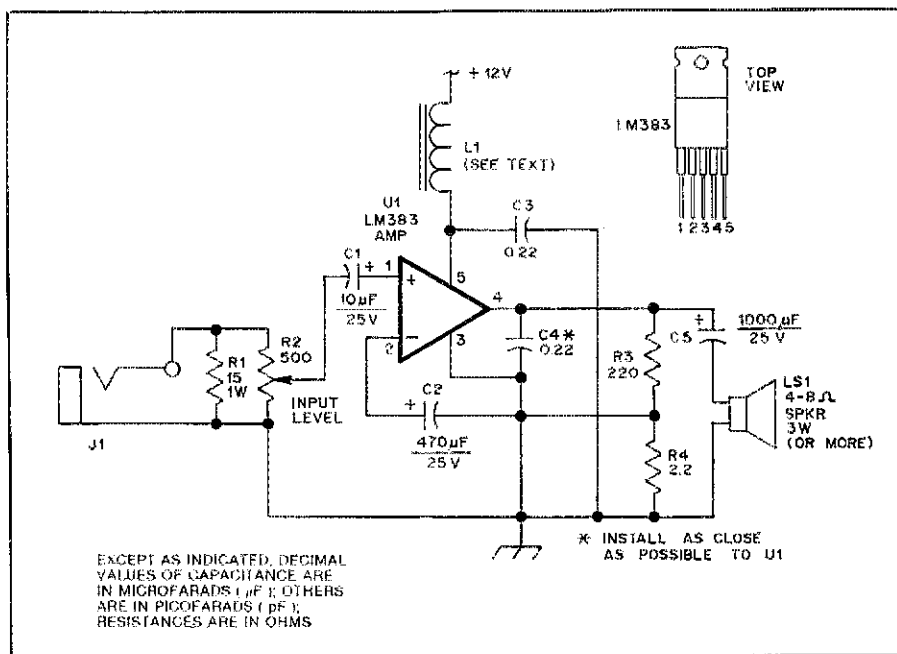


Fig 1—Schematic diagram of the amplifier circuit. A heat sink is required for U1. C4 should be installed as close as possible to pin 4 of U1. L1 is an alternator-whine choke and can be homemade (see text).

(In the parts list below, part numbers in parentheses are Radio Shack.)

- C1—10  $\mu$ F, 25 V (272-1012).
- C2—470  $\mu$ F, 25 V (272-1018).
- C3, C4—0.22  $\mu$ F, 50 V (272-1066).
- C5—1000  $\mu$ F, 25 V (272-1019).
- J1—1/8-inch phone jack (274-251).
- L1—See text.

- LS1—8- $\Omega$ , 5 W (21-549).
- R1—15- $\Omega$ , 1 W (271-003).
- R2—500- $\Omega$ , 1/4-W trimmer potentiometer (271-226).
- R3—220  $\Omega$ , 1/4 W (271-1313).
- R4—2.2  $\Omega$ , 1/4 W; four 10- $\Omega$ , 1/4-W resistors (271-1301) in parallel (see text).
- U1—LM383 audio amplifier IC (276-703).

arrangement, but using a potentiometer makes it easy to set the amplifier's maximum gain.

C4 kills any oscillations that can make U1 "history." R4, a 2.2-ohm resistor, can be made of four 10-ohm resistors in parallel if you can't find a 2.2-ohm resistor.

When powered from the vehicle's electrical system, the amplifier's +12 V power source requires a filter (L1 of Fig 1) to eliminate alternator whine. If you can find a junked car radio, a suitable choke can probably be obtained from it. Many old Delco® radios have a suitable

choke, mounted outside the radio, in the +12 V supply line. A satisfactory choke can be made from two 8d, 1½-inch-long nails and some no. 18 enameled wire. The two nails make up the choke core. Simply wind about 100 turns of the wire around the core and secure the coil windings with a layer of electrical tape.

### Construction

First, get a suitable speaker and enclosure, if you don't have them in your "junk box" already. The speaker should be capable of handling three watts (or more) continuously. Because the speaker/amplifier is to be used in a vehicle, the enclosure should be fairly compact. I used a Radio Shack® mobile extension speaker (21-549). The speaker (an 8-Ω, 5-W unit) is housed in a rugged, black enclosure and comes complete with an under-the-dash mounting bracket and ten feet of cable equipped with a 1/8-inch-diameter plug. A surplus two-way radio speaker, often supplied complete with a mounting bracket, is another eligible candidate. Such speakers can be found at most hamfest flea markets for a couple of bucks. Just make sure the speaker in the enclosure isn't damaged.

The LM383 requires a heat sink. For the unit I built, I made a U-shaped heat sink for the LM383 that would also hold a terminal strip for mounting some of the other components; see Fig 2. (A close-up photo of the components mounted on this bracket is shown in Fig 3.) I made the bracket from a ¾- × 4-inch piece of 16-gauge aluminum. The bracket's dimensions allow it to fit inside the speaker's enclosure while clearing the speaker itself. The dimensions of your bracket may be different to suit your enclosure.

The LM383 can be mounted directly on the heat sink because the mounting tab is at ground potential. If the speaker enclosure is metal, you can mount the LM383 and the terminal strip directly to the inside of the enclosure. If you use a U bracket as I did, prewire the components on the bracket and then install it in the speaker housing.

Except for the placement of C4, component layout is not critical. C4 should be connected as close as possible to pin 4 of U1. Most of the components can be mounted near U1 using point-to-point wiring to and from the terminal strip.

Figs 4 and 5 show the way I mounted the components inside the Radio Shack speaker enclosure. J1 is a 1/8-inch phone jack that can be installed on the side or back of the speaker enclosure. R1 and R2 can probably be connected directly to J1. C5, the output capacitor, will probably be physically large. I found space for C5 in a corner of the speaker enclosure and secured it in place with Duco® cement; epoxy glue is a good substitute. In another corner of the

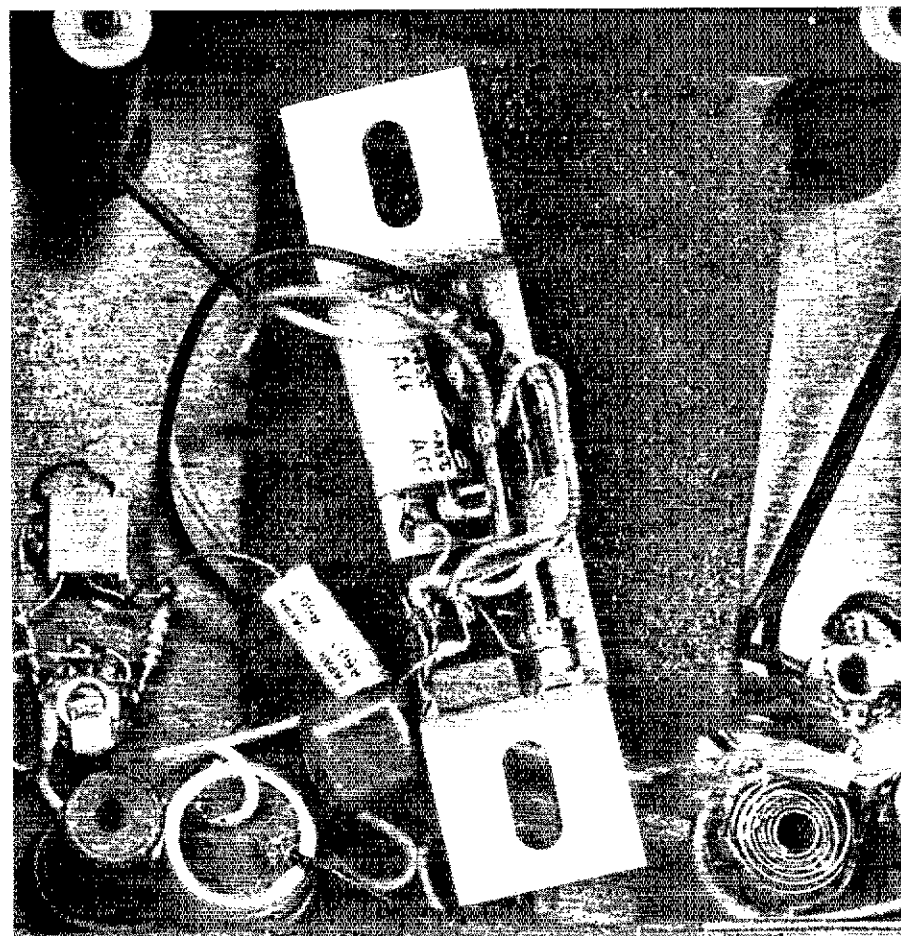
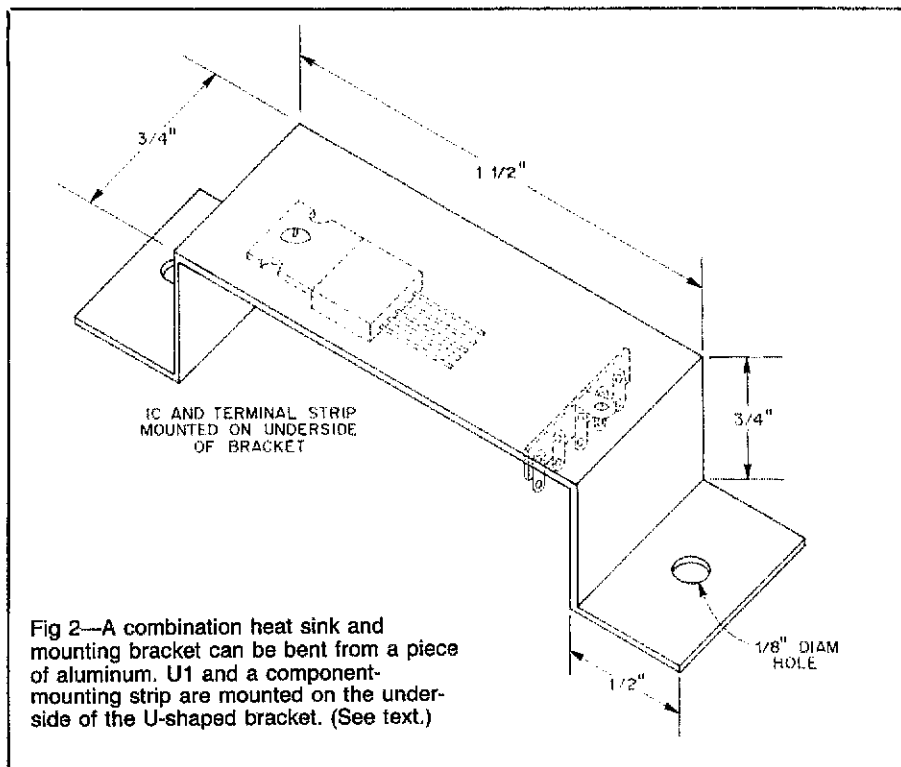


Fig 3—A close-up of the mounting bracket/heat sink combination. In this view, the audio amplifier IC is at the bottom of the bracket. Connections are made directly to the IC's pins, which are bent back over the body of the IC. C5 and L1 are to the left and right, respectively, of the bottom of the bracket. The INPUT LEVEL potentiometer is at the left and immediately above J1. The jack above and to the right of L1 connects directly to the speaker, bypassing the amplifier; this jack is not shown in Fig 1.

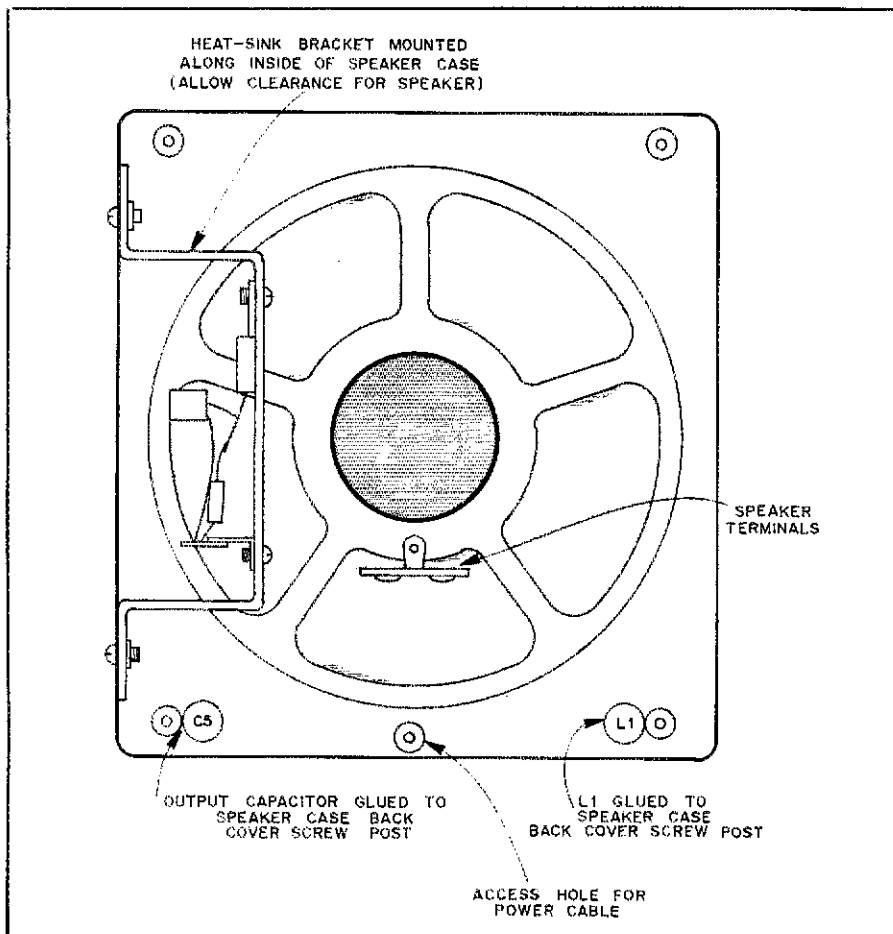


Fig 4—Parts placement of the components in the speaker enclosure. See text for details.

enclosure, I found space for L1 and glued it in place, too. Depending on your installation, a couple of items you might add to the speaker/amp are a power switch and pilot light.

For power connections, I ran short lengths of red and black no. 16 wires from the positive and negative points in the circuit through a 1/4-inch hole in the enclosure and terminated the wires with a two-pin

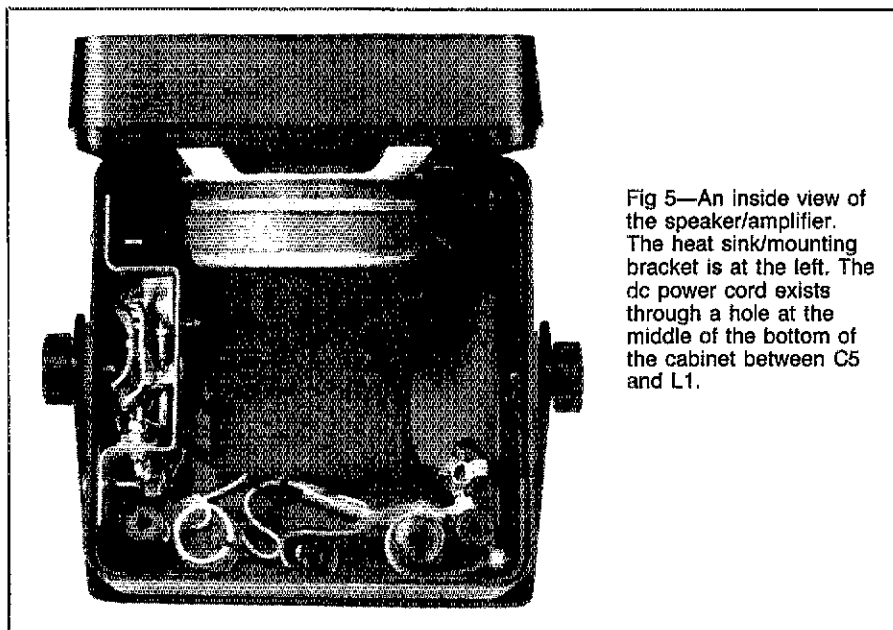


Fig 5—An inside view of the speaker/amplifier. The heat sink/mounting bracket is at the left. The dc power cord exists through a hole at the middle of the bottom of the cabinet between C5 and L1.

male Molex connector. A knot in the wires on the inside of the enclosure serves as a strain relief. If your speaker enclosure is metal, be sure to place a rubber grommet in the hole.

The power cable from the vehicle is fitted with a matching female connector that makes it convenient to remove the speaker/amplifier from the vehicle. Don't use a power cable without a fuse! I use a 2-A in-line fuse in the +12 V lead of the vehicle's power cable; it's attached to the vehicle's radio connection on the fuse block. This is usually a switched (ignition switch) source of +12 V. Connect the -12 V lead to a good ground point on the vehicle.

### Operation

Most hand-held transceivers use either a 1/8-inch or 3/32-inch phone jack for the external speaker output, and many of the new speaker/microphones also have provisions for an external speaker output. Simply plug in a cable fitted with a male 1/8-inch phone plug at the amplifier end, and a connector for the radio's external-speaker connector. (I didn't find it necessary to use a shielded cable.) Use the transceiver's volume control to set the output level. I adjust R2 (see Fig 1) so that setting the hand-held transceiver's volume control about 1/3 open produces a comfortable audio output level from the speaker/amplifier. This setting allows me to control the amplifier output by using the transceiver's volume control, and I don't worry about overdriving the amplifier.

*Thirty years ago, at the age of 14, Leonard Van Prooyen received his Novice license, KN8KWD. Six months later, he upgraded to Technician. His early interest in radio led him to get his FCC First Class radiotelephone ticket at the age of 17. By working part-time as a TV repairman, two-way-radio repairman, broadcast engineer and disc jockey, Leonard financed his way through Michigan State University and earned his BSEE degree.*

*After graduating from MSU, Leonard took a position with the Lutheran World Federation Broadcasting Service in Addis Ababa, Ethiopia. There, he helped build a high-power shortwave station (ETLF), relying heavily on material that appeared in the ARRL Handbook. The station used two 100-kW transmitters and several curtain arrays. While in Ethiopia, Leonard assisted in investigating and refining backscatter-propagation measurement techniques.*

*After his tour in Ethiopia, Leonard returned to the US and worked as a radio engineer, including a brief stint at WRC (NBC, Washington) as chief engineer. In 1973, he returned to MSU and worked as a radio engineer for the University's various broadcast services. During his second stay at MSU, Leonard's vocational interests expanded to include digital systems and computers. He's currently employed as a computer-systems engineer doing logic design for computer control systems.*

*Leonard's Amateur Radio interests primarily include RTTY and packet-radio operation, with some HF DXing and 2-meter FM activity to round things out.*



# Adding 160-Meter Coverage to HF Amplifiers

Getting an HF amplifier going on 160 needn't involve guesswork or fried components once you've got a handle on what has to be done. Here's what you need to know to do the job right.

By Richard L. Measures, AG6K

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If you have ever tried to use the 80/75-meter band for local communications on winter evenings, you have probably experienced situations in which propagation was almost nonexistent for paths shorter than 120 miles or so. The group of friends that I talk with on 75 meters was plagued by these "winter doldrum" conditions, so a few of us put up 160-meter antennas to see if communication could be improved. We discovered that when the 75-meter band was essentially useless for short-haul propagation, the 160-meter band often provided good communication.

There were some trade-offs to using the 160-meter band: Most of us had to put up compromise antennas—like the end-fed Marconi—that would fit on a city lot. Such antennas are not as efficient as full-size dipoles; the only practical way to compensate for the lack of efficiency is to increase power. We discovered another characteristic of 160 meters: a peculiar type of fading that takes a 100-W signal down into the noise for 10 to 20 seconds every couple of minutes. Again, the solution to this is to increase power.

Most commercial HF Amateur Radio amplifiers manufactured in the last 20 years do not cover 160<sup>1</sup> because maximum legal-limit power has been permitted there only since 1984. The easiest way to increase power on 160 meters nowadays is to sell the old 80- through 10-meter amplifier and buy an amplifier that covers 160. Instead, I decided to add 160-meter coverage to my Heathkit® SB-220 amplifier. A successful amplifier modification would net me knowledge, experience and the sense of a job well done—plus the 600-or-so-dollar difference between the cost of an SB-220 and a new amplifier that covers 160!

The modification succeeded. Since putting my own SB-220 on 160, I have been

involved in modifying six more amplifiers to cover the band. These experiences indicate that 160-meter coverage can be added to similar amplifiers by applying the theory and practice I used to modify my SB-220. This article describes that theory and practice.

## The Basics of Adding 160

To make an 80-meter amplifier work on 160 meters, the circuit reactances—capacitors and inductors—must generally be doubled in value. This includes components in the amplifier's input and output resonant circuits, the anode RF choke, and bypass capacitors. The filament RF choke—if there is one—usually need *not* be doubled in reactance, as will be explained later.

Some of the amplifier circuit reactances can be doubled (relative to those employed on 80) without affecting operation of the amplifier at HF; others cannot. For instance, additional bypass capacitors can be left in place for operation on 80 through 10 meters, as can the inductance added to the stock anode RF choke. Components that tune the amplifier's input and output circuits to 160 meters, though, must be switched out for operation at HF.

If the amplifier manufacturer has provided extra band-switch contacts, switching 160-meter components in and out of line is a piece of cake—but such contacts *don't* exist on the SB-220 and many other HF amplifiers. Because of this, the switching must be done with relays controlled by a front-panel switch (S1A in Fig 1A). One S1 position selects 80-through-10-meter operation; the other selects 160 meters—with the amplifier's main band switch set to 80 meters.

Fig 1 shows all of the circuit modifications necessary to add 160-meter coverage to a Heathkit SB-220 amplifier. The Fig 1 caption lists all the parts you need to put an SB-220 on 160, but does not explain specification, selection and construction of

critical parts—information *you must have* to successfully put an SB-220 or other HF amplifier on MF. We'll cover that information next.

## Component Ratings

The ratings of the components used in this project deserve special attention because we are dealing with surprisingly high RF currents and voltages. For example, the RF circulating current in the amplifier output network is much higher than the dc anode current (in this case, 0.8 A) might imply.

**Capacitor current ratings:** The capacitors used must possess sufficient voltage and current capability *at 1.8 MHz*. (Just because a 500-pF TV doorknob capacitor is rated at 20 kV dc does not mean that it can handle even 530 V RMS at 1.8 MHz. At 1.8 MHz, the reactance of 500 pF is about  $-j177 \Omega$ . Applying 530 V RMS across such a capacitor results in an [apparent] current flow through it of about 3 A—enough current to cause severe heating of the capacitor dielectric, rapid capacitance shift and destruction of the capacitor.) RF-current-rated capacitors include transmitting micas and ceramics, and air- or vacuum-dielectric capacitors.

The RF (circulating, or flywheel) current in an amplifier's output pi network is roughly equal to network Q multiplied by the amplifier's dc anode current. In the case of an SB-220, the output network circulating current is about  $12 \times 0.8$  A, or 10 A. The output-network tuning capacitor must be able to withstand this current. When the tune padder (C55A) is switched into the circuit on 160 meters, *and the tuning capacitor is set to minimum capacitance*, C55A must be able to withstand at least 90% (9 A) of the RF circulating current in the network. It's safest to assume that the tune padder must handle 100% of the network circulating current. As specified in the Fig 1 caption, C55A consists of two 150-pF, 5-kV, or three

<sup>1</sup>Notes appear on page 28.

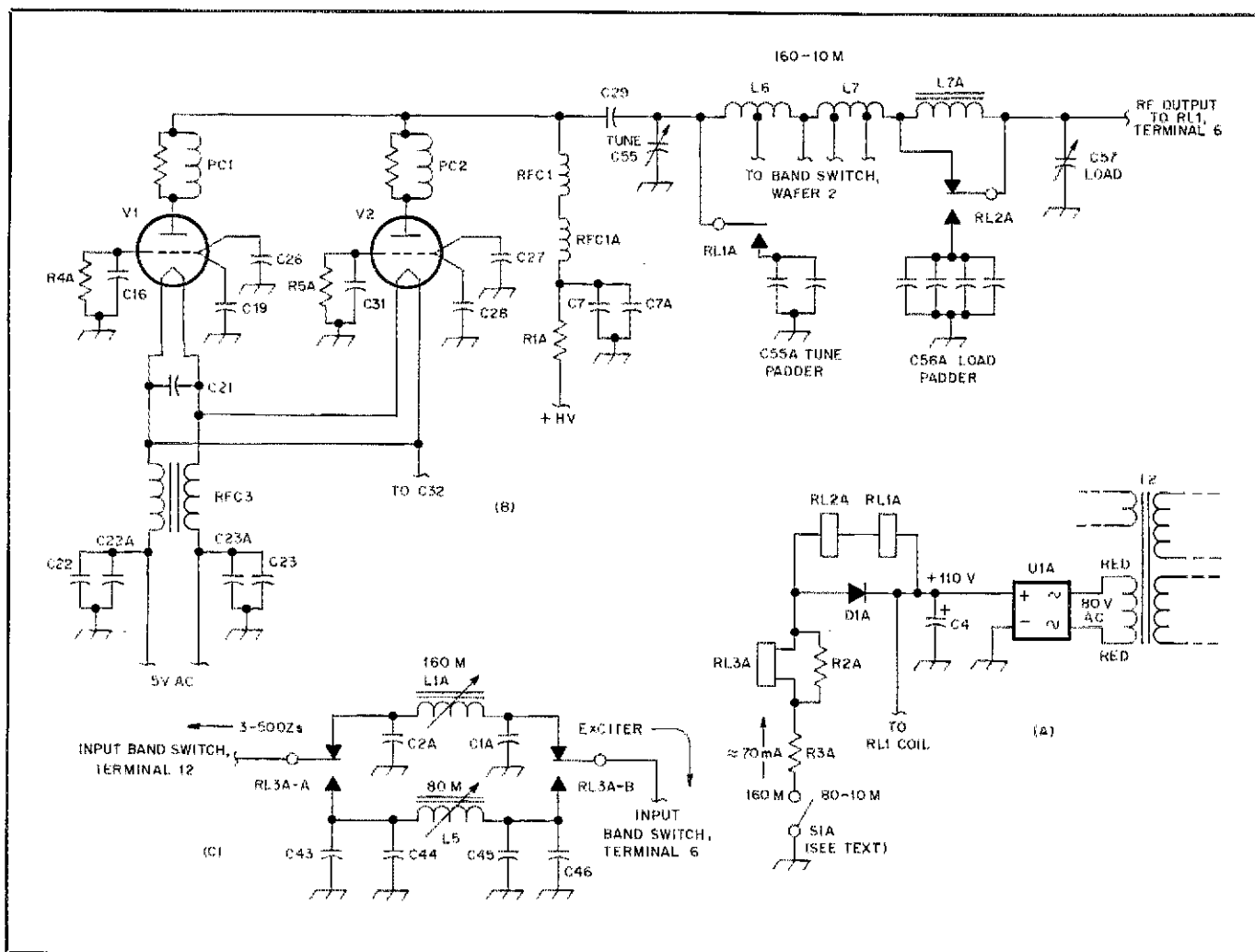


Fig 1—Schematic showing the changes necessary to put the Heath® SB-220 amplifier on 160 meters. (Components added for 160-meter operation are designation by the suffix A; components without the A suffix are original Heath parts. Component designators not in keeping with QST style are used for compatibility with designators on the SB-220 schematic.) Modified in this way, the SB-220 is switched to 160 meters by setting its BAND switch to 80 meters and selecting 160 M with S1A. Control circuitry for the added band-switching relays, and changes to the SB-220's relay power supply circuit, are shown at A. Modifications to the '220's filament, anode-supply and output circuitry are shown at B. C shows changes to the '220's input circuitry. R1A is included as an HV current limiter to protect amplifier components in case of VHF parasitic oscillation by the 3-500Zs. See text.

- C1A—2700-pF, 500-V mica.
- C2A—3000- to 3300-pF, 500-V mica.
- C7A—4700-pF, 3-kV (or greater) disc ceramic.
- C22A, C23A—0.02- $\mu$ F (or greater), 1-kV disc ceramic.
- C55A—Three 100-pF, or two 150-pF, 5-kV ceramic "doorknob" transmitting capacitors in parallel.
- C56A—2000-pF, 2-kV mica; four 500-pF units (Heath part no. 20-711 suitable) in parallel.
- D1A—200 (or greater) PIV, 1-A rectifier diode.
- L1A—Slug-tuned, 4- to 6- $\mu$ H coil wound with no. 24 (or heavier) enameled copper wire.

- L7A—9  $\mu$ H: 16 turns of no. 14 stranded, Teflon®-insulated wire on a T-225A-2 powdered-iron toroidal core. Cover the core with silicone-rubber or fiberglass tape before winding the coil. See text. (T-225A-2 cores are available from Amidon Associates, Palomar Engineers and RADIOKIT.)
- R1A—10  $\Omega$ , 7 W, wirewound.
- R2A—430  $\Omega$ , 2 W, metal film. See RL3A.
- R3A—620 or 680  $\Omega$ , 4 W. Select for a current of approximately 70 mA through S1A.
- R4A, R5A—24 to 30  $\Omega$ , 1/2 W. These resistors replace RFC4 and RFC5, respectively,

- and serve as fuses to protect the 3-500Zs against grid-to-filament shorts.
- RFC1A—65 to 135  $\mu$ H; see text.
- RL1A, RL2A—Jennings RB1, Kilovac H-8 or similarly rated vacuum relays with 26-V coils. See text.
- RL3A—Metal-can relay, 26-V coil, coil resistance about 700  $\Omega$ , 2-A contacts. If your relay's coil resistance differs greatly from 700  $\Omega$ , adjust the value of R3A to maintain the correct voltage drop across the coil. See R3A.
- U1A—1-A, 200-PIV bridge rectifier.

100-pF, 5-kV, transmitting capacitors in parallel. The 100-pF capacitors are rated at 3.4 A each at 1 MHz; in parallel, the three have a total current rating of 12 to 15 A at 1.8 MHz—sufficient for the job.

The RF current ratings of transmitting ceramic capacitors vary with frequency. For example, a 500-pF, 5-kV Series 58 Centralab™ (now Jennings™ Series 58) capa-

tor is rated to handle 2.5 A at 10 MHz, but only 1.1 A at 1 MHz. At 1.8 MHz, this capacitor can probably handle around 1.5 A. Assuming that a 500-pF capacitor was called for in the first place, this unit won't cut it at C55A or C56A (the load padder) in Fig 1B. Investigation of the Jennings Series 58 range reveals that even the 1000-pF Series 58 entry is unsuitable

for use at C56A: Its current rating is only 1.4 A at 1 MHz.

**Relays:** The current and the open-contact voltage ratings of the output-network switching relays, RL1A and RL2A, deserve special consideration because RF energy is much more capable of jumping across open switch contacts than 60-Hz energy. Break-down voltage decreases with frequency: At

30 MHz, the breakdown voltage between two points separated by a given dielectric is roughly 60% of the 60-Hz value.

**Conductor ratings:** RF current travels on the surface of conductors, largely bypassing the conductive path below the conductor's skin. This is known as *skin effect*, and it becomes more pronounced as frequency increases. Because of skin effect, the effective RF resistance of a given conductor increases with frequency. As a result, the ac current capability of wire and contacts must be derated with frequency. (Example: No. 12 copper wire, which is rated to handle over 20 A continuously at 60 Hz, can handle only 5 A continuously at 30 MHz.)

RF-current-rated relays are normally derated to about 20 to 30% of their dc or 60-Hz current ratings for use at 30 MHz. Unlike RF voltage breakdown ratings—which are absolute and can't be pushed—the continuous-duty RF current ratings of wire and relay contacts can be exceeded in intermittent applications like CW and SSB. The result of this is a bit more conductor heating and a slight decrease in overall circuit efficiency.

**Voltage ratings:** The maximum RF peak voltage encountered by the output-network tuning capacitor in a *properly tuned* grounded-grid amplifier is approximately equal to the anode supply voltage minus about 200 V. In the SB-220, this is about 2.7 kV minus 200 V, or about 2.5 kV peak.<sup>2</sup>

Switching 2.5 kV is not difficult at 60 Hz. At 29 MHz, however, switching 2.5 kV is not so easy. Example: If a relay (RL1A) with a rating of 3 kV peak at 60 Hz were used to switch C55A (the tune padder), its *open contacts* would arc over during operation on the upper HF bands. Instead, a relay with a sufficient *RF* voltage rating must be used. The only practical relay for this difficult job is a *vacuum* relay that is (open-contact) rated for at least 2.5 kV peak at 30 MHz. (The Jennings RD5 and RB1, and the Kilovac® H-8, are suitable; many other vacuum relays are rated for 2.5 kV peak at 30 MHz. Those I've mentioned are more common at swap meets than other types, however.)

RL2A, the SPDT relay at the 50-Ω (low-voltage) end of the amplifier output network, switches the load padder (C56A) and the added output-network inductance (L7A). The maximum RF voltage at these points is less than 1.2 kV peak. An ordinary 15-A, open-frame relay can be used at RL2A if its open-contact air gap can withstand 2.5 kV dc on a breakdown-voltage tester.<sup>3</sup> Another Jennings RB1 or RJ1A (like that shown in Fig 2), or a Kilovac H-8 would be even better.

#### Powering the Relays

The rated coil current for a Jennings RB1 is 100 mA. If speed of relay closure is not a factor—as in this application—a lower actuating current may be used. The actual

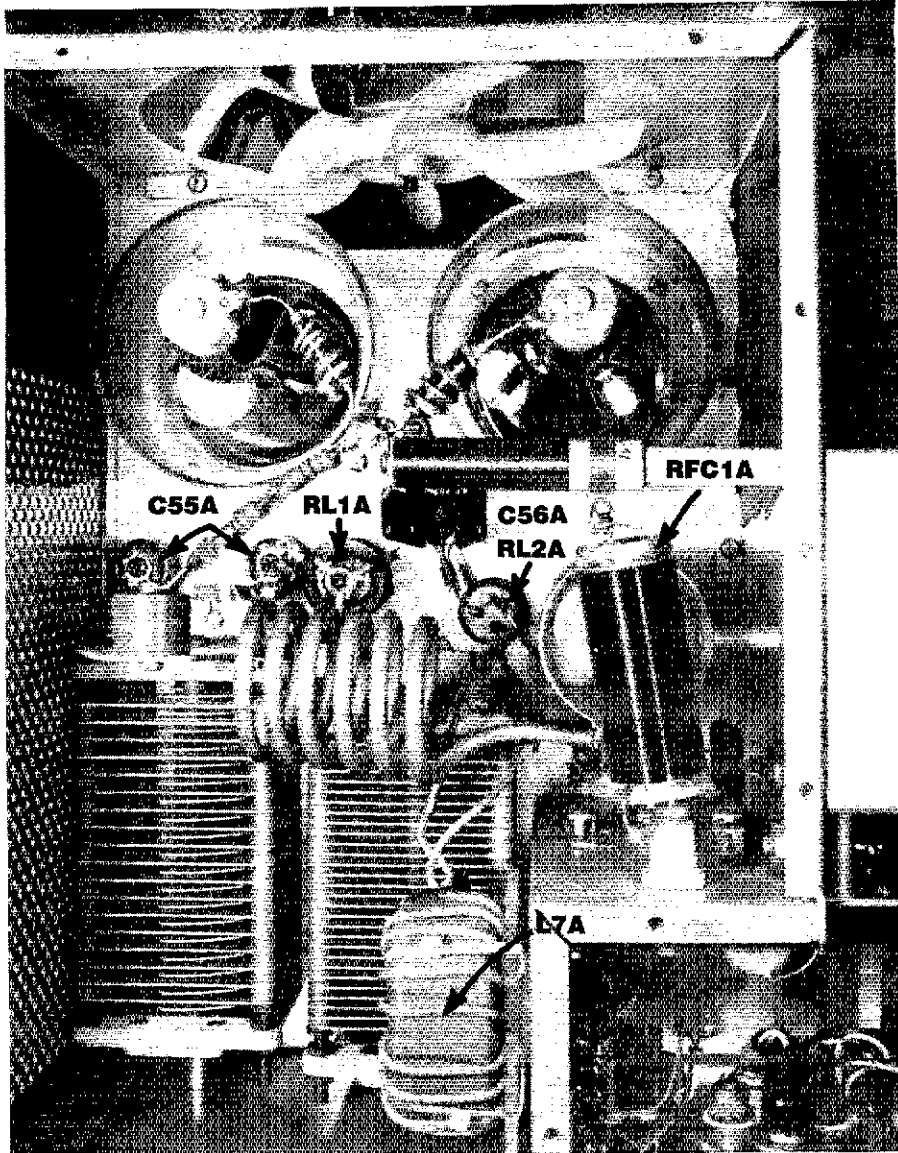


Fig 2—These components modify the output-network and anode portions of the SB-220 circuit for operation on 160 meters. The added anode RF choke (RFC1A) is left in the circuit on 160 through 10 meters; added output-network components C55A, C56A and L7A are switched into line on 160 by means of vacuum relays RL1A and RL2A. See text. (The resistors between the anode choke and the doorknob capacitor on the SB-220 TUNE capacitor [lower left] are not part of Heath's design. They were an intermediate—and unsuccessful—R and D step in suppressing VHF parasitics in this particular amplifier and are unrelated to the 160-meter modification process. The parasitic-suppression circuitry that worked is described in R. Measures, "Improved Anode Parasitic Suppression for Modern Amplifier Tubes," QST, Oct 1988, pp 36-38, 66 and 89.)

minimum pull-in current for an RB1 is about 50 mA. For reliable operation and maximum coil life, a coil current of approximately 70 mA is appropriate.

The stock, half-wave rectified, +110-V relay power supply in the SB-220 is adequate for the original current load (RL1 only) of about 25 mA. The additional current required by RL1A, RL2A and RL3A can be accommodated by modifying the SB-220's half-wave-rectified supply to a full-wave-bridge rectifier circuit. To do this, remove D16 and rewire the supply as shown in Fig 1A.

One Jennings RB3 DPDT relay can do the jobs of RL1A and RL2A, but the RB3's rated coil current (200 mA) is probably too much for T2's relay-supply secondary winding to handle. Thus, if you choose to use a single relay instead of RL1A and RL2A, you'll probably have to build in an 18- to 24-V supply to power it.

#### Filament Choke

Most of the articles about 160-meter amplifier modification that I've seen presume that a given amplifier's stock 80- to 10-meter filament RF choke must be

replaced with a more inductive choke. On the contrary: *In most amplifiers—including the SB-220—the 80- to 10-meter filament choke can be used on 160.*

The SB-220 has a 9- $\mu$ H filament choke. The reactance of this choke at 1.9 MHz is about  $+j107 \Omega$ . If a reactance (at 1.9 MHz) of  $-j107 \Omega$  (an 800-pF capacitor is close enough) is connected in parallel with the 9- $\mu$ H choke, the choke and capacitor resonate and act as a high impedance at 1.9 MHz. Resonated in this way, the original HF filament choke *can* do a good job on 160.

The impedance of a tuned circuit generally varies much more rapidly with frequency than the reactance of a choke (or capacitor) on its own, however. Because of this, the off-frequency impedance—at the 160-meter band edges—of a resonant filament-choke circuit deserves evaluation. The admittance of a 9- $\mu$ H inductor in parallel with an 800-pF capacitor is about 1/900 S (siemens [previously called *mhos*]) at 1.8 MHz and 2 MHz. This admittance, equivalent to an impedance of about 900  $\Omega$ , is almost 14 times greater than that of the paralleled cathodes of the SB-220's two 3-500Zs (about 65  $\Omega$  [averaged over a full cycle of the input waveform]). Result: Resonating the SB-220's filament choke to 1.9 MHz causes the impedance of the 3-500Zs-and-filament-choke circuit to vary from just below 61  $\Omega$  at 1.8 and 2 MHz to about 65  $\Omega$  at 1.9 MHz. This modest impedance variation presents no problems.

Because the cold ends of the filament choke windings are grounded for RF by C22, C22A, C23 and C23A, the 800-pF resonating capacitance can be paralleled with the filament choke by connecting the capacitor between the 3-500Z cathodes and chassis. This is most easily done by adding 800 pF at the output of the amplifier's 160-meter input pi network. (The value given for C2A in the Fig 1 caption includes the 800 pF necessary to resonate the choke.) Because the input network is band switched, the filament choke resonates at 1.9 MHz only on 160 meters.

### Tuned Input Circuit

Before the values of the components in the 160-meter input pi network can be calculated, a value of network Q must be chosen. For this purpose, Q is defined as the input resistance of the pi network divided by the reactance (in ohms) of the input capacitor, or  $Q = R_{in} \div X_{Cin}$ . If the Q chosen is too low, the bandwidth of the input network will be wide, but the SWR presented by the network to the exciter will not be especially good anywhere on the band. If the Q of the input circuit is too high, the SWR at the middle of the band will be low, but the SWR at the band edges will be too high. Because of this, a compromise Q must be chosen to balance bandwidth against minimum attainable SWR. According to the Varian EIMAC<sup>®</sup>

## Getting Parts for 160-Meter Amplifier Modifications

### Parts Suppliers

*New vacuum relays and transmitting capacitors rated for RF current:*

Surcom (Jennings relays)  
2215 Faraday Ave, Suite A  
Carlsbad, CA 92008  
tel 619-438-4420

*New vacuum relays:*

Kilovac  
550 Linden Ave  
Carpinteria, CA 93013  
tel 805-684-4560 (ask for Gail or the order desk)

*New-surplus and used vacuum relays and transmitting capacitors rated for RF current:*

Alan Emerald, K6GA  
8956 Swallow Ave  
Fountain Valley, CA 92708  
tel 714-962-5940

Hiway Sales  
305 Wisconsin Ave  
Oceanside, CA 92054  
tel 619-722-1175

Fair Radio Sales Co, Inc  
Box 1105  
1016 E Eureka St  
Lima, OH 45802  
tel 419-223-2196

### Parts Costs and Tips

Vacuum relays average about \$35 each at swap meets. New relays cost about \$100 each. Test swap-meet relays—*before* purchasing them—with two seriesed 9-V batteries (to power the relay coil) and an ohmmeter (to make sure that the contacts open and close properly). I also strongly recommend that you test the open-circuit voltage capability of bargain relays *before purchase* with a current-limited HV breakdown tester. (The breakdown tester measures the integrity of the vacuum inside the relay. For information on how to construct such a device, see the article cited at note 3 of the main text.) If swap-meet vacuum testing is inconvenient, be sure to get the relay seller's call sign and vehicle license plate number—and a money-back guarantee—in case the vacuum proves to be bad.

Jennings 100-pF, 5-kV transmitting capacitors cost about \$11 each new, and about \$3 to \$5 used.

The total parts cost of this project for a skilled scrounger is about \$80. The cost of all-new parts is about \$300.

### Literature

For information on the availability of Varian EIMAC's *Care and Feeding of Power Grid Tubes*, call 415-592-1221, or write Varian EIMAC, 301 Industrial Way, San Carlos, CA 94070.

book *Care and Feeding of Power Grid Tubes*, an input-circuit Q of about 2 should be used. The 80- through 10-meter input networks of the SB-220 exhibit a Q of only about 1. This results in an SWR that is acceptable for transceivers with vacuum-tube finals, but less than optimum for modern all-solid-state transceivers.

Plugging a Q value of 1.6 into the formulas in the Varian EIMAC book results in these calculated values: input capacitor (C1A), 2700 pF; L1A, 4 to 5  $\mu$ H; output capacitor (C2A), about 2500 pF. (The C2A specification in the Fig 1 parts list is 3300 pF because the spec includes the 800 pF necessary to resonate the filament choke at 1.9 MHz.) C1A and C2A must possess a mica dielectric and be rated at 3.5 kV. Inductor L1A should be wound from no. 24 or larger insulated copper wire

to keep the coil Q high; smaller-diameter wire would degrade the amplifier's input SWR. (L1A is wound on a slug-tuned form to allow some adjustment of the input SWR; see the next paragraph.)

*Adjusting the amplifier input SWR:* Do not try to minimize the input network SWR by varying the value of C1A (the input capacitor of the 160-meter pi network); doing so changes the network Q. Instead, adjust the network inductance. This adjustment mainly changes the network center frequency, however, and may not result in an acceptable minimum SWR. If this is the case, adjust the value of C2A and L1A until the proper impedance transformation ratio and minimum SWR are achieved.<sup>4</sup>

### Anode Choke

Designing an anode choke for a single-

frequency amplifier is easy. (For single-frequency operation, choke self-resonances—which are *unavoidable*—can be parked at frequencies sufficiently removed from the operating frequency to avoid frying the choke with the amplifier output.) When an amplifier is to be operated over a wide frequency range, however, anode-choke design is critical because the choke must (1) exhibit sufficient inductive reactance to keep it from dissipating too much power at the amplifier's lowest operating frequency and (2) *not* exhibit self-resonances at or near any of the amplifier operating frequencies. (The RF current responsible for destroying a choke that fails to satisfy either or both of these conditions flows through the choke and the HV-to-ground bypass capacitor [C7 and C7A in the modified SB-220].) Satisfying both conditions simultaneously is tricky: Adding turns to (increasing the inductance of) a choke that does not satisfy condition 1 increases the choke's distributed capacitance and the number (and position) of choke self-resonances below 30 MHz.<sup>5</sup> If one of these resonances occurs at an amplifier operating frequency, an unpleasant choke fire may result—and the choke may be "crispy-crittered."

The inductance of the SB-220's stock anode choke, RFC1, is 50  $\mu$ H. Heath chose this value wisely: RFC1's lowest self-resonance occurs above 40 MHz—well above the operating frequency range of the amplifier. The reactance of this choke at 1.8 MHz is  $+j565 \Omega$ . The ac anode voltage in the SB-220 is about 2.5 kV peak  $\div \sqrt{2}$ ,

or about 1768 V RMS. At this voltage, the RF current through RFC1 is  $1768 \div 565$ , or 3.13 A! This substantial current would cause severe heating of the choke's no. 28 wire and the ceramic-dielectric HV bypass capacitors (C7 and C7A) at the cold end of the choke. Thus, another choke must be placed in series with, and at a right angle to, RFC1. The inductance of this choke (RFC1A) can be as little as 65  $\mu$ H or as much as 135  $\mu$ H. (Its inductance can be anything up to about 135  $\mu$ H as long as a self-resonance cannot be found on frequencies within about 5% of the edges of any operating amateur band covered by the amplifier.<sup>6</sup>)

A 65- $\mu$ H choke can be made by filling about 2 inches of winding space on a 5/8-inch-diameter coil form with no. 27 high-temperature enameled copper wire.<sup>7</sup> The lowest self-resonance of such a choke occurs at about 35 MHz, so the choke should work well between 3.5 and 30 MHz while providing enough total inductance (RFC1 + RFC1A = 115  $\mu$ H) to keep itself and bypass capacitors C7 and C7A from overheating at 1.8 MHz. A compact 65- $\mu$ H choke can be made by filling about 1-9/16 inches of winding space on a 1-inch-diameter coil form with no. 27 wire. A suitable 135- $\mu$ H choke can be made by filling 1-13/16 inches of winding space on a 1-inch-diam coil form with no. 27 high-temperature enameled copper wire. Such a choke is self-resonant at about 23 and 35 MHz, making it safe for use at 15, 12 and 10 meters.

To avoid destructive RF dielectric

heating of the coil form, avoid form materials (such as nylon and PVC) that have high RF dissipation factors. Delrin® has an intermediate dissipation factor; polyethylene, TFE, and ABS (acrylonitrile butadiene styrene) and other styrenes, have low dissipation factors. Thin (0.02-inch)-wall G-10 or G-11 fiberglass tubing is excellent for this application because it is lightweight, RF- and heat-resistant, and very strong. (A choke constructed on fiberglass tubing is lightweight enough to be supported by the no. 18 solid wire I used to connect the choke into my amplifier.)

Wire gauges from no. 24 to 28 can be used for RFC1A if the winding space on the coil form is adjusted accordingly. After you build your choke, check its self-resonances as described in note 6. If necessary, remove turns to park the choke's self-resonances between Amateur Radio bands. (Achieving a particular choke inductance is far less critical than the position of the choke's self-resonances in the spectrum!) Give the finished choke a thin coating of polyurethane varnish to keep the winding from rattling with modulation.

#### General Construction Notes

Component placement is not critical when modifying an amplifier for use on 160 meters. The only guideline is to put each RF part reasonably close to the part of the circuit to which it is connected.

Use no. 14 or heavier wire for leads that carry RF circulating current in the amplifier output network. To minimize stress on the vacuum relays' metal-to-glass seals, install a flexible copper-ribbon section (about 1 inch long and 1/8 to 3/16 inch wide) between the relay RF terminals and the heavy wires that connect the relay contacts into the circuit.

#### Specifics on Modifying the SB-220

Figs 2 and 3 show how the 160-meter parts fit into an SB-220. Disconnect the doorknob capacitor (C6) at the base of RFC1. Remove RFC2 and replace it with RFC1A. Once this is done, C6 may be removed or reconnected in parallel with C7 and C7A for improved HV-lead bypassing.

If you use the compact 65- $\mu$ H choke, you won't have to remove the SB-220's HV interlock switch to make room for RFC1A. If you use a larger choke for RFC1A, you'll have to remove the interlock to make room for the choke.<sup>8</sup>

The ceramic coil form used in the SB-220's stock anode choke (RFC1) cannot withstand the RF voltage that appears at its chassis end as a result of removing C6 and adding RFC1A. To solve this problem, replace the aluminum spacer under RFC1 with a no. 6-32 threaded ceramic pillar or the phenolic spacer from the SB-220's HV interlock. (You'll need to use washers with the phenolic spacer to make its length equal to that of the original aluminum spacer.)

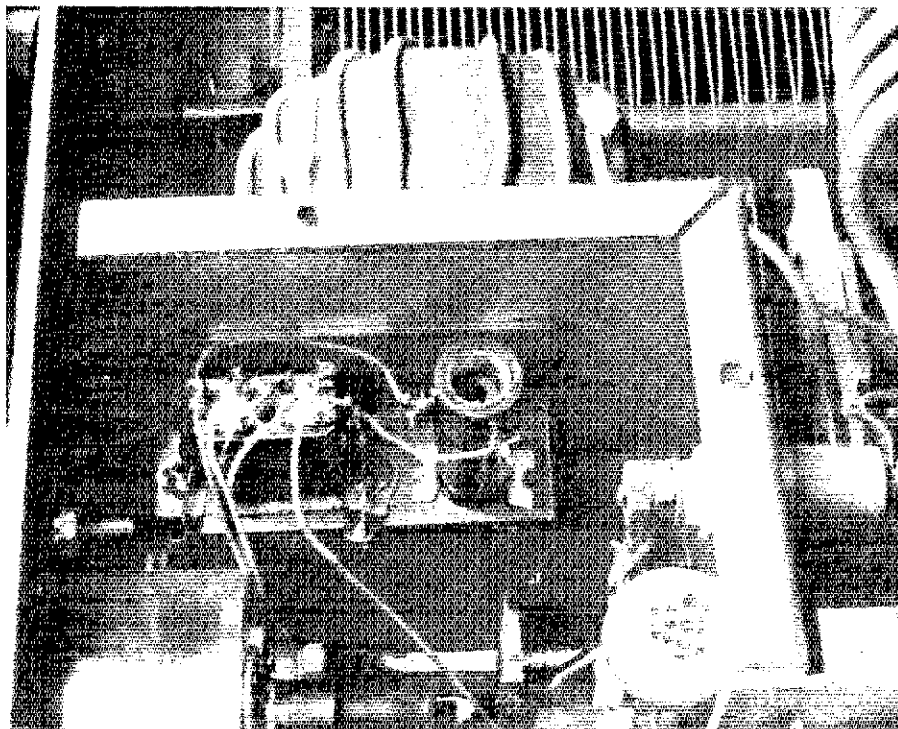


Fig 3—The additional components necessary to put the SB-220's input pi network on 160 are mounted near the input-network components for 80 through 10 meters. RL3A and L1A are mounted on the metal bracket at center.

The 160-meter tank circuit inductor (L7A) is wound on a T-225A-2 powdered-iron toroidal core. Cover the bare core with one overlapping layer of Plymouth Rubber Co silicone-rubber tape. If silicone-rubber tape is not available, use fiberglass tape. (Don't use vinyl tape.) Use Teflon-insulated wire for L7A; such wire is ideal for RF applications. Secure the ends of the winding with nylon cable ties. Also using cable ties, mount the completed inductor on a square of 1/8-inch-thick acrylic sheet. (Drill holes in the acrylic sheet to pass the ties.) Fig 2 illustrates this mounting method.

## Conclusion

Putting an HF amplifier on 160 meters needn't be a hit-or-miss job. In this article, I've covered exactly what's involved in getting an SB-220 going on top band and covered the theory behind the modifications in sufficient detail to allow owners of other HF amplifiers to modify their gear for MF. If you would like discuss any part of this article with me, my telephone number is 805-482-3034.

*More SB-220 improvements from Richard Measures—including better suppression of VHF parasitics, heat reduction, fan lubrication and how to keep your SB-220 from pitting the control-relay contacts in the transceiver that drives it—will appear in an upcoming Hints and Kinks column.*

## Notes

<sup>1</sup>Rich Measures' use of HF in this sentence is intentionally colloquial. Of course an HF amplifier doesn't cover 160 meters; 160 is an MF band, contemporary ad copy and transceiver-panel labels notwithstanding. If you need more output power than your "HF" transceiver may currently provide on 160, this article is for you: In it, AG6K shows you how to turn an HF amplifier into an MF/HF device. —Ed.

<sup>2</sup>When the peak anode current is at maximum and the instantaneous anode voltage is at minimum in a properly tuned amplifier, the anode voltage must be about 200 V more positive than the (grounded) grid in order to attract most of the electrons emitted by the cathode. If the output network is adjusted to load the amplifier tube(s) too lightly—which causes the instantaneous, minimum anode voltage to dip below about +200—electrons that would normally flow from cathode to anode flow from cathode to grid instead. The result is excessive grid current and amplifier nonlinearity (a euphemism for rotten splatter).

<sup>3</sup>R. Measures, "High-Voltage Breakdown Tester," QEX, Aug 1988, pp 5-7.


<sup>4</sup>Altering a pi network's impedance-matching ratio involves adjusting the values of two or more of the network reactances. The network's impedance-transformation ratio cannot be altered by adjusting only one of its three reactive components.

<sup>5</sup>One popular variation on the add-turns-to-choke theme depends on a gap of about 3/4 inch between the added turns and the main choke winding to decouple the inductors and avoid self-resonance problems. Unfortunately, a 3/4-inch gap does not sufficiently reduce coupling between coils that share a common axis. The best way to prevent inductive coupling between two or more unshielded solenoidal inductors is to place the inductors at right angles to each other.

<sup>6</sup>The choke's self-resonant frequencies can be found by connecting the choke terminals together with a short clip lead, coupling a dip meter to either end of the choke and sweeping the choke's operating frequency range. Dips indicate self-resonances; these should be quite sharp and easy to find. If possible, check for resonances with the choke in its installed position; nearby metal objects—shield partitions and chassis walls—can cause self-resonances to shift. [Photographic evidence of this effect can be seen in Zack Lau, "More Choke Info," Technical Correspondence, QST, Jun 1988, p 51.—Ed.]

<sup>7</sup>This silicone-varnish-insulated wire is available from shops that rewind electric motors. It has much better RF and HV insulating qualities than any of the Formvar or nylon-clad wires.

<sup>8</sup>Readers may raise their eyebrows at my suggestion that the SB-220's HV interlock be removed

and not reinstalled. In my opinion, this amplifier is not much safer with the HV interlock than without it. Even if the interlock is functioning properly—and with the amplifier plugged in and switched off—you can receive a fatal electric shock by touching any of several components under the amplifier chassis that are connected to the ac mains. Because this situation exists regardless of the presence or operability of the interlock, I had no qualms about removing my SB-220's interlock to make room for RFC1A. The choice is yours. (The only way to work on an amplifier safely is to never put your hands or a conductive tool inside an amplifier unless it is unplugged from the ac mains and its HV-supply capacitors are fully discharged. Don't let the presence of an interlock lull you into believing that a plugged-in amplifier is safe to work on!) 

# New Products

## RF CONCEPTS 8-RC REPEATER CONTROLLER

□ The 8-RC Repeater Controller is a multifunction device that can be configured as a stand-alone unit, or as part of a multifunction repeater system. Features include inputs for a control-link receiver, remote-base control and CTCSS-decoder. In addition, there are 8 (expandable to 40) auxiliary on/off outputs and alarm circuit controls for environmental conditions such as power failure or open doors. All controller program data is stored in EEPROM, eliminating the need for separate controller memory battery backup. The 8-RC can also be configured as part of a modular repeater control system. Options for the 8-RC include full-function autopatch (with remote control and reverse functions), remote-base interface, packet radio interface and serial data interface. For equip-

ment availability and price information, contact RF Concepts, 2000 Humboldt St, Reno, NV 89509, tel 702-827-0133.—Tom Francis, NMIQ



## QEX: THE ARRL EXPERIMENTERS' EXCHANGE AND AMSAT SATELLITE JOURNAL

The December issue of QEX includes:

- "CW and SSB Audio Filters Using 88-mH Inductors," by Ed Wetherhold, W3NQN. The passive LC audio filter is still preferred by many radio amateurs and professional filter designers. Here's how to apply LC-filter theory to the design and construction of inexpensive, high-performance, CW and SSB audio filters.

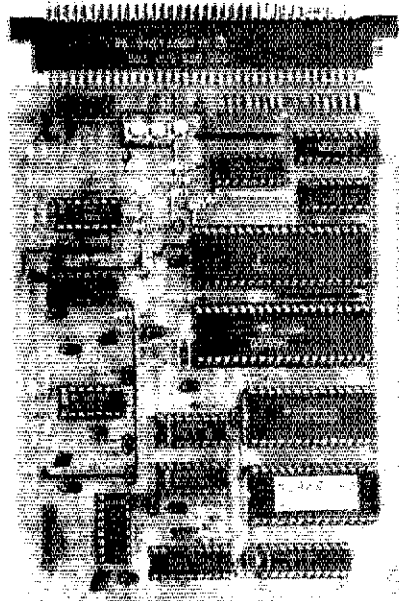
- "Path Selection," Part 1, by Dennis L. Haarsager, N7DH. Path selection is an important aspect of successful long-distance operation at wavelengths shorter than those propagated by the ionosphere. N7DH explains how to plan a DX-contact attempt over a non-line-of-sight path.

- > 50, by Bill Olson, W3HQT. Reflector antennas, such as parabolic dishes and corner reflectors, are popular among VHF/UHF/SHF operators. This month's column is the first part of a series on reflector antennas, and covers basic parabolic-dish theory.

- Components, by Mark Forbes, KC9C. Mark talks about J. W. Miller and Coilcraft inductors; Inresco overcurrent protectors; the IBM® PS/2® Model 30 286 computer; NEC microwave prescalers; Polycore MMICs and RF power FETs; Micro Crystal crystals—and the Components reader survey is on!

- In Correspondence, Dom Mallozzi, N1DM, tells you how to obtain NTIS publications and reviews three of them he found of interest.

QEX is edited by Paul Rinaldo, W4RI, and is published monthly. The special subscription rate for ARRL/AMSAT members is \$10 for 12 issues; for nonmembers, \$20. There are additional postage surcharges for mailing outside the US; write to Headquarters for details.





**Table 4**  
1st Latitude Character

Degrees Longitude	Letter
-90	A
-80	B
-70	C
-60	D
-50	E
-40	F
-30	G
-20	H
-10	I
0	J
+10	K
+20	L
+30	M
+40	N
+50	O
+60	P
+70	Q
+80	R
+90	

**Table 5**  
2nd Latitude Character

Degrees Latitude	Number
-10	0
-9	1
-8	2
-7	3
-6	4
-5	5
-4	6
-3	7
-2	8
-1	9
0	

**Table 6**  
3rd Latitude Character

Minutes Latitude	Letter
-60.0	A
-57.5	B
-55.0	C
-52.5	D
-50.0	E
-47.5	F
-45.0	G
-42.5	H
-40.0	I
-37.5	J
-35.0	K
-32.5	L
-30.0	M
-27.5	N
-25.0	O
-22.5	P
-20.0	Q
-17.5	R
-15.0	S
-12.5	T
-10.0	U
-7.5	V
-5.0	W
-2.5	X
0.0	

**Table 7**  
Sample Grid Locators

City	Longitude	Latitude	Locator
Munich	11° 36.5' E	48° 8.8' N	JN58TD
Montevideo	56° 12.7' W	34° 54.6' S	GF15VC
Washington, DC	77° 3.9' W	38° 55.2' N	FM18LW
Wellington	174° 44.7' E	41° 17.0' S	RE78IR

Remember: West longitudes and south latitudes are treated as *negative* values in the grid locator system; east longitudes and north latitudes are *positive*.

fourth characters into smaller rectangles that are 5 × 2.5 minutes of arc in size. The letters A through X are used to specify each coordinate of these 5' × 2.5' rectangles.

**Conversion Tables**

Tables 1 through 6, inclusive, can be used to convert latitude and longitude to grid locators, or grid locators to latitude and longitude.

*Converting Latitude and Longitude to Grid Locators*

Example: The location of an observatory at 105° 44.0' W longitude and 32° 58.8' N latitude can be readily converted to a grid locator. Find the longitude characters first. (Remember: West longitude is negative in the grid-locator system.) According to Table 1, the first grid character is D because the observatory's longitude is between -100° and -120°. Record the first character of the unknown locator, leaving space for the characters to come:

D \_ \_ \_ \_

(For values of longitude that are exact multiples of 20°, work from zero and choose the grid-locator letter "above" the correct exact longitude value. For examples: -120° longitude = C, not D; +20° longitude = K, not J. Apply this "use the higher letter or number" rule to Tables 1 through 6 whenever you must work with exact multiples of the longitude and latitude increments reflected in the tables.)

So far, we have accounted for exactly 100° of the observatory's longitude. Find the second longitude character by referring to Table 2 for the number corresponding to the longitude remainder, -5° 44.0'. Because -5° 44.0' falls within the -4° to -6° range, that number is 7. We now have two characters of the grid locator:

D \_ 7 \_ \_

Now, we have accounted for exactly 104° of the observatory's -105° 44.0' longitude. Use Table 3 to find the letter that corresponds to the remaining -1° 44.0' of longitude. Expressed in minutes, -1° 44.0' = -60' + -44.0', or -104.0'. This number falls within the -100' to -105' range, so the third longitude letter is D. Now we have all three longitude characters of the unknown grid locator:

D \_ 7 \_ D \_

The three latitude characters come next. The observatory's latitude is 32° 58.8' N. This is a *positive* latitude in the grid-locator system. According to Table 4, the first latitude character is M because the observatory's latitude is between +30° and +40°. We now have four grid characters:

DM7 \_ D \_

The most significant latitude character, M, accounts for exactly 30° of the observatory's latitude. Find the second latitude character by referring to Table 5 for the number corresponding to the latitude remainder, +2° 58.8'. Because +2° 58.8' falls in the +2° to +3° range, that number is 2. We now have five grid-locator characters:

DM72D \_

So far, we have accounted for exactly 32° of the observatory's +32° 58.8' latitude. Use Table 6 to find the letter corresponding to the remaining +58.8' of latitude. Because +58.8' falls within the +57.5' to +60.0' range, that letter is X. We now have the observatory's complete grid locator: DM72DX.

*Converting Grid Locators to Latitude and Longitude*

The conversion of grid locators to geodetic coordinates can be illustrated with the grid locator DM13EK. The geodetic coordinates we find will correspond to the *exact center* of the region specified by DM13EK. As before, it's useful to separate the grid locator into elements of longitude and latitude. Also as before, we'll do the longitude first:

$$\begin{aligned}
 D &= -100^\circ \\
 1 &= -16^\circ \\
 E &= -1^\circ 35' \\
 \text{Round} &= -0^\circ 2.5'
 \end{aligned}$$

$$\text{Sum} = -117^\circ 37.5', \text{ or } 117^\circ 37.5' \text{ W longitude}$$

The rounding term is used to compute the longitude of the *center* of the specified region—a region 5' × 2.5' (longitude × latitude) in size because DM13EK is a six-character locator. We know that the longitudinal center of this region must lie somewhere along a line half—2.5'—of the region's longitudinal width (5') from its

(continued on page 43)

80° N to 90° N. West longitudes and south latitudes are treated as *negative* values in the grid locator system; east longitudes and north latitudes are *positive*.

The third and fourth characters are digits in the range 0 through 9. The third character divides longitude lines into 2° increments; the fourth character divides latitude zones into 1° increments.

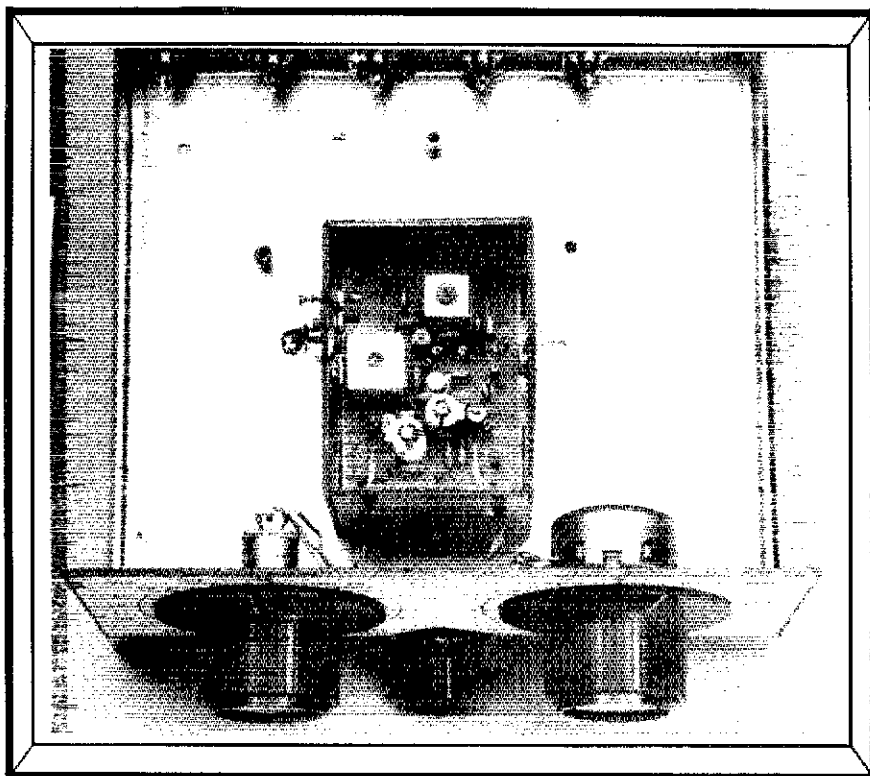
The last two characters (always letters) in a grid locator subdivide the 2° × 1° rectangles designated by the third and



# A VFO with Bandspread and Bandset

Eliminate expensive vernier drives and dials with an old technique—bandspread and bandset tuning!

By Doug DeMaw, W1FB  
ARRL Contributing Editor  
PO Box 250  
Luther, MI 49656



**A**re you old enough to recall those days when we amateurs had receivers that had two readout dials? One was a bandset dial (coarse tuning) and the other was for bandspread (fine tuning). When I compare that method to modern digital-readout techniques, I wonder how we managed to get on frequency; the resolution of the dials was primitive by today's standards! The bandset dial was calibrated in megahertz and the bandspread dial indicated kilohertz. The tuning increments for the bandspread dial were in 5- or 10-kHz steps, depending on the model of the receiver!

We may apply that old technique to modern circuits. Reasonable readout accuracy is possible with the method discussed in this article. The trick is to make both dials read kilohertz, rather than megahertz and kilohertz. The circuit described here is meant to be an inspiration toward a design of your own. It serves as a model for a starting point, with a circuit-board pattern offered if you wish to experiment. My circuit values are for use in a 6.572- to 6.872-MHz VFO. This VFO serves as the local oscillator for a homemade 80-meter CW receiver that uses a 3072-kHz IF and a crystal filter made from low-cost computer crystals. I plan to describe the entire receiver in a subsequent article.

## Circuit Features

Please refer to Fig 1, which shows the circuit for my experimental VFO. You will

note that I use electronic tuning. D2 and D3 are VVC (voltage variable capacitance) diodes. They are also called varactors or tuning diodes. As the reverse bias (positive voltage) is varied at the diode cathode, there is a significant change in the junction capacitance of the diode. This enables us to change the VFO frequency, as would be the situation if we replaced D2 and D3 with mechanical tuning capacitors. The advantage of using the diodes is that we can use standard carbon-composition controls (R2 and R7 of Fig 1) for tuning the VFO. This provides a compact VFO module, should that be our objective.

D2 functions as the bandset tuning diode, while D3 is used for the bandspread function. Each diode has a trimmer capacitor (C3 and C4) between it and L2. The trimmers are set to control the tuning range of each VVC diode.

All is not "milk and honey" when we use tuning diodes in VFOs. Although the diodes offer some advantages over air-variable capacitors, they are not as frequency stable as mechanical tuning devices. The more semiconductor junctions we add to an oscillator circuit, the greater the opportunity for frequency drift—particularly short-term drift (first five minutes of warm-up). This is because the transistor and diode

junctions must come up to operating temperature as current flows through them. This involves both RF and direct currents. The stability of the VFO in Fig 1 is adequate for many amateur needs, such as simple receivers and signal generators. Short-term drift is on the order of 1.5 kHz from a cold start to the period when long-term drift commences. Long-term drift occurs for 15 or 20 minutes, and it amounts to a range of 200-300 Hz. Thereafter, the frequency creeps up and down over a range of 5-10 Hz at room temperature. In other words, the circuit in Fig 1 represents a good VFO, but not a spectacular one. It is on par with what I expected when using two VVC diodes.

## Remainder of the VFO Circuit

Q1 of Fig 1 is a 2N4416 JFET. This device surpasses the performance of the generic MPF102 family of transistors. It has a better pinchoff characteristic than does the MPF102 and similar devices. This means that greater output is possible at a given operating voltage, compared to an MPF102. Oscillator feedback is by way of the Q1 source and L1. This link has  $\frac{1}{4}$  the number of turns used on L2, which is pretty standard for a feedback winding. The two coils are wound on an Amidon L-57-6

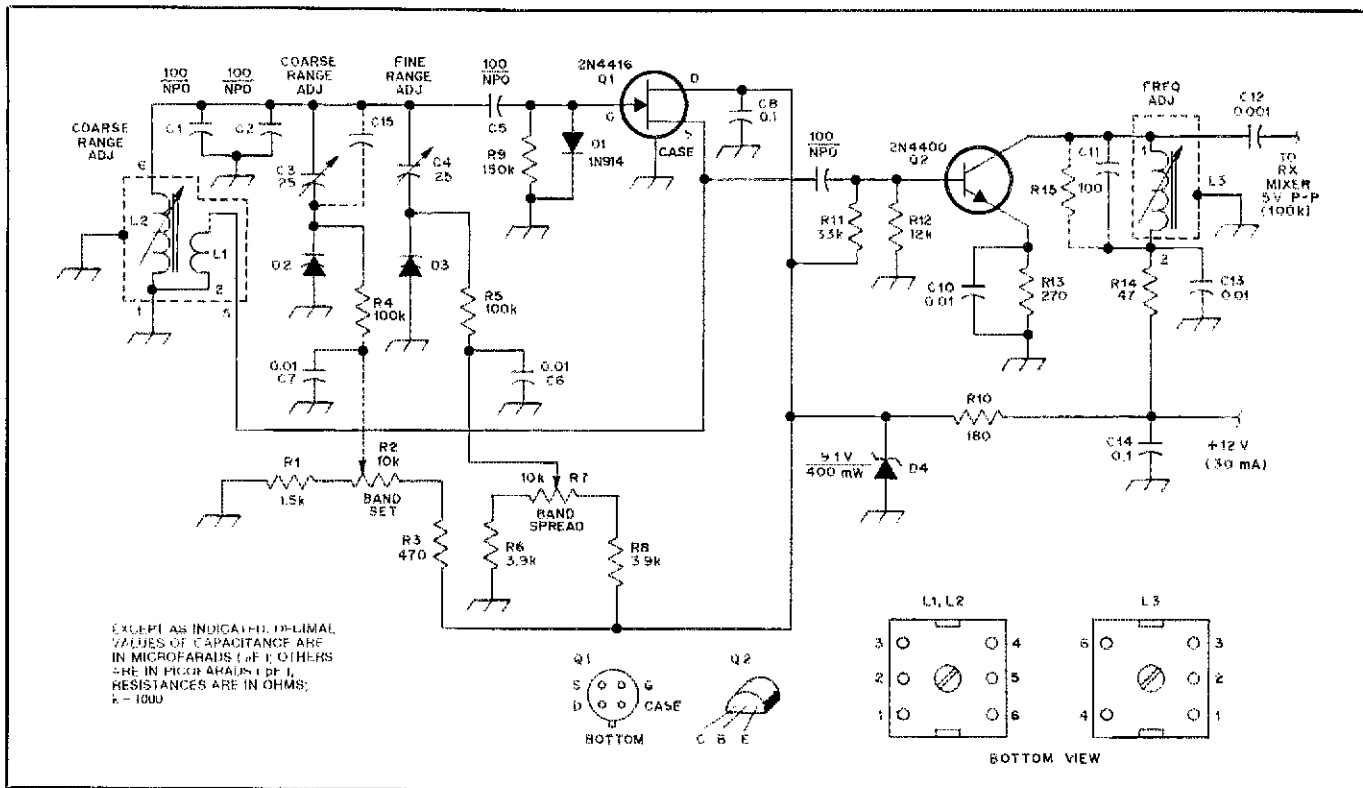


Fig 1—Schematic diagram of the VVC-tuned VFO. Fixed-value capacitors are disc ceramic, 50- or 100-V rating. Fixed-value resistors are 1/4-W carbon composition. NPO notations are for temperature-stable disc capacitors (zero temperature coefficient).

C3, C5—25-pF NPO miniature ceramic trimmer or E. F. Johnson I-9-5 miniature air-variable trimmers.

C15—See text.

D1—Silicon switching diode, type 1N914 or equiv.

D2, D3—Motorola MV2109 tuning diode or equiv, 30-70 pF typical range. Available from All-Electronics Corp, Van Nuys, CA 91408.

D4—9.1-V, 400-mW Zener diode.

L1—4 turns of no. 30 enam or Litz wire over grounded end of L2. Use Amidon Assoc, Inc L-57-6 shielded assembly.

L2—16 turns of no. 30 enam or Litz wire on L-57-6 bobbin. Use Q-Dope to secure windings (see text).

L3—24 turns of no. 30 enam or Litz wire on the form of an Amidon Assoc L-43-2 shielded assembly. Turns must be scramble-wound to fit on form.

R2, R7—10-kΩ linear-taper carbon-composition control (see text).

R15—See text.

transformer assembly. The no. 6 (yellow) powdered-iron core material is best for VFO service. It is more temperature stable than the other core materials.

NPO temperature-stable capacitors (C1, C2, C5 and C9) are used to aid the stability. D1, from the Q1 gate to ground, stabilizes the bias on Q1 and limits the device transconductance on sine-wave peaks. This helps to keep the junction capacitance fairly constant—an aid to stability. A further enhancement to stability is provided by Zener diode D4. It regulates the operating voltage for D2, D3, Q1 and the base of Q2.

Buffer-amplifier Q2 is used to boost the RF output of the oscillator chain to 5 V P-P. The output is designed to look into a 100-kΩ load, which may be gate no. 2 of a dual-gate MOSFET mixer. R15 may be added (3.3 kΩ to 10 kΩ) across L3 (dashed lines in Fig 1) to broaden the response of L2. This will reduce the RF output somewhat.

You may use a lower value of capacitance at C9 if you require lower output

from Q2. The smaller the C9 value, the greater the overall VFO stability. In a like manner, the lower the C5 value, the better the stability. C5 needs to be of a large enough value to allow Q1 to oscillate. The Q of the oscillator tank and the specific transconductance of Q1 are determining factors when selecting the C5 value in a VFO of this general type. C5 values as low as 5 pF are usable, especially when L2 has a high value of Q (100 or greater).

#### Circuit Variations

If you desire greater frequency stability than I mentioned earlier, replace D2 and D3 with small air-variable capacitors. You may use a 100-pF unit in place of D2. The bandspread tuning can then be done with a 15- or 20-pF variable. This calls for the deletion of the VVC diode components, R1 through R8, plus C6 and C7, and of course, D2 and D3.

C15 of Fig 1 is shown in dashed lines. You may add a capacitor at this circuit point if you wish to increase the tuning

range of the bandset control. Experiment with the C15 value to obtain the range you need.

#### Construction in General

Use a single-sided PC board for this project. Double-sided board material increases the VFO drift, owing to the formation of unwanted low-stability capacitance between the PC foil and the ground-plane side of the board. Try to use high quality glass-epoxy board material. Phenolic PC boards are not suitable for VFOs.

I enclosed my VFO in a homemade box, as shown in the title photo. The box is made from pieces of PC board that have been soldered together. The cover, removed for the photograph, is a U-shaped piece of aluminum. The cover is affixed to the box by means of two no. 4-40 screws. I soldered two 4-40 × 1/4-inch nuts on the inside of the box to accommodate the two screws. I used two surplus Teflon push-in feed-through terminals to route the +12 V to the circuit, and to bring the RF output from

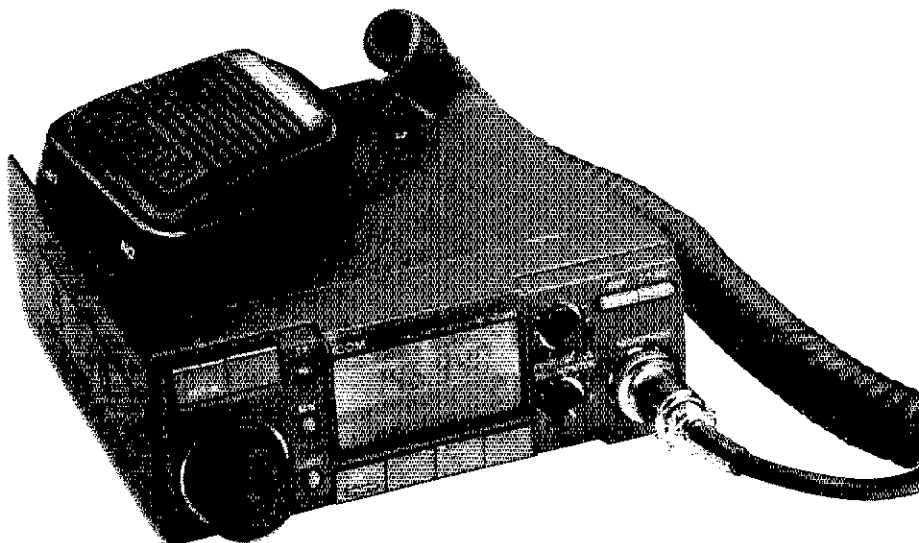


## ICOM IC-228H 2-Meter FM Transceiver

Reviewed by Rick Palm, K1CE

You would think that after tens of years in business, and producing countless models, ICOM would have the production of high-quality 2-meter rigs down to a T. Well, you're right—they do. The IC-228H continues a long tradition of excellence in 2-meter FM rigs. I know—I've owned or operated most of them. My classic six-year old IC-25A is still ticking, even after being brutalized by two years of 24-hour-per-day use with my packet-radio bulletin-board system. So, there's one item you can count on—reliability.

There are others, beginning with user friendliness. All IC-228H functions are front-panel controlled, and yes, you can play with them safely while driving. To test this, I used the '228 while driving through the downtown Hartford "mixmaster"—the intersection of two interstate highways rated in the top five most hazardous in the nation. In rush-hour traffic, I successfully selected one of four frequency display backlighting levels and entered into memory two repeater channels with irregular split—all without incident! I even made an autopatch telephone call without hitting anything—powerful testimony to the rig's ergonomics, considering that many other hapless drivers (with both hands on the



wheel) enter the mixmaster, never to be seen or heard from again!

### Front Panel

The front panel is utilitarian, but attractive. One large tuning knob takes care of memory and frequency selection. The buttons are easy to use while driving. Special mention goes to the power/volume

control—pushing it toggles between power off and on, but the volume stays the same. The controls have an avionics-quality feel. Nice!

The very first thing I look for in a 2-meter FM transceiver is frequency display readability. Can the frequency be read easily? In inky blackness? In direct sunlight? With the IC-228H, the answer is yes. The frequency display is incorporated in an LCD that occupies almost a third of the front panel. The frequency display characters are oversized black numbers on a yellow background that stand out in the

Table 1

### ICOM IC-228H 2-meter FM Transceiver, Serial no. 671-001094

#### Manufacturer's Claimed Specifications

Frequency coverage: receiver, 138.0 to 174.0 MHz; transmitter, 140.0 to 150.0 MHz. Specifications apply from 144 to 148 MHz only.

Mode of operation: FM.

Frequency display: Not specified.

Frequency resolution: 5 kHz.

Power requirements: 13.8 V dc ( $\pm 15\%$ ) at 9.5 A max on transmit and 800 mA on receive.

#### Transmitter

Power output: Low, 5 W; high, 45 W.

Spurious signal and harmonic suppression: Better than 60 dB.

#### Receiver

Receiver sensitivity: Better than 0.18  $\mu\text{V}$  for 12 dB SINAD.

Squelch sensitivity: Not specified.

Receiver audio output: More than 2.4 W at 10% distortion (THD) with an 8- $\Omega$  load.

Color: Black.

Size (height, width, depth): 1.97  $\times$  5.5  $\times$  6.25 inches.

Weight: 2.45 lbs.

#### Measured in ARRL Lab

As specified.

As specified.

6-digit LCD, black digits with amber background.

As specified.

13.8 V dc at 8.0 A on transmit (high power) and 3.0 A (low power), and 630 mA on receive.

#### Transmitter Dynamic Testing

Low, 5.1 W; high, 43 W at 146 MHz.

See Fig 1.

#### Receiver Dynamic Testing

0.18  $\mu\text{V}$  for 12 dB SINAD.

0.28  $\mu\text{V}$  for 20 dB quieting.

0.05  $\mu\text{V}$  min, 0.27  $\mu\text{V}$  max.

3.13 W at 10% THD with an 8- $\Omega$  load.

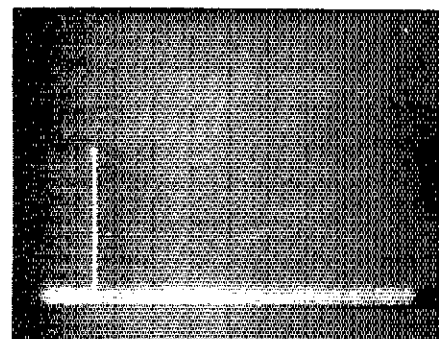


Fig 1—Worst-case spectral display of the ICOM IC-228H. Horizontal divisions are each 100 MHz; vertical divisions are each 10 dB. Output power is approximately 43 W at 146 MHz. The fundamental has been reduced approximately 31 dB by means of notch cavities to prevent analyzer overload. All harmonics and spurious emissions are at least 70 dB below peak fundamental output. The IC-228H complies with current FCC specifications for spectral purity.

most intense glare of the sun. At night, excellent backlighting highlights the display characters. Four levels of display backlighting—dim to bright—are available. So, when you're with your spouse, you can "set the mood" as you would with your dimmer-controlled dining room chandelier! Seriously, adjustable backlighting is a nice feature, and I used it a lot.

In addition to operating frequency, the LCD shows more than a dozen other operating parameters. Displayed parameters include selection of duplex operation (+ or - offset), VFO or memory operation, memory channel in use and selection of low (5 W) transmit power. Also shown are received-signal strength and relative RF-power output.

#### Other Features

Audio quality, both received and sent, is excellent. Full, deep, loud received audio is a key factor in enjoying QSOs in my noisy truck. Transmitter audio reports were good. The microphone didn't pick up ambient noise in my vehicle.

I hate things that beep at me. The IC-228H beeps when you touch just about any control. Fortunately, it's possible to turn the beep function off so you can enjoy blissful operation without the obnoxious beeps. Nice! (The way things are going, next year's models will have synthesized voice advisories like "you're 5 kHz off frequency," or "illegal to order pizza via autopatch, patch disconnected.")

Memory programming is a breeze: weird offsets, ups and downs—no problem. Priority and calling features allow you to listen on one frequency while spot-checking (every five seconds) another for calls. A touch of the CALL button brings you immediately to your favorite repeater. Tuning steps are easily programmed from 1 MHz down to 5 kHz, a useful feature when tuning large chunks of band space (the receiver covers 138-174 MHz).

If you're looking for someone to talk to on a lonely stretch of interstate, or if you want to mind somebody else's business in the public safety band, then scanning is essential. With the '228H, you can scan the entire band or selected frequencies within boundaries you set. You can scan just the memories, too. Memory skip allows you to skip selected channels.

Here are some other IC-228H features.

- The microphone has a 16-digit keypad, as well as UP/DN buttons for memory or frequency selection and scanning start/stop.
- If you press the MONITOR button, the squelch opens and you hear the input frequency of the repeater you're using so you can determine if your contact is within simplex range.
- The transmitter's 45-W output is handy if you're mobiling in some repeater's fringe, or in a mountainous area.
- The rig is durable. It survived bumps,

jolts, grinds, beer and pizza spills, in my dilapidated old pick-up truck.

• IC-228H is small. This is a big plus for owners of small cars; the '228H can be mounted just about anywhere. But, be sure to leave room for air circulation around the radio: At full power, the deep heat sink on the back of the chassis gets hot!

#### Summary

There's no sense in hiding it: The IC-228H is expensive! More than \$500 is a lot of money to pay for a 2-meter radio. But, it's no more expensive than other comparably equipped Japanese rigs. The yen is strong, and prices are high. If you're in the market for a new 2-meter mobile rig, and ready to plunk down big bucks, take a look at many models and brands, bells and whistles, and choose carefully. After having used this rig for four months, I'll bet my emergency brake release warning beeper that the IC-228H will be among your finalists.

Price class: \$540. Manufacturer: ICOM America, Inc, 2380-116th Av NE, Bellevue, WA 98004, tel 206-454-7619.

### AUSTIN CUSTOM ANTENNA'S METROPOLITAN TRIBAND VHF/UHF ANTENNA

Reviewed by Larry Wolfgang, WA3VIL

As I prepared to install the ICOM IC-900 multiband radio in my car to do a Product Review<sup>1</sup>, I realized that I did not have an antenna for 220 MHz. One of my favorite 2-meter repeaters in the Hartford area is linked with a 440-MHz repeater. Both repeaters use antennas from Austin Custom Antenna. In fact, a member of the repeater group had often told me about the performance of Austin antennas; it sounded almost too good to be true!

Several of the regulars on these repeaters were also using Austin mobile antennas, and one of them had recently installed a multiband antenna for use with a 144- and 440-MHz dual-band radio. About this same time, I saw some information about an Austin mobile antenna that covers 144, 220 and 440 MHz. So when I began to think about an antenna to go with the IC-900, I naturally wondered about reviewing the Metropolitan, as this triband antenna is called.

The 18-7/8-inch-long Metropolitan antenna consists of three sections (see the accompanying photo). The bottom section is 6 3/4 inches long and just over 1/2 inch thick. The middle section is also 6 3/4 inches long, but only about 5/16 inch thick. These two sections are rigid, and they are covered with a heavy layer of material that appears to be heat-shrinkable tubing. The top

<sup>1</sup>L. Wolfgang, "ICOM IC-900 Multiband VHF/UHF FM Mobile Transceiver," QST, Dec 1988, pp 37-40.

section is a 5-3/8 inch long steel whip. The bottom antenna section features a length of 3/8-inch threaded rod, so it can be attached to just about any standard mobile antenna mount. I used the review antenna with an optional Austin magnetic mount that includes a length of coaxial cable and a very powerful magnet.

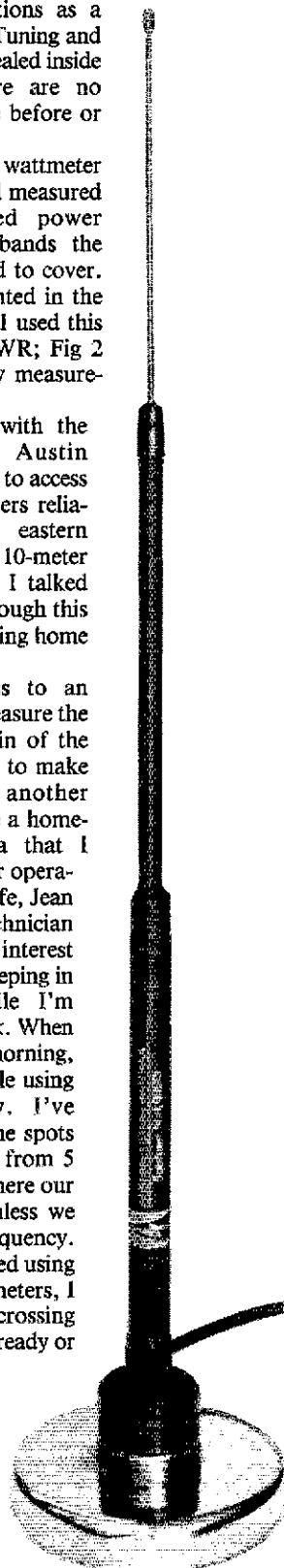
The Metropolitan operates as a 1/4-wavelength vertical on 144 and 220 MHz. On 440 MHz, it functions as a 3/4-wavelength antenna. Tuning and matching networks are sealed inside the antenna, and there are no adjustments to be made before or after installation.

I borrowed an RF wattmeter from the ARRL lab and measured forward and reflected power throughout the three bands the Metropolitan is designed to cover. (The antenna was mounted in the center of my car roof.) I used this data to calculate the SWR; Fig 2 shows the results of my measurements.

I was very pleased with the operation. Of the Austin Metropolitan. I was able to access several 220-MHz repeaters reliably, including one in eastern Connecticut that has a 10-meter link. On one occasion, I talked with a ham in Texas through this repeater while I was driving home from work.

I didn't have access to an antenna test range to measure the radiation pattern or gain of the antenna, but I was able to make a comparison with another 2-meter antenna. I have a home-made on-glass antenna that I normally use for 2-meter operation from my car. My wife, Jean (WB3IOS), has a Technician license. Most of Jean's interest in ham radio involves keeping in contact with me while I'm driving to and from work. When I leave for work in the morning, we often chat for a while using a simplex frequency. I've become familiar with the spots where I have to switch from 5 watts to 25 watts and where our conversation is over unless we change to a repeater frequency.

The first day that I tried using the Metropolitan on 2 meters, I suddenly found myself crossing the "conversation over, ready or not" line and wondering how much farther I would still be able to talk with Jean. When she mentioned that I was getting pretty noisy, I was about to sign clear until I real-



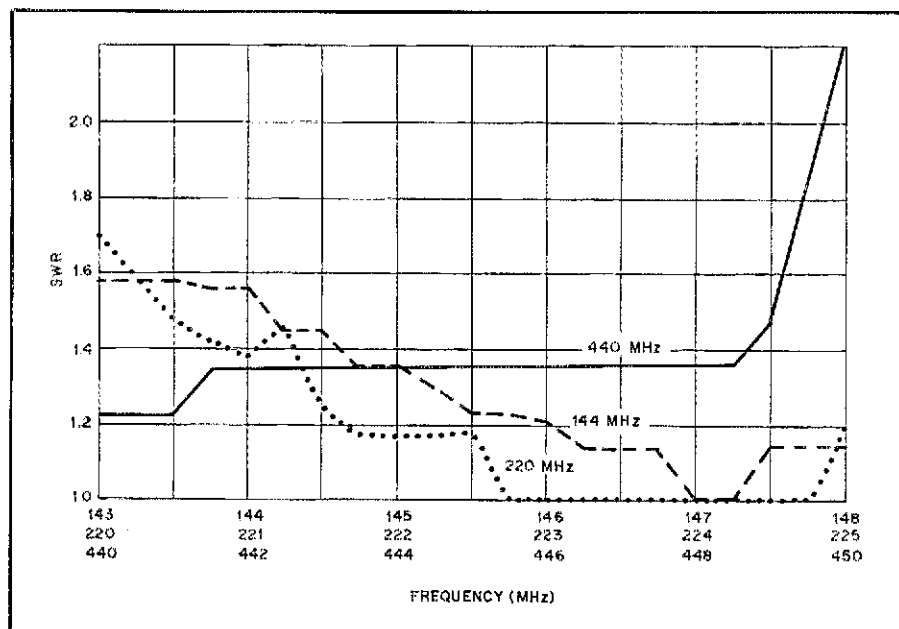


Fig 2—Graph of the measured SWR with the Austin Custom Antenna's Metropolitan Triband Antenna over the 144, 220 and 440-MHz bands. The antenna is usable over a wide range, including MARS frequencies between 143 and 144 MHz.

ized that I was still using low power! I switched to high power and was able to continue the conversation until I went over a hill that would block my signal no matter how much power I was using. We repeated that exercise for several days and then I switched back to the on-glass antenna. Sure enough, we lost contact at the old spot again. I don't know how much gain the Metropolitan has, but it works better than anything else I've used on my car.

The Metropolitan has been on my car continuously for several months. The antenna itself is in excellent condition. It has collected a bit of dirt and a few bugs between washings, but otherwise shows no negative effects from the weather. The heat-shrinkable tubing that covers the bottom two sections of the antenna is an effective seal against moisture. The

magnetic mount, however, is beginning to show some signs of weathering. Some rust is starting to show through the chrome on the top of the magnet. That surprises me.

To use this one antenna on two or three bands with the IC-900, you need a duplexer (or triplexer), since each band module has its own antenna connector. Some other dual-band radios have a built-in duplexer so they only have one antenna connector. The Metropolitan antenna is ideally suited for use with that type of radio. If you are looking for mobile antennas to cover the 144, 220 and 440-MHz bands, this one antenna may be just what you need.

Price class: Metropolitan triband antenna, \$40; magnetic mount, \$22.50. Manufacturer: Austin Custom Antenna, PO Box 357, Sandown, NH 03873, tel 603-887-2926.

## SOLICITATION FOR PRODUCT REVIEW EQUIPMENT BIDS

[In order to present the most objective reviews, ARRL purchases equipment "off-the-shelf" from Amateur Radio dealers. ARRL receives no remuneration for items presented in the Product Review or New Products columns. —Ed]

The following ARRL-purchased Product Review equipment is for sale to the highest bidder. Prices quoted are minimum acceptable bids and reflect a discount from the purchase price.

Sealed bids must be submitted by mail and be postmarked on or before January 27, 1989. Bids postmarked after the closing date will not be considered. Bids will be opened seven days after the closing postmark date. In the case of equal high bids, the high bid bearing the earliest postmark will be declared the successful bidder.

Please clearly identify the item you wish to bid on, using the manufacturer's name, model number, or other identification number if specified. Each item requires a separate bid and envelope. Shipping charges will be paid by the successful bidder, FOB Newington. The successful bidder will be advised by mail of the successful bid. No other notifications will be made, and no information will be given by telephone to anyone regarding final price or identity of the successful bidder.

Please send your bids to Kathy McGrath, Product Bids, ARRL, 225 Main St, Newington, CT 06111.

ICOM IC-900 VHF/UHF FM transceiver, serial no. 654-001349, with UX-29A 2-meter band unit and UX-39A 220-MHz band unit (sold as a package only; see Product Review, December 1988 *QST*). Minimum bid, \$673.

Yaesu FT-212RH 2-meter FM transceiver, serial no. 7N050451 (see Product Review, December 1988 *QST*). Minimum bid, \$264.

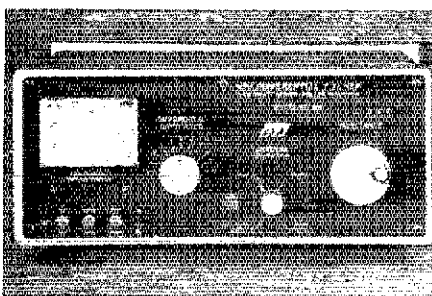
Yaesu FT-712RH 70-cm FM transceiver, serial no. 8C050021 (see Product Review, December 1988 *QST*). Minimum bid, \$290.



## New Products

### MFJ-986 DIFFERENTIAL-T ANTENNA TUNER

MFJ Enterprises of Starkville, Mississippi, has introduced the MFJ-986, a 3-kW roller inductor differential-T antenna tuner. The MFJ-986 tuner employs a single differential capacitor in place of two variable capacitors, simplifying the



antenna matching process. Other features of the MFJ-986 include an illuminated, two-color, peak or average cross-needle SWR/wattmeter, three-digit inductor position readout, and six-position antenna switch. The MFJ-986 is housed in a 10 3/4 x 4 1/2 x 15-inch black aluminum cabinet. Price class: \$239. For more information, contact MFJ Enterprises, 921 Louisville Rd, Starkville, MS 39759. —Tom Francis, NMIQ

## MORE ON RESONANT SPEAKERS

□ I read with interest the article by Wally Millard, K4JVT, concerning the construction of a resonant speaker for CW.<sup>1</sup> Using the editor's note that accompanied Wally's article, I decided on a four-inch-long piece of PVC that has an ID of 42 mm (1-5/8 inches). I mounted a 2-inch-diam speaker (Radio Shack® 40-245) to one end of the tube with electrical tape as suggested by K4JVT.

In order to test the resonance of the system, my son wrote a program in Microsoft® BASIC 3.0 for the Macintosh computer. This program allows me to modify and display the frequency of the tones produced at the speaker port. Using the Macintosh to drive the speaker system, a noticeable increase in volume was apparent at 870 Hz.

With some further experimentation, I found that an even stronger peak occurred—at a frequency somewhat lower than that of the open-ended tube—when the tube is placed open end down on a hard surface with a small space between the tube and supporting surface. Currently, I am supporting the tube on three pennies (Fig 1). This provides maximum output at 670 Hz—approximately 200 Hz lower than the “wide open” tube.

This project is very easy to construct, and is certainly worth the few dollars of investment needed for the parts. Any CW

<sup>1</sup>W. Millard, “A Resonant Speaker for CW,” Hints and Kinks, QST, Dec 1987, p 43.

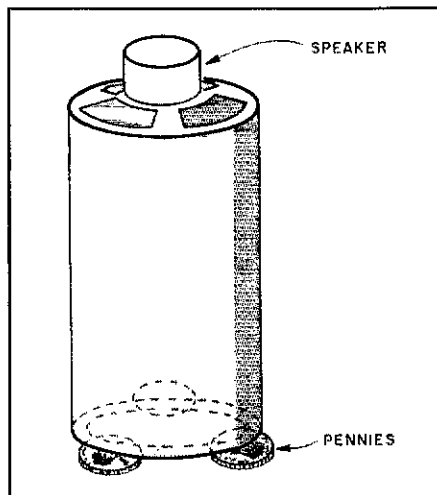


Fig 1—Richard Clemens increased the sharpness of his resonant speaker's peak by upending the tube and supporting the tube on three pennies. This also decreases the assembly's resonant frequency somewhat; see text.

enthusiast should enjoy the result. —Richard Clemens, KB8AOB, 103 Barbour St, Buckhannon, WV 26201

AK7M: There isn't space in Hints and Kinks to publish the Clemens resonant-speaker program, but Richard Clemens has graciously agreed to make a source code listing available for a no. 10 SASE carrying 25 cents postage. “Or,” Richard adds, “if interested readers are willing to send a formatted Macintosh disk and return postage, I would be happy to copy the software to their disk. [ARRL and QST in no way warrant this offer.—AK7M] Two items should be noted: (1) My son, Michael Clemens, is the author of the software (he adds his blessing to the project) and (2) the software has been placed on CompuServe™ and is currently available for downloading.”

## NOTES ON RESONANT SPEAKERS FOR ENHANCED CW RECEPTION

□ Resonant columns are somewhat like antennas: Short, fat pipes are low-Q, like cage or cone antennas; long, thin pipes are high-Q resonators. (Trying to use a resonant column as a sound generator can give you an idea of the importance of “acoustical Q” in a resonator: Blowing across a pop bottle produces a fairly well-defined tone with many overtones, like a flute. Producing any sort of tone with a pop can is difficult.)

A fat tube with a speaker in the end is not exactly a closed pipe, so formulas that attempt to characterize a speaker-tube assembly as such will fail. Instead of altering the length-to-diameter ratio with a plug, using a smaller-diameter pipe

should give a sharper resonance. (Consider the length-to-diameter ratio of organ pipes as a good starting point; their proportions are similar to those of a pencil.)

The 440-Hz peak Wally Millard heard may have been the speaker's free-air resonance (as modified by the presence of the resonant tube), which can be determined with the setup shown in Fig 2A. Matching the pipe length to the speaker's resonance will improve performance. A capacitor can be added to series-resonate the speaker inductance for an even sharper response (Fig 2B). This requires cut and try; use nonpolarized capacitors, paralleling capacitors of different values as needed.

For optimum results with a resonant speaker, especially at slower code speeds, I suggest using a tiny speaker resonating at 300 to 400 Hz (tune the speaker with a capacitor to accentuate the speaker's natural resonance). Once the speaker has been tuned, find the pipe length that matches the speaker's resonance and mount the speaker to the pipe. The speaker's free-air resonance shifts when the speaker is coupled to the pipe, so some fine tuning of the speaker tuning capacitors will probably be required. (Adjustment of the pipe length may also be necessary, so make the pipe longer than necessary to start with.)

I suggest using resonant speakers at pitches between 300 and 400 Hz because the ear is logarithmic in sensing volume and pitch. QRM at 700 Hz is about a whole step removed from a desired signal at 800 Hz, but almost half an octave removed at signal and QRM pitches of 300 and 200 Hz, respectively. Thus, lower received-signal pitches generally allow the ear to do a better job of distinguishing adjacent signals from one another.

By the way, graphic equalizers can also be used for tailoring audio response. Boosting a desired pitch and attenuating all other frequencies produces a well-defined passband. A stereo equalizer with both sections connected in series should provide more than adequate audio selectivity for general communication purposes.—Jim Weiss, W9ZMV, c/o WTAQ, La Grange, IL 60525

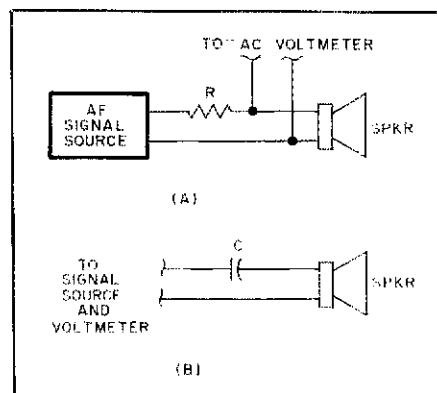


Fig 2—A setup for determining speaker resonance is shown at A. R (5 to 10 Ω) may be necessary for isolation between the audio source and tuned speaker. Speaker resonance is indicated by a voltmeter peak. Jim Weiss suggests enhancing the speaker's free-air resonance by means of a series capacitor or capacitors (B); if you do this, use your receiver or transceiver as an audio source to ensure that the capacitance selected allows for the effects of the rig's audio-output circuitry.

## AMPLIFIER TR RELAY SWITCHING INVERSION

□ Because I burned out a relay contact in my Drake TR-5 transceiver by switching the antenna relay in my Heath® SB-200 amplifier, James Hebert's January 1988 article on a solid-state antenna-relay switch caught my attention.<sup>2</sup> I wanted to use

<sup>2</sup>J. Hebert, “Using the SB-220 Amplifier with Solid-State Transceivers,” Hints and Kinks, QST, Jan 1988, page 45.

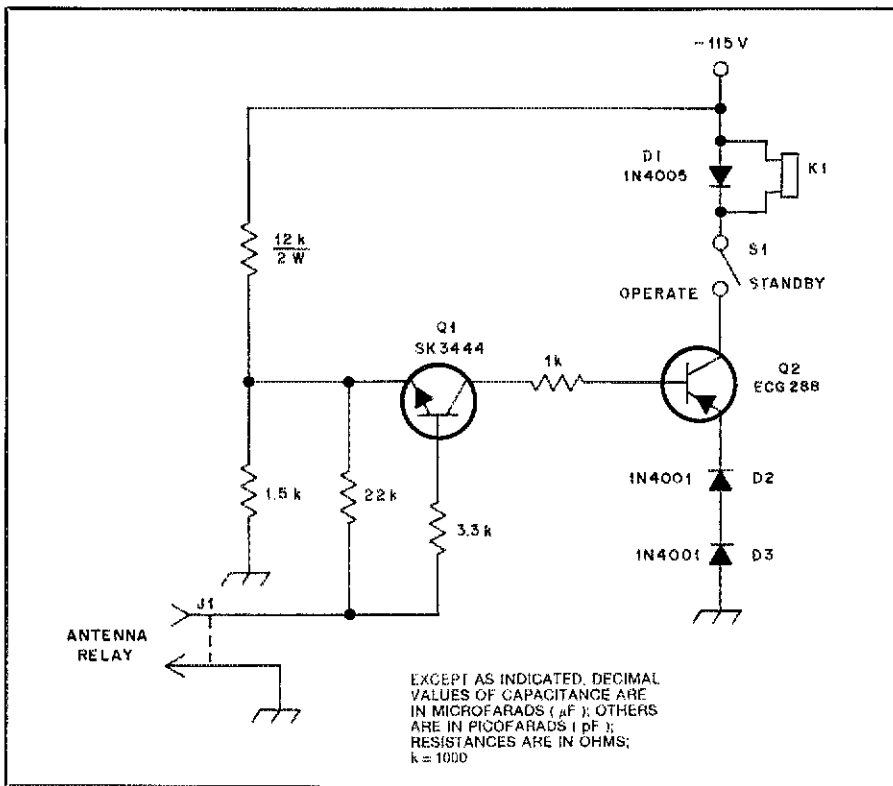


Fig 3—Wilbur Fulton modified the K8SS antenna-relay control circuit for use with the SB-200's negative antenna-relay supply as shown here. J1 and K1 are SB-200 parts; D1 is a 1-A, 600-PIV diode; D2 and D3 are 1-A, 50-PIV diodes and S1 is an SPST toggle. Resistors are 1/4-W, carbon-film units unless designated otherwise.

James' circuit, but the SB-200's antenna relay operates at *negative* 115 V dc instead of the +125 V used in the SB-220. With a few modifications, the circuit can key the SB-200 relay:

- 1) Substitute an SK3444 (PNP) for Q1.
- 2) Substitute an ECG288 (PNP) for Q2.
- 3) Reverse the polarity of D1-D3.

Fig 3 shows the revised circuit. The relay in my TR-5 now switches only 10 V at 0.8 mA.—*Wilbur S. Fulton, W2SE, Box 681, 7 Lakes, West End, NC 27376*

### BETTER SSB FOR THE COLLINS R-390A RECEIVER

The Collins R-390A is a great receiver except for its poor performance on SSB. The primary reason for this fault is an improper signal versus BFO level in the detector stage; with the BFO as weak as it is, the '390A's AGC range is insufficient to ensure undistorted reception of strong SSB signals. The addition of a single 33-kΩ resistor between the anode of the AGC rectifier tube (pin 6 or 7 of V510) and the grid of the AGC time constant tube (pin 7 of V511) gives the AGC a helping hand, producing excellent SSB quality.

You can test this modification without removing the R-390A's IF subchassis as follows: Extend the leads of a 33-kΩ, 1/2-watt resistor by soldering a length of solid, insulated hook-up wire to each resistor pigtail. Wrap the resistor and its

leads with insulating tape. Next, strip both of the extended resistor leads for 1/2 inch. Remove tube V510 from the R-390A IF subchassis and tightly wrap the bare end of one resistor lead around pin 6 or 7 at the tube base. Reinstall the tube, being careful that the twisted resistor wire remains insulated from the other tube pins and shield base when the tube is seated. Connect the other resistor lead to pin 7 of V511 in the same manner. Excellent SSB performance should be noticed, with no adverse effects on AGC time constant.

A more permanent modification would involve placing the 33-kΩ resistor in parallel with the series combination of resistors R556 and R557 inside the IF subchassis.—*Ken Johnson, N5US, PO Box 10063, Austin, TX 78766*

### GENERIC FILM FOR THE FILM-AND-PHOTOCOPIER PC-BOARD METHOD

In his article on PC-board fabrication,<sup>3</sup> Doug DeMaw mentions Meadowlake Tec 200 film, a commercial product useful in making photocopier-transferred PC-board patterns. I've had good results replacing Tec 200 film with 10-mil Mylar® film. Such film is often available from

<sup>3</sup>D. DeMaw, "Homemade Circuit Boards—Don't Fear Them!," *QST*, Aug 1987, pp 14-16 and 23.

paper suppliers or transformer manufacturing companies.—*Peter Robson, 18 Washington Tr, Hopatcong, NJ 07843*

### RFI-PROOFING A PHONOGRAPH TURNTABLE

I recently discovered that my wife's hi-fi setup (a Hitachi turntable and a Sherwood receiver) did *not* like me operating on 15-meter CW at 100 W output: Every time I tapped my key, a sound akin to a bass drum emanated from the speakers.

The first thing I checked was whether or not the speaker leads were acting as antennas and feeding RF into the receiver. I verified that the RFI was *not* entering the receiver via this route by disconnecting the speakers and listening to the stereo receiver with a pair of headphones. The interference persisted.

Working through the rest of the system interconnections in a systematic way, I discovered that the most significant interference reduction occurred when the phonograph input cables (shielded cables equipped with phono plugs) were disconnected from the back of the stereo set. This, of course, pointed to the record player as the primary culprit in my RFI problem.

I removed the bottom cover of the phonograph. At the exit point of the two phono cables, inside the turntable itself, I installed ferrite beads and 0.001-μF bypass capacitors as shown in Fig 4.

As a further measure, I took the precaution of bypassing the ac-power-cord wires to ground with two more 0.001-μF disc-ceramic bypass capacitors. Then I reassembled the phonograph.

To choke common-mode RF currents on the shields of the phono input cables, I wound both cables several times through a large ferrite toroid (the core of a discarded TV deflection-yoke coil). This concluded my modification of the record player.

Because many TVI/RFI solutions come about only with application of *several* cures in combination, I also replaced the "zip cord" stereo speaker leads with foil-shielded wire. Again using ferrite beads and 0.001-μF capacitors, I bypassed the speaker

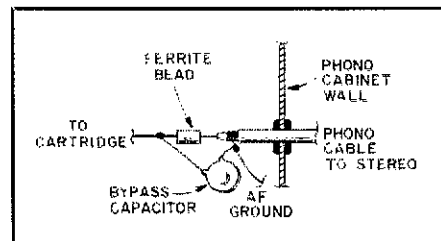


Fig 4—Battling a case of "hi-fi-I," Edward P. Swynar installed two RF-filter components at the phonograph end of each phono input lead as shown here for one cable. See text.



leads at the stereo-receiver speaker terminals. As a further precaution, I installed a good-quality high-pass filter at the receiver's FM-antenna terminals. Finally, I wrapped the receiver's ac-line cord around a 7-inch-long ferrite rod, securing the turns to the rod with electrician's tape. (This choke, I felt, would minimize common-mode conduction of RF up the line-cord wires.)

The result of all these maneuvers? My wife and I are friends again—and the RFI has gone for a hike!—*Edward Peter Swynar, VE3CUI, 48 Evergreen Dr, Whitby, ON L1N 6N6*

**AK7M:** For golden-eared audiophiles who cringe at the thought of bypassing high-impedance phono inputs ( $Z = 50\text{ k}\Omega$  for many magnetic cartridges) with  $0.001\text{-}\mu\text{F}$  capacitors ( $X = 10.8\text{ k}\Omega$  at  $15\text{ kHz}$ , the upper limit of the Record Industry Association of America's standard phono equalization curve), I suggest replacing the ferrite beads and  $0.001\text{-}\mu\text{F}$  capacitors in VE3CUI's phono-cable filters with  $1\text{-mH}$  chokes and  $100\text{-pF}$  disc-ceramic capacitors, respectively. At  $3.5\text{ MHz}$ ,  $100\text{ pF}$  looks like  $455\ \Omega$  and  $1\text{ mH}$  looks like  $22\text{ k}\Omega$ ; such a filter should be reasonably effective in suppressing HF interference. At  $15\text{ kHz}$ ,  $100\text{ pF}$  looks like  $106\text{ k}\Omega$  and  $1\text{ mH}$  looks like  $94\ \Omega$ —reactances that should have a minimal effect when used in parallel and series, respectively, with a  $50\text{-k}\Omega$  audio circuit. Beware of one potential snag when using solenoidal chokes in this application, though: They may introduce hum into the phono circuit in the presence of strong mains-ac fields.

### CURING AIR-CLEANER INTERFERENCE

□ My Heathkit® GDS-1297 electrostatic air cleaner worked fine as assembled, with the exception that it caused a loud frying noise in nearby MF and HF receivers, and snow on a TV in the same room. The unit's power supply—approximately  $6\text{ kV}$ —is clean. Only when the air-filter cell was connected to the supply did the noise appear. My cure? A simple T-section filter consisting of two  $1\text{-M}\Omega$  resistors and a  $500\text{-pF}$ ,  $7.5\text{-kV}$  capacitor to ground between the power supply and the air-filter cell (see Fig 5). This filter reduced the noise to an acceptable level.—*John L. Morris, W6YAR, 14427 Allingham Ave, Norwalk, CA 90650*

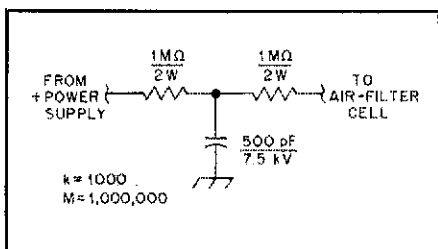


Fig 5—John Morris cleaned up air-cleaner interference with this simple T-section filter. See text.

### STOP THAT DRILL

□ To avoid overdrilling holes in sheet metal, find a piece of metal tubing about  $\frac{1}{4}$  inch shorter than the bit. Slip the tubing over the bit before drilling. The tubing limits the bit's travel and keeps the bit from damaging components behind the drilled surface. A stack of rubber grommets works well, too.—*Frank A. Reed, Jr, W6PWQ/7, PO Box 275, Langlois, OR 97450*

### CONTROL EXTENSIONS FOR THE ICOM IC-735 TRANSCEIVER

□ I'm sure there must be other fat-fingered hams out there who are proud but uncomfortable owners of IC-735s: proud because they own a '735, and uncomfortable when trying to use the tiny slide controls under the rig's front-panel trapdoor. The door can be removed easily: Just flip it to the horizontal position and pull.

Here's how I extended the IC-735's slide controls for easier operation. (These instructions are for one control.) Cut a bobby pin so that its loop end is about  $\frac{3}{4}$  inch long (Fig 6A). Slip small-diameter heat-shrink tubing over the pin ends as shown in Fig 6B. Shrink the tubing. Next, use a small screwdriver to spread the bobby-pin ends and slip the modified pin over one of the IC-735's slide controls. Push the control extender into place until it protrudes for  $\frac{5}{16}$  inch or so.

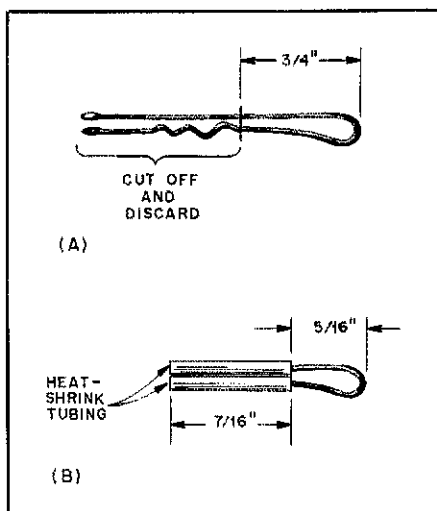


Fig 6—Larry Murdoch increases the "grabability" of his IC-735's slide controls with bobby pins modified as shown here.

This idea works well for me; I put these extenders on the IC-735 slide controls I use most: RF POWER, VOX DELAY, and MIC GAIN. Yes, they are removable!—*Larry D. Murdoch, K6AAW, 14370 Brian Rd, Red Bluff, CA 96080*

### HEAD-OPERATED TUNING FOR FREQUENCY-SLEWABLE TRANSCEIVERS

□ While renovating an old pair of boom-mic-equipped headphones, the idea occurred to me of controlling some of my new transceiver's functions at the headset. Many newer transceivers offer scan tuning that can be operated by UP and DOWN buttons on a microphone. I developed the scheme of using two mercury switches glued to each other at angles (Fig 7). By mounting this arrangement inside the headset, I reasoned, frequency control could be accomplished by simply tilting the head left for DOWN and right for UP. I tried the idea, and it works! With a little practice, I could fine-tune my transceiver with quick nods to either side.

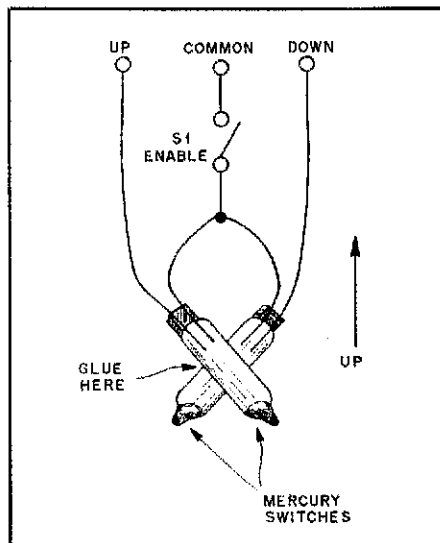


Fig 7—Bob Nagy's head-operated tuning scheme uses two mercury switches as UP and DOWN frequency-slewing controls. Mounted in a headset, they allow hands-off frequency excursions with rigs that include this feature. See text.

This little modification has applications for handicapped hams, of course, but it's a neat idea for anybody's shack. Be sure to include a switch (S1) to turn the circuit on and off, though: If you forget that the head-operated tuning is operative, you may think other stations are drifting every time you scratch your head!—*Bob Nagy, WA2TMD, 3303 Larry Ln, Austin, TX 78722*

### FIXES FOR 3-400Z AND 3-500Z TUBES

□ In investigating a filament failure in my home-brew push-pull 3-500Z 40-meter amplifier, I found something that I had never seen before. All wiring, the filament transformer and tube sockets were working correctly, but the series connected filaments of the tube would not light. I pulled the amplifier out of the relay rack and examined

the circuitry. It was easy to find which tube was at fault: Twisting one tube lightly in its socket caused both tubes to light. Examination of the tube base showed slight signs of heating on pin 1. (I just couldn't believe that a 3-500Z's filaments might burn out after only 3½ years of use!) Using a soldering iron, I melted the solder on pin 1 of this tube and an air bubble appeared—an indication that the pin had been improperly soldered to begin with. I resoldered the pin and everything worked fine. The other filament pin of the faulty tube was soldered properly, as were those of the other 3-500Z.

#### REMOVING GRID-TO-FILAMENT SHORTS IN 3-400Zs AND 3-500Zs

Since they were introduced in the 1960s, 3-400Z and 3-500Z vacuum tubes—particularly early versions—have been plagued with grid-to-filament shorts. In my opinion, this usually results from inadequate ventilation of the tubes, or from the improper operating conditions that can occur when 3-400Zs are replaced with 3-500Zs without adjusting the bias on the newer tubes.<sup>4</sup> (I did the latter myself on an early version of the original Henry 2K

amplifier and experienced nothing but grid-to-filament shorts—until I rebuilt the transmitter and changed the bias, that is!)

If the tubes are not severely damaged, grid-to-filament shorts can be removed by connecting 120 V ac (in series with a 120-V, 500-W incandescent lamp for current limiting) between pin 1 or 5 (filament) and pin 2, 3 or 4 (grid) of the tube base. Gently tap the tube with a soft piece of wood or similar material. This should clear the grid-to-filament short and restore the tube to useful service. *Wear eye protection* and take care not to contact the ac mains while doing this—and be careful not to break the tube!

Experience has shown me that removing grid-to-filament shorts with this technique eventually deteriorates the grid, the result of which is the flow of plate current even with the associated amplifier in standby. I don't consider this current to be a problem as long as it remains below 50 mA—I've

<sup>4</sup> A recent QST article suggests another possibility: that grid-to-filament shorts in these tubes can occur as a result of strong VHF parasitic oscillations. See R. Measures, "Improved Anode Parasitic Suppression for Modern Amplifier Tubes," QST, Oct 1988, pp 36-38, 66 and 89. —Ed.

been operating a pair of original carbon-plate 3-500Zs (purchased in the mid 1960s) in this way for over ten years! In standby, they draw about 45 mA. "Zapping" the grid-to-filament short circuits out of these tubes did not affect their output-power capability.

If your tubes are still under warranty and seem to harbor grid-to-filament shorts, contact the tube manufacturer instead of trying my zapping technique. If the tubes' warranty has expired, though, give my idea a try; you may be pleased with the results. —John O. Norback, W6KFFV, ARRL Assistant Technical Coordinator, 133 Pino Solo Ct, Nipomo, CA 93444

#### TOOTHPASTE AS A POLISHING AGENT

□ After accidentally scratching the digital readout on my Kenwood TR-2600A handheld transceiver, I wondered if the scratch could be removed. On a hunch, I discovered that the readout face could be polished to its original smoothness with toothpaste—by briskly rubbing a small amount of paste over the scratched area with tissue paper. Since then, I've found that this method works well on many soft plastics. —Ronald E. Wright, N9ADJ, 612 Forest Ave, Alton, IL 62002

## New Products

### KANTRONICS PRESS COMMUNICATIONS BOOKS

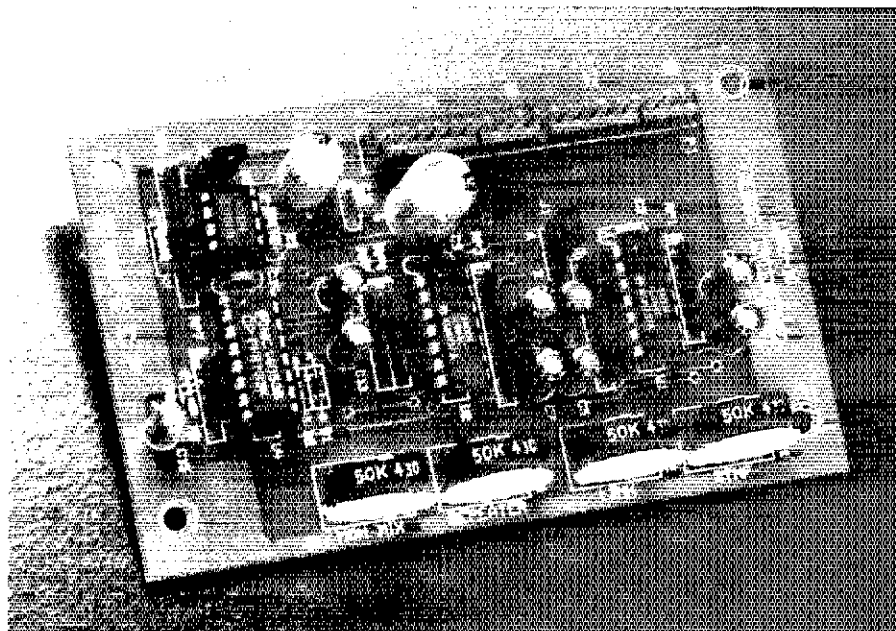
□ Kantronics Press, a subsidiary of Kantronics Company, Inc, is introducing a series of pocket-sized books suitable for Amateur Radio operators. Book titles include *Introduction to Packet Radio*, *Packet Command Handbook*, *Advanced Packet*, *The Hamfest Book*, *Beginning Packet* and *Communication Codes Handbook*. The retail price for each book is \$2.95 plus \$1 for shipping and handling. Foreign orders incur additional costs. All of these are available from Kantronics Company, Inc, 1202 E 23rd St, Lawrence, KS 66046, tel 913-842-7745. —Tom Francis, NMIQ

radio to any stand-alone repeater controller. Price class: \$44. For more information, contact Creative Control Products,

3185 Bunting Ave, Grand Junction, CO 81504, tel 303-434-9405. —Tom Francis, NMIQ

### UAI-10 UNIVERSAL AUDIO INTERFACE

□ The UAI-10, designed and built by Creative Control Products, is a repeater and link audio mixer featuring DTMF mute, DTMF output and monitor and mixing controls. This mixer will interface a repeater receiver, transmitter and link



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

## BIASING BIPOLAR RF TRANSISTORS

□ Bipolar RF transistor biasing circuits are usually misunderstood. Often, for the sake of convenience, the current-shunt diodes connected in parallel with the transistor base are incorrectly placed far from the transistor being biased. This effectively defeats the intended purpose of the diode: to provide thermal compensation of the bias supply current. In other words, if the diode doesn't get hot when the transistor does, the circuit won't work well.

The basic concept behind simple diode biasing is to feed the base of the transistor and the diode from a current source as shown in Fig 1A. The current source is often approximated with a large-value resistor (R1) hooked to the supply voltage. When a diode or transistor junction gets hot, its voltage drop for a given amount of current decreases. If D1 is omitted, decreased voltage drop across Q1's base-emitter junction results in increased base and collector current flow through Q1. This leads to a phenomenon known as thermal runaway.

The heated diode steals current from the transistor's base, preventing the transistor from drawing more current. For proper operation, select a diode having thermal characteristics that match those of the transistor with which it is to be used. Here's how: With a properly selected diode, the base bias current level will drop to normal when RF drive is removed. With no RF drive, the bias level should be relatively constant and exhibit little, if any, increase over time. Self-biasing problems caused by rectification of the driving RF signal do not appear to be a problem with current-source biasing using active current sources. As shown in Fig 1B, the LM317 adjustable regulator is easily configured as a current source.

It is possible to bias a bipolar transistor with a thermally compensated voltage source, as used in the 140-W amplifier built by Helge Granberg, K7ES, and described in *The 1987 ARRL Handbook*. The negative feedback is accomplished by means of a diode that is thermally coupled to the transistors. However, this circuit does not support the incorrect assertion that one can bias a transistor with a 0.7 V source—that rarely works without feedback.

Unfortunately for builders used to dealing with vacuum tubes and FETs, bipolar transistors aren't as easily modeled as voltage-controlled devices because they are current-controlled devices.—Zack Lau, KH6CP, ARRL Lab Engineer

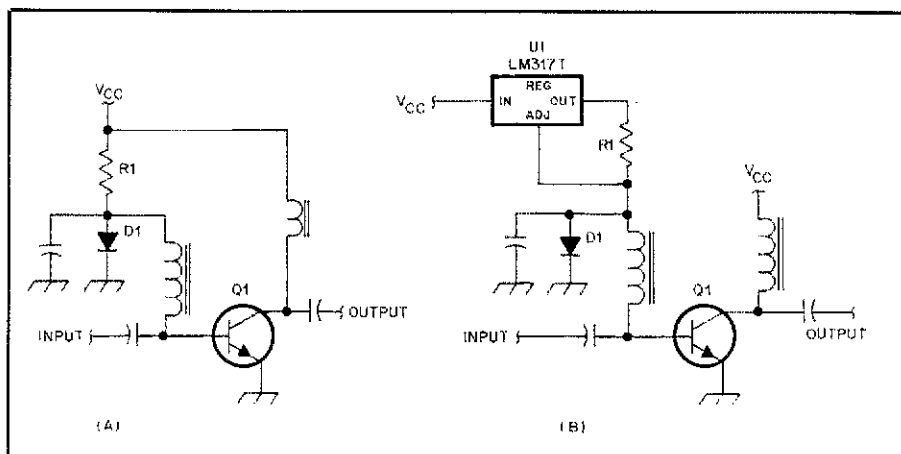


Fig 1—Two methods of biasing bipolar transistors with dc shunt diodes. See text for details.

## GROUNDING TECHNIQUES

□ The US Army Signal Corps recently reported on the results of improved grounding techniques for mobile field tactical radio stations.<sup>1</sup> These mobile stations are usually installed in trucks, and use vertical antennas. The ground system consists of a cable connected to a copper rod driven several feet into the earth. The typical ground resistance and RF impedance obtained, therefore, are often not optimal.

In order to improve the effective ground, field tests were made employing a number of ground rods mechanically connected in parallel around the mobile radio station. The ground rods were driven into the earth at various depths, and the resultant ground resistance and RF impedance measurements were recorded. Then the tests were repeated with ground rods mechanically connected in series and driven to different depths in the earth.

Analysis of the recorded data and the field radio transmission tests indicated that the use of four series-connected ground rods, driven only a foot or two into the earth, provided the most efficient ground system. These improved field grounding techniques should be applicable to Amateur Radio stations, particularly during Field Day operations.—Lt Col AUS (ret) David Talley, W2PF, Suite 1533-S, 10275 Collins Ave, Bal Harbour, FL 33154

<sup>1</sup>Signal, Mar 1988, pp 79-80.

## "SUPER DUMMY" RESISTOR CONSIDERATIONS

□ If you're thinking of constructing the Super Dummy,<sup>2</sup> you should be aware of some subtle differences between Carborundum's 889SP and 889AS resistors.<sup>3</sup> They both look the same, but the SP series is rated to 350°C, and the AS series is rated to only 230°C. More significant, though, is the performance of these resistors when immersed in cooling fluids. To quote the Carborundum catalog:

### Fluids

The power-handling capability of the resistors may also be increased by immersion in (cooling) fluids. Mineral oils, fluorocarbons, and silicones are often used. Many fluids will be limited in application by their own maximum temperature, not by the maximum temperature of the resistor.

### Type SP

These (cooling) fluids have no known effect upon type SP resistors except that they increase the ability of the resistors to dissipate power. They do not increase the ability of the resistors to handle high voltages.

### Type AS

Unless the resistors are protected by a coating that the fluid cannot permeate, [italics added] such as an epoxy, these fluids cause the

<sup>2</sup>See *The 1988 ARRL Handbook*, pp 34-22 to 34-23.

<sup>3</sup>The SP series resistors are available from RADIOKIT, PO Box 973, Pelham, NH 03076, tel 603-635-2235.

resistance of Type AS resistors to *increase* [italics added]. With some silicones, this increase is as little as 10%; with some mineral oils, this can be as much as 100%. Generally, the resistance will rise as the fluid permeates the resistor body, and it will finally stabilize...

—Dick Jansson, WD4FAB, ARRL TA, 1130 Willowbrook Trail, Maitland, FL 32751

### CYCLON-BATTERY DISCHARGE WARNING

□ Sealed rechargeable lead-acid batteries bearing the trade name Cyclon (made by Gates Energy Products) have appeared at local hamfests and at other sources. The ones seen most often are rated at 2.5 Ah, and are the same size as a D cell, although they are rated at 2 V each. One of the cautions printed on the battery label says to avoid shorting—*this warning should be followed scrupulously!*

The Cyclon cells have, according to the manufacturer's data sheet, a low internal impedance and are capable of high discharge rates. The X cell can put out 200 A, the J cell, 250 A, and the BC cell is capable of delivering up to 600 A. Even the lowly D cell is capable of delivering (for

a short time) over 100 A!

A local ham accidentally shorted a battery pack made up of four series-connected Cyclon D cells. The connecting wires were melted, and the cells spit out drops of molten metal and were destroyed.

Anyone using the Gates Cyclon cells should be aware of their tremendous short-circuit-current capability. Make sure the cells are fused as closely as practical to the battery terminals, and use care in installation.—Michael A. Czuhajewski, WA8MCO, Box 232, Jessup MD 20794

**Note:** All correspondence addressed to this column should bear the name, call sign and complete address of the sender. Please include a daytime telephone number at which you may be reached if necessary.

## Feedback

□ Please refer to "Build A Dummy Dipole!" *QST*, April 1985, p 52. There is an error in Equation 3. The proper form

of this equation is:

$$C = \frac{1}{(2\pi f_0)^2 L}$$

(Tnx to Fred Grant, AA4NG.)

□ In my article, "A Dipper Amplifier for Impedance Bridges," *QST*, Sep 1988, pp 24-25, I suggested that T1 should have a 25-turn primary and 9-turn secondary for use at 1.8 MHz. This was a calculation based on performance at 3.5 MHz. At 1.8 MHz, however, this number of turns provides insufficient inductance and results in a maximum reading of only 5  $\mu$ A on the bridge meter.

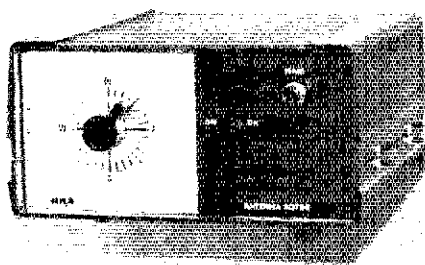
With the following modifications, a full-scale meter reading can be obtained from 1.8 MHz to 45 MHz when the bridge is looking at a 50- $\Omega$  resistive load and is set to maximum impedance. Use an FT-37-43 core for T1. Place 20 turns on the primary and 7 turns on the secondary. Increase the number of turns in the pick-up coil (L1) from 1½ to 2½.

As described in the article, the bridge works fine over the 3-60 MHz range. I apologize for the error and hope it did not inconvenience anyone.—Andrew S. Griffith, WAULD, 203 Lord Granville Dr, Rt 2, Morehead City, NC 28557

## New Products

### ROTATOR-CONTROL UNIT FOR VISUALLY IMPAIRED HAMS

□ Norm's Rotor Service, of Rockville, Maryland, is producing the HAM-SP rotator control for visually impaired hams. The HAM-SP controller works with the following rotators: TR-44 (series 3), CD-44 and -45-II, HAM-M series 3, 4 and 5, HAM-II, HAM-III, HAM-IV and Tailtwister. The controller will also work (after wiring modifications) with the following rotators: TR-44 (series 1 and 2), HAM-M (series 1 and 2). In all rotators used with the HAM-SP, the 500- $\Omega$  position-feedback potentiometer must be replaced with a 1-k $\Omega$  unit.



Operational functions of the HAM-SP are marked on the front panel in Braille and with panel labels. Operation of the HAM-SP is simple: twist the direction dial to the desired heading, push the start button, and listen for the rotation-indicator tone (2900 Hz,  $\pm$  500 Hz). The control takes care of

extracting the brake wedge, turning the rotator to the desired heading, and reinserting the brake wedge after a five-second delay. Price: \$249. Available from Norm's Rotor Service, 677 Southlawn Ln, Rockville, MD 20850, tel 301-340-0520.—Rus Healy, NJ2L

### How to Contribute to the W1AW Renovation Drive

• **By Mail:** Address all contributions to W1AW Fund Drive, 225 Main St, Newington CT 06111. Please make your check or money order payable to W1AW Renovation Fund.

• **By Phone:** For your convenience, credit-card contributions can be made by calling Jennifer at ARRL HQ, tel 203-666-1541, between 8 AM and 4 PM Eastern Time, weekdays.

All contributions are tax deductible to the extent allowed by law, as ARRL is a 501(c)(3) tax-exempt organization. Does your employer have a match-contribution program? Some major employers will match your contribution.

### Recognition

Contributors to the W1AW Fund Drive will be recognized as follows:

- *W1AW Kilowatt Club:* Those contributing \$1000 or more.
- *Hiram Percy Maxim Club:* Contributions of \$500-\$999
- *W1AW Century Club:* Contributions of \$100-\$499
- *W1AW Booster Club:* Contributions of up to \$100

All contributors will receive a handsome certificate, suitable for framing. Members of the *Hiram Percy Maxim* and *Kilowatt Clubs* will, in addition, have their name and call sign inscribed on a special plaque that will be on permanent display in the renovated W1AW Building. Members of the *Kilowatt Club* will receive a specially inscribed personalized plaque, which you'll be proud to display in your ham shack. In addition, special recognition will be given to those who donate substantially more than \$1000.

# New Books

## THE "GROUNDS" FOR LIGHTNING AND EMP PROTECTION

By Roger R. Block. Published by Polyphaser Corp, 1425 Industrial Wy, Gardnerville, NV 89410-1237. 1987 edition. Soft cover, 8½ × 11 inches, 108 pages, \$19.95.

Reviewed by Doug DeMaw, W1FB

If books with nontechnical language appeal to you, this may be a volume to add to your reference library. *The "Grounds" for Lightning and EMP Protection* contains a minimum number of formulas so that "a maximum number of people can understand and install good protection/ground systems for protecting communications equipment against all active pulses." This statement is found in the book's introduction, and it appears to me that the author has lived up to his pledge.

The text of the book was prepared in camera-ready form with a word processor. This is similar to the format of *W1FB's QRP Notebook* and *W1FB's Antenna Notebook*. The print is bold and clear, and the text is justified. Line drawings are provided where necessary. They are easy to read and are labeled adequately.

The chapter titles are: Current Distribution; UFER Grounds; Low Inductance Ground Rods and Connections; Guy Anchor Grounding; Ground Impedance; Inside Hut Grounding and Shielding; Protecting Remote Equipment from Power Source Surges; Tower-Top and High Rise Radio Equipment; Exploding the Myths about Lightning Protection; Protecting Equipment from EMP Damage; The Dynamic Testing of Grounds; A General Review of Standard; Radius of Protection and Side-Mounted Antennas; Security Cameras; CATV; Telephone Central Offices and Computers; Ethernet Protection Method; TVRO Systems; Utility Pole Supports; Towers on Buildings.

This book also contains an epilogue, a bibliography and two appendices. The chapters are short and to the point, which makes for comfortable reading. For instance, in chapter 7, the following quote shows this book's clarity in style: "Four-layer semiconductor protection devices are not limited to power-line applications. They also may be used on telephone or control lines. Sometimes they are used alone, sometimes in complex combinations (hybrids)." Another excerpt provides an example of the easy reading I find in this book: "In some installations, the tower-hut distance can be a 'pretty far piece.' Ground rods are needed. But how deeply they are driven into the earth, how far apart they are placed and how they are connected together is very important."

This book should be a useful reference in a radio-club library. Those who operate and maintain repeaters, especially, should find this book helpful, owing to the lofty heights where most repeaters are situated. But even the amateur with ordinary equipment and modest antennas can

benefit from the sound advice given in this volume. I'm sure that this book will be of value to members of the industrial fraternity also. I consider it recommended reading for all who need to protect electronic equipment from lightning and EMP damage.

## Conversion Between Geodetic and Grid Locator Systems

(continued from page 30)

eastern and western edges, so the longitude rounding term is 2.5'. (The rounding term must carry the same sign as that of other coordinate digits [negative rounding terms for negative longitudes and latitudes, positive rounding terms for positive longitudes and latitudes.]) Next, we'll calculate the latitude specified by DM13EK:

$$\begin{aligned} M &= +30^\circ \\ 3 &= +3^\circ \\ K &= +0^\circ 25' \\ \text{Round} &= +0^\circ 1.25' \end{aligned}$$

$$\text{Sum} = +33^\circ 26.25', \text{ or } 33^\circ 26.25' \text{ N latitude}$$

For six-character locators, the latitude rounding term is 1.25' because the region designated by a six-character locator is 2.5' wide in latitude. Again, the rounding term must carry the same sign as that of the other coordinate digits.

For four-character (grid-square) locators, the rounding terms are 1° (longitude) and 30' (latitude) because grid squares are 2° × 1° (longitude × latitude) in size. As before, the grid-square rounding terms must carry the same sign as that of the other digits in their respective coordinates.

For more examples of grid locators, see Table 7. Use the coordinates and grid locators shown there as a basis for practice in converting geodetic coordinates to grid locators, and vice versa.

The *Rand-McNally Road Atlas* can be used for estimating station locations by interpolating between the geodetic coordinates marked on the edges of the atlas' state maps. For the highest precision, use US Geological Survey quad sheets that cover your areas of interest.

### Summary

Tables 1 through 6, inclusive, provide a field-transportable method of converting between the geodetic and grid-locator systems. For Field Day exercises and VHF/UHF contests, the tables provide a means of cross-checking station coordinates when the station computer has been left at home.

### References

J. Lindholm, "VHF/UHF Century Club Awards," *QST*, Jan 1983, pp 49-51.

W. Overbeck, "A Universal Grid-Locator Program for Your Personal Computer," *QST*, Dec 1986, pp 30-31.

*Edmund T. Tyson became interested in Amateur Radio in the early 1940s. Entering military service in 1944, he worked in various career fields involving electronics. Assigned to Wright Field in 1953, Ed worked on airborne TV systems for reconnaissance. In 1957, he was assigned as project engineer to establish and operate an observatory for tracking and photographing satellites. Retiring after 33 years of military and civilian service, Ed has been involved in designing and building electronic and computer equipment for astronomical applications. He is currently involved in relocating a 48-inch telescope from New Mexico to California. He was licensed as a Technician in 1986 and upgraded to Advanced Class in 1988.*

## New Products

### VEHICULAR CALL-SIGN DISPLAYS

□ Sign On, of Merrick, New York, makes vehicular call-sign displays in two varieties: a magnetic vinyl sign for metal vehicle panels, and a suction-cup mounted version for inside-window mounting. The flexible, plastic 2- × 8-inch in-window signs are available in white lettering on black, blue or red backgrounds. Magnetic signs, also 2 × 8 inches, are available in black, blue or red lettering on a white background. Price: \$8.50 per sign, postpaid; volume discounts are available. For more information, contact Sign On, Dept PT, 1923 Edward Ln, Merrick, NY 11566.—*Rus Healy, NJ2L*



# The Non-DXpedition or Taking Your Radio On A Business Trip

By Robert R. Ramsaur, WA6MQF

11823 Lost Ranch Way  
Nevada City, CA 95959

Many amateurs have the opportunity to travel as part of their business or vocation. Business travel has its drawbacks as far as family responsibilities are concerned, but it does provide free evenings with few demands on your time. It sounds like a great opportunity to get on the air to me!

For the past 20 years, I have worked as a field engineer, and when work was over, I have been in contact with the world via ham radio. During these years, I have experimented with many radio and antenna systems using them in the portable mode. I have also encountered obstacles in the form of baggage handlers, zealous airport security officers, hotel/motel room layouts, damaged radios, low-gain antennas and low power levels. Dealing with these obstacles is an ongoing challenge for those who enjoy this type of radio operation. For me challenge is what life is about—remember, no pain, no glory!

I have just completed a 5-day trip where I was able to work 25 countries in 3 evenings. I did this with near QRP power and an antenna the size of a fishing pole. This adventure started in California and took me across three East Coast states and ended with a total of 35 international contacts. My business went as expected, but when my work was over, I could barely wait to get back to my hotel room. The band conditions were excellent, and I wanted to get on the air.

## What You Will Need

There are two major pieces of hardware necessary for portable operation. You must have a radio and an antenna. In addition you will also need a few accessories such as your amateur license, a power source, a log book and a key or microphone. There are also important personality traits that are needed to be successful at these types of endeavors. They are persistence, creativity and ingenuity.

Fortunately, for the traveling radio operator of today, there are many compact solid-state transceivers that will fit into a large suitcase and still leave room for a

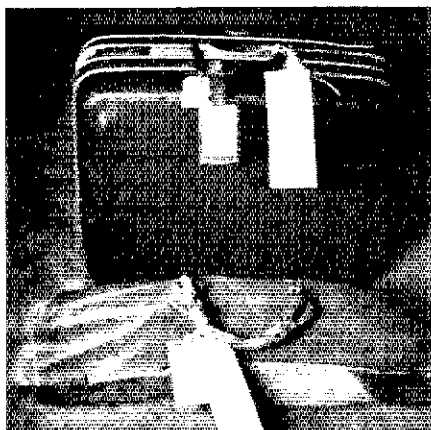


Fig 1—The WA6MQF station packed and ready for transit. (photos courtesy WA6MQF)

large suitcase and still leave room for a week's supply of clothing. As for the selection of the actual manufacturers and model numbers—that's up to each individual's preference. However, there are significant points to consider. The most important is general durability. It is hard to get on the air if you are spending all your time repairing your radio. Radio repair is difficult in the field, and you may not have access to the necessary parts. More about spares later in the article.

Right along with durability is transportability. Twenty years ago, I used a Collins KWM-2 transceiver for portable operation. The Collins people got together with the Samsonite luggage people and manufactured a suitcase. That is what it looked like on the outside, but on the inside it was custom molded to hold and protect a KWM-2 and PM-2 power supply. It also had storage pouches for accessories. This was an ideal setup for my portable operation. When the new generation of radios became available, I put the KWM-2 to work in my shack and replaced it with a compact solid-state transceiver. I still use the Collins CC-2 suitcase, but it now holds the transceiver, power supply, microphone, key, bug, headphones, antenna tuner, spares box, logbook, clock, *DXCC Countries List* and a week's worth of clothing. There are many manufacturers

that will provide shipping cases with each side filled with a block of foam rubber. These are used by photographers to make custom carrying cases and should also work for lightweight ham gear. The compactness of modern radio equipment has certainly made portable operation much easier now than it was 20 years ago. Fig 1 shows the entire station packed and ready for a trip.

If the radio is electronically reliable, but does not travel well, you may end up with a big problem—a broken radio. There are some basic packing techniques that will help the equipment survive travel. Place heavy items in the lower part of the case, being careful that they are cushioned on all sides. When packing the transceiver, it is especially important to make sure that the radio does not rest on its face. Most equipment cannot withstand much abuse to front panels. Be especially careful to protect the knobs and dials. Fig 2 shows the general layout I have found to be most reliable when packing my radio equipment in a suitcase.

## Other Features That Will Help

There are radio design features that will add to the effectiveness and reliability of the portable station. Your radio may be connected to less than the ideal antenna. My antennas have run the gamut. Protection to the final amplifier transistors is very important to me because I cannot always be sure of my antenna load. I'll likely be off the air for the rest of the trip if, the first time I key up the radio, I destroy my finals because of an antenna mismatch.

Another useful pair of features are an antenna tuner and SWR meter. These two items can compensate for the less than ideal antenna load that you may connect to your radio. My portable transceiver is a Ten Tec 525D. This radio has a built in forward/reverse RF power meter. I have constructed a compact antenna tuner that will provide my transceiver with a 50-ohm antenna load across all the bands. The circuit for the antenna tuner is the SPC Transmatch found in *The ARRL Handbook*. I have used low-power components and assembled them all in a 2½- × 5- × 5-inch steel box. Fig 3 shows this most valuable accessory.

Another desirable feature for the receiver is an impulse noise blanker. I have operated portable in large metropolitan areas. Signals radiated from automobiles with noisy ignition systems will drive your AGC

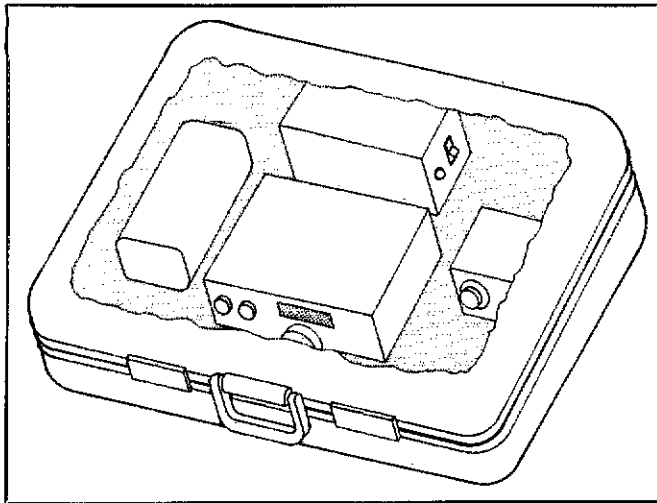


Fig 2—The radio equipment packed in a hard suitcase with the heavier items located near the bottom.

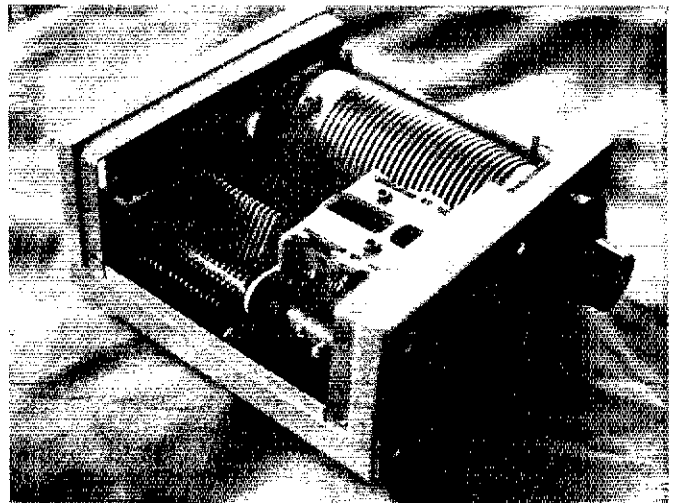


Fig 3—My home-brew antenna tuner is a valuable accessory.

circuits crazy if you do not use a noise blander.

### Antenna Considerations

Ask a group of hams their preferences as to which antenna is best, and you will usually get a different answer from each one. There is an abundance of technical information on antenna theory in *The ARRL Antenna Book* and other books on this subject, so I will limit my comments to those of installation, location, and transportability. The one most restricted element of the portable amateur radio station is the antenna. If the radio outing is a vacation in the forest, it is a relatively simple task to string up a 1/2-wave dipole. However, if you are staying on the 67th floor of a high-rise hotel in Manhattan, and your room window only opens three inches, a 40-meter dipole is out of the question.

I have been known to sneak up on the roof and install a 80/40-meter dipole, but those opportunities are few and far between. The majority of time, I have used vertical antennas with loading coils. Several companies make a mobile antenna system with different loading coils for each of the HF amateur bands. My system comprises a folding base section and a resonator with a whip. The base section is available in several formats. My version folds in the center. It is possible to disassemble the antenna mast at this folding point. The whip will also come completely free from the resonator. With these items disassembled, all pieces will fit into a carrying bag 30 inches long. Fig 4 shows the entire 5-band antenna system disassembled and ready to be put into the shipping bag. I modified a 90-degree shelf bracket to be used as a mounting point for the base section. This bracket is clamped to the window structure using locking pliers. I have taken the precaution to secure the pliers to the bracket with a safety strap. This is a must for safety reasons! I don't

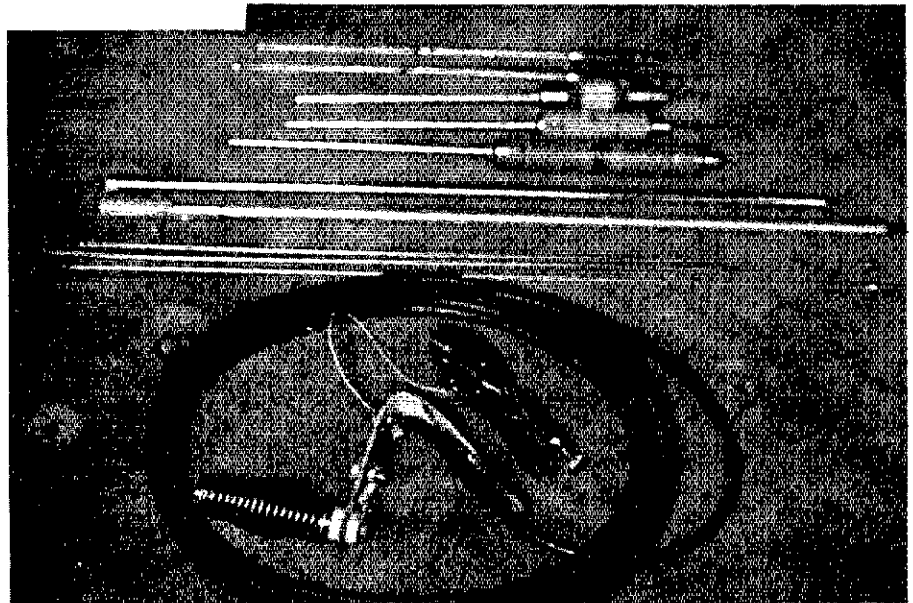


Fig 4—The entire 5-band portable antenna.

want to be responsible for the damage done by anything falling 67 stories. Fig 5 shows the antenna mounted to the window frame and ready to be used.

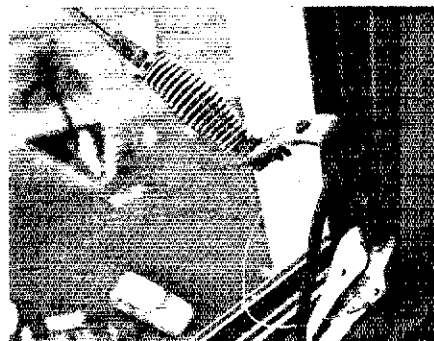


Fig 5—The antenna is mounted to the window frame with a bracket and locking pliers

I have noted varying degrees of success using portable antennas and have identified which installations seem to work the best. Let's say I will be staying on the East Coast. When I arrange for my accommodations, I ask for a room (1) with fresh air (one with a window that opens), (2) located two levels down from the top of the building, (3) with a view to the east. This location will give me the best chance to work Europe and Africa. The reason for the fresh air room is so that I will have a place to put my antenna. Beware that there are many hotels that have no windows that open. The reason for the choice of room location is antenna directionality. The metal structure behind the vertical antenna may act as an RF reflector. You've got to be sure to get the metal behind you, because it will block your signal otherwise. See Fig 6. Beware of overhangs above the antenna for they will greatly reduce the

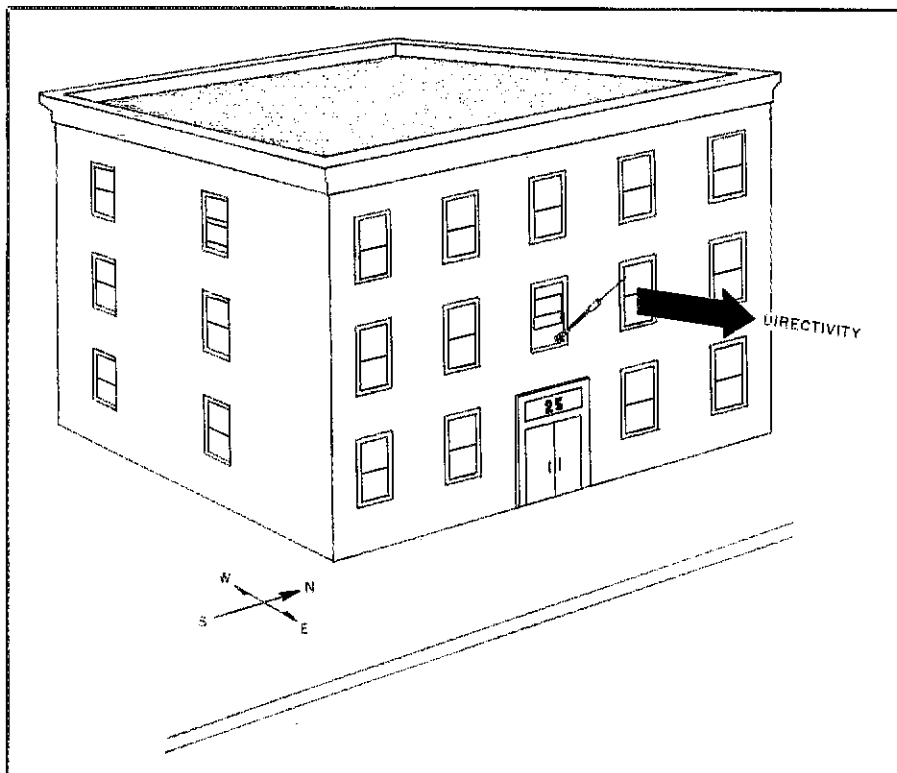


Fig 6—I make sure I ask for a room with a window facing the direction I want to operate, in this case, east.

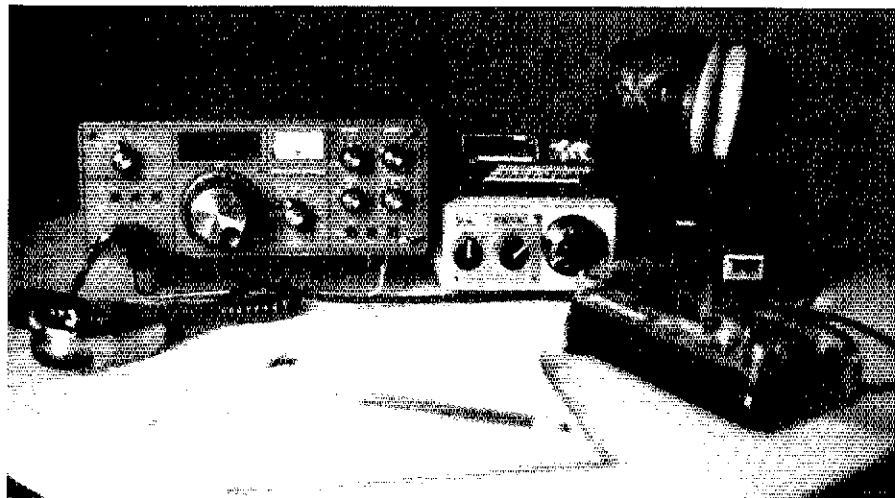


Fig 7—The complete station—ready to go.

effectiveness of this type of antenna system.

#### Additional Hints

Radios are noisy to some people. Be warned, not all the population staying in the hotel will be interested in 40-meter CW at 2 AM. I have opted to use headphones at all times. It really does cut down on the QRM given to you by guests in adjoining rooms. It will also keep down the visits from hotel security. I use a dual digital clock with date, local and UTC displays so my log will be accurate, a must for DX QSLs. My accessory bag contains other

items such as a microphone, a bug and a key. There have been times when I have needed an extra length of feed line or a power extension cord, or just a cube tap, so those items are also in my accessory pack. I am amazed at the number of times I have needed a cube tap to plug in my radio because all available outlets were already in use.

On most field trips there is little time for major repair of radio equipment, but I do have a small spares set that I carry with me. Remember you will have to carry all of this stuff. A list of my spares follows:

- (1) Fuses, 5 each (all values in radio and power supply)
- (2) Set of final transistors or tubes
- (3) Microphone key and antenna connectors
- (4) Jumper wire with alligator clips

Along with the above items, I carry an electronic tool set as part of my profession. The suggested items are listed below.

- (1) Soldering iron and solder
- (2) Miscellaneous screwdrivers
- (3) Needle nose and side cutter pliers
- (4) VOM (small digital)
- (5) Parts (miscellaneous resistors and capacitors in small box)

#### Installing the Station

After moving into my hotel room and unpacking my clothes, I check out the radio for shipping damage. The most common problem I have found is screws that have come loose.

I then assemble the antenna and clamp it on the room window frame, being careful to get as good a ground as possible. I run the feed line around the table leg a couple of times so that if the locking pliers pop loose, I won't have the antenna falling down 67 stories and the feed line pulling the radio out the window after it. Don't ask me why I decided to take this precaution.

I then put RF directly to the antenna and adjust the whip length for best SWR at the desired frequency. The SWR usually ends up around 2:1. The antenna tuner is then put in the line and adjusted for no reflected power. Now is a good time to turn on the TV and see if there are any TVI problems. The few problems I have encountered I dealt with by changes in my grounding system. Fig 7 shows my portable station fully assembled and ready to go on the air.

#### Operating Technique

After all the advanced planning, custom construction, shipping, setup and adjustment, there is still the final issue of operating technique. My experiences in the field have never included the luxury of high power or a high-gain antenna system. Whatever level of success I have achieved has come to me as a result of operating proficiency. I have found the QRP techniques discussed in several books to be most useful. I have had little luck calling CQ—instead I listen for stronger stations and call them.

I won't ruin your fun by telling you any more. I wouldn't want to rob the reader of the opportunity to experience the many joys and challenges that operating while traveling has to offer.

I have enjoyed the opportunity to have a portable station that I can take on my field trips. This opportunity has given me many hours on the air that I would not otherwise have had. It has also provided me with technical and operational challenges that have expanded my knowledge of Amateur Radio principles.



# Father Mike, the Voice of IMRA

## 1987 ARRL International Humanitarian Award Recipient

By Mary E. Schetgen, N7IAL, and Jeff Bauer, WA1MBK

**M**any active hams have had, at one time or another, the opportunity to aid an individual or group in an emergency situation through the use of Amateur Radio. For some hams, this experience blossoms into an all-out personal challenge to be ready at any time to handle emergency traffic and health-and-welfare messages. Often willing to spend many hours at the key or mike to provide a vital communications link with those needing help, these committed Amateur Radio operators exemplify the finest spirit of the Amateur Radio Service.

The Rev Michael F. Mullen, C.M., WB2GQW, known to most hams as Father Mike, has been a driving force behind the International Mission Radio Association (IMRA), an organization dedicated to worldwide missionary and emergency communications. As president, publicist, editor, filmmaker, media spokesman and leading net manager, Father Mike has brought universal recognition and attention to the work of the IMRA and its Amateur Radio emergency operations. With daily two-hour nets and check-ins from over 40 countries, IMRA has been a reliable source for news and information to missionaries and their families for over 25 years. In times

of natural disaster or government upheaval, IMRA and international Amateur Radio operators have worked in concert to quickly and efficiently handle emergency traffic and have brought messages of hope and relief to thousands of families and groups. In addition, Father Mike produced the popular video "Making Contact," whose many showings have helped heighten the public's knowledge of not only IMRA, but of Amateur Radio in general.

A member of the Catholic religious community known as Vincentians, Father Mike's educational training and teaching career have proved to be of inestimable benefit in publicizing the usefulness of Amateur Radio for routine and emergency communications. With Father Mike at the helm of the St John's University station, WAZKUX, for coordination of emergency relief and health-and-welfare messages, IMRA has continued its service to others through its network of dedicated, fast-response traffic handlers. Missionaries throughout the world now depend on Amateur Radio's vital advantage for making contacts when more conventional communications are not possible or practical. With an unflagging effort made to spread the word on an *international* level,

Father Mike's message of Amateur Radio goodwill has inspired many, both here and abroad, to become capable and experienced Amateur Radio operators... ready to assist when needed.

*The Officers, Directors, and members of ARRL wish to express their sincere appreciation to Father Mike Mullen, WB2GQW, for his exemplary service to his fellow man through Amateur Radio work with the International Mission Radio Association, Inc.*

□

### Learn More About IMRA

People helping people... a *wonderful* credo! The International Mission Radio Association is more than just a traffic net on 20 meters. It is a multifaceted support system for missionaries, their families and friends. More than simply a traffic pipeline to the States, IMRA provides all participants a sense of *personal* satisfaction in assisting others. If you are a traffic handler, you can help by sharing your well-honed operating skills and experience. If diagnosing an electronic bugaboo is your idea of having fun, there are missionaries in remote locations in need of your particular technical expertise via the IMRA on-the-air technical support system. Have capabilities for phone patching? The joy of providing perhaps the *only* available voice communications between loved ones who are separated by oh-so-many miles may be yours. Of course, help with the equipment bank is always welcome—and needed.

Just how does one get involved? The best way to test the water is to monitor the net's activities. Check 14.280 MHz, Monday through Saturday, 1830-2000 UTC. IMRA is known as the "family net," because its members are a close-knit and caring group. If what you hear sounds like something you would enjoy participating in, then jump right in—the water's fine! For more information about IMRA, write to Rev. Thomas Sable, S.J., University of Scranton, PA 18510.

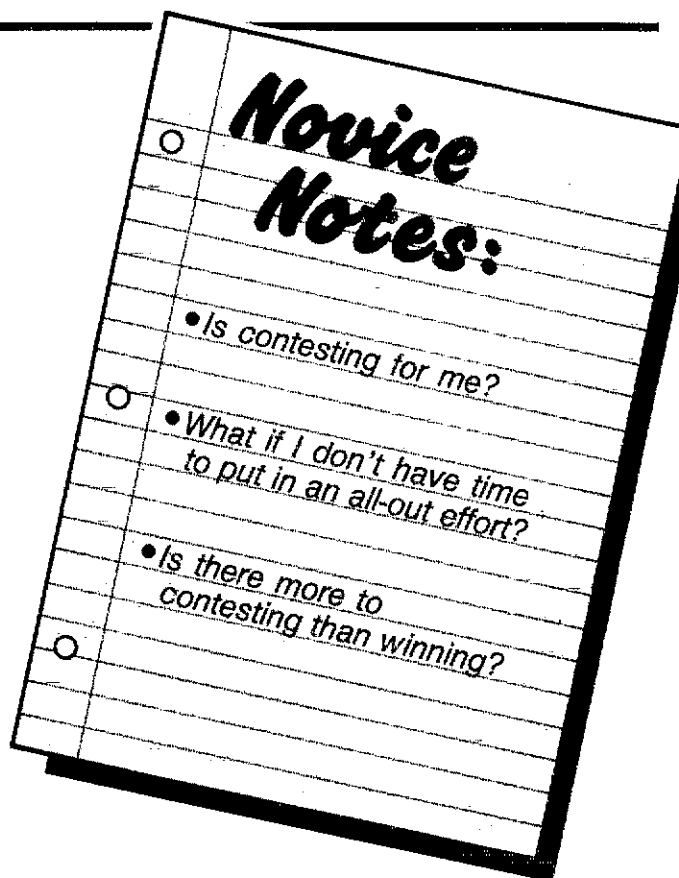


Father Mike, WB2GQW, in action at "Mission Control."

# Contests and You—Perfect Together

Superb conditions, Novice 10-meter SSB privileges and vast armies of contesters tuning your subband to work you: an ideal combination, whatever goals you've set in Amateur Radio.

By Robert J. Halprin, K1XA  
ARRL Contributing Editor  
PO Box 624  
Newington, CT 06111



**O**n-the-air contests are exciting, action-packed excursions that you can take right from your ham radio work station. What's the difference between that and conventional Amateur Radio operating? Well, contesting is like putting your normal hamming into fast forward. A rapid-fire information exchange is substituted for the more leisurely ragchew, and then onward to the next contact. You'll find it will really get your juices flowing! In a sense, you're actually exchanging the same kind of information that you would in a traditional ragchew, but the format is more concise.

For the next few years, band conditions will be as good as they ever are, particularly on 10 meters, so if you want to try contesting, this is the time. You can probably work more contacts during one day of a contest than you might normally work in a month. Moreover, when it comes to 10-meters, *everyone* (not just your Novice and Tech colleagues) tunes the Novice SSB portion, because they have the large Novice/Tech population foremost in mind. In so doing, the Novice SSB subband has become the nerve center of all 10-meter activity. With solar activity peaking such that 10 meters is wide open for worldwide communications throughout the day, the Novice SSB portion is the principal crossroads of the entire Amateur Radio contest world. So whatever you want to work,

you'll find it in *your* portion of the band.

## Contests Defined

Generally, a contest involves working as many different stations as possible in a predetermined period of time (usually a weekend). Depending upon the individual contest, a premium is placed on working specific types of stations in different geographical areas (which could be states, ARRL sections, DXCC countries, grid squares and so on). The geographical areas are called "multipliers." Contests

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*It's perfectly fine to sit down at the rig and work a few stations, then take a break or call it quits.*

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sometimes have elaborate methods for determining your final "score," which is generally determined by the number of QSOs (two-way contacts) or QSO points times the number of multipliers. But you don't have to bother with the arithmetic

unless you plan on submitting your log to the organization sponsoring the contest.

With all this talk of keeping score, multipliers and so forth, it's important to keep in mind that radio contests are not just for that small hard-core group of eccentrics that are out to "win." It's perfectly fine to sit down at the rig and work a few stations, then take a break or call it quits. It's all up to you; you're free to choose when, where and how long. It's the multitude of casual participants that keep the contest program alive and well; without amateurs just like you, many of the so-called "serious" contesters would quickly run out of other contesters to work after the first few hours and things would be painfully slow and boring. Moreover, the contest environment is perfect if you want to qualify for awards in a minimum amount of time, indulge your competitive spirit by filling up your log sheet, develop crisp operating procedures (including increasing your code speed), expand your knowledge of propagation or test your antenna system.

Please understand that the purpose of this article is *not* to discuss the relative merits of contests versus other operating activities and/or spectrum usages. If you don't like contests, fine. Those who suggest that exchanging programmed, if not prepackaged, information with faceless hordes doesn't make any sense may have

a very good point. But despite this obvious flaw from the pure logic standpoint, the sport of contesting, to whatever extent it's pursued, is nevertheless great fun and provides one of the most potent forms of stimulation that ham radio has to offer. If you've had the urge from time to time to join in, even for a fleeting moment, then this article will provide some, I hope, practical suggestions.

### Freedom of Choice

The great thing about contests is that you can decide at the spur of the moment whether you want to participate or not. You can get into a contest merely when the mood strikes, make 25 contacts, and resume whatever else you were doing—whether it be mowing the lawn, watching the game, playing with the kids or protest-marching for giraffe rights.

You don't need to preregister and you don't need any official forms (unless you later decide to submit your log). You don't need to wait on line all night to get tickets. You don't even need to go to the Olympic Training Center in Colorado Springs to get into shape. Just tune across the bands, say on a Saturday morning when you have a spare half hour or so. If you come across a spirited concentration of signals that might be the ham-radio equivalent of the feeding-frenzy surrounding Dan Quayle's first national press conference or the new version of "The War of the Worlds," it's a contest!

Rest assured that not all radio contests are going to cause that kind of commotion. Contests come in all shapes and sizes (and modes) virtually every weekend. See the Contest Corral in *QST* for specific details on all kinds of fun contests. The smaller contests are fine, and are often the best place to get your feet wet. These sorts of contests fit neatly into a small amount of spectrum without attracting undue attention. But if your operating time is limited, you'll probably want to get on when there is going to be the liveliest activity. That is to say, in this case at least, bigger might be better; unless the bands are alive with wall-to-wall signals, it may not be worth your while to operate at all. Therefore, in Table 1, I have (admittedly subjectively) listed what I consider the "major" contests of the year, limited to those that can boast appreciable Novice activity.

By way of explanation, I made a big effort in the 1987 and 1988 ARRL 10-Meter Contests, CW-only category, yet only worked a handful of Novices in the Novice CW subband. The vast amount of activity was on the SSB portion of the band. This is not meant as a criticism, it's merely an observation. For CW enthusiasts like me, the ARRL DX Contest CW weekend in February and the November Sweepstakes and CQ Worldwide CW weekend in November are like the World Series or Super Bowl. You'll note, however, that they don't appear in Table 1 because all of the tumult takes place essentially within the

**Table 1**

### Major HF Contests for Novice Activity

Month	Contest	Scope	Exchange	Details in:
Feb	ARRL Novice Roundup (phone & CW)	Novices/Techs work others	Signal report & ARRL section	Jan <i>QST</i>
Mar	ARRL DX Contest, phone	W/VE stations work DXCC countries	W/VE stations: Signal report & state (or province)	Dec <i>QST</i>
Mar	CQ WPX (prefix) Contest, phone	All stations can work each other	Signal report & consecutive QSO serial number	Contest Corral, Feb <i>QST</i> or Jan <i>CQ</i>
Jun	All Asian DX Contest, phone	Asian stations work all others	Signal report & age	Contest Corral, May <i>QST</i>
Jun	ARRL Field Day (phone & CW)	primarily W/VE stations	Transmitter "class" & ARRL section	May <i>QST</i>
Jul	IARU HF World Championship	All stations can work each other	Signal report & ITU zone	May <i>QST</i>
Sep	Worked All Europe, phone	EU stations work all others	Signal report & consecutive QSO serial number	Contest Corral, Jul <i>QST</i>
Oct	CQ Worldwide DX Contest, phone	All stations can work each other	Signal report & CQ zone	Contest Corral, Oct <i>QST</i> or Sep <i>CQ</i>
Nov	ARRL Sweepstakes phone	W/VE stations work each other only	See rules for details	Oct <i>QST</i>
Dec	ARRL 10-Meter Contest	All stations can work each other	W/VE stations: signal report & ARRL section	Nov <i>QST</i>

first 50-70 kHz or so of the low end; unfortunately, activity does not extend into the Novice subbands for most CW contests for the most part. Operating those extraordinary CW contests is a treat that you can look forward to just as soon as you upgrade to General (and will be the subject of a future article).

As suggested previously, when the FCC enacted Novice Enhancement, Novices and Techs were given a choice phone segment on 10 meters, 28.3 to 28.5 MHz, which has become the *mainstream* DX and contest portion of the band. You're not missing anything on 10 meters; in fact, most of the phone activity of that band has gravitated to (and adjacent to) the Novice SSB segment. Now that informed sources indicate that Cycle 22 has commenced, you can look forward to several years of strong signals and solid propagation to all corners of the world. It will be one big party, and all you need is 100 watts and a comparatively simple antenna. (On 10, effective beam antennas tend to be small and light, making for relatively easy installation).

The bottom line is that insofar as Novices are concerned, you can maximize your contest success (other than in the Novice Roundup and Field Day, where

there is intense and abundant activity on the Novice CW bands) by invoking your 10-meter SSB privileges in the major contests listed in Table 1. Ten-meter SSB is where the high-volume contest action is for Novices in terms of DX (that is, long-distance) communications, and that's what the rest of this article will concentrate on.

### Qualifying for Awards

DX-type contest contacts and awards are usually interrelated. If you're hunting for DXCC, Worked All States (WAS), Worked All Continents (WAC), the new ARRL Diamond Jubilee award (see October 1988 *QST*, page 59) or the many other certificates that are available, keep in mind that making the required contacts for those certificates is often, if accomplished solely via routine operating, rather time consuming. In the fast-paced environment of a major contest, when all sorts of stations from rare states and countries show up and are workable with reasonable effort, you'll be surprised how quickly you can rack up the QSOs you need for awards, since these operators are placing their complete emphasis on working as many stations as possible in the shortest amount of time. Moreover, you'll be amazed at all the states, countries and what-have-you that



Nickle, KB5ETO, operated 10-meter phone for the Southwest Dallas ARC (K5HJ) during Field Day. At the right is SWL Randy, who assisted with logging at the Novice station.



Charlie, KB4WEH, with SWL Ryan, was running 'em on the Novice portion of 10 meters for the W4KS Field Day effort.

will be ripe for the taking during a contest, while maintaining radio silence at other times. Each contest is a unique adventure, with the challenge of the unexpected waiting on every frequency.

Sure, exchanging information machine-gun style is not what you would really call true interpersonal communication (which gives rise to all the perfectly reasonable criticisms of contesting mentioned previously). However, you may want to get your WAS out of the way quickly, so that you can sit back and relax and converse with stations of your choice to your heart's content otherwise.

Look at it this way. You could spend months plumbing the depths of 40 or 15 meters looking for a Maine or Montana ragchewer with which to finish up your WAS. Or you could snag one in a 15-second contact while you're tuning the band during a contest. The former is a lot more "up close and personal," but the latter is a more efficient use of both your time and the radio spectrum. Indeed, it's simply a more effective method of time management that will result in many beautiful certificates, signifying your operating skill, adorning the walls of your radio room. (Look for an special article under the Novice Notes heading about awards chasing in a near-future issue of *QST*.)

#### Contest Hints and Etiquette on 10-Meter Phone

Suppose it's December and you decide you want to put in a few hours in the ARRL 10-Meter Contest, where you can work both US and DX stations. Or March has rolled around, and you feel you'd like to give the ARRL DX Contest (phone) a shot on 10. Here are some suggestions (admittedly from an East Coast perspective—as they say on the TV networks, check your local listings for time in your area!) that you may want to consider.

- Operating time: If you only have a few hours, consider getting on first thing in the

morning for as long as you can; if conditions are right, 10 should be wide open to Europe. The mornings are prime, so don't miss this opening if you can. Later, at your local sunset and an hour or so after, get on and work some JAs and other Pacific stuff. (BY4RB in the People's Republic of China has recently been worked locally on the Novice SSB portion at around 2330 UTC. A Connecticut station, running a barefoot transceiver and a small beam, got through on one call.) During the course of the day, you'll find Caribbean DXpeditions, Central and South Americans and many areas of the US coming through. If you have a chance, the afternoon hours could yield some African contacts, although the volume of contacts during these non-peak periods will be limited. Generally, the band will be closed in the late evening and night hours.

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*If you only have a few hours, consider getting on first thing in the morning for as long as you can.*

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On a recent Sunday morning, in the midst of writing this article, I decided to casually tune around the 10-meter SSB Novice band at about 1400 UTC with a communications receiver and a non-directional antenna just to see what was on. The band was loaded with DX signals: Italy, East and West Germany, the Soviet Union, Czechoslovakia, Finland, Hungary, Sweden, Norway, Poland and a host of others, plus many Midwest, South and West Coast US stations. All these stations had strong signals and were being easily

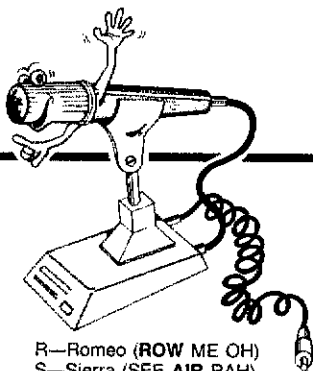
worked by many Novices running modest stations probably a lot like yours and mine. Undoubtedly, your station is good enough to get your share too. And this wasn't a contest weekend even. If it was, expect perhaps 100 times this level of activity!

- *Day:* In a 48-hour contest, even the so-called "big guns" and/or DXpeditions start running out of persons to work, particularly on Sunday. So they'll really appreciate your answering their "CQ Contest." For this reason, if you have a choice of, say, operating either Saturday or Sunday, pick Sunday. The pileups will also have diminished somewhat on some of the rarer stuff, and you'll have a much better chance of getting through. By the way, keep in mind that the "big gun" contesters are persons exactly like you who happen to have, at that moment in time, the opportunity to operate from a station with a big antenna or from a state or country that is considered "rare" within the context of the contest.

- *The exchange* (that is, the specific QSO information that the contest rules require you to send and receive): Before you jump in, take a moment to review the rules of the contest (see the Contest Corral column in *QST* for details) so that you know precisely what information you need to transmit to the station you want to work. For example, in the ARRL DX Contest, the exchange for US stations is signal report and state (DX stations respond with signal report and power), which will be obvious in a quick scan of the rules (or you could also just listen around the band until you figure out what the appropriate exchange is).

It would be poor form in the DX Contest to call a station and give him your ZIP code or the serial number of your 2-meter handheld. It would be just as impolite to waylay him with Dragnet-style questions about what QSO information he (or she) needs when you can find that out for yourself easy enough. Again, just take a few minutes to skim the rules and you'll be fine. (Listening around first also gives you a good idea

**Table 2**  
**The ITU Phonetic Alphabet**



**Phonetically Speaking**

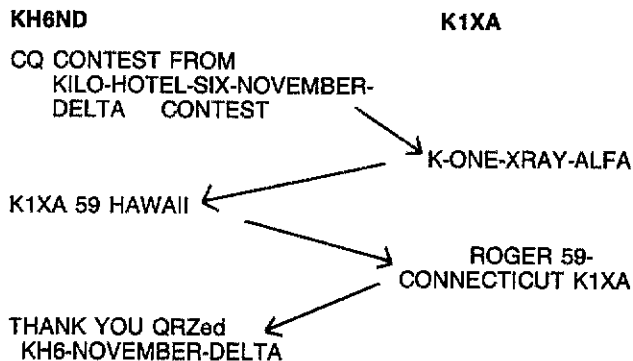
These International Telecommunication Union phonetics can help you get voice messages through noise and interference. See the text for how to use them.

A—Alfa ( <b>AL</b> FAH)	I—India ( <b>IN</b> DEE AH)	R—Romeo ( <b>ROW</b> ME OH)
B—Bravo ( <b>BR</b> AH VOH)	J—Julieta ( <b>JEW</b> LEE ETT)	S—Sierra ( <b>SEE</b> AIR RAH)
C—Charlie ( <b>CHAR</b> LEE or <b>SHAR</b> LEE)	K—Kilo ( <b>KEY</b> LOH)	T—Tango ( <b>TANG</b> GO)
D—Delta ( <b>DELL</b> TAH)	L—Lima ( <b>LEE</b> MAH)	U—Uniform ( <b>YOU</b> NEE FORM or <b>OO</b> NEE FORM)
E—Echo ( <b>ECK</b> OH)	M—Mike ( <b>MIKE</b> )	V—Victor ( <b>VIK</b> TAH)
F—Foxtrot ( <b>FOKS</b> TROT)	N—November ( <b>NO</b> VEM BER)	W—Whiskey ( <b>WISS</b> KEY)
G—Golf ( <b>GOLF</b> )	O—Oscar ( <b>OSS</b> CAH)	X—X-ray ( <b>ECKS</b> RAY)
H—Hotel ( <b>HOH</b> TELL)	P—Papa ( <b>PAH</b> PAH)	Y—Yankee ( <b>YANG</b> KEY)
	Q—Quebec ( <b>KEH</b> BECK)	Z—Zulu ( <b>ZOO</b> LOO)

Note: The **boldfaced** syllables are emphasized. The pronunciations shown in this table were designed for speakers from all international languages. The pronunciations given for "Oscar" and "Victor" may seem awkward to English-speaking people in the US.

**Table 3**  
**A Sample SSB Contest Contact**

Suppose you're tuning the 10-meter Novice portion and hear Mike, KH6ND, working the contest. It dawns on you immediately that you still need Hawaii for your Worked All States (WAS) award, and you've been looking around for a KH6 during casual operating conditions with no success. You've determined what the appropriate contest exchange is, your rig is properly tuned up and your beam (if you have one) is pointed in Mike's direction. So you're ready to fly. Here's how you might work KH6ND in the contest (please substitute your own call, phonetics and appropriate contest exchange under "K1XA"):



Short and sweet, and he's in the log. The contact, and your WAS is history. You don't need to be a Robert DeNiro to remember all your lines in this little drama. And the nice thing is that everyone wins. You get KH6 to bring your WAS effort to closure and KH6ND gets another contact (and perhaps a multiplier to boot) for his contest effort.

as to who's there—whether or not the band is open, and to where. Listen carefully—perhaps you'll locate a rare but somewhat weak DX station that no one else has found yet. You can successfully make a two-way contact, getting in and out before the inevitable pileup begins—sort of like the early-bird special at the local diner.)

Unless you're in a big pileup which necessitates dumping your call sign in several times to get the other station's attention, call the station *once* using ITU standard phonetics. The ITU phonetic alphabet (see Table 2) is generally understood by hams in all countries, so if you want amateurs everywhere to understand you, stick to the

standard phonetics. (Moreover, the use of nonstandard phonetics is often more confusing than using no phonetics at all.) If the station called indicates that he doesn't have your call complete, that's your cue to say it again phonetically. Otherwise, just say your call sign normally (that is, sans phonetics) as you give the other station your QSO information exchange. See Table 3 for a sample contest-contact format.

Remember too that FCC rules do not require you to sign the other station's call at all, so don't overwhelm the operator of the other station with your rendition of his call sign over and over (rest assured the other operator *already* has a fairly good idea what *his* call sign is and needs no prompting!).

And please, just send your exchange *once*—and don't include any extraneous information if you can help it. For those who are trying to compile a decent score, time is of the essence. If the other station needs a repeat, he'll ask for it. Obviously, being basically friendly creatures, we all have a natural inclination to talk a bit; but in contests, unlike some of the other Amateur Radio interest areas, brevity is what we strive for so that all concerned can make as many contacts as possible within the available operating time. Keep your response plain and simple, and speak clearly.

Contest operators, both DX and state-side, are more comfortable with "bare-bones" contacts anyway, so please be sensitive to this. Shorter contacts, particularly on 10 meters, are often better during unsettled band conditions; this allows as many stations as possible to work whatever DX or contest multiplier might be coming through. Fading or interference may cut your contact short anyway if you go on yakking. Keep in mind that the operator who is calling CQ and running strings of stations is sort of like a busy switchboard operator or auctioneer; it wouldn't be sporting to disrupt what he's trying to accomplish with everyone else.

• *Tuning:* Although the Novice phone subband starts at 28.3 MHz, the activity may not be so hot until you get somewhat farther up. Try tuning from 28.4 MHz up, perhaps (depending upon where the concentration of activity begins). As mentioned before, tune around until you feel comfortable and acclimated to the goings on. Then, each time you hear someone calling "CQ Contest," give him a call and try to work him. This is called "hunting (or searching) and pouncing." Think of it as if you were in the supermarket, tooling down the aisles with your shopping cart, stopping only to select an item from the shelf that you want to buy.

The basic idea of hunting and pouncing is to start at one one of the band and methodically work your way up to the other end, trying to contact all the stations you haven't already worked in between. Or you can be more selective and only make contacts with those stations in states or DXCC

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***The basic idea of hunting and pouncing is to start at one end of the band and methodically work your way up to the other end, trying to contact all the stations you haven't already worked in between.***

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countries and the like that you need for awards or some other distinct purpose. There will be plenty of loud signals for you to choose from on the band, so it's up to you. Once you get to the top of the band, reverse direction and start hunting and pouncing from the high end down to either the end of the activity or 28.3 MHz, whichever comes first.

If you come across a station who's working callers one after another in a hefty pileup, and you have dumped your call in a few times without success, don't lose heart. Make a note of the exact frequency for later reference and keep tuning for other stations. As indicated before, there will be an ample supply of stations to work, so don't be obsessed with just one. Then, when you return later, you might find the frequency much less crowded and getting through will be a heck of a lot easier. Also, you might find a weaker station in that same country or state just a few kilohertz higher, calling CQ with no takers. You'll be able to jump right in and work him.

As you get more experience, you may want to stake out your own frequency and call "CQ Contest" to see if you can get a bunch of stations coming back to you. The late Andy Warhol said everyone will be famous for 15 minutes, and running stations on your own frequency may be your way to instant celebrity status! If you do this, make sure that you have carefully listened and found a frequency that appears unoccupied by any other station. It's not good form to "step on" a fellow amateur. Calling CQ effectively (please keep your CQ calls relatively short) also requires getting the attention of the other stations and motivating them to call you. It's helpful to have a decent signal when you seek to get their attention; knowledge of your station's capabilities is required to make that determination—the contest environment is the best place to answer that question. Snappy operating is one of the effective ways to motivate them to call you. Another way is to get on the air when the contest is nearly over, and everyone is looking for "fresh meat," especially if you're located in a rare multiplier!

By and large, however, concentrating on the hunt/search and pounce mode (or, as they say at the local radio club, "search and destroy"!)) will be the most proper allocation of your resources if you're new to contesting.

• **Logging:** Use any log form that is convenient for you. Make sure you're logging in a coherent way so that you can go back and send for QSL cards if that's what you want, and be sure to log in UTC (Universal Coordinated Time, formerly GMT), *not* local time. Similar to the use of standard phonetics, the use of UTC assures that amateurs regardless of where they are log the contact in the same time system, thus eliminating any time-zone confusion. If you intend to send the log in to the contest sponsor (such as the ARRL or *CQ Magazine*), it's a good idea to write for the official forms. But don't bother if, for whatever reason, you have no interest in sending your log in. Once you've developed a "comfort zone" in contesting, you might want to submit your log as an official entry—by then, you might be in the running for a contest certificate in your category.

If you're working quite a few stations, or (if you're like me), your memory has become somewhat feeble, maintenance of a duplicate sheet ("dupe sheet") is a critical aid to hunting. The dupe sheet (available from ARRL HQ for ARRL contests) is a matrix-type form upon which you put the calls of the stations you've worked as you worked them. You can usually only work a station once per band for contest credit, so a quick glance at your dupe sheet will indicate to you if you've already worked that station. It's a little embarrassing (and a waste of both operators' time) to call someone you've already worked.

The purists may not agree, but I give everyone a 59 (actually 599 for my CW-contest endeavors, since I'm seldom a participant in phone contests) when a signal report is required. It eliminates one unnecessary detail (which is also why my car has an automatic transmission!); in this way, superfluous log entries are minimized.

Obviously, 59 in the literal sense means that you've maxed-out as far as signal strength is concerned. And I fully understand that not every signal encountered in a contest will max out. But I can write 59 (599) at the top of the first page of my log under "exchange sent" and never have to bother with entering it again for the rest of the contest. Generally most everyone sends 59 (599) in return, too. So under "exchange received," I can write 59 at the top and dispense with writing in 59 for each contact unless another station sends something other than 59. In those unique cases, I log the specific report received. Look, I know that one of the stated goals of contests is to determine how well you're station is getting out. But S-meters are generally inaccurate anyway; the very act of getting through (or not) to the various contest stations inherently provides an excellent indication of how well you're doing, and what station improvements you may or may not need to

bring on-line.

• **Peripherals:** Have several sharpened pencils (preferred over pens because of the ease of making corrections), your favorite beverage to keep the vocal cords well lubricated, a digital clock set to UTC and a pair of good communications headphones. (Speakers aren't nearly as sensitive as 'phones, especially for picking out the weak ones, and the use of headphones also avoids disturbing the household.) Have a copy of the *ARRL DXCC Countries List* at your operating position. It will help identify the countries you're working and serve as a checklist for your DXCC progress; the *Countries List* booklet is especially key when the DX station is using a special (that is, unconventional) prefix. A quick reference to the international call sign prefix list will instantly reveal the country of origin of that unusual sounding prefix. If you have a rotatable antenna on 10, make sure your beam-heading chart is at hand. That way you can aim your antenna directly at the location you wish to work, for maximum signal strength in the desired direction. I like to have some decent food within immediate reach (preferably not sticky or gooey) that I can easily wolf down without getting it all over myself or the equipment. My solution: Bagels, which (along with vitamins and coffee) have kept me going strong in many a contest.

For more information on contesting, DXing, QSLing and operating in general, see *The ARRL Operating Manual*. For an excellent discussion of 10-meter operation, see "Plain Talk about Voice Operation" by Dave Newkirk, AK7M, which appeared under the Novice Notes banner in June 1987 *QST*. These sources were a great help to me in preparing this article.

#### **A Final Thought: Always Have Fun**

So next time you're tuning across 10 meters and you hear the equivalent of the compelling hustle-bustle associated either with a rock video, the Morton Downey Jr show or the conduct of the salesmen on the floor of the New York Stock Exchange, consider that contesting is a part of what makes our Amateur Radio hobby rich and colorful. It's also the express lane to qualifying for all kinds of awards. And if you're "in search of excellence" in Amateur Radio operating, contests are where you'll find it.

So how about broadening your Amateur Radio experience and having some fun by personally savoring the friendly competition of contests? Contests are feisty, productive and a whirlwind of excitement. But please remember to only operate at your own pace and within your available spare time. Each participant in a contest gains expertise, learns a little more about propagation and becomes a better operator, more equipped to explore some new area of the Amateur Radio art, all while having a good time! But fundamentally, an Amateur Radio contest is an operating event held over a predefined time period that really has only one principal goal: to enjoy yourself to the fullest.

# Beyond the Ham Bands

Perhaps you've wondered about the usefulness of the general frequency coverage of your transceiver—Wonder no more!

By Gerry L. Dexter

RR4 Box 110  
Lake Geneva, WI 53147

**U**nexplored areas pictured on ancient maps often bore the legend "here there be dragons." The average amateur doesn't believe there are dragons roaming around in the lands beyond the borders of 20, 40 and 80 meters, but it's likely that belief isn't the result of personal exploration.

Saurians aside, hams are more likely to think there's nothing worth tuning in these frequency ranges. While they are right about the dragons, they're wrong to think that these regions are as dull as a one-street town on a weeknight.

Shortwave radio outside the amateur bands offers an astounding collection of voices and noises that can never be completely explored. This kaleidoscope of sound changes by the second. It is a world of preachers and propagandists, of pirates and poachers. A world of broadcasters, maritime and aero, military and point-to-point communications. A world out in the open and a world with dark and dangerous back alleys.

## Tuning the Bands

Let's flick on our state-of-the-art communications receiver and spend an evening touring these areas. Perhaps I can give you a sense of what's out there beyond the ham bands.

If we tune down from 14.150, past the foreign phone segment of 20 meters and on through the CW portion, then out the back door below 14.000, we soon find ourselves in one of the newly designated shortwave broadcasting bands (22 meters—13.600-13.800). Here's some rock and roll on 13.680. Would you believe this is the World Service of Radio Moscow? Rock on the Soviet international service—Glasnost seems to have wrought some wondrous things. They're also using the band for other services such as Radio Peace and Progress, Radiostansiya Atlantika (Atlantic Radio Station) and relays of the foreign services of the various republic broadcasters such as Radio Kiev.

The US recently began allowing use of 22 meters by nongovernment broadcasters. Religious station WYFR, in Florida, parks on 13.695 all day long.

Further down we stop at an SSB signal on 13.285. It proves to be an airliner in con-



Bob Thomann (l) and Bob Zanotti present "Swiss Shortwave Merry-Go-Round" each week on Swiss Radio International. The program features media news and tips for DX listeners.

tact with the Toronto airport. They're asking airport officials to have a customs interception standing by when the plane lands—it seems there's a passenger who has a live bird that will need to be processed. A bird requiring customs clearance is on the lighthearted side compared to some of the things one can pick up on the aeronautical frequencies. It's not uncommon to hear requests for emergency medical teams to be standing by to aid a stricken passenger, or reports of trouble with the aircraft itself.

Internationally known Israeli journalist Michael Gurdus has scooped the world on several occasions simply because he knows when and where to tune for military, aero and other communications on shortwave. He once listened as a hijacker killed an airline passenger. Ordinary, nonprofessional monitors occasionally catch high administration officials, even the President himself, speaking 'in the clear' from Air Force One. And even the most casual scan of the shortwave bands may well produce reception of a Strategic Air Command transmission, although only insiders can make any sense out of the complex alphanumeric code words being used.

Let's jump back up in frequency, to 15.580 in the 19-meter band. Here's KUSW in Salt Lake City, one of the more recent of a flood of US shortwave broadcasters that have come on the air since 1982. Most of these are religious in content; KUSW is one of only two that are strictly commercial ventures (the other is WRNO in New Orleans). One of the biggest is the Christian

Science Monitor, which put WCSN on the air a few years ago and soon after that purchased financially troubled KYOI on Saipan. Now they're building a 500 kW station in South Carolina, due on the air in 1989.

## Faraway Lands

The digital readout says 15.495 as we hear Arabic music, creating visions of Bedouins, bazaars and belly dancers. The station is Radio Kuwait. Listen to these folks through the day and you'll catch everything from rock and pop to tangos to jazz, marches and country-western. They try to please everybody by covering all the musical bases.

Just a little lower, on 15.474, we're in time to hear the sign-off announcement for Radio Nacional Arcangel San Gabriel, an Argentine station that isn't in Argentina. The transmitter is at Esperanza Base in Argentine Antarctica. And it's not alone at the bottom of the world—the US Navy's Antarctic Support Force operates AFAN at McMurdo as a local radio service.

How are our friends on 15.084 doing? A check and we find the usual strong signal with indigenous music and talks in Farsi from the Voice of the Islamic Republic of Iran. For reasons no one seems to know, the Ayatollah doesn't make much of an effort to tell his story to listeners in the western world. There's an hour of English each day (1930-2030 UTC on 9.022), but it isn't received nearly as well as the all-day broadcasts on 15.084. Radio Baghdad in Iraq does a much better job, with two hours of English for North America (currently 0000-0200 on 11.775). But much of the venom one would expect these two countries to spit at each other is kept to the local language services as well as unofficially supported "freedom" stations that the two countries beam at each other.

Let's drop down to the 31-meter band and check out some things there. 9.960 turns up a continuing mystery: Radio Caiman (Alligator) pumping out pop music and anti-Castro commentary. The powerful, rock-steady signal carries some very professionally done programming, but never a mention of ownership or location. Monitors who specialize in this type of thing have made virtually no progress on this puzzle.

Another anti-Castro voice recently returned to the airwaves. "Commandante David" got considerable publicity with his



This is the transmitting room for Trans World Radio's facility on Bonaire in the Netherlands Antilles.

broadcasts, FCC bust, subsequent court appearances and the eventual dropping of charges several years ago. Now "David," or someone using his nom de plume, is appearing with a station calling itself "Radio Libertad Cubana y Radio Felipe de la Cruz." He's active local Monday, Wednesday and Friday nights around 0100 UTC in the 7.045-7.075 region.

As we tune higher, 9.770 presents us with Radio Beijing and an English-language broadcast for North America. It's not completely what it seems though, because the broadcast is actually being relayed through the government broadcaster in Mali. China helped refurbish that facility and gets partial use of the transmitters as compensation. Beijing has made a major effort in recent years to provide more reliable signals for many parts of the world, including North America. It also works time exchanges with government transmitters in Switzerland and Spain.

In an hour we can swing back up to this vicinity (9.615) and catch the start of the two-hour English service from Radio RSA in South Africa. Even more interesting are the local South African stations such as Radio Five (from 0300 on 4.880) which come complete with pop music, local news and even cigarette commercials!

A little bit before 0330 we want to check 4.972. If the often-present strong interference on 4.975 is gone, we should hear the sound of a rooster crowing and the opening announcements in Portuguese for the Voice of the Resistance of the Black Cockerel. This is Jonas Savimbi's UNITA opposition radio broadcasting from in or near Angola. Like Radio Caiman, Radio Libertad Cubana and many others, it is a clandestine broadcaster out to do what it can to bring down a government its backers oppose.

Now move up a bit to 5.030 and find still another curious broadcaster: Radio Impacto from near San Jose, Costa Rica. This is a licensed Costa Rican station that rarely, if ever, airs a commercial. It does air plenty of pro-Contra, anti-Sandinista programs, though. Armed guards are reported to be stationed at the ramshackle white house that is home to the station.

#### All Right Sports Fans

Given the right season of the year, earlier in the evening we might have caught a local 60-meter Brazilian station with a soccer broadcast. You think John Madden gets excited, these soccer announcers (in Portuguese) put him to shame. The record for the longest "goooooooooalllll" announcement is believed to be 47 seconds!

Late in the evening we can tune up to 4.996, just below WWV, and catch the sound of an entirely different culture. Radio Andina in Huancayo, Peru is often there with hour upon hour of huayno music dedications. The only description that applies to the huayno is "haunting." And "addictive"!

#### Playing the Numbers

Go lower, down to 4.670, and we hear a woman's voice reading numbers, groups of five, in Spanish. This is one of the so-called "numbers" stations, which have been around for some 25 years. Despite extensive and intensive research by monitors who have made these stations their special interest, no final answers have been found. Spanish is the most commonly heard language, but there are others, including German, Korean, Russian and Chinese.

We can take a quick run through the area right above the amateur 40-meter band, which has been dubbed "the pirate band." Unlicensed broadcasters are most likely to

be found in this 7.300-7.500 range on weekends and around holidays. Radio Newyork International made a big media splash when it broadcast for a couple of days from aboard a ship. These things don't appear very often, for obvious reasons, and most are fairly harmless. One pirate does support various freedom movements and another preaches white supremacy.

#### That's Not All Folks!

All of this activity comes to only a fraction of one percent of what's out there to be heard on the nonamateur frequencies. There's enough work here to keep Sherlock Holmes, Sam Spade and Thomas Magnum busy for a lifetime!

There wasn't time tonight to listen to the chatter of tugboat captains plying the Mississippi River or to check air-route weather forecasts from Gander, Shannon or New York VOLMET radios, or to have another try at catching a couple of drug smugglers arranging a delivery. These types are said to hang out somewhere above the amateur 20-meter band. And we also missed the "Media Network" show on Radio Netherlands. It's one of the best sources for news about electronic media anywhere.

There are more things to try and listen to regularly, to scout around for and check into than there are hours in the day in which to do them all. Several dozen countries program English to North America, and there are some 1500 broadcasters on shortwave, plus thousands of aero, maritime, military and other transmitters in use.

Hundreds of thousands of people are buying sleek shortwave portables to tune in the programs of the BBC, Voice of Germany and Radio Australia. In addition, there are a lot of hams discovering what can be received on the general-coverage receivers of their transceivers.

Well, time to quit for tonight. Just going to punch up 15.170 on the radio and drift off with the music of Radio Tahiti.

*Gerry L. Dexter has been an active shortwave listener for 37 years, and is a full-time freelance writer and publisher on radio communications subjects. Gerry is the shortwave broadcasting editor for Popular Communications magazine and writes regularly for several other communications magazines.*

*Books he has written include The World Broadcast Station Address Book, Clandestine Confidential, Secrets of Successful QSL'ing, Muzzled Media—How to Get the News You've Been Missing and So You Bought a Shortwave Radio!. His articles have appeared in a number of publications, including Hands On Electronics, International Broadcast Engineer and Consumer's Research.*

*Gerry is also editor of Shortwave Radio Listening with the Experts.*



# The Future Generation

Are you concerned about the lack of young hams and the future of Amateur Radio? Here are some tips on what *you* can do to contribute to the future of our hobby.

By Kevin Wallenius, KA3PDM  
8712 Camille Dr  
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**L**et's face it: We need to get more people into this hobby of ours. Being a loyal ham for over two years now, and being 14 years old to boot, I've tried to get some friends into ham radio. I'm going to try to shed some light on what turns teens on, and what you shouldn't say unless you want them to think that ham radio is worse than the plague.

I hope you'll have a better understanding of how kids look at things, and perhaps you'll make an effort to encourage young people to get into the radio world. After all, our future lies in them.

## Choose Your Target

The emphasis for recruitment should be put on young people between the ages of 11 and 18, with more effort on the younger half, since the older ones need more time to do homework, cram for tests, and the like.

Children under 11 or so really don't get all they can from studying theory and code. Remember, preteens are rowdy and restless, and telling them that they'll need to read a book full of equations and theory and then dumping on them the fact that they'll need to study strange noises for weeks won't get their adrenalin flowing. This isn't to say that they won't get interested, but there will only be a few that will like the idea of using the code and studying the theory.

## The Way Teens Are

Let me start by giving you a description of the average 13 or 14 year old. They are usually more calm than the rowdy 11 year olds, and they look at things in a slightly different way. They start paying attention to how practical something is, but usually are attracted to something that seems fun and exciting. The usual response to hearing the word "study" is a low, deep groan. You will find that the older they are, the more emphasis they will place on how interesting and practical something is. Often, they will be attracted by something interesting rather than something that just seems flashy and wild.

## Appealing to the Senses

I've said what attracts teens to some-

## A Brief Run-down

Just in case you looked at the title and decided to move on, please read this brief summary, then read the article for more details!

- Get a prospective ham into your shack
- Start quickly and keep it simple
- Let them tune the receiver
- Involve them in a QSO (Remember the third-party agreements!)
- Give them "Amateur Radio: A National Resource"
- Tell them how to get started
- Stress your devoted support in helping them
- Assist them in finding help for upgrading
- Never give up

thing, so the first thing to do when trying to hook one is to make radio appealing.

Depending on their age, you may want to modify this approach somewhat. The first thing is to get the prospective ham into your shack. If you are a teen yourself, just inviting a friend from school and slipping a tour of your shack into part of the day will be enough to get everything going. If, however, you are a father or mother, you may hit a snag. The best thing is to get your



Kevin, KA3PDM, at his "double-duty" station—not only does he enjoy operating it, he also uses it to get his friends interested in Amateur Radio!

son or daughter to bring a friend over after school and plan to be operating the station when you are introduced. Tell them about the hobby and give them the pamphlet "Amateur Radio: A National Resource," which is available free from the Educational Activities Branch at ARRL HQ.

After you have the prospective ham in the shack and have their attention, you really have to work fast. Remember that this is probably their first exposure to ham radio, so keep it simple. Save the showing off for physics class! Get to the point right away; tell them how fun and exciting it is to chat with people in the exotic corners of the globe. If emergency work is your thing, then stress it. Show them how you'll be ready to provide communications when needed.

Show off your gear, but please remember that young people don't have that much money. While showing off your equipment, keep slipping in the fact that many, like I, got on the air with a borrowed receiver, a \$30 transmitter and a simple wire antenna.

If you have kept their attention to this point, you can slow down a bit. Chances are that by now they will be as eager to find out more as you are to recruit them! Let them take the operator's position and fiddle with the receiver, then look around the bands, find a CQ, answer and put them on. Sometimes they may be very shy. If they seem uncomfortable taking over, don't put them on the spot. Tell the operator on the other end your situation and have them say hello to the prospective ham.

Tell them about getting started themselves with *Tune in the World with Ham Radio*. Always offer your support and tell them to give you a call about anything they need help on.

You will find it very useful to also talk to the prospective ham's parents. If they get into it, great, but just make sure they know what's going on so they can help their child.

See what we've done? We've found a promising prospect, gotten them started and offered our undying support. You

(continued on page 57)

• *At the Foundation*

# So Your Club Wants to Give A Scholarship?

Is your club considering sponsoring a scholarship? There exists no better investment for a club than one which fosters and encourages educational support of a young person in their community. Here's how to do it!

By Mary Schetgen, N7IAL  
Assistant Secretary  
The ARRL Foundation

**E**very year in your community, young college-bound amateurs begin the search for funds to help underwrite their college expenses. By sponsoring a scholarship, your club can help a deserving young person reach an educational goal while at the same time netting your club prominent goodwill publicity in your community.

To begin, your club needs a source of funds. Fund-raising activities can take place at any time during the club year. Ideas for fund raisers might include, but not be limited to:

- percentage of flea market proceeds
- proceeds of hamfests or convention gate
- Amateur Radio auction
- proceeds from Novice class where \$1.00 assessment is made for this purpose
- club-submitted ARRL membership renewals rebate
- percentage of dues

Have your club set a goal for the scholarship award amount. Realistically assess your club's likelihood of reaching your funding goal and discuss all aspects of the efforts needed by your club membership. Then, move on to the next step.

Appoint a scholarship committee or ad hoc team to draft a scholarship application, outlining the qualifications criteria by which an applicant or candidate will be evaluated. You may wish to start with the following outline and add, modify or delete criteria to reflect interests your club wants to emphasize:

- a) Amateur Radio license class (prerequisite)
- b) Scholastic achievement
- c) Leadership qualities
- d) Public service activities
- e) Electronics projects
- f) Club participation



Dave Clemons, K1VUT, accepted the first award of the new Dr James L. Lawson Memorial Scholarship (\$500) from Director Tom Frenaye, K1KI, at the New England Division Convention at Boxboro, Massachusetts last October.

Specify any preferences or restrictions your scholarship may include (academic major, geographic area, school attended, financial need). Specify the use of the award monies; ie, tuition, fees, books and other expenses necessary to an advanced education.

Now it's time to get the word out. Distribute scholarship information/applications to area senior high school guidance

counselors and to the student finance office of your local college. Publicize your club's scholarship in the local media (newspapers, posters, cable-access community bulletin board, etc).

When you've collected applications, have the club's scholarship committee review on objective, preagreed criteria using a "score sheet" approach and take your recommendations to the entire club for approval. The committee may also want to personally interview finalists before a candidate is selected.

Now comes the most satisfying part of the entire process: Presentation of the scholarship award by club officers and/or members. Arrange to be included at a local scholastic or community awards dinner or arrange your own presentation. Provide for media coverage with photos and write-ups of the presentation and route these to the local media sources. The goodwill generated by your club's support of a young student will not only enliven your own membership, but might just inspire new members to attend your "community-spirited" club. Consider becoming a scholarship sponsor the next time your club is planning community activities.

## INVITATION TO APPLY

Are you a ham and student, digging to uncover every source of supplemental funding for your academic tuition? Have you applied to the ARRL Foundation? Well, why not? If you read last month's column you met students like yourself who wrote in and requested applications and information about the various scholarships we offer. With new scholarships being added each year, you may already be qualified for several and never even know it! Why miss this opportunity? Send today for full scholarship details to: *The ARRL Foundation, 225 Main Street, Newington, CT 06111*

## BIEBERMAN FUND GETS A BOOST FROM THE HOME TEAM

Just before this column went to press, the Foundation was contacted by former members of the now-defunct Southern Chester County Amateur Radio Club (PA). As a long-time, active member of SCCARC, the late Jesse Bieberman, W3KT, was well-loved by his clubmates. When word of the reactivation of the Jesse Bieberman Meritorious Membership Program appeared in *QST* earlier this year, former officers of the inactive club contacted one another and reached the consensus that a fitting tribute to Jesse's memory would be to donate the remainder of the club's treasury to the Meritorious Membership Fund. This generous donation will make possible the award of several additional Meritorious Memberships in 1989. We'd like to thank SCCARC for remembering Jesse's ideals through this excellent gesture!

### Contributor's Corner

We wish to thank the following for their generous contributions to:

#### *The Goldwater Scholarship Fund*

Paul Boller, W8IRT, and Alice Boller, KA4NYC (in memory of Alton Fisher, NICTA)

Frank N. Schwartz, K9QLC, and the 9th Area ARC

Hal Masden, AF6B

#### *The Victor C. Clark Youth Incentive Program Fund*

Seattle Seafair Salmon Derby Committee with Thomas E. Bainbridge

Tom Frenaye, K1KI

James A. Guida, W1KQ

#### *The Bill Bennett, W7PHO Scholarship Fund*

John E. and Rani E. Tatman  
Patricia Forman-Meeks, KS7L  
Lawrence L. Lanier, K1MIZ

#### *The General Fund*

The Millipore Foundation  
with Mauro Accomazzo  
Richard C. McCurdy, KA1DU.  
Grace W. Scholz

(in memory of Walter H. Scholz, KA9CSC)

Mr and Mrs W. H. Funnell and

Mr and Mrs R. H. Bushnell

(in memory of Fred J. Merry, W2GN)

Craig W. Smith, N6ITW

William Leroy Wagner

David G. Johnson, WA6HIS

Rafael Rivera-Alverio, KP4PN

William F. Donnelly, K2ROU

John J. Fackeldey, KB6KLD

William Burden, WB1BRE

Truman O. Moore, W7FCQ

Charles R. Steffler, KA5DYO

W. Raymond Burrows, WA2FLT

Margaret L. Van Tuyl

Aulton M. White, N4OWB

Michael E. Laszczyk, WD8NXI

Harold B. Dominy, W2LVP

Hans Kriegl, DL9OT

Martin H. Brill, K3NVW

Ted Patrick

Ellsworth E. Wightman, WB2BIP

Ronald V. Crosby, VK2BCH

Pier L. Bargellini, WA3KNN

Donald A. Katchusky, KV2N

Mark R. Smith, WB8KKZ

E. J. Seppala, KC3LV

Santa Fe Energy Co

with Robert Dorbecker

Ginger McCausey, N5LTH

Robert M. Fenichel, WA2TMT

Michael C. Poteet, W5FTD

B. P. Bongera, W6SDF

Robert D. Price, WB4VHE

(in memory of John Robinson, K4NV)

Clyde E. Wiegand, W6CGD

Julian M. Sobin, W1UWB

(in memory of Gerald Golden, W1OZ)

Jonathan S. Arney, WB3LH1

John M. Bianchi, WA9LOZ

Edward W. Frisbee, WD4OMF

(in memory of Mary Frisbee, WD4PGU)

#### *The Jesse Bieberman Meritorious Membership Fund*

Raymond Carley, WB3CZG, and Evelyn

Carley, N3AVC

(in memory of Fred J. Merry, W2GN)

As received and acknowledged during the month of October. QST



## THE ARRL FOUNDATION, INC.

*"for the advancement of amateur radio"*

## The Future Generation

(continued from page 55)

will find, as I have, that they leave your shack feeling comfortable and excited. The younger ones will keep thinking how neat it is, and the older ones will see how useful it will be in geography, math and physics.

### What Next

Okay, let's say you've got a live one. They're interested and they have a copy of *Tune in the World with Ham Radio*. Call them often (maybe twice a week) and ask how they're doing and if they need any help. So you don't seem pressing, ask them about their math assignment or how their dog is doing.

If you see that maybe they need an extra nudge, try to acquire a receiver and set it up in their room one weekend. Remember that you only need a scrap of wire for receiving. This will let them hear what it's like on the air and see what countries they can expect to contact. They'll also have the opportunity to get excellent code practice by listening to WIAW.

When a holiday, such as spring break, rolls around, something that will be of

great help is to tell them you are going to help them on the last final stretch of learning and to get tested before school starts back. Remember these holidays are only a bit over a week—plan well in advance so that all you need to do during the break is smooth out the ripples and drill them with questions.

If you're eligible, you can be half of the administering team when the prospective ham feels ready to take the test. Having someone they know and like testing them will be a great comfort. Remember to help the examiners and the applicant get acquainted before the test. Everything to calm those nerves, right?

### After the Test

After they pass the exam, your responsibilities aren't over. Your new Novice will need help setting up a station. You'll need to help them get through their first QSO and to get some QSL cards printed. Take them to a hamfest or two and take them to your local club's meeting.

Remember to call occasionally to ask

how they are and to offer your assistance, or refer them to someone who can assist them, in upgrading. If you stay in touch, they'll know they have a friend forever. Knowing that they made a great friend through radio, they'll be enthusiastic to make more and to help someone else get started.

### Tying It Up

After the new ham is on the air, you can pat yourself on the back, take a break and then poke around for another "victim."

Well, that about does it. Excuse me, my good friend and prospective ham, David Feldman, is coming over for some quizzing.

*Kevin Wallenius was born in Chile and moved to the US with his family in 1979. He got interested in Amateur Radio in 1984 while playing with walkie-talkies and reading about radio. His father, CE3VU, has been licensed since 1958 and helped Kevin get started. Though his dad had been inactive since 1964, Kevin says his father is back into ham radio now and "hogs the station!" Kevin is starting a radio club at the Washington International School, where he attends classes.* QST

# The Listener

Over 50 years ago, Grote Reber began listening to the ultimate DX, and he's still at it. Find out what this radio astronomy pioneer is doing now.

By Richard W. Miller, VE3CIE

RR #1  
Hillsburgh, Ontario  
Canada N0B 1Z0

In the summer of 1985, radio amateurs around the world monitored voice and SSTV transmissions from the space shuttle Challenger and talked with astronaut Tony England, W0ORE, as he orbited the earth during the Spacelab-2 mission. On the night of August 15, as Challenger came up over Australia, shuttle commander Gordon Fullerton and pilot Roy Bridges prepared to fire the Orbital Maneuvering Subsystem (OMS) engines. The OMS burn at 1659 UTC would only last 16 seconds, but it would release a quarter ton of fuel. This would open a "hole" in the ionosphere. The OMS exhaust gases would react with the ionospheric plasma, causing the ions to form neutral particles, thus creating the ionospheric hole.

Signals from space at 1 to 2 MHz cannot normally penetrate the ionosphere to reach the earth's surface, but the OMS burn opened a window that would allow these signals to be heard. Below, in his laboratory at the Low Frequency Radio Observatory of the University of Tasmania, near Hobart, Grote Reber was listening—as he had done for the last half century—for the radio whispers of the cosmos.

## An Interest is Sparked

"My interest in radio astronomy began after reading original articles by Karl Jansky (1932, 1933). For some years previous, I had been an ardent radio amateur and considerable of a DX addict, holding the call sign W9GFZ. After contacting over 60 countries and making WAC, there did not appear to be any more worlds to conquer."

With these thoughts in mind, Grote Reber began a lifelong study of radio astronomy. For a decade prior to World War II, he was the world's only radio astronomer. Were it not for the pioneering efforts of this radio amateur, the science of radio astronomy would have lapsed into oblivion during this period.

## The Father of Radio Astronomy

The story of W9GFZ began with the work of Karl Guthe Jansky (1905-1950),

who is considered the father of radio astronomy. Jansky was a young physicist working for Bell Telephone Laboratories at Homdel, New Jersey. His assignment was to study the directions of arrival of atmospheric static at a wavelength of 15 meters, which was being used for ship-to-shore and transatlantic radio communication.

At the radio field station (1928-1930), Jansky constructed a large array antenna, known as a Bruce array. It was 30 meters long and 4 meters high, with a beamwidth of 30°. The entire array was mounted on four Ford Model T front wheels and was automatically rotated through one complete revolution every 20 minutes. This was accomplished by using a ¼-horsepower motor through a speed reducer and a 30-meter sprocket wheel and chain. The antenna was connected to a superheterodyne receiver; the receiver's output fed a chart recorder.

It was with this apparatus that Jansky first detected what he called "hiss static." A study of his directional data for the "hiss static" indicated that the source of the static was of extraterrestrial origin, and was coming from a location near the center of our Milky Way galaxy in the constellation of Sagittarius. On May 5, 1933, the *New York Times* carried a front-page report, "New Radio Waves Traced to the Center of the Milky Way."

Although Jansky published several papers on his discovery in both engineering and astronomical journals, it did not excite the radio engineers or astronomers of his time. Radio engineers were concerned with improving techniques to provide better radio communication, not with outer space, and the astronomers had no comprehension of the world of vacuum tubes, amplifiers and antennas.

Jansky did receive an inquiry in 1935 from radio engineer and Amateur Radio enthusiast Grote Reber. Reber later commented on the possible short-sightedness of astronomers, "I wouldn't say they were short-sighted...they didn't build radio sets—they weren't even radio amateurs. If they needed a radio, they went to the store and bought one."



The listener, Grote Reber, has made a lifelong study of radio astronomy. (photo courtesy of the National Radio Astronomy Observatory, operated by Associated Universities, Inc. under contract with the National Science Foundation)

Reber thought that Jansky had made a fundamental and important discovery. He considered the two fundamental problems of cosmic static to be: 1) how does the cosmic static, at a given frequency, change with position in the sky, and 2) how does the cosmic static, at a given location in the sky, change its intensity with frequency. These were the problems that W9GFZ set out to investigate.

## The First Radio Telescope Dish

Reber decided that the only feasible antenna would be a parabolic reflector and he conceived the idea of using a single dipole inside a waveguide at the focus of his dish antenna (remember this was 1936!). He designed a dish, 10 meters in diameter, that was to have a meridian transit mount movable only in elevation. (A meridian mount allows the antenna to scan the sky

at a fixed elevation as the earth rotates about its axis and the stars move across the sky.)

### Home Brewing a Necessity

Reber was quoted a price of \$7000, which was too expensive, so he decided to build the antenna himself. The cost came to \$1300, a princely sum in 1937. The frame of the dish was made of 2 x 4 lumber and the surface was covered with 26-gauge galvanized iron in 45 pieces, which were supported on 72 wooden rafters cut in a parabolic curve. Brass screws, spaced at 30-cm intervals, joined the overlapping plates. The surface of the dish was constructed accurately to within 3 mm.

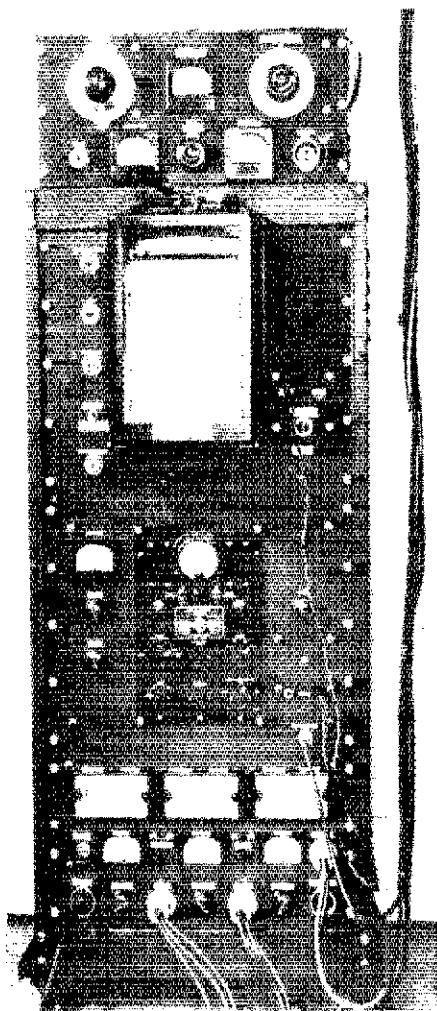
The entire project was completed with the part-time assistance of two men in a period of four months. The antenna weighed about two tons. When parked in a vertical position, great volumes of water poured through a central hole during rainstorms. This led Reber's Wheaton, Illinois neighbors to conclude that the machine was for collecting water and controlling the weather. Today, Reber's antenna is on display at the National Radio Astronomy Observatory at Green Bank, West Virginia.

Commercial gear at VHF/UHF frequencies was scarce or nonexistent, so all of Reber's equipment was home brew. He began his investigations at a wavelength of 9 cm (about 3300 MHz) using a crystal detector and an RCA type 103A end-plate magnetron. The rest of the receiver consisted of a four-stage audio amplifier using 6F5 triodes. Investigations were carried out during the spring and summer of 1938 at 3300 MHz, but with no cosmic static detected. Reber then designed another receiver that operated at 33 cm (900 MHz), but observations during the fall and winter of 1938 yielded no better results.

In 1939, he started again at 1.87 meters (160 MHz) with a superheterodyne receiver with as wide a bandwidth as possible. Reber successfully detected radio emissions from the Milky Way with this apparatus. Because of trouble with automobile ignition noise during the day, he made his measurements between midnight and 6 AM, then drove 50 km to Chicago for his job designing radio receivers.

His observations were originally taken by noting the deflections of a microammeter at one-minute intervals. The beamwidth of his dish at 1.87 meters was 12°. In 1940, Reber added a strip-chart recorder, which enabled him to gather data automatically. With this apparatus, in 1941 he succeeded in mapping the radio emissions from the northern sky. A contour map of 160-MHz intensities of cosmic static was published by Reber in the *Astrophysical Journal* of 1944.

Further receiver design improvements led to a five-stage receiver having a gain of 90 dB over a frequency band of 150-164 MHz, compared to a bandwidth



Front view of the control cabinet, Reber Telescope, taken at Wheaton, Illinois in 1942. (photo courtesy of NRAO)

of 0.16 MHz for the earlier design. This equipment allowed Reber to undertake a complete survey of the sky in 1946 and to detect radio emissions from the quiet sun. With new equipment operating at 480 MHz, in 1946-47, he succeeded in detecting intense transient solar radio waves apparently emanating from small independent sources (that is, solar flares) on the sun's surface.

Like the Wheaton experiments, Reber's more recent shuttle experiment was successful. An ionospheric window was opened at 1.7 MHz for approximately four hours as a result of the OMS burn, and investigators were able to monitor the cosmic radio noise at this frequency.

The lowest frequency which will normally penetrate the ionosphere from space is about 2 MHz, and Reber has mapped most of the Milky Way at this frequency from Tasmania. In 1987, he was a visiting research scientist at the Herzberg Institute of Astrophysics (HIA) of the National Research Council in Ottawa, Canada, where he employed a 14-acre

antenna to complete the northern portion of the 2-MHz survey. On December 22, 1987, a colloquium was held at HIA to commemorate the 50th anniversary of the construction of the Wheaton radio telescope.

Among those celebrating the half century of Grote Reber's work were Arthur E. Covington, formerly VESCC, and John Kraus, W8JK. Covington pioneered the 10-cm solar flux observations from near Ottawa, Canada. This program, which began in 1946, is still carried on by HIA's Algonquin Radio Observatory today. John Kraus is the designer and founder of the Ohio State University radio telescope known as "The Big Ear," and is inventor of the helical antenna. According to Kraus, Grote Reber was "the right person in the right place at the right time doing the right thing. He was a one-man self-supporting scientific lab."<sup>1</sup>

### More Work to be Done

In a January 1958 paper, "Early Radio Astronomy at Wheaton Illinois," which appeared in the *Proceedings of the Institute of Radio Engineers* commemorating the 25th anniversary of Karl Jansky's pioneering work, Reber says, "The old experiments at Wheaton were quite thrilling. My present experiments at the other end of the spectrum in Tasmania using cosmic static at kilometre wavelengths fully equal the old in the realm of the unexpected. Much remains to be done."

At the age of 76, Grote Reber is still listening for the whispers of the cosmos.

### Note

<sup>1</sup>Dickinson, T., "First Radio Astronomer was Backyard Amateur," *The Universe, The Saturday Star*, Toronto, Ontario, 1988.

### Further Reading

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Reber, G., "Cosmic Static," *Proceedings of the Institute of Radio Engineers*, v 36, pp 1215-18, October 1948.

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# President Reagan Signs Bill Lauding Radio Amateurs

The high point so far in the struggle to save 220 MHz.

By Perry Williams, W1UED  
ARRL Washington Coordinator

**M**any months have flown off the calendar and a million words have poured out of the "mill" since the Amateur Radio community first officially heard the bad news on February 12, 1987: The Federal Communications Commission was proposing, in General Docket 87-14, to reallocate the frequencies 220-222 MHz from the Amateur, Fixed and Mobile Services as coprimary uses, to Land Mobile alone.

## History

It was no consolation that the same docket also proposed that 222-225 MHz, likewise allocated on a coprimary basis, was to become exclusively amateur. The entire 220-MHz band had been assigned to amateurs exclusively by the FCC way back in April 1948, responsive to allocations made by the 1947 WARC held in Atlantic City. Ten years later, under an emergency order brought on by the Cold War, the amateur allocation was made secondary to military radiolocation, without advance notice to, nor opportunity for comment from, the public. In 1959, the International Radio Regulations established the Amateur and Radiolocation Services as coprimary in this hemisphere. In the States, radiolocation continued primary, with amateur secondary. Increasingly, though, amateurs were all alone in the band as the military radars were replaced by newer ones on higher bands.

Then, beginning in the 1970's, came a stream of bright ideas about things to put in 220-225 MHz, or parts thereof, continuing up to the present time: A Class E CB service, cordless telephones, an automated Maritime Mobile Service, a second FM broadcast band, a reading service for the blind, even an interactive TV gadget. In time, amateurs came to regard all these pet projects collectively as a Sword of Damocles. That amateur use of the band didn't grow as fast as other VHF-UHF bands shouldn't be surprising. What is startling is that—in

spite of all these threats—amateur usage did grow! Gradually, more and more amateurs decided to invest part of the family grocery money in 220-MHz weak-signal experimentation, control links for repeaters on other bands, repeaters, remote-base stations and, finally, inter-city packet networks with the potential of handling data as fast as technology allows. (An amateur-designed 56-kilobaud radio modem for 220 MHz was on display at the International Telecommunication Union (ITU) Telecom 87 in Geneva.)

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*By late spring, it was clear... that... amateurs needed to go past the Commission, to the body which had created it, which oversees and funds it: the Congress.*

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In 1979, radar's eventual departure was blessed by the World Administrative Radio Conference—its use of the band was primary only by footnote, and only until 1990. In place of Radiolocation, the WARC-79 conferees put Fixed and Mobile alongside Amateur as coprimary services. The FCC followed suit in December 1983, but qualified the allocation by saying, "There is an FCC/NTIA working group developing an allocation plan for this band. No assignments will be made to the fixed and mobile services until the allocation and service rules are finalized." Comes February 12, 1987: Surprise, surprise!

## Amateurs Strike Back

All over America, individual

amateurs, clubs and the service agencies which rely on Amateur Radio for emergency communications filed comments with the Commission. The time for filing was extended. More comments came in. The time for filing Reply Comments arrived, with a flood of mail; it was extended (after the deadline had already passed!) and more reply comments came in. The ARRL filed massive comments on behalf of its members. And reply comments. And after the delayed reopening of the reply period, Supplemental Reply Comments containing well-thought-out alternatives for the narrowband land mobile systems the Commission was endeavoring to promote. Thousands of letters—estimates range between 5000 and 7500 in all—poured in to the FCC. All except 15 or so were against the Commission's proposals. Those 15 were from companies which make or plan to make amplitude-companded single-sideband (ACSSB) gear for land mobile and from land mobile trade associations. **Not one, up through the closing date in August 1987, was from a potential end user of the technology!**

The League's Washington team called on FCC Commissioners, Bureau Chiefs and the Commission's Chief Engineer and his staff. Explaining. Explaining. Explaining. The team called on the National Telecommunications and Information Administration (NTIA), which shares responsibility for allocations and spectrum policy with the Commission. Explaining. Explaining. Explaining. The NTIA supported the Commission; the Commission remained unbending.

## Bring on Congress

By late spring, it was clear to the League's Washington team—volunteer officers, staff and counsel—that... amateurs needed to go past the Commission, to the body which had created it, which oversees and funds it: the

Congress. A consulting firm which spends all its time working with and for associations needing to reach the Legislative Branch came on board to furnish their expertise in dealing with Senators, Representatives and their committees and staffs. Spontaneous letters from individual amateurs had begun arriving on Capitol Hill at the same time as their formal comments were sent to the Commission. Our consultants built a Commission letters-to-Chairman Patrick campaign on this grass-roots sentiment. Through the fall and winter we visited more than a hundred offices on Capitol Hill, concentrating on Senators and Representatives whose committee assignments or interests marked them as potential allies. Mail from home gets attention on Capitol Hill and many of the Congressmen were willing to express their constituents' outrage to Chairman Patrick by letter (or, in at least one case, a direct phone call).

#### Bills in the Hopper

When the Commission added further insult to injury by adding to the Docket the Comments of the United Parcel Service six months after the close of public participation—for the first time providing a “customer” for ACSSB—it came time to seek legislation. On June 14, Representative Robert K. Dornan, (R-CA) introduced House Concurrent Resolution 317 (HConRes 317) which lauded the work of amateurs in providing communications for all sorts of disasters and then went on to express the sense of the Congress that it supports amateurs and that government agencies should take their needs into account when making decisions affecting the Amateur Service. On June 28, a similar resolution was introduced into the Senate by Senator Pete Wilson (R-CA). (By the time Congress went home October 21, 1988, there were 107 cosponsors in the House and 52 in the Senate joining Mr Dornan and Senator Wilson. Again, the Washington team worked closely with ARRL volunteers all across the country to see that this happened.)

#### Black Thursday

August 4 arrived, and it became known that the first big battle had been lost. The Commission went ahead with reallocation of 220-222 MHz, just as they had proposed a year-and-a-half earlier. Special inserts in September *QST* got the word out to the members: The four leaders on communications matters on Capitol Hill, Senators Hollings and Inouye and Representatives Dingell and Markey, in particular, should be asked

to help. Legislation was proposed to turn back the clock. Congress was asked to adopt a measure which would require the FCC to enforce the allocations and rules for 220-222 MHz which were in force on August 3. Unfortunately, in the time available, the League was unable to overcome the Congress's innate reluctance to get involved directly in allocating spectrum. This proposed legislation did not pass in the 100th Congress.

The *QST* special insert stated that the leadership should also be asked to secure passage of the concurrent resolutions. This second initiative fared much better! In the closing days of Congress, after consultation with the appropriate committees of both Houses, Senator Wilson reoffered his Resolution as an amendment, new Section 10 of the FCC authorization bill, S.1048. Section 10 starts with several paragraphs of “findings” explaining the good work amateurs do, and then finishes:

“(b) It is the sense of the Congress that—

“(1) it strongly encourages and supports the Amateur Radio Service and its emergency communications efforts; and

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***Some 600 [Petitions for Reconsideration] were filed, including those on behalf of the Secretary of Defense, and ARRL.***

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“(2) Government agencies shall take into account the valuable Contributions made by amateur radio operators when considering actions affecting the Amateur Radio Service.”

The amendment was accepted, the bill was agreed to in the Senate and the House concurred on October 19. The President signed it on November 3: Our Section 10, with the rest of S. 1048, is now Public Law, 100-594! Section 10 does *not* turn back the clock to August 3, but it *could* become an important building block toward a solution to the 220-222 MHz problem with which amateurs can live.

#### Reconsideration

As has also been reported in *QST*, Federal Register publication of the FCC Report and Order in General Docket

87-14 came on September 19. That began the 30-day period during which Petitions for Reconsideration could be filed. Some 600 were filed, including those on behalf of the Secretary of Defense, and the ARRL. These petitions were put on notice by the Commission on November 1, starting a 15-day period for Oppositions to Petitions for Reconsideration and a 10-day period for Replies to Oppositions. The test of whether the petitions succeed or fail will be in whether they can convince the Commission that new and novel material, not previously available, has been furnished. This should call for a different result. Time will tell.


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***If the same determination and cooperation continue, Amateur Radio may yet carry its point. . .***

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And there remains another available remedy, the possible filing by ARRL of a Petition for Review in the US Court of Appeals for the DC Circuit.

Meantime, amateurs do not have to vacate 220-222 MHz until after “service rules” have been written for Land Mobile use of the band, and plans are set for coordination between Government and private land mobile users.

In closing this report, the staff of ARRL would like to emphasize that we achieved passage of Section 10, Public Law 100-594, through a total team effort involving ARRL volunteers all over the country who came to Washington or cornered their legislator when he or she was “on the stump,” or telephoned, or sent a telegram, or mailed a letter or posted a QSL with a terse message. The team included Senator Wilson, Representative Dornan and their staffs; the officers of ARRL, the consultants, the normal League crew in Washington and the ARRL/*QST* staff who burned the midnight oil on extra jobs which always had to be done “yesterday.” If the same determination and cooperation continue, Amateur Radio may yet carry its point: The public needs its emergency radio service provided by amateurs, and the Amateur Radio Service needs 220-225 MHz, among other things, for its state-of-the-art, state-to-state packet message technology. 

## League Members Elect Representatives

Votes were counted for ARRL Division Directors and Vice Directors at Headquarters on November 20, 1988 under the watchful eye of a Price Waterhouse auditor. Newly elected representatives and those who were unopposed will take office January 1, 1989 and will serve two-year terms.

Here are your newly elected representatives and the vote counts for each candidate:

### Central Division

*For Director: Edmond A. Metzger, W9PRN, (unopposed)*

Ed returns as the Central Division Director, the position he's held since 1981. A former Assistant Director, Vice Director, and Section Communications Manager, Ed lives in Springfield, Illinois and is active in the Sangamon Valley Radio Club. He is an Advanced class operator and is a Life Member of the QCWA and a Charter Life Member of the ARRL.

Ed has been chairman of the Administration and Finance Committee for the past four years and was heavily involved in selecting a new computer system for HQ which is now on-line. Ed has been licensed since 1941 and is retired as comptroller of a midwestern theater chain.

*For Vice Director: Howard S. Huntington, K9KM, 3117*

Kenneth A. Ebnetter, K9EN, 1217

Howard returns as Vice Director of the Central Division. Continuously licensed since 1959, he lives in Lake Zurich, Illinois and is manager of the Engineering Section, International UHF Mobiletelephone Development at Motorola in Arlington Heights, Illinois. Howard holds a BSEE from Purdue University and an MSEE from the Illinois Institute of Technology. He is past Contest Advisory Committee chairman and currently serves on the ARRL RFI Task Group. Howard has held the offices of Secretary, President and Chairman of the Board of the Northern Illinois DX Association. He holds various contest and operating awards, including DXCC, and is a Life Member of ARRL. He has served as Vice Director since 1983.

### Hudson Division

*For Director: Stephen A. Mendelsohn, WA2DHF, 2972*

Vincent J. Biancomano, WB2EZG, 1201

Steve begins his second term as Director after four years as Vice Director. He was first licensed in 1959 and is a Life Member of ARRL. He has served as Board Liaison to the ARRL Public Relations Advisory Committee and as editor of the Repeater Coordinator's Newsletter. He presently is

Chairman of the Board's Volunteer Resources Committee. An audio engineer for CBS Inc, Steve is very active in various public-service activities. He has been involved with communications for the annual NYC Marathons, and lives in Dumont, New Jersey.

*For Vice Director: Paul S. Vydareny, WB2VUK, (unopposed)*

Paul has been the Hudson Vice Director for two years and Eastern New York Section Manager since 1980. Paul has served as a Section Emergency Coordinator and was a member of the League's Emergency Communications Advisory Committee. He is active on numerous traffic nets, packet radio and Army MARS. Paul lives in North Tarrytown, NY, and is general manager of a hardware store there.

### New England Division

*For Director: Tom Frenaye, K1KI, 3607*  
Albert W. Hamilton, AG1F, 739

Tom, an ARRL Life Member elected to his third term as New England Division Director, lives in Unionville, Connecticut. He is an Information Center Manager for Phoenix Mutual Life Insurance. He was an Assistant Communications Manager at ARRL HQ from 1977-81. He holds an MA in Political Science. First licensed in 1964, Tom is an Extra Class. He has several operating awards, including A-1 Operator, SBDXCC and DXCC Honor Roll. He is former President of the Yankee Clipper Contest Club and a former member of the ARRL Awards Committee. Tom now serves on the Board's Executive Committee and Elections Committee. He is chairman of the ARRL Education Task Force and is a Director of the ARRL Foundation.

*For Vice Director: Clevis O. Laverty, W1RWG, 2214*

William A. Burden, WB1BRE, 2115

A new Vice Director, Cliff has served four terms as the Section Manager of Maine. He has been Section Traffic Manager, Route Manager and net manager of the Pine Tree Net. He holds an Extra Class license and is a member of QCWA. Cliff has worked as a Flight Radio Officer for Pan American Airways and for the military during WW II. He also sailed as a Radio Officer in the Merchant Marine and worked as a telegraph operator for the Boston and Maine Railroad in Massachusetts. A retired high school teacher, Cliff holds an MA from the University of Maine and a BA from the University of New Hampshire. He is an editor of *Shrine* magazine, and lives in Norway, Maine.

### Northwestern Division

*For Director: Rush S. Drake, W7RM, 2426*  
Mary E. Lewis, W7QGP, 2028

Rush returns for his second term as Director. On the air for over 54 years, he is a member of QCWA and a Life Member of ARRL. He is an Extra Class licensee. From 1984 to 1986, he was Vice Director of the Northwestern Division. He is a Director of the ARRL Foundation, member of the ARRL Administration and Finance Committee, has served as Board Liaison for the Contest Advisory Committee and is presently Board Liaison for the DX Advisory Committee. He retired in 1979 after 32 years of marketing in technical sales as a manufacturer's representative, and lives in La Center, WA.

*For Vice Director: William R. Shrader, W7QMU, (unopposed)*

Bill, of Medford, OR, was first licensed in 1951. Married to Judy, KA7OFM, he is a Life Member of the ARRL and is a member of SOWP, NW Shrine ARC and QCWA. He was runner-up for the Herb S. Brier, W9AD, Memorial Instructor of-the-Year award. Bill was elected Section Manager of Oregon from 1981-86. He is an ARRL Instructor and Volunteer Examiner. Bill presently serves as Board liaison to the VHF/UHF Repeater Advisory Committee. Retired from the US Coast Guard, he presently is working as an electronic engineer with Redtronix, Inc.

### Roanoke Division

*For Director: John C. Kanode, N4MM, 2236*

Claude E. Feigley, W3ATQ, 1473

John enters his first term as Director from the Roanoke Division after serving as its Vice Director for 8 years. John lives in Boyce, Virginia and does electronic circuit research and development for IBM. An Extra Class licensee, he is a former ARRL QSL Bureau manager for W4, K4 and N4 calls. He has served on the ARRL DX Advisory Committee from 1976-80 and was then its Board liaison from 1981-87. John is currently Board Liaison to the ARRL Contest Advisory Committee. N4MM holds DXCC Honor Roll, 7BWAS, 6BDXCC, 6-Meter 600 Club, WAZ, WPX and over 400 other operating awards. Licensed since 1952, John is a Life Member of ARRL, AMSAT, QCWA and IARC and is a Senior Member of the Radio Club of America.

*For Vice Director: James G. Walker, WD4HLZ, (unopposed)*

Another new Vice Director, Jimmy has served over six years as Section Manager of South Carolina. An ARRL Life Member,



he was first licensed in 1976 and has served as Emergency Coordinator, Section Emergency Coordinator and as a Volunteer Examiner. Jimmy has written emergency plans for the State of South Carolina and the National Weather Service, implementing for the latter a state-wide SKYWARN system. He is President of the Greater Pee Dee Radio Society, lives in Marion, SC, and is employed as a systems specialist with DuPont.

### Rocky Mountain Division

*For Director: Marshall Quiat, AG0X, 1466*  
Laurence A. Eichel, K2NA, 621

Marshall is elected to his second term as Director. He is a practicing attorney in Denver, CO, and a former district judge and state legislator. He served as Vice Director from 1982-86. He is a past president of the Denver Radio Club and current chairman of the ARRL Legal Strategy Committee which concerns itself with antenna ordinances, zoning problems and deed restrictions. Marshall is also chairman of the ARRL Membership Services Committee. He served on the special committee which helped draft ARRL comments in the PR Docket 88-139, the FCC rewrite of the Amateur Radio Rules.

*For Vice Director: William M. Sheffield, KQ0J, 1122*

Hugh Winter, W5HD, 950

Another Denver resident, Bill begins his first term as Vice Director. He has served as Section Manager from Colorado for 6 years and has organized a statewide emergency linking system of voice and packet communications. Bill is a retired police lieutenant with 20 years in law enforcement. For the past 10 years, he has been self-employed. He is a member of DXCC, holds the Extra Class license and is active in most facets of Amateur Radio.

### Southwestern Division

*For Director: Fried Heyn, WA6WZO,*  
(unopposed).

Fried Heyn, who is a resident of Costa Mesa, California and is a high school mathematics teacher, begins his third term as Southwestern Division Director. Fried was a production coordinator at Collins Radio from 1965-68.

An ARRL Life Member, Fried is involved with AMRAD, AMSAT, HANDI-HAMS, and MARS. He serves on the ARRL Membership Communications and Election Committees.

Twice a Section Manager, Fried was also Vice Director of the Southwestern Division and an Assistant Director. He holds an Extra Class license and is active in contests, DXing and net activities. Fried shares Amateur Radio interests with his wife, WA6WZN, and daughter, N6KFC.

*For Vice Director: Wayne E. Overbeck, N6NB, 4265*

Karl V. Pagel, N6BVU, 1081

Wayne is a resident of San Clemente,

California and holds a PhD from UCLA and a JD from Loyola Law School. He has written three college textbooks, two of them on communications law. He is a professor at California State University-Fullerton and USC. He is also a part-time attorney.

An ARRL Life Member, Wayne has been Vice Director since 1983 and is former chairman of the ARRL Contest Advisory Committee and coordinator of the 1977 and 1980 West Coast VHF Conferences. First licensed in 1957, N6NB holds an Extra Class license. He won the ARRL Technical Excellence Award and other honors for designing the quagi antenna. He serves on the Legal Strategy Committee.

### West Gulf Division

*For Director: Jim D. Haynie, WB5JBP,*  
2768

Thomas W. Comstock, N5TC, 1802

Jim begins his second term as Director. First licensed in 1971, he has served as President and Vice President of the Dallas Amateur Radio Club and is Assistant Dallas Co RACES officer. Past President of the Southwest Radio Society, he has taught numerous Amateur Radio classes, with over 1500 students becoming licensed. Jim participated in communications for Hurricane Alicia and the Mexican and Guatemalan earthquakes. A member of AMSAT and the Texas VHF-FM Society, Jim is Chairman of the ARRL Publications Committee. He is president of the Jim Haynie Company, a manufacturer's representative, and he lives in Dallas, Texas.

*For Vice Director: Sam C. Sitton, KV5X,*  
(unopposed)

A new Vice Director, Sam was first licensed as WN5OAP in 1964 at age 14. His call was changed to WA5RKU in 1965 and to KV5X in 1982. A former Assistant Director, he currently holds field appointments as Section Traffic Manager, Net Manager and Official Relay Station. His primary interest has been in the National Traffic System, and he is active on many Texas and Oklahoma section nets. He is also active in the Central Area Net and is a member of the Transcontinental Corps. Sam is an attorney with a JD degree from the University of Houston and lives in Edmond, Oklahoma. He is employed as a Vice-President and Director of Hadson Petroleum (USA) Inc, an independent oil and gas exploration and production company.

### HAL BUBB, W1JTD, SK

Many outstanding contributors to the general welfare of Amateur Radio are left almost unknown and unsung. One of these was Hal Bubb, W1JTD, a former ARRL HQ staffer, who recently became a Silent Key. The word "key" especially applies to Hal, for he was an ardent CW man.

Hal came to ARRL HQ in 1933 from Jamestown, New York, where he was

W8DES. For almost 10 years he served as chief operator, first at W1MK, then, when W1MK was flooded out, at W1INF and finally at W1AW in Newington. He left HQ shortly after the start of WW II. At the time of his death, he was retired as an electrician for the State of Connecticut.

Hal is perhaps best known for his construction of the first W1AW transmitters at the new Hiram Percy Maxim Memorial Station, W1AW, in 1936. Hal constructed four new kilowatt transmitters for the station and later built a similar transmitter for 10 meters. These rigs, with modifications from time to time as the years passed, were used until the complete W1AW refurbishment in 1964.

Hal was an ardent DXer in recent years and was active in traffic nets and contests. He was also interested in construction and was a pioneer in the introduction of stable variable frequency oscillators to replace crystal control. He will be greatly missed by his many friends on the air and by the Amateur Radio fraternity in general.

### KANSAS CITY COORDINATION DISPUTE OVER

A long-standing dispute over repeater frequency coordination in the Kansas City area has been laid to rest. Representatives of the Missouri Repeater Council, Kansas Amateur Repeater Council, and MO-KAN Council of Amateur Radio Clubs have initialed an agreement on how the frequency coordinators for the various parts of Missouri and Kansas should be listed in the *ARRL Repeater Directory*. The organizations also have agreed to exchange the information contained in their databases.

ARRL Midwest Division Director Paul Grauer, W0FIR, was instrumental in resolving the dispute. He brought the parties together, first by telephone conference and later in person, for the purpose of settling the matter.

"I'm glad it's over," said Grauer. "There are a lot of good things happening in Amateur Radio in Kansas and Missouri, including the 1990 ARRL National Convention scheduled for Kansas City. This coordination problem was casting a shadow over all of that. Ken Enenbach, KC0WX, Wendell Wilson, W0TQ, and Jasper Simpson, W0ZGK, deserve a lot of credit for seeing that we had to get this behind us, and for doing what needed to be done."

The listing of sole frequency coordinators maintained by ARRL now reads as follows for the two states:

### KANSAS

Kansas Amateur Repeater Council, Inc, Member, Mid-America Coordination Council, Inc

(Kansas Frequency Coordinator)—Wayne L. Fowler, Jr, KA0E, 4708 Bluejacket, Shawnee, KS 66203, tel 913-268-4916

(Assistant Frequency Coordinator, Western Kansas)—Rod R. Hogg, K0EQH, 907 E Johnson, Garden City, KS 67846

(Kansas City, 40-mi radius)—Kansas Amateur Repeater Council, Inc MO-KAN Council of Amateur Radio Clubs, Inc, Frequency Coordinating Committee, PO Box 411024, Kansas City, MO 64141-1024, tel 913-631-7069

### MISSOURI

Missouri Repeater Council, Inc, Member, Mid-America Coordination Council, Inc.

(Missouri Frequency Coordinator)—Wayland N. "Mac" McKenzie, K4CHS Rte 4, Box 326, Columbia, MO 65201, tel 314-442-7619

(Assistant Frequency Coordinator, Western Missouri)—Wayne L. Fowler, Jr, KA0E, 4708 Bluejacket, Shawnee, KS 66203, tel 913-268-4916

(Assistant Frequency Coordinator, Eastern Missouri)—Clarence "Sparky" Herron, W0KUI, 3417-A Belt Ave, St Louis, MO 63120

(Kansas City, 40-mi radius)—Missouri Repeater Council, Inc—MO-KAN Council of Amateur Radio Clubs, Inc, Frequency Coordinating Committee, PO Box 411024, Kansas City, MO 64141-1024, tel 913-631-7069

### HAM RADIO FROM RUSSIAN SPACE STATION MIR

Amateur Radio operations from the Soviet Space Station Mir have begun. Cosmonauts Vladimir Titov and Musa Manarov are using the call signs U1MIR and U2MIR, respectively. QSOs have been reported between the Soviet spacecraft and numerous amateurs. Normal operations commenced on November 19.

The Mir amateur station consists of a quarter-wave ground-plane antenna mounted outside the spacecraft, and a 2-watt Yaesu FT 290R FM transceiver donated by UA6HZ. According to our latest information, the operation will be split frequency with the cosmonauts listening on 145.525 MHz (primary) and 145.575 MHz (secondary). U1MIR will transmit on 145.550 MHz. The frequency selections were made based on the 2-meter allocations for Europe, Africa and much of Asia. As noted before, the cosmonauts will only operate U1MIR/U2MIR during crew rest and recreational periods and on weekends.

### FCC PROPOSES BAN ON SOME VHF MARITIME RADIOS

The FCC has proposed prohibiting VHF maritime transmitters that are capable of being operator-programmed for frequencies other than those allocated to the maritime services (PR Docket 88-507).

The proposal calls for the exclusion from type-acceptance of any VHF maritime transmitter with frequency programming capabilities that could permit operation on unauthorized frequencies.

Several current transceivers are capable of being programmed by their operators for operation on frequencies not authorized by

## FCC-ISSUED CALL SIGNS UPDATE

The following is a list of "just issued" call signs as of November 1.

District	Group "A" Extra	Group "B" Advanced	Group "C" Tech/Gen	Group "D" Novice
0	W00G	KE0YU	N0JWH	KB0DIZ
1	NU1A	KC1MC	N1GBL	KA1SQJ
2	WK2Q	KE2JT	N2IRI	KB2GMI
3	NS3M	KD3KB	N3GPQ	KA3TSA
4	AB4LE	KM4JI	N4UEP	KC4HFS
5	AA5IM	KG5OT	N5NJO	KB5HON
6	AA6LG	KJ6OB	N6TOU	KC6AKH
7	WU7F	KF7PB	N7LVL	KB7FZE
8	WM8D	KE8UU	N8KBA	KB8FPP
9	WE9C	KE9NQ	N9HXL	KB9BQB
Guam	KH2K	AH2CC	KH2DM	WH2ALT
Hawaii	**	AH6JG	NH6RS	WH6CAK
Alaska	**	AL7KL	NL7PB	WL7BSK
Virgin Islands	NP2E	KP2BN	NP2CR	WP2AGE
Puerto Rico	**	KP4PU	WP4RX	WP4IFK

\*\*indicates all 2 x 1 calls have been issued in the district.

the Maritime Service. The Commission's concern is that this allows the operator to select unauthorized frequencies and thus interfere with public safety and other radio services.

The FCC also proposed that certain VHF maritime transmitters be phased out over a two-year period following the final order in the proceeding. The FCC is accepting Comments on the phase-out period. The deadline for these Comments is February 24, 1989, with Reply Comments due by March 31.

### MICROSATS SCHEDULED FOR LAUNCH IN JUNE

Work on MicroSats is proceeding! The newest and smallest OSCAR satellites are beginning to take shape in Boulder, Colorado. The MicroSats are tentatively scheduled for launch atop an Ariane booster in June, 1989.

The PACSAT version of the MicroSats will allow users to make use of what is essentially a "flying mailbox." The protocol will be AX.25, and therefore will be compatible with a TNC 2 and an appropriate PSK modem currently available.

### SECTION MANAGER ELECTION NOTICE

To all ARRL members in the Maryland-DC, Nevada, New Hampshire, Northern New Jersey, Rhode Island, San Joaquin Valley, Utah and West Texas Sections: You are hereby solicited for nominating petitions pursuant to an election for Section Manager. Incumbents are listed on page 8 of this issue.

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*. It is advisable to have a few more than five signatures on each petition.

Petition forms (FSD-129) are available on request from ARRL Headquarters but are not required. The following wording is suggested:

(Place and date)  
Field Services Manager, ARRL  
225 Main Street, Newington, CT 06111

We, the undersigned Full members of the...ARRL Section of the...Division, hereby nominate...as candidate for Section Manager for this Section for the next two-year term of office. (Signature... Call...City...ZIP).

Any candidate for the office of Section Manager must be a resident of the Section, a licensed amateur of Technician class or higher, and a Full Member of the League for a continuous term of at least two years immediately preceding receipt of a petition for nomination. Petitions must be received at Headquarters on or before 4:00 PM Eastern Standard Time March 10, 1989.

Whenever more than one member is nominated in a single Section, ballots will be mailed from Headquarters on or before April 1, 1989. Returns will be counted May 22, 1989. SMs elected as a result of the above procedure will take office July 1, 1989.

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, 1989.

If no petitions are received for a Section by the specified closing date, such Section will be resolicited in April QST. An SM elected through the resolicitation will serve a term of 18 months.

Vacancies in any SM office between elections are filled by the Field Services Manager.

You are urged to take the initiative and file a nomination petition immediately.  
Richard K. Palm, K1CE  
Field Services Manager

### REPEAT NOMINATING SOLICITATION

Since no petitions were received for the Missouri Section Manager election by the deadline of September 9, 1988, nominating petitions are herewith resolicited. See the above notice for details on how to nominate.





# MAJOR ARRL OPERATING EVENTS AND CONVENTIONS—1989\*

(Check QST monthly for updates)



<p><b>JULY</b></p> <p>5 West Coast Qualifying Run W1AW Qualifying Run (35-10 WPM)</p> <p>6 ARRL Hamfest (Des Moines, IA)</p> <p>8 Central Division Convention (Indianapolis, IN)</p> <p>8-9 IARU HF World Championship</p> <p>9 ARRL Hamfest (Alexander, NY)</p> <p>9 ARRL Hamfest (Downers Grove, IL)</p> <p>15 ARRL Hamfest (Union, ME)</p> <p>16 ARRL Hamfest (St Charles, IL)</p> <p>16 ARRL Hamfest (Washington, MO)</p> <p>23 ARRL Hamfest (Garden Prairie, IL)</p> <p>28-30 West Gulf Division Convention (Oklahoma City, OK)</p> <p>29 ARRL Hamfest (Texas City, TX)</p> <p>29 W1AW Qualifying Run</p> <p>30 ARRL Hamfest (Peotone, IL)</p>	<p><b>AUGUST</b></p> <p>1 West Coast Qualifying Run</p> <p>5-6 ARRL Hamfest (Cedar Rapids, IA)</p> <p>5-6 UHF Contest</p> <p>6 ARRL Hamfest (Barryville, VA)</p> <p>11 W1AW Qualifying Run</p> <p>12 ARRL Hamfest (Springfield, MO)</p> <p>19-20 Southeastern Division Convention (Huntsville, AL)</p> <p>19-20 10-GHz Cumulative Contest</p> <p>25-27 Southwestern Division Convention (Los Angeles, CA)</p> <p>26-27 Michigan State Convention (Saginaw, MI)</p> <p>27 ARRL Hamfest (St Charles, MO)</p> <p>27 ARRL Hamfest (Danville, IL)</p> <p>29 W1AW Qualifying Run</p>	<p><b>SEPTEMBER</b></p> <p>6 West Coast Qualifying Run</p> <p>9 W1AW Qualifying Run</p> <p>9 ARRL Hamfest (Windsor, ME)</p> <p>9 ARRL Hamfest (Butler, PA)</p> <p>10 September VHF QSO Party</p> <p>16 ARRL Hamfest (Wichita Falls, TX)</p> <p>16-17 Virginia State Convention (Virginia Beach, VA)</p> <p>17-18 ARRL Hamfest (Cincinnati, OH)</p> <p>23-24 ARRL Hamfest (Milton-Freewater, OH)</p> <p>24 ARRL Hamfest (Berea, OH)</p> <p>27 W1AW Qualifying Run</p>
<p><b>OCTOBER</b></p> <p>3 West Coast Qualifying Run (10-40 WPM)</p> <p>8 W1AW Qualifying Run (10-40 WPM)</p> <p>8 ARRL Hamfest (Lima, OH)</p> <p>14-15 ARRL Hamfest (Memphis, TN)</p> <p>21 ARRL Hamfest (Brooklyn Park, MN)</p> <p>21-22 Simulated Emergency Test</p> <p>29 W1AW Qualifying Run</p>	<p><b>NOVEMBER</b></p> <p>1 West Coast Qualifying Run</p> <p>4 ARRL Hamfest (West Monroe, LA)</p> <p>4-6 November Sweepstakes, CW</p> <p>6 W1AW Qualifying Run</p> <p>10-12 Texas State Convention (Houston, TX)</p> <p>18-20 November Sweepstakes, phone</p> <p>28 W1AW Qualifying Run</p>	<p><b>DECEMBER</b></p> <p>1-3 160-Meter Contest</p> <p>5 West Coast Qualifying Run</p> <p>9-10 10-Meter Contest</p> <p>12 W1AW Qualifying Run</p> <p>27 W1AW Qualifying Run</p>

\* Hamfest/Conventions of record as of November 15, 1988

†Not an ARRL event

## FOC at 50

Within Amateur Radio, there are many special interest groups, subgroups catering to particular interests within the hobby. One of the longest-lived of these, maintaining a strong sense of purpose within its fraternalization, is FOC, the First Class CW Operators' Club.

FOC members have met distinct club-set standards of competency using the code and have additionally proven their versatility in multiband operation, coupled with a rare sense of the international ramifications of Amateur Radio. Limited to 500 members, FOC numbers within its ranks active multimode, multiband, DX-type operators, with calls well known to the readership of this column.

The club's roots go back to 1938. It was in the spring of 1938 that a few CW men began to search for an idea that would improve the standard of operating on the amateur bands. A small group of enthusiastic amateurs led by G5BW and G2ZQ formed the FOC. From the early recruits a committee of five was given the job of selecting possible members. Early club notes state that the First Class CW Operators' Club came into existence with the avowed object of taking into membership any amateur who, "by virtue of his ability as a telegraphist and his general attitude to Amateur Radio, appeared worthy to belong to an organization the aims of which were to encourage good operating and the proper use of our bands."

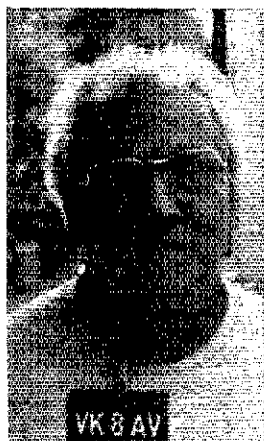
On October 1, 1988, 255 guests from about 25 countries gathered in London to

celebrate the golden anniversary of the formation of FOC. Your editor was privileged to attend and to capture a number of familiar DX faces for the readers of this column. As G3FXB's

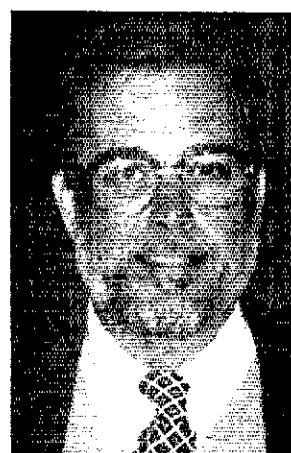
historical compilation of FOC from 1938-1983 states, "FOC is many things: character, integrity, compassion, education, discipline, charity, and fraternization. It is truly more than a club."



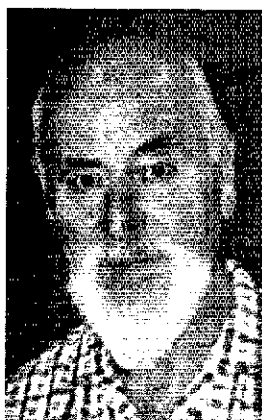
G3FXB



VK8AV



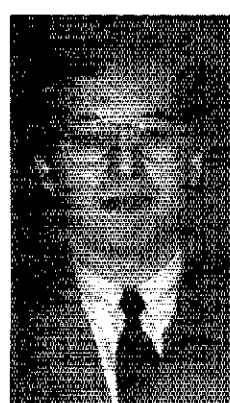
W9KNI



G3XNG (ex-ST2NG)



G5RV



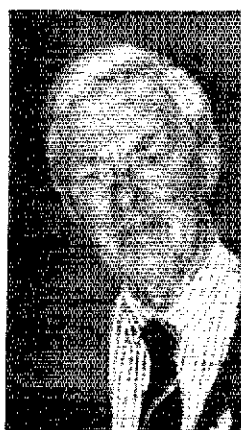
JE1JKL



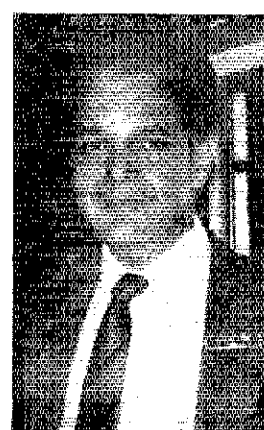
EI3CP



VP2MT



DL6TQ



4X4NJ

## HOW DO YOU SEND THAT?

A special thanks to the several dozen of our column readers who like the feature, want it continued and made that special effort to let me know! [I might add that a slight editorial slip is evident in the November issue, however! The "good DX" CW should read: Horótego DX—the "o" and "t" sent together; not sent as a double "oo."] Let's try a few more.

English/Russian (Overscored letters are sent together, without normal letter spacing):

Good morning—Dobre utro

It is snowing—Idet sneg

Time to eat—Pora pokuofatx

Peace and DX—Mir i DX

Happy New Year—S nowym godom

## 8-BAND CHALLENGE

That dedicated operator W1JR shows just what you can do with determination. In 1979 W1JR earned 5BDXCC no. 750. In 1985 he received 160 meter DXCC no. 69, making it 6 bands. He worked country number 100 on 30 meters in August and on September 5, Joe worked VK9NQ for country number 100 on 12 meters! Although the 30-meter band doesn't count for ARRL's DXCC awards

(shared bands represent a potential QRM hazard for other services), it is an eye opener to see what the W1JRs of our Amateur Radio world can find to work—regardless of the part of the spectrum they pursue.

## NIGERIA de KH6HSS/SN9-0

I never thought I would write in to complain, but I had to get this off my chest. I am taking a break from operating because too many stations just *have* to transmit when I'm in the middle of a QSO. Somehow the southern EU stations just have to relax a bit. On other Nigerian matters, Larry 5N0WRE has gone QRT. I am not their QSL manager, but can help with cards for the following 5N0 stations: DK3LQ G3GLQ N6QLQ 5N0ABA 5N0SKO. I can help with other Nigerian stations, but only for those on Ikoyi or Victoria Islands.—KH6HSS/SN9

## QRP ON LARGO ISLAND

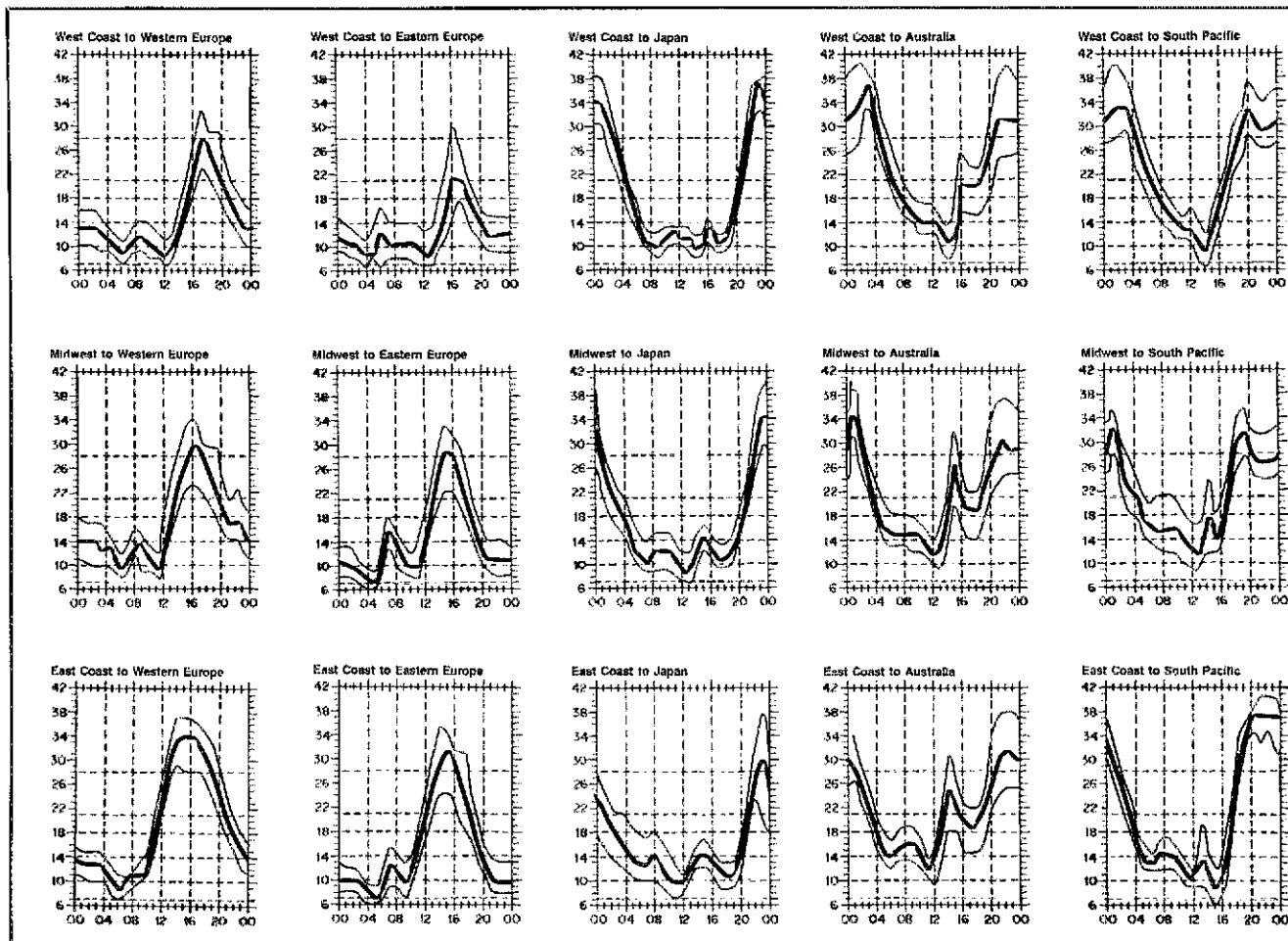
Listen for ZZSAS (by PP5AS) and ZZ5FO (by PP5FO) January 1-9, operating from Largo Island in the Santa Catarina Island Archipelago (IOTA SA-26). This Brazilian QRP special will be using 7.030, 14.060, 21.060 and 28.060 MHz. Grimm and Karl are

planning on using a Ten-Tec Argonaut and a DM-5 (Brazilian brand), both with a maximum of 5 watts output. Antennas will include a vertical for 40 and 2-element monobanders for 20-15-10 meters. Power source will be a 12-volt car battery. SWL reports are also encouraged. QSL via the bureau.

## ROUTINGS

XE2GCK (CQWW CW) via AA6EE. 9VITJ (Mar 87-Jul 88) via K0GYK, 10803 Adare Dr, Fairfax, VA 22032. 5N2KRC and 5N2KRC/0 via WA7WOC as of 9/1/88. Don notes that Yemi is a new ham in Lagos, active on 40-10 phone. 4MSRY (CQWW RTTY) via Pasquale Casale, YV5KAJ, Box 40.240, Caracas 1.050, Venezuela. 7Q7BC (1969-1976) via Peter Conway, G3UFI (ex-VQ2BC/9J2BC), 1 The Woodlands, The Ridge, Hastings, East Sussex TN34 2SF, England. Help: W5LVD hopes for W6ODD/FI8 (1948). K0OR needs CE0AA (9/84), no response from the Radio Club of Chile.

K6TS reminds this writer of W9BRD's paraphrasing of the famous, always relevant Ehrmann Desiderata (Mar 1973 "How's DX?"), particularly so at the start of a new calendar year and the onset of the ARRL DX



**When are the bands open?** These charts predict this month's average propagation predictions for high-frequency circuits between the US and various overseas points. One chart showing 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 lowest curve (optimum traffic frequency, or FOT). The horizontal axis shows Coordinated

Test. Below are a few extracts of particular appeal to this writer:

"Go placidly amid the noise and haste, and remember what peace there may be in later silence. So far as possible without surrender be on good terms with all big-gun locals. Transmit quietly but clearly, and listen carefully for all others, even the dull and ignorant, for they too may be new multipliers. Try to avoid loud and aggressive QRM; it is a vexation to the spirit. If you compare your reports to those of others you may become vain and bitter, for always there will be greater and lesser signals than your own. Keep interested in your countries total. However humble, it is a real possession in the changing fortunes of DX. Exercise caution in QSLing for the world is full of trickery. But let this not blind you to what virtuous QSLers there are. Be yourself. Neither become cynical about DX, for in the face of all aridity and disenchantment it is perennial as the grass. Take kindly the counsel of OTs and gracefully surrender the foibles of young squirts. Nurture strength of ham spirit to shield you in sudden QSB. You are a child of the ionosphere no less than those with higher power and bigger beams. You have a right to be here. And whether or not it is clear to you,

no doubt the solar cycle is unfolding as it should. With all its sham, drudgery and broken dreams, it is still a beautiful DX world. Strive to be happy. Be careful. Switch to safety."

FR0A	(F6FNU)	VU2GSW	(W7GSW)
FR4FA	(F6FNU)	VX9XT	(W7SW)
HL88XP	(HL1XP)	V85DA	(VK1DA)
KP2A	(N6CW)	Y33UL	(Y66QL)
L7D	(LU9DBK)	VK0AE	(VK2DJ)
OD5KS	(HB9EYH)	ZL5BA	(KB4GID)
PJ0K	(NK4U)	ZY0TT	(PP2NBQ)
PJ1B	(K2SB)	4X4FF/5N4	(WA4WTG)
P40SV	(VE7SV)	4X46UO	(WB3CQN)
TF6PS	(W3HNK)	5H3BH	(SM0EAL)
TU0A	(F6FNU)	5UV386	(DJ6SI)
TL8KH	(NA2K)	9X5AA	(W4FRU)
VQ9QM	(W4QM)		

## QSL Corner

Administered By Joanna Hushin, KA1IFO

### ARRL OUTGOING SERVICE RATES ARE GOING UP

Effective February 1, 1989, QSL cards will be shipped overseas for \$2.00 per pound, approximately 150 cards weigh one pound. Packages of 10 cards or under will continue to be distributed for \$1.00.

Here is some information for those of you who would like to QSL a QSL manager or 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.

AH6GX/ WH0 AY9D	(JA2VUP) (LU9DBK)	A22RA FH5EG	(ZS5ABT) (F6EZV)
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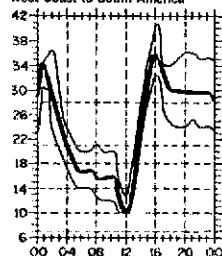
### QSL MANAGER VOLUNTEERS

ND3R	WD8MZH
KB4GID	N3CHR
WB0YEA	

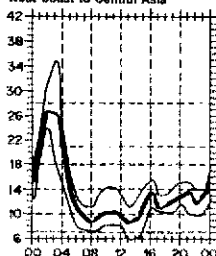
### SPECIAL NOTES

- WA5GFS *not* manager for: 9Y4SF, 9Y4TR
- W5NK *not* manager for anyone.
- QSL Corner, December 1988 *QST*, page 74, contains information and address for the for the ARRL Incoming Bureau. QSL Corner, September 1988 *QST*, page 59, contains information on the operations of the ARRL Outgoing Service. For additional information on bureau operations (Incoming and Outgoing), send a self-addressed, stamped envelope to ARRL QSL Bureau, 225 Main St, Newington, CT 06111.

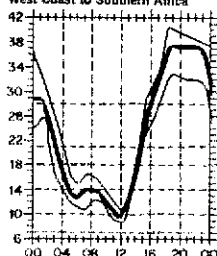
West Coast to South America



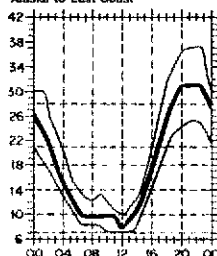
West Coast to Central Asia



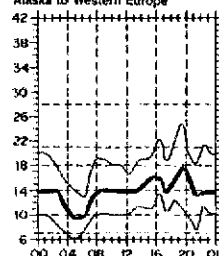
West Coast to Southern Africa



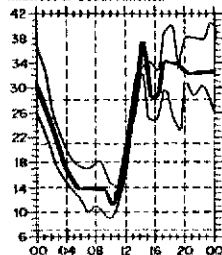
Alaska to East Coast



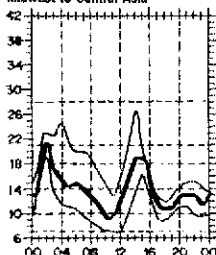
Alaska to Western Europe



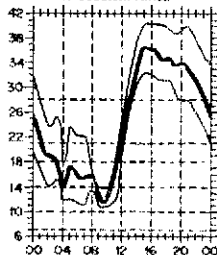
Midwest to South America



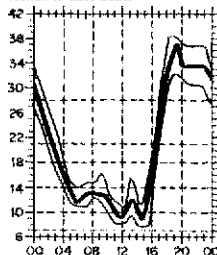
Midwest to Central Asia



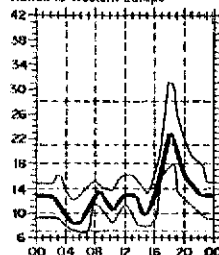
Midwest to Southern Africa



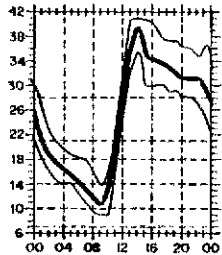
Hawaii to East Coast



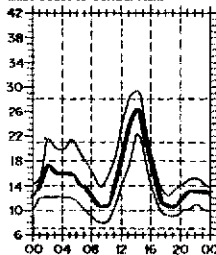
Hawaii to Western Europe



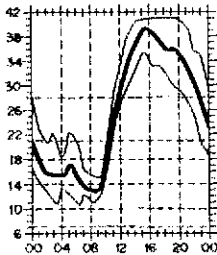
East Coast to South America



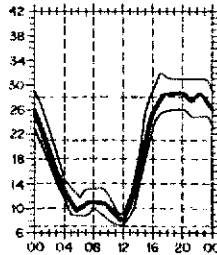
East Coast to Central Asia



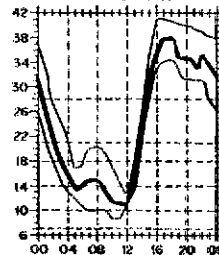
East Coast to Southern Africa



East Coast to West Coast



Puerto Rico to West Coast



Universal Time (UTC); the vertical axis, frequency in MHz. See April 1983 *QST*, pp 63-64, for a more-detailed explanation. The 3rd edition of *The ARRL Operating Manual* contains similar charts for a range of sunspot numbers and times of the year. Data provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for January 16 to February 15, 1989, assume a sunspot number of 145, which corresponds to a 2800-MHz solar flux of 188.

# DX Century Club Awards

Administered By Don Search, W3AZD

The DX Century Club certificate is awarded to amateurs who submit confirmation for contacts with 100 or more countries on the official ARRL Countries List. There are now 319 current countries on the list. The DXCC Honor Roll includes those who are within 9 countries of that figure. The following annual listing of the DXCC membership contains the call signs and exact country totals by endorsement during the two-year period from October 1, 1986 through September 30, 1988. Honor Roll members are indicated with an asterisk (\*).

<b>MIXED</b>	*W1JR	355	*K9ECE	*W2CP	*W9AZP	*JA3BG	*W6ZKM	*JA1EOD	*W62YQH	W2IOT	*N3ED	*W4VZB	*AE3T	*L8BCJ	VE3XK	319
<b>370</b>	*K2BZT	*DL9OH	*W9RM	*W2JVN	*W3EYF	*OH6RA	*W7CB	*JA1ZZ	*K3TJF	*W4JZB	*W3ZN	*W4V4K	*K0ZEP	*L22AW	*Y5ZCBM	*DL2AW
<b>W1GKK</b>	*K2FL	*E3AT	*W9TKD	*W3EYF	*K4CJC	*O1KMG	*W7OM	*JA2DH	*W3L8	*W43BK	*W4CNP	*W4CNP	*K4FCT	*F68KI	*K1H2Z	*K11RH
<b>388</b>	*W2BOK	*K18DB	*W6GKL	*W3EYF	*W4BEP	*O23PO	*W7RV	*JA2AH	*W43ATP	*AB4H	*W5QCR	*W4GJD	*W5QCR	*K4UEE	*Y1XW	*K11ST
	*W3CWC	*JA1DM	*W6WV	*W4BEP	*W5EJT	*SM6AEK	*W8L8C	*JA2BL	*K4CEF	*K4LTA	*N4XX	*K8XJ	*K4UEE	*Y2LAW	*K11ST	*JA1PCY
	*K4KQ	*PA8FX		*W5EJT	*W8MVR	*W8RCM	*W8RCM	*K4UTE	*K4LTA	*W4YA	*W4B7J	*N4OL	*N4OL	*Y1XW	*K11ST	*JA1PCY
	*LU8DJX	*W4DR	351	*K8MA	*JA2XW	*W8EYB	*W8EYB	*O2E1UJ	*N4XR	*K4E4I	*W4ADRU	*W7UZA	*N4WJ	*N4WJ	*N4WJ	*JA1JOU
	*W2AGW	*W5AL	*DL1HH	*W6ERS	*O2H2BC	*VE3MJ	*VE3MJ	*O2BRT	*W4CPZ	*W4ECS	*W4R4K	*AC8K	*N4AM	*N4AM	*Y1RR	*W2LZX
	*W4EK	*W6BS	*ZL3IS	*W6FW	*ZL1ARY	*W6FW	*W6FW	*O2H2VB	*K5JW	*W4DXI	*K5L1M	*K8CW	*K8CW	*K2LQ	*W2TA	*JH1AB
	*W7B8	*W7YK	*ZS6RM	*W6FJ	*N1XK	*W6FJ	*W6FJ	*O2K1TA	*K5OS	*W4R1M	*W6UP	*K2MFI	*N8TJ	*K2MFI	*K3GYD	*JA3JOR
		*W7OC	*K4IQY	*JADY	*W7CSW	*W1FTX	*W2FG	*O2K1TA	*W5DJ	*N5TP	*N6MU	*W8E1E	*K5KLA	*W2YXJ	*K3QTY	*JA4ND
		*W7GN	*W1HH	*O2E1FT	*K8FT	*W1NHJ	*W2FG	*O2K1TA	*W5RA	*K6J9	*N6RA	*W8OB1	*K5OA	*W2YXJ	*K4AE8	*JASPLU
		*W8AH	*W2AX	*K9YD	*W7OC	*W2LNB	*D5J5H	*O2K1TA	*W7RO	*W7RO	*W8GJ	*W8GJ	*N5UR	*K3UA	*W4J7Q	*JA6BVU
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		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
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		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
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		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
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		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
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		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*W8GJ	*JA8HQ
		*W8M	*W44FQ	*W8Y1L	*W8Y1L	*W8Y1L	*JA1MCU	*YU7DX	*W8GJ	*W8GJ</						







\*KH8OR \*VE3WW 334 \*W6KON \*JA1MCU \*JF1PJK 318 \*XE1GBM W5DBV N44VW WAJHE W40VW 286 SM5HYL JA2GBO 378 KD4HO

KD9EB WZ2FA 282 EISEK JF1VST JABLIN OZ1BNZ VE3CWH VE3SHZ VE3MFW K2MFM K4CZH W4PC W5QK K5PQK W5NDP NE8J KB7TU N7GMT W08NMV 283 31B1 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000

*F3AT	JA1MDK	K2UFM	W9NUF	HK3DDD	258	242	DL7AFV	VE2AH	JA1UPO	AH1N	154	136	K9ZXB	106	KAS7QF	202	
*JH3CXL	JH7BRG	W2TQC		HK3YH	F6HBI	241	DL7AFV	K1HDQ	NIQY	AJ3K	154	136	W9BXXB	106	K6MS	W8LYM	
*ON5NT	SM5DQC	K4NIV	281	J2PNS	JAGCNL	241	HK2UDV	K1BDBH	N7PFD	W3NB	154	136	W8BXXB	106	K83DYY	K07V	
*K1MEM	VE3BR	N4IR	JA2TK	K2MFP	J2PNS	241	SM5C5S	W5LW	N7PFD	W2KX	124	124	W8BXXB	106	JH8H2G	N7DXX	
*W6PT	K1JA	W4LWM	SM3DZC	K2KPK	W3BBL	241	KR1B	K5G3X	188	W81C	124	124	W8BXXB	106	UC2ACZ	W8CFC	
*K9AJ	W3EKN	W4AJTJ	SM3DXC	W3BBL	W1K5Z	241	N1CYA	K2GQF	204	W81Q	124	124	W8BXXB	106	Y540L	K8BTD	
314	AA4AR	KD8V	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	Y30IS	N8BOK	
*JA3BQE	KE4I	W9WAO	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	NG1G	W8SK	
*JABEAT	W4WJ	K8KES	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	W42MZX	285X	
*OZ1LO	W6TFO	292	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	AB5C	K08OIH	
*PY2TM	W8ZCQ	292	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	107	DJ5FM	
*W3AP	K9MFP	292	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	DK9EO	W8ZJR	
*K4XO	W8KGD	292	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	DL4KF	W6GC	
*W68TW	JA1JUP	280	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	H89AWS	182	
*K8VWV	JA8CAK	N7RT	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	JA1KWC	W8ZJR	
*K9VBP	OH2BN	W8UBI	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	HA8ZC	182	
*W0WP	N4KG	K9XG	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	VE3FZW	W8ZJR	
313	W5LVD	291	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	K10C	181	
*JA1GTF	I79TQH	291	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	UX2CKL	181	
*JF1FK	JA1PNA	303	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	K4PB	181	
*JH1FY	JG1NBD	303	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	Y4XJ	181	
*LARCJ	K4CCE	303	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	W2EJG	121	
*OZ3Y	K9MFP	303	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	K7EM	121	
*OZ7BW	W41AER	304	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	W44QCV	121	
*W1JR	K2J	290	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	NYS6M/KH2	121	
*W4VQ	W2LZX	290	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	W41WMS	121	
*K5KLA	K3KA	DK5PR	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	NW2J	121	
*K5VT	N6JV	DL3RK	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	N3DMR	121	
*N5JR	NS8C	I18BU	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	W44Y	121	
*W8RSE	W7UUV	PA8LOU	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	W4R	121	
W7LR	AJ8J	SM7FDO	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	KD5R	121	
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*W8SR	9Y4VU	W1BFT	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	K6TV	121	
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*Q3KMA	K5AS	K4CCE	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	W8UW	121	
*OZ1UKL	NSFW	W4ADAN	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	NATI	106	
*OZ1CK	K6DT	W8LU	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	DL3BH	106	
*VE3CKF	K7ZR	K9ZO	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	DL6SF	106	
*N2KW	W8WQI	KD9E	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	EA7LQ	106	
*W2MIG	301	289	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	G4UOL	106	
*AA6AA	JA1BN	DL7ME	277	GM3YOH	JA5THQ	277	GM3YOH	JA5THQ	277	GM3YOH	277	GM3YOH	277	GM3YOH	277	JA5THQ	106
*K8JG	JA8DNV	JA1N0E	DK1RV	DL5FF	VE3BP	277	GM3YOH	JA5THQ	277	GM3YOH	277	GM3YOH	277	GM3YOH	277	JA5THQ	106
*W6TC	W1WLV	JA1N0E	DL5FF	VE3BP	277	GM3YOH	JA5THQ	277	GM3YOH	277	GM3YOH	277	GM3YOH	277	JA5THQ	106	
*W8RSW	K4XG	JA5JOR	W82P	KF8N	K86G	277	GM3YOH	JA5THQ	277	GM3YOH	277	GM3YOH	277	GM3YOH	277	JA5THQ	106
*W8RT	KSNV	JH7BDS	JA7IL	K4MF	W5AL	277	GM3YOH	JA5THQ	277	GM3YOH	277	GM3YOH	277	GM3YOH	277	JA5THQ	106
*W9XK	W6J	W3EKN	SM8CGM	W3EKN	W1K5Z	277	GM3YOH	JA5THQ	277	GM3YOH	277	GM3YOH	277	GM3YOH	277	JA5THQ	106
311	300	289	SM8CGM	W3EKN	W1K5Z	277	GM3YOH	JA5THQ	277	GM3YOH	277	GM3YOH	277	GM3YOH	277	JA5THQ	106
*JH1IFS	DJ5JH	K5TSQ	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	W3EKN	106	
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*JA3MNP	JA8ZO	DL1KB	DL1XG	DL1XG	DL1XG	252	JA1SGU	JK1HLQ	214	200	149	129	W8BXXB	106	W3EKN	106	
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*W1GL	K2AGJ	K1VHS	JA7FS	JA6FD	NE4F	252	JA1SGU	JK1HLQ	214	200	149	129	W8BXXB	106	W3EKN	106	
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*K4KUZ	W4DJJ	W8WJU	OZ8AE	K7SP	K8ADJZ	252	JA1SGU	JK1HLQ	214	200	149	129	W8BXXB	106	W3EKN	106	
*W5ZPA	AG9S	K4I	W1BWS	W4JTL	W4JTL	252	JA1SGU	JK1HLQ	214	200	149	129	W8BXXB	106	W3EKN	106	
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309	298	274	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	W3EKN	106	
IK5IM	DF3SV	W9L1Q	274	W3EKN	W1K5Z	274	W3EKN	W1K5Z	274	W3EKN	274	W3EKN	274	W3EKN	274	W3EKN	106
JH1EDB	DL7LW	DL7LW	286	DL7NB	JA2CV	286	DL7NB	JA2CV	286	DL7NB	286	DL7NB	286	DL7NB	286	DL7NB	106
*JA3GM	JA2ME	SL8AS	JA2ME	SL8AS	JA2CV	286	DL7NB	JA2CV	286	DL7NB	286	DL7NB	286	DL7NB	286	DL7NB	106
*PY7ZZ	JR7TEQ	K1EPI	VE3BV	K8XN	W8GAX	286	DL7NB	JA2CV	286	DL7NB	286	DL7NB	286	DL7NB	286	DL7NB	106
*SM6CST	SM6DYK	W3GJ	W1FR	W8GAX	W8GAX	286	DL7NB	JA2CV	286	DL7NB	286	DL7NB	286	DL7NB	286	DL7NB	106
*AA1K	K4FJ	W6MU	W8HEZ	W8HEZ	W8HEZ	286	DL7NB	JA2CV	286	DL7NB	286	DL7NB	286	DL7NB	286	DL7NB	106
*N4NX	K5LM	K8FD	K8FD	K8FD	K8FD	286	DL7NB	JA2CV	286	DL7NB	286	DL7NB	286	DL7NB	286	DL7NB	106
*K5KR	295	285	W3EKN	W1K5Z	W4JFE	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	W3EKN	106	
K8CBL	JA1HGY	18WY	JA3CMD	W3EKN	W1K5Z	241	W4NUS	W4NUS	204	DF3QW	153	136	W8BXXB	106	W3EKN	106	
*K8DYZ	OK1MG	SM7BYP	J3AOF	273	NK4L	273	NK4L	W8GMB	273	NK4L	273	NK4L	273	NK4L	273	NK4L	

112	105	WA7EGA	180	190	175	180	UT5AB	145	129	122	N8DX	SP3BQD	W1FZ	H89AHL	AB6X	W4VQ
DL7UX	JH1QDB	KD9OH	METERS	W2OKM	N1ACH	ON4UN	W1OO	W2FP	VK8HD	W4UW	113	K2FL	W2HPK	OK1DOT	W4LC	W8DAO
	W5SL	101	217	187	174	K8UWA	K94W	W8PGI	W8PGL	121	HK8HEU	106	N8QJ	OK1DXS	W4BCK	A47A
110	KN6J	101	217	187	174					121	K5W	F3AT	G3KMA	OK1JDX	101	W7UW
EA1AVN	AG9S	HB8BTQ	W4DR	K2PEQ	N4KG	159	151	W2FCR	127	W4DHZ	N9US	G3KMG	OK1MG	OK3CSC	F9YZ	W7OEV
Y38XO		JF3UJQ	KSUR			K2CL	424DX	141	141	W83AVN	111	T77C	177C	G3BDQ	HB9G	K8CFU
109	IS6MVE	PY8ACP	206	188	171		K1IU	W9GH	126	W1AB	111	SP5INQ	105.	G4AAV	G4VGO	KE9A
AB6Y	ZL2AKI	W8ZABD	W8ZV	184	170	JA1GTF	OK1ATP	140	OK3COD	119	RT5UN	110	RT5UN	OK1DWJ	OK3BRK	W1ENE
NT8V	NSAKQ	W8ZBV		184	170	OZ1LO	K3UA	140	W1WA1	119	UA4HBW	110	UA4HBW	OK2BQU	AB1A	110
108	WB5CBV	AB90	205	W3AP	W2JB	W8BTKT	AA4M	W1NG	W3PN	119	UR1RWX	110	UR1RWX	OK3BRK	W2TA	W9MAF
G8AZT	KC8EU	AA1K	202	W2SM	W8AH	W400	AA4V	W3PN	W6CM	125	K4UAS	109	K4UAS	SM6EHY	K3KG	W9YSK
127ZK	KR90		202	W2SM	W8AH	K4UEE	W40WJ	140	140	125	K9S9	109	K9S9	N4MM	N4MM	104
107	LX2EL	W8AKT	N4WW	181	167			138	IT9ZGY	117	OE2LU	109	JAT7AO	104	104	DL1CF
G2ATX	OE2WJL			181	167			138	W3GG	117	N2WK	109	JAT7AO	104	104	100
15HZ	OH2LU			181	167			138	K2V	117	UZ6LWZ	108	G3BRD	W2JVV	W7SP	V8900
OE20WM	N2WK	UZ4FWD	K1ZM	180	166	W2BHM	W1JR	137	W7AWA	SM7BIC	108	G3BRD	W2JVV	W7SP	V8900	DL2KBS
9V4VU	DL7XS	K4XG	184	W2BXA	W4MGN	W4FX	DJ8RX	131	W7AWA	SM7BIC	108	G3BRD	W2JVV	W7SP	V8900	DL2KBS
WB2JVO	EASCVR	KJ4MR	N4SU	N4J	185	154	K2JU	131	KJJI	8Y4VU	108	GM3ITN	N9BBQ	W7FG	K1JO	N3COG
106	SV1IW	VE9EJ	KD6PY	191	176	K2RIH	K4PI	131	WB9NSZ	W6AJJ	107	JR1EBE	W8EJ	K8GG	K1ST	W8AH
CT1AUR	W8BAT	W9DNE	K1MEM	W8CD	181	152	W8UVZ	130	K9AB	124	107	RT4UA	102	K8OQL	N4LBJ	
DJ2YA	N8AZK	W8ZKZ		W8CD	181	152	NA8Y	130	AB90	WA4VDE	107	OK3CQR	102	K8Z	W4BAA	
WK6E	KE7PN			W2LPE	181	152	L22DF	130	AB90	WA4VDE	107	OK3CQR	102	W8YYG	W4NL	
									123	W1AX						

## DXCC Notes

### New DXCC Country

The ARRL Awards Committee has unanimously ACCEPTED the DX Advisory Committee majority-decision recommendation to add Malj Vysotskij Island (M-V Island) to the DXCC Countries List by virtue of a commitment ARRL made in 1970. Additionally, the Awards Committee unanimously ENDORSED the DXAC finding that the 4J1FS operation of July 1988 met the published accreditation criteria.

M-V Island, located in the bay of Vyborg, Western USSR, was found in 1970 to qualify as a separate DXCC country under point 3(b) of the Countries List Criteria, and was awaiting activation. The island, leased by Finland from the USSR, is separated from Finland (OH) by intervening Soviet territory.

In reviewing the accreditation of the 4J1FS operation, both the DXAC and the Awards Committee were troubled by the call-sign prefix. In the course of discussion, however, it was the sense of the Awards Committee that M-V Island may very well have qualified under the now-defunct "separate administration" clause of the country criteria. (This clause was in effect when ARRL first approved M-V Island in 1970.) Under separate administration, the call-sign would not have been an issue.

DXCC credit will be given for contacts made with M-V Island commencing with the July 1988 4J1FS operation. DXCC credit will be issued starting March 1, 1989. QSL cards submitted prior to that date will be returned without credit.

### RTTY News

The DX Advisory Committee considered a petition to establish an RTTY Honor Roll and to reduce the endorsement levels for the RTTY DXCC. In August 1988, the DXAC voted on the petition, which resulted in both items being rejected.

## License Renewal Information

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

2) Mail to FCC, PO Box 1020, Gettysburg, PA 17326. There is no fee.

3) 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 five-year grace period under which you may still renew

without retesting. However, after two years of the grace period has elapsed, you will lose your call sign, and will be assigned a new one. After this five-year grace period is over, you must be reexamined for a new license.

4) Note that 10-year-term licenses, which have been issued to all amateur licensees renewing since January 1984, have only a two-year grace period before both the license and call sign expire.

5) You may apply to have your license renewed at any time during the term of

the license. FCC suggests the application be made approximately 90 days before expiration.

6) If you are simply modifying your license (change of address, for example), you must fill out a Form 610. Incidentally, your license will also be renewed automatically for 10 years at this time.

7) If you have any questions or problems, drop a note to the Regulatory Information Department, ARRL HQ.

## Strays



### HAMS AGAINST DRUGS

Two Police Officers for the city of Colorado Springs, Colorado have started an Amateur Radio educational project to "show the youth of '80s that there are educational and technical interests that are fun..." Henry Hill, WA3CYC, and Andre Clair, NØICK, have developed a program called Hams Against Drugs (HAD) to bring ham radio into every school district in their area, grades 6-12, and license as many students as possible over the academic year.

Calling the present drug use by American youth, "Epidemic, plague, scourge," Officer Hill states he has been reacting to the problem after it occurs, and decided it is time to attack



Students from Woodland Park (CO) High School interested in the Hams Against Drugs (HAD) project meet with Officers Andre Clair, NØICK (l), and Henry Hill, WA3CYC (3rd from l), in the school library.

the problem before it happens. He believes, from his law enforcement experience, that attitude plays a major role in a young person's participation with drugs. Using the philosophy that youth who are busy studying for a ham license will lose interest in drugs and crime, the project focuses on ham radio—exposing the students to a world of fun and excitement, where they can channel their creativity and energy. The station, put together with donations, loaner gear and Officer Hill's own money, will operate CW, phone and packet, HF through UHF, and allow many students to participate at the same time. Officer Hill would like to thank the following companies and organizations: ARRL, Ten-Tec, ICOM, Heathkit, Alinco, Nye Viking, Coaxial Dynamics, Butternut, Yaesu, MFJ, Kantronics and Shure Brothers. He plans to report on HAD's progress later in the school year.

Amateur stations operating at 1900-2000 kHz must not cause harmful interference to the radiolocation service and are afforded no protection from radiolocation operations; see January 1986 Happenings for details.

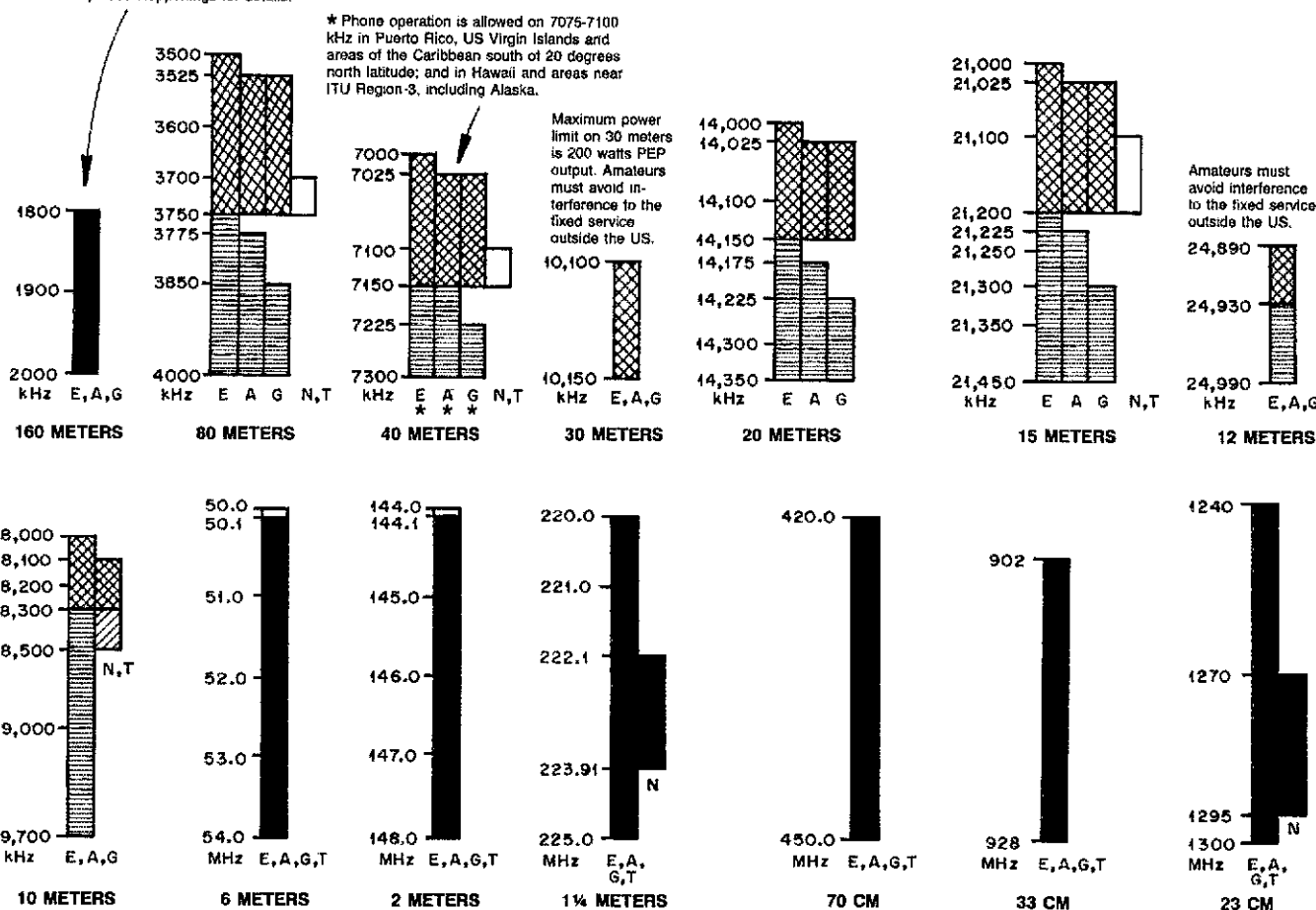
## US AMATEUR BANDS

(Effective 0001Z, March 21, 1987)

\* Phone operation is allowed on 7075-7100 kHz in Puerto Rico, US Virgin Islands and areas of the Caribbean south of 20 degrees north latitude; and in Hawaii and areas near ITU Region-3, including Alaska.

Maximum power limit on 30 meters is 200 watts PEP output. Amateurs must avoid interference to the fixed service outside the US.

Amateurs must avoid interference to the fixed service outside the US.



Operators with Technician class licenses and above may operate on all amateur bands above 50 MHz. For more detailed information see *The FCC Rule Book*.

5167.5 kHz Alaska emergency use only (SSB only) E, A, G, T, N

- = CW ONLY
  - ▨ = CW AND RTTY
  - ▤ = CW, VOICE, SSTV AND FAX
  - = CW, VOICE, SSTV, FAX AND RTTY
  - ▧ = CW AND SSB
- E = EXTRA
  - A = ADVANCED
  - G = GENERAL
  - T = TECHNICIAN
  - N = NOVICE

### US AMATEUR POWER LIMITS

At all times, transmitter power should be kept down to that necessary to carry out the desired communications. Power is rated in watts PEP output. Unless otherwise stated, the maximum power output is 1500 W. Power for all license classes is limited to 200 W in the 10.100-10.150 MHz band and in all Novice subbands below 28.100 MHz. Novices and Technicians are restricted to 200 W in the 28.100-28.500 MHz subband. In addition, Novices are restricted to 25 W in the 222.1-223.91 MHz subband and 5 W in the 1270-1295 MHz subband.

### The "Considerate Operator's Frequency Guide"

Some frequencies that are generally recognized for certain modes or certain activities (all frequencies are in MHz):

1.800- 1.830	CW, RTTY and other narrow-band modes	14.070-14.0995	RTTY
1.830- 1.840	CW, RTTY and other narrow-band modes; intercontinental QSOs only	14.100	NCDXF beacons
1.840- 1.850	CW, SSB, SSTV and other wide-band modes; intercontinental QSOs only	14.230	SSTV
1.850- 2.000	CW, phone, SSTV and other wide-band modes	14.313	Maritime mobile
3.590	RTTY DX	21.070-21.100	RTTY
3.610- 3.630	RTTY	21.340	SSTV
3.790- 3.800	"DX window"	24.920-24.930	RTTY
3.845	SSTV	28.070-28.150	RTTY
7.040	RTTY DX	28.200-28.300	Beacons
7.080- 7.100	RTTY	28.680	SSTV
7.171	SSTV	29.300-29.510	Satellite downlinks
10.140-10.150	RTTY	29.520-29.580	Repeater inputs
		29.600	FM simplex
		29.620-29.680	Repeater outputs

ARRL band plans for bands above 29.300 MHz are shown in the *ARRL Repeater Directory* and *The FCC Rule Book*. For suggested packet frequencies, see p 54, Sept 1987 *QST* and p 51, Mar 1988 *QST*.

All letters will be considered carefully. We reserve the right to shorten letters selected in order to have more members' views represented. The publishers of *QST* assume no responsibility for statements made herein by correspondents.

[The letter entitled "CW—Obsolete?" which appeared in November 1988 *QST* created a great deal of debate. Dozens of letters were received, all in opposition to N8IKW's viewpoint.—Ed.]

## CW OBSOLETE? NO WAY!

□ . . . In the time that I've been a ham, I've seen more and more "communicators" entering our hobby. They surely have found an interesting hobby, however, I question whether it is really ham radio. A familiar fist or voice is not permissible in their "communicating."

While the average person on the street may perceive ham operators as introverts who wield soldering irons and wear pocket protectors, I know better. Packet moves information quickly and accurately, but it is impersonal—machines communicating [with each other.] Indeed, these communicators may have missed out on ham radio's greatest opportunity. As operators using "antiquated" modes like CW and SSB, they could be out making friends around the world.

Decades from now, "communicators" will be able to read dot matrix printouts of old bulletin boards. I guess I'll have to settle for my Novice QSL from JH1WIX or my first 5-band QSL from KH6IJ. Granted, my views are those of an "old-timer" (aged 32 and licensed 18 years) with a 1 × 2 call.—*Jim White, K1ZX, Goulds, Florida*

□ . . . I remember reading a story about a ham who experienced a microphone problem while demonstrating his rig. He quickly took out a pair of wires and made a QSO using Mr. Swanson's "obsolete mode" of CW. An amateur with a no-code license would be in quite a predicament in this situation. Being 25 and a ham for over a decade, I appreciate all QSOs made with old-timers. They know the true value of home-brew equipment and of the phrase "simpler can be better." I have nothing against the "engineering marvels" of today. They've put bread on the table for me, but if hams rely totally on this new technology, they may find themselves lost without it.—*Andrew Singer, WK2F, Garner, North Carolina*

□ . . . I am really surprised at his ignorance of history and utility of CW as a communications mode. [N8IKW] states: "The use of Morse code in future conflicts as the principal means of communication is unthinkable. To suggest such a thing could be an invitation to ridicule." This has no basis in fact. The US Air Force, within the last two years, has shown a renewed interest

in the use of CW as a primary means of communication in a nuclear-modified atmosphere and the Air Force MARS program has a very extensive CW training program at this time as an adjunct to regular Air Force communications.

In World War II, Germany used high speed CW operations at over 100 WPM, and this is quite comparable to our present 60 to 100 WPM RTTY operations. To say that it takes forever to manage information using the Morse code shows ignorance of historical fact. The Morse code is still quite unique in its ability to be the only code readily understood by both man and machine. It will be here as long as we have radio communication.

Also, the opposition to the code requirement is not traditional at all, but rather it comes from those who don't fully understand or chose to ignore our role as amateurs in bare-bones emergency and contingency type communications.—*W. R. Phillipson, W6PRI, Cupertino, California*

□ N8IKW's letter makes the error of assuming that amateur traffic is in competition with the many other services which exist today, however, we do not have to be able to move huge volumes [of traffic] fast. Sure, if we can do it through the use of computer modes, that's very good and should be encouraged. No one is suggesting that we argue that the military should use CW, however, many of the newest military transceivers do have provisions for CW, and it doesn't hurt that hams are a group the military doesn't have to train in CW.

When I was a Communications Officer in the Army in Greenland, I recall an occasion when the North East Air Command's tropo-scatter link to the States was knocked out in an intense magnetic storm which lasted three days. The Danish weather net, which had stations all along the coast, filled in for us and they used low frequency CW with 30's vintage gear and hand keys. The data rate was very slow, but the traffic got through. Only the most urgent traffic was sent. It forced everyone to greatly edit what was being sent, and it was surprising how much didn't need to be sent! —*David L. Wiesen, K2VX, Newark, New Jersey*

□ . . . As a member of the Marine Corps, I have seen a growing emphasis on the use of the obsolete CW. —*Sgt Anthony Engracio, N4FPO of Miami, Florida*

□ . . . The Soviet Navy makes heavy use of CW; it's cheap and reliable. After the US Navy commo-satellites get knocked out by

EMP, who will be left on the air? As far as taking forever to manage information using this mode, all this means that N8IKW needs to practice CW more!

It is true, as he states, that digital electronic modes are engineering marvels; however, they are also quite costly, especially to the little guy entering the hobby. They are also very complex technologically and therefore subject to malfunction. Finally, CW is an art form and it still separates the men from the boys! —*Hans K. Hildebrand, KA1PCJ, Conway, New Hampshire*

□ . . . Let me say that the age of computers and digital communications is truly wonderful. I use my home computer for many tasks, including the typing of this letter. I have designed and built many circuits using digital circuitry. It is here to stay, and I'm glad. Digital and analog electronics enthusiasts should learn to recognize the merits of each area of interest and try to get along and not be critical of one another.

CW is valuable in the following ways: 1) It teaches those who are inclined to build communications equipment. A great deal of the young engineers coming out of school these days, while they are being taught plenty about computers, are being taught relatively little about . . . electronics. Many I have seen can't troubleshoot a simple audio circuit. 2) [CW is useful because] it can be used in emergencies when more complex forms of communications have failed. 3) Allowing to its simplicity and smaller size, it would be of great value in a [war emergency]. The Navy still uses CW in the form of light from ship-to-ship and ship-to-shore.

To those out there in radioland who enjoy using packet, I say more power to you. I am glad you have found a mode that you like. If each of us have different interests, then we won't be competing for or be crowded into the same band space. Just remember this: One of these days, someone yet to be born will come along with a "newfangled" idea that will make antique and "obsolete" what you have become comfortable with. I hope that you extend to them the same courtesy that others have extended to you.—*George R. "Bob" Howe, KB9JR, Mahomet, Illinois*

□ I have only been a ham for one year, but there is one thing I have noticed while tuning around the 10-meter "war zone" of 28.3-28.5 MHz. Most of the hams I hear want a no-code license, and many say that



CW is useless or that they can't copy 13 WPM. Well, I worked very hard for my ticket, and I've held three calls in six months. I wasn't born with Morse code running through my brain. One thing I can say is that ham radio does not give you something for nothing. CW is only as hard you make it. You can't buy it or have it given to you or even steal it—you must work for it and earn it yourself. All I want to say is "Don't let code die"—keep the code requirements and we will have better operators on the bands.—*Ron Smith, KF7JF, Phoenix, Arizona*

□ . . . Here is another important factor that rarely enters into the code/no-code argument: the code test is a simple communications skills test and more specifically, a listening test. It gives one the ability to listen and discern and react by writing down the information heard. This is proof that prospective amateurs have sharpened their real time communications skills to some degree. Can anyone suggest a code-free method of testing listening skill that will be more uniform and fair for all and as easy to administer as the code test?—*Steve Kirschner, WY6P, Redondo Beach, California*

□ . . . Only in exceptional circumstances—such as lack of availability of other equipment—would CW actually be considered a necessary or expedient mode of communications nowadays. Using CW might be considered analogous to the engineer who uses a slide rule when pocket calculators are available.

However, a significant number of hams, myself included, prefer this mode for recreational purposes. Some of us have developed proficiency in CW which may not be "useful" in such endeavors as the high speed transmission of great megabytes of data for commercial profit, but we enjoy it anyway as an escape that is better than watching television and more fun than jogging to the point of exhaustion in subzero weather!

In short, for many of us, CW IS FUN. In this society, fun is something that, in its purest form, ought to be more widespread. There will always be those of us who pound away on keyers, bugs and, yes, even straight keys. Precluding QRM, QRN, power failures, heart attacks or other catastrophes, such QSOs are inevitably finished all too quickly most of the time.—*Stan Gibilisco, W1GV, St Paul, Minnesota*

□ . . . To those who say that it takes forever to communicate on CW, I suggest that they listen on 20-meter CW a little. They'll find stations operating at 30+ WPM, and I'll bet that they're not nearly as tired of communicating after several hours than SSBers who have yakked for the same. It takes a lot less effort to move two fingers than two lips!—*Mike Gilbreath, N4OHB, Fort Payne, Alabama*

□ . . . Let's not take the personality out of ham radio by looking for ways to make contacts shorter and less personal. I love CW! It happens to be my favorite mode of operation. Sure, I do packet and occasionally voice; I'm even planning my first satellite contact, but CW gives me a greater sense of accomplishment and enjoyment than any other mode.

I was willing to put in study time and practice [in order to earn] my Extra Class license. I didn't expect the privilege of ham radio just to be given to me. I also don't expect it to be degraded by allowing anyone who can run a computer and dial up a BBS to become a ham operator.

You may be surprised to find out that I am not an old-timer in ham radio. I'm 33 years old, and I've had my ham license for two years. I'm also one of those high-tech software engineering people who works with and helps create some of those impersonal and speedy methods of moving "data." I still go back to CW for that special thrill...maybe it's the sparks!—*Scott J. Gottfried, NØHOT, Longmont, Colorado*

□ Almost 150 years ago, Daguerre, a French experimenter, introduced photography to an astonished world. The following day, a newspaper carried the headline: "From Today, Painting Is Dead." Somehow, painting managed to survive. It survived because painting was, and is, an art. Not the most modern way of capturing a scene on paper or canvas and not the most accurate way, but to many, the most beautiful way.

CW is also an art. Practiced and loved by many, many thousands, CW will survive. Letters condemning CW have always seemed rather sad. Sad, because someone is missing out on one of ham radio's greatest pleasures, and sad because it is so unnecessary to condemn one mode in praise of another. To me, there are few pleasures in the world that compare to a good, snappy CW QSO. Occasionally, when someone compliments me on having a "good fist," I feel proud. Recently, when a VK told me "your old bug is music to my ears; I could listen to it all day," I felt very honored.

Small pleasures perhaps, and certainly not for everyone, just as some modes are not for me. I love DXing, rag chewing, building and CW. I have little interest in RTTY, 2-meter FM, packet, EME and so on, but how glad I am that we have all of these wonderful and varied means of communications. I will fight to the end to preserve each and every one of them.—*Bruce Vaughan, NR5Q, Springdale, Arkansas*

#### THE REAL ATLAS RADIO, INC

□ Within the past year or so, an unfortunate situation has come about which

reflects on my former company, Atlas Radio, Inc. An individual located on Long Island, New York has been using the name Atlas Radio with an exact copy of our former logo and type style. There is no connection between this firm and my former company.

There are currently two qualified service organizations for original, genuine Atlas Radio equipment that I know of. They are: 1) RF Parts, 1320 Grand Ave, San Marcos, CA 92069 tel: 619-744-0728 2) Clint Call, W6OFT (who was Service Manager at Atlas for several years) 2248 Jefferson, Carlsbad, CA 92008 tel: 619-729-0850. Thanks.—*Herb Johnson, W6QKI, Cardiff, California*

#### GOOD SHOW

□ Edward Mitchell, WA6AOD, did a superb job with his October *QST* article entitled "Emergency Communication: Is It Legal?"

We were able to use portions of the thoughtfully constructed piece on our Upstate Regional Emergency Training Net which meets weekly and covers four repeaters in 13 contiguous counties in upper South Carolina. The really nice thing about Mitchell's work is that it leaves one with the impression that he may not be hung up on "the way we did it in the Army." Thanks for the article.—*George Allgood, K4PYM, Walhalla, South Carolina*

#### RTTY ROUNDUP—GET READY!

□ I'm delighted to read in November *QST* that users of RTTY and other digital modes of communication are to have a contest in January. It may surprise some that the ARRL did sponsor a RTTY Sweepstakes in 1962. February 1963 *QST*, page 50, acknowledges that over 300 stations participated in that contest.—*E. Stephenson, W6MKM, San Mateo, California*

## Strays



I would like to get in touch with . . .

□ anyone who has operating and/or maintenance manuals for a National NCX1000 transceiver. George Uminski, K6YGK, 13776 Mira Montana Dr, Ca 92014.

□ anyone using the Butternut Butterfly antenna. F. E. Tweed, N9FWM, 38 W 248 Joan Dr, St Charles, IL 60175.

□ anyone who has info on model TT 264 A/G teletypewriters which were used on a WW II P2V anti-submarine aircraft. Eric Smith, ND3J, 501 Beaumont Rd, Colesville, MD 20904, tel 202-778-5506.

□ anyone who has a service manual for a Hewlett Packard 3469B multimeter and/or a 5260A frequency divider. John Anderson, N7GGO, PO Box 1145, Shelton, 98584.

## Future Shock? Real Traffic Handlers Use CW!

By James Waides, WB8SIW

[ARRL HQ has received a large number of letters in response to the "Future Shock" article which appeared in the September 1988 edition of this column. This is one of the more interesting responses—Ed.]

Brad Wells' article "Future Shock in the NTS" brought to mind many thoughts developed over a period of many years spent in various capacities within the ARRL public-service community.

First of all, while it is probably safe to assume that packet radio is quicker and more convenient for the radio amateur, one could probably make a strong case that this is not the typical driving force behind the hobby. Most amateurs participate in the NTS because they enjoy the challenge of traffic handling. While I support digital technology, and use it myself, it will never give me the same thrill as picking up a string of messages at 35 WPM without a miss. Sure, I could drop a radiogram onto a BBS and forget about it, but what challenge is found in doing so? With all due respect to modern engineering, I'd rather play the violin! The simple fact is that it takes little more skill to hook up a TNC, computer and 2-meter radio than it does to interface a VCR with a TV, outdoor antenna and cable converter. This is not to say that packet radio is of no value. It is simply a way of saying that digital communications, for many, lacks the challenge provided by traditional modes.

Although digital communications are far superior to CW or SSB in many cases, there are many who could effectively argue that situations arise where a good, low-tech system will save the day when all else fails. Both the maritime services and our military recognize this. I have seen many cases myself where CW has cleared more traffic than both packet and SSB on poor propagation paths. Does this mean CW is better? Of course not; it simply means that all modes have a place in Amateur Radio and emergency communications, depending upon the circumstances.

An often-overlooked fact is that all communications must start with the written or spoken word. The skills gained through regular operation on a SSB or CW traffic net will always be of great value in various communications situations. The self-discipline gained through regular participation in an NTS area net will be of untold value while operating on traffic nets and

### The Net Control Sheet

Net controlling is no easy task, requiring much talent on the part of the operator. A useful prop is a set system for keeping track of net operation so that you don't get mixed up and start to lose control. This can best be effected by a sheet of paper on which you record who has what traffic, who covers what and who is on what side frequency. Trying to keep this information in your head is a losing battle unless you have a remarkable memory.

There are many methods for doing this, depending to a great extent on what net is being controlled and the exact procedure used. In general, however, the best method is to list the calls of stations reporting in vertically down the page, followed by their coverage, if known. The coverage may be unnecessary if the NCS knows his stations, but it is a good idea to leave space for it in case an unfamiliar station reports in and you have to ask his location.

Next, list horizontally across the page the traffic reported by each station coming into the net, using destination (abbreviated) followed by the number of messages. From this you can see at a glance when traffic flow can start. In most nets, it is best to start it right away, and not wait until all stations have reported in. As traffic is passed, it can be crossed off. Whenever you get a station who has no traffic and for whom there is none, that station can be excused (QNX) and crossed off the list. As stations clear traffic and there is none for them, they also can be excused.

If side frequency (QNY) procedure is used, net controlling is a bit more complicated, but the use of such frequencies vastly speeds up the process. In this case, you will need to keep track of who is on which side frequency clearing which traffic, and you will be kept busy dispatching them, sending stations up or down to meet stations already on side frequencies, checking stations back into the net as they return, etc. Both your fingers and your key or mike button will be kept going, and it can be a nightmare if not handled properly.

Probably the best method is to keep the side frequencies on a separate sheet, each side frequency utilizing a separate column, labeled up 5, up 10, down 5, down 10, or whatever spacing intervals you find practical. As two stations are dispatched to a side frequency, enter the suffixes of their calls in the appropriate column, at the same time crossing out the traffic they are sent there to handle. When they return, cross them out of the side-frequency column; this side frequency can then accommodate two other stations. Of course, if you dispatch a third station to the side frequency to wait to clear traffic to one of the stations already there, enter him in the column also, and then only one of the two originally dispatched will return, so just cross off that one. When all your listed traffic is crossed off, the net is ready to secure (QNX QNF).

There are a number of refinements to this method, but the above is basic and a good way to start. Experience will soon indicate better ways to do it.

various public service nets—such as a severe weather net or 2-meter ARES net—or any communications situation that involves high levels of stress and the need to operate under pressure. Any amateur with a long tenure of experience in public-service communications will be quick to recognize that such discipline is sadly lacking in the Amateur Radio Service. If you don't believe it, tune in on 20 meters next time there is a major disaster and listen for yourself. The quality of emergency communications has dropped dramatically in recent years and much of the problem stems directly from a lack of operator discipline; a discipline which cannot be learned by dropping radiograms onto a packet BBS.

Another serious problem affecting our hobby is a narrow-minded sense of parochialism that clouds the minds of many amateurs whenever opinions are formed about the relative merits of various modes or activities. We've all heard it before: "CW is obsolete and for idiots," "packet makes all other modes obsolete," "real traffic handlers use CW," and so forth. In reality, these comments say only one thing about the individual who holds them to be true.

The individual who calls CW obsolete in the November *QST* Correspondence column should monitor QMN, the Michigan Radiotelegraph Net, for several weeks (using a code reader if necessary!) before forming an opinion. Sure, it's not

as fast as packet, but in many cases it is faster than the SSB nets. Does this make SSB obsolete? Of course not; such a thought would be considered ridiculous. The simple reality is that the measure of a mode's value is directly proportional to the operator's skill and how appropriate that mode is to the communications situation.

If we wish to revitalize the NTS and Amateur Radio in general, a good place to start might be in the thousands of Novice license classes held throughout the country each year. All too often, newcomers to Amateur Radio are taught simply enough to pass the exam and little else. How often are Novice students shown an example of a skilled CW traffic handler at work? How often are Novices introduced to public-service communications or taught how to work DX with courtesy?

More often than not, the newcomer to the hobby is taught that "CW is meant simply to keep the CBers out" and is told very little about the fine traditions of operating excellence upon which the foundations of our hobby are built. Over 50 years ago, the ARRL ran an ad in *QST* for *How to Become a Radio Amateur* which stated, "not more amateurs, but better amateurs." Perhaps it is time for the ARRL, while promoting modern advances in communications technology, to look back to that phrase as a goal for today's League. Perhaps then we can insure that today's radio amateur has an open-mindedness which will allow him to embrace new technologies while respecting the value of the operating traditions established by the pioneers in our hobby.

## SPOTLIGHTS ON SERVICE

### Walker Mountain Fire, Grants Pass, Oregon

A lightning storm started numerous forest fires in the vicinity of Grants Pass, Oregon on the evening of August 23, 1988. Two fires, of 1000 acres each, were threatening a heavily-wooded subdivision north of Grants Pass.

The Sheriff's department called the Red Cross to establish an evacuation center at Fleming School near Merlin. The Red Cross radio officer, WA7TZG, contacted the Josephine County Emergency Coordinator, KA7DEF, who immediately activated the Amateur Radio Emergency Service and dispatched WM7K to set up a station at the Fleming evacuation center.

WA7TZG was already manning the permanent VHF and HF station at the Red Cross headquarters for contact with the evacuation center by using the Southern Oregon Radio Club repeater, K7LIX. He was later relieved by KA7NCH and W7TLK.

KF7HW accompanied the Red Cross director on his rounds Friday. The Emergency Coordinator deactivated the ARES



Amateur Radio operators responded to this train collision in Altoona, Iowa. (photo courtesy NAØR)

at noon on August 27, upon notification from the Sheriff that the immediate emergency was over.

Twenty Amateur Radio operators were directly involved, as well as a number of others who monitored and indirectly assisted the Emergency Coordinator. These amateurs contributed over 146 hours of service and drove hundreds of miles to perform their assignments. It was a very successful response to a sudden requirement for public-service communications by the Amateur Radio Service.—Robert Peck, KA7DEF, EC, Josephine CO, OR

### Altoona, Iowa Rail Accident

Two freight trains collided head-on in Altoona, Iowa on July 30, 1988. Right behind one of the diesel engines, a fire broke out on two tank cars filled with denatured alcohol creating the possibility of a tremendous explosion and fireball. There were two fatalities from one train crew, while the other crew jumped clear.

Altoona amateurs KAØNNS, KAØYXY, NØJAJ and NØJAS were the first hams to respond to the critical situation. After conferring with the Polk County Emergency Director, Bob Plath, activation of an Amateur Radio station in the command post was requested, in case phone lines became overloaded if an explosion occurred.

It was decided to let the fire burn itself out and evacuate the northeast part of Altoona and surrounding countryside. 1500 to 2000 residents were asked to vacate their homes, and the area was sealed off by local authorities about three hours after the accident was reported. This evacuation was to extend over two days. Shelters

were opened by the Red Cross, but most of the evacuees stayed with relatives or at motels. With phone lines in their normal condition and few evacuees in the Red Cross shelter, it was decided to wait to see if the situation became worse before setting up an Amateur Radio station.

KDØBG, the Iowa Section Emergency Coordinator, was notified shortly after the accident and recorded the calls of local hams that could be of assistance.

The Polk County Emergency Coordinator, NAØR, was kept abreast of the situation while finishing up an afternoon at work. After having a conference with Bob Plath at the command post in Altoona, a two-hour schedule was drawn up and filled immediately with area hams. With the exception of early morning hours on Sunday and Monday, the ham station at the CP was manned on a continuous basis.

Sunday morning, officials from the National Traffic and Safety Board surveyed the scene and declared it a major disaster. The decision to let the fire burn itself out was reaffirmed and the evacuation remained in effect. The safety features on the two burning tanks were working and the situation then seemed under control.—James Snapp, NAØR, EC, Polk Co, Iowa

### Council Bluffs, Iowa Tornado

Before last summer, I was under the impression that we had an adequate number of trained and experienced net control operators in our ARES organization, but a major storm with tornadoes came through our community. Now the training of more net control operators is our number one priority.

In most ARES groups and nets, members train for an event that they hope will never happen—a disaster. Yet, nothing perfects skills quite *like* a disaster! In our organization, nine people were trained in net control operations, and I felt that this number would be adequate. However, in an actual disaster, the more skills a member can bring to the situation, the more valuable they are to the total effort. For example, a person with damage assessment, emergency power and net control operator training can handle more duties than someone who only has damage assessment training. Volunteers who are better trained are more flexible in the ways that they can help.

Ironically, this worked to our disad-

### How to be the Kind of Net Operator the Net Control Station (NCS) Loves

As a net operator, you have a duty to be self-disciplined. A net is only as good as its worst operator. You can be an exemplary net operator by following a few easy guidelines.

1) *Zero beat the NCS.* The NCS doesn't have time to chase all over the band for you. Make sure you're on frequency, and you will never be known at the annual net picnic as "old so-and-so who's always off frequency."

2) *Don't be late.* There's no such thing as "fashionably late" on a net. Liaison stations are on a tight timetable. Don't hold them up by checking in 10 minutes late with three pieces of traffic.

3) *Speak only when spoken to by the NCS.* Unless it is a bona fide emergency situation, you don't need to "help" the NCS unless asked. If you need to contact the NCS, make it brief. Resist the urge to help clear the frequency for the NCS or to "advise" the NCS. The NCS, not you, is boss.

4) Unless otherwise instructed by the NCS, *transmit only* to the NCS. Side comments to another station in the net are out of order.

5) *Stay until you are excused.* If the NCS calls you and you don't respond because you're getting a "cold one" from the fridge, the NCS may assume you've left the net, and net business may be stymied. If you need to leave the net prematurely, contact the NCS and simply ask to be excused (QNX PSE on CW).

6) *Be brief when transmitting to the NCS.* A simple "yes" (C) or "no" (N) will usually suffice. Shaggy dog tales only waste valuable net time.

7) *Know how the net runs.* The NCS doesn't have time to explain procedure to you. After you have been on the net for a while, you should already know these things.

vantage during the actual disaster operations, as those who were trained in net control operations were also trained in other areas where they were needed. For example, Paul had experience with the 911 center and the emergency operations center. He was also busy restoring reliable 2-meter communications there, and was not available to take on NCS duties. Two other experienced operators were busy providing emergency power for the Red Cross chapter house. My background with the Red Cross also involved a lot of liaison work with that agency. Of the nine trained net operators, five that were available to help were involved in other phases of the disaster effort. Other ARES member stations were present or on the repeater and available for different assignments, but none felt that they could jump in and handle net operations. The need was met by another station and myself sharing the net control duties back and forth. This pointed out the necessity for more trained net operators in our organization.

The need for experienced net operators is also realized when a disaster effort lasts for several days. When a net runs for 10 to 14 hours a day, many people are needed to take over the duties of net control. The burden often falls to a few who are trained and feel comfortable in managing the business of the net.

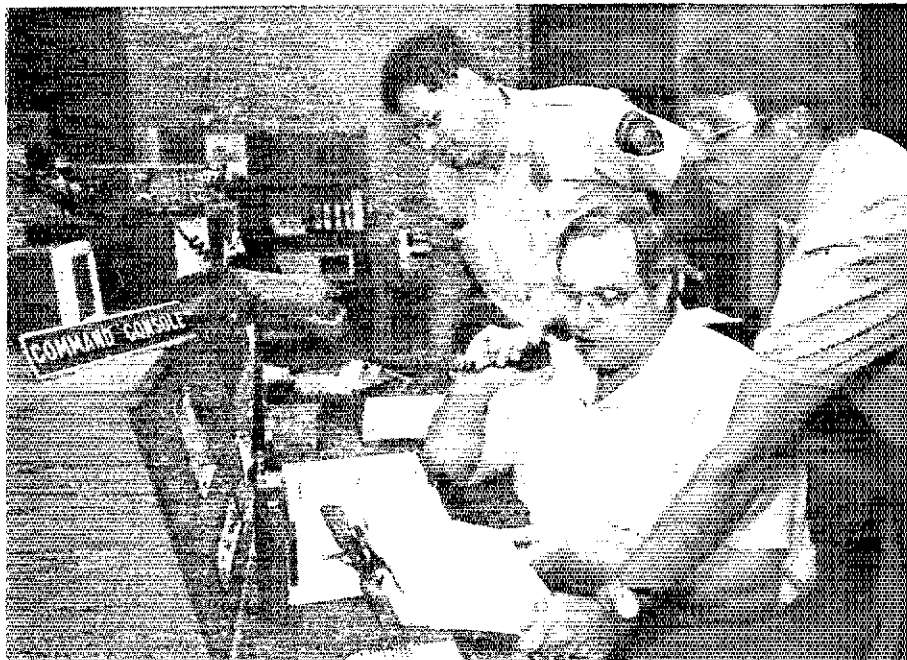
Fortunately for us, the disaster happened on a Friday afternoon, and the bulk of our services was provided over a weekend. Out of the nine trained net operators, two or three would have been available if the

disaster had happened during the week, when most of the nine would have been working. I would likely include some who could be available during the day in future training sessions for that very reason.

So, if you asked me today if it was possible to ever have enough people trained in net control operations, I would answer "No, you can *never* have enough." Those who have had the training are even better net participants and have a better understanding of the process and purpose of the net.

One final point should be made. The purpose of disaster training is to practice the skills you strive to achieve. Get accustomed to being net control. Volunteer to take nets whenever you can. Practice doesn't always make perfect (like handwriting), but it can make for a fair amount of permanence. Practice skills often, and they will become automatic when you need to call upon them in an emergency situation. You won't have to stop and think about what you should do. You will have done it often enough before, so that you will do the right thing. In our experience with the tornado disaster, the need for more trained net control operators was recognized and will be addressed with future training sessions.

If you belong to any ARES or traffic nets, you could make your organization more flexible and ready for the unexpected by volunteering to train and take net control functions periodically and keep your skills sharp. You and your organization will be better for it.—Terry Lindsley, KS0L



A tornado in Council Bluffs, Iowa brought ARES members to the communications command center (photo courtesy KS0L)

# Field Organization Reports October 1988



## ARRL Section Emergency Coordinator Reports

Thirty SEC reports were received, denoting a total ARES membership of 19,040. Sections reporting were: CO, EPA, GA, IA, IN, MDC, MI, MN, MO, MS, NFL, NH, NM, NJ, NTX, NV, OH, ORG, PAC, SD, SDG, SJV, STX, VA, VT, WA, WNY, WPA, WTX, WV.

### Cycle Three

Area Net	31	130	4.19	.414	86.6
EAN	31	130	4.19	.414	86.6
<b>Region Net</b>					
1RN	31	86	2.77	.277	95.9
2RN	31	117	3.77	.361	97.4
3RN	30	38	1.26	.167	94.4
4RN					83.8
8RN					93.5
ECN					83.8

### Cycle Four

Area Nets	31	1111	35.84	1.298	99.5
EAN	31	1111	35.84	1.298	99.5
CAN	31	721	23.26	.960	100.0
PAN	31	531	17.13	.812	95.2
<b>Region Nets</b>					
1RN	62	483	7.79	.563	94.5
2RN	48	146	3.04	.406	70.3
3RN	59	201	3.40	.314	96.6
4RN	62	556	8.97	.380	95.8
RN5	62	537	8.66	.620	82.0
RN6	83	492	7.93	.600	93.0
RN7	62	286	4.61	.594	94.9
8RN	60	284	4.73	.370	86.0
9RN	61	306	5.01	.420	85.9
TEN	60	288	4.77	.509	80.6
TWN	60	230	3.83	.402	86.1
ECN					100.0
ARN	31	140	4.52	.134	100.0
					93.5

\*PAN operates both cycles one and two.

ARRL Section Traffic Managers reporting: AL, AR, AZ, DE, EMA, ENY, EPA, GA, IA, IL, IN, KS, MDC, ME, MI, MN, MO, NC, NH, NTX, OH, OK, OR, ORG, SB, SC, SCV, SD, SFL, STX, TN, UT, VA, VT, WA, WMA, WNY, WPA, WTX, WV, WY.

## Transcontinental Corps

Area	Successful Functions	% Successful	TCC Function Traffic	Total Traffic
<b>Cycle Two</b>				
TCC Eastern	110	90.00	430	880
TCC Central				
TCC Pacific	106	85.48	358	658
Summary	216	87.74	788	1538
<b>Cycle Three</b>				
TCC Eastern				
<b>Cycle Four</b>				
TCC Eastern				
TCC Central	73	94.80	273	544
TCC Pacific	115	92.74	450	888
Summary	188	93.77	723	1432

## TCC Roster

Eastern Area Cycle 2: KW1U Director, K1EIC WA1FCD KA1MDM KT1Q W1QYV WA1TBY KW1U WB2EAG WA2FJJ W2FR NI2H N2HIF WA2SPL N2XJ N3AZW N3EMD NC3V NJ3V WA3YLO AA4AT WD4FTK N4GHI KB4N WB4PNY N4SS W8PMJ WB8YDZ VE3FAS VE3ORN

Central Area, Cycle 4: K5GM Director, W4ZJY K5GM WB5J K5MXQ W25N WR5O N5TC K5TL W5TNT KB5W W9CBE WB9UYU AI8O K58U.

Pacific Area, Cycle 2: ND5T, Director, W5JOV ND5T N6LHE K6UYK WF6O VE6CHK N6GW KF7R W7TGU W7IGC WA8OYI WD8CKC N8HFZ ND8A

Pacific Area, Cycle 4: K0DJ Director, N2IC ND5T W5QVK K6LL W8EOT W8VZT W6INH W7EP W7GHT K5GXZ KA7CPT KN7B W7VSE NN7H NR7E K0DJ K0EZ K0TER KC0D KJ0G

## National Traffic System

Net	Sess	Tfc	Avg	Rate	% Rep to Area
<b>Cycle Two</b>					
<b>Area Nets</b>					
EAN	31	753	24.30	.721	94.6
CAN	31	577	18.61	.476	100.0
PAN*	62	459	7.40	.576	97.3
<b>Region Nets</b>					
1RN	62	372	6.00	.397	100.0
2RN	62	343	5.53	.394	92.3
3RN	31	111	3.58	.400	89.6
4RN	62	392	6.32	.290	78.0
RN5	62	503	8.11	.413	86.0
RN6	51	141	2.76	.285	—
RN7	62	303	4.89	.427	87.5
8RN	62	275	4.43	.298	98.3
9RN	62	282	4.55	.336	90.0
TEN	70	572	8.17	.369	79.0
TWN	56	224	4.00	.348	88.2
ECN					80.7

## Public Service Honor Roll

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 NT8 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; (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 qualify for the Public Service Honor Roll 12 consecutive months, or 18 months out of a 24-month period, will be awarded a special PSHR certificate from HQ.

919	117	N6NLW	90
N4GHI	KA3DLY	WB4WII	W6VOM
409	K4NLK	K5KCL	KD2UV
KC9CJ	114	101	89
268	WX4H	KT1Q	NB1A
W7A	113	K8TVG	WA1TBY
WB7VSN	WB8HTN	WA2JBO	AA4ZV
224	N9BDL	K4MTX	88
198	KD7ME	100	K2ZVI
KA7EEE	WF6O	KA1FVY	KB4WT
197	WB2VUK	WB4KSG	ND2S
W7VSE	112	99	87
165	N2EIA	N3EMD	W4RWB
WA9VND	111	KJ4NK	86
155	AG9G	98	WD8GUF
WB4DUV	NG1A	WA1FCD	KV5X
150	W9CBE	N4MEJ	WB8SYA
WB2OWO	NM1K	WB1HIH	KB9LT
135	KA7SYG	97	N7BGW
KF5BL	W9CBE	WG6S	K2YAI
W7LNE	107	W4PIM	85
131	AA4TE	NO3M	W5CTZ
WB2ZJF	WA4PFK	KD8HB	W7GHT
N4EXQ	106	W5YQZ	KB1AF
129	WB1GXZ	96	NC9T
WA2SPL	W4ANK	W4CKS	N4KSO
128	KJ4VT	WD5GKH	84
WB8KQC	105	K2VX	N3COY
127	WBOYH	N2HIF	AK1W
W2QNL	WA4JDH	WA3YLO	83
125	KW1U	W4JLS	AC6Z
WB4DVZ	WE2G	WBSJ	W8J
124	WB6DOB	KA2INE	N3EGF
WA4QXT	K5UPN	94	82
123	104	N8CEI	81
W2MTA	W9YCV	AA4HT	80
122	N8FCO	K4VWK	79
W5XTP	N1CPX	KA2QOO	78
121	W9YCV	80	77
W7LRB	K6UYK	WB4WQL	76
119	W4E1C	N3DRM	75
WG7H	WA2FJ	W3YVQ	74
118	102	WB4WQL	73
N2XJ	W6INH	W1KX	72
		N4SMB	71
		K9CNP	70
		KV7F	69

80	W2GJ	WJ2S	KA6HJKT
WB8R	72	KC2HJ	61
N2ABA/T	KJ9J	W2FR	W0OUD
79	N8EFB	66	KD0NH
WA1JVJ	KA4FZI	KA1MDM	WB7WOW
KB4JPN	71	WB1BTJ	KA6TND/T
KC3Y	WA6QCA	KB4JPN	N2DXP
KJ3E	N3AZW	KQ3T	K3GHH
KA1JXH	KA4HHE	WA4RUE	W4HON
WD4KBW	WA9VLC	K4BGZ	K4ZUY
N4ORZ	NJ3V	65	WB4PNY
78	70	A100	KI4W
N8GPU/T	K9QBE	W4HON	60
NC3V	K8CPS	W1PEX	N8HWD
77	K4ZUY	KI6ZH	W2PRX
NY8W	K4IWW	KA22NZ/T	WD8KBW
WR5O	69	64	WB4ZTR
75	WA8DHB	WB8WNJ	KB2EPU
ND0N	WB9QBZ	WD8EIB	KB4OPR
WB8ZNY	K8JDJ	WB2FTX	59
N8HSC	K14BR	KF4FG	W8I0/T
W4RWB	68	KA9QXI	53
K9ZBM	KA9RII	63	KA9CTW/T
74	KA8ARP	WA3UNX	47
WA0TFC	N0IYE	WB8KWC	KA1HPO/T
KA1IFC	NV5L	KA1QFV/T	N2EVG/T
73	WB5YDD	62	40
N1DHT	NO8A	NS9Q	N8HRW/T
NW8M	W1KK	W9UMH	
KD8KU	67	K5FRD	

The following stations qualified for PSHR in previous months, but were not listed in the respective columns: September: NV5L, AC5Z, WD5GKH, WB5YDD, WB5J, NZ5J, WR5O, W8I0/T. August: W5CTZ, AC5Z, NV5L, WB5J, NZ5J, WB5YDD, WD5GKH, WR5O. July: AC5Z, WD5GKH, W5CTZ, WR5O, WA2VJL, NZ5J, NV5L, WB5J, WB5YDD, WB5FQU.

## Brass Pounders League

The BPL is open to all amateurs in the United States, Canada and US 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 the standard ARRL form.

The Brass Pounders League Medallion is available to individual operators who achieve BPL and are listed in the BPL column for the third time. This medallion is a one-time-only award, ie, it is not issued more than once. It is not necessary that the three months involved be consecutive. Any three months will qualify an operator. Stations that qualify for the BPL medallion, upon written notification of the qualifying months to the ARRL Public Service Branch, will be awarded the call-sign-engraved BPL medallion.

Call	Orig	Rcvd	Sent	Divd	Total
W3CUL	763	891	1287	91	3032
WA2SPL	42	1063	1144	28	2277
N4GHI	38	1017	202	813	2070
WB9YPV	0	1176	110	727	2013
W1PEX	0	295	1573	11	1879
KB4N	0	795	743	0	1538
WA9VND	6	629	596	71	1302
WB8WNJ	230	96	650	5	981
WB8TAX	0	459	459	0	918
W8AKF	107	321	321	184	913
KC9CJ	7	482	72	342	903
W3IWI	1	422	418	0	841
WA1FHB	1	414	416	3	834
W3VR	240	268	230	47	785
WA4JDH	1	343	407	4	755
KA1IFC	15	323	271	12	621
WF6O	0	291	278	17	586
N3AZW	21	271	259	17	568
K5UPN	0	258	298	1	557
N9ABC	82	189	253	12	536
WX4H	0	252	260	5	517
KF5BL	11	116	339	4	508
BPL for 100 or more originations plus deliveries:					
WB5QHK	135				
WB9MDS	125				
WB5Z	100				
KB4KXV	100				

## Independent Nets

Net Name	Sess	Tfc	Check-Ins
Amateur Radio Telegraph Society	26	178	326
Clearing House Net	31	269	338
Early Bird Net	31	821	207
Empire Slow Speed Net	31	70	393
Golden Bear Amateur Radio Net	31	252	1472
IMFA	26	1019	1588
Northern California Net	93	248	1278
NYSPTEEN	31	84	522
Southwest Traffic Net	31	222	1606
WCN	30	881	472
20 Meter Interstate SB Net	28	861	472
7290 Traffic Net	47	450	3014

## A New QTH for W3XO

For some years, I have been planning to make a move to the great state of Texas. My retirement from the Johns Hopkins Applied Physics Laboratory last March finally made that possible. My wife Mattie and I have purchased a new home on a ranch about 60 miles northwest of San Antonio (in EM00) and will be moving in about the time this appears in print. It looks like it will be a fine radio location, with plenty of room for antennas. I am looking forward to trying my hand at VHF from that part of the country. It will certainly be quite different from the East Coast, and is sure to offer many new challenges.

Column correspondence should no longer be sent to Burtonsville, MD. The new address, effective immediately is:

**HCR 5 Box 574-334  
Tierra Linda Ranch  
Kerrville, TX 78028**

Naturally, the answering machine phone number is no longer in service. I will let you know next month what the new number will be.

### Pioneer Moonbouncer Joins the Silent Keys

The history of amateur EME was blazed by Bill Smith, W3GKP, and Ross Bateman, W4AO. In 1953, these two set up experimental equipment on 2 meters to prove that bouncing signals off the moon is within the reach of amateurs. Their success set the stage for others who followed in the 1960s and 70s, and up to

the present day, to demonstrate that our closest celestial neighbor can be very useful as a reflective surface for completing long-distance contacts at frequencies of 50 MHz and above. Bill Smith, who had moved to Franklin, North Carolina and became K4RJ, passed away in 1975. Now, his partner in these early EME experiments has also succumbed. A story in the *Washington Post* announced that Ross Bateman, W4AO, died October 11 of cancer at age 76. The article noted that Ross had come to the Washington area during World War II to work in the field of radio propagation. It went on to chronicle his long and distinguished career in government and private industry. The amateur moonbounce work was mentioned prominently by the *Post*.

### ON THE BANDS

**6 Meters**—As of the end of the first week in November, the 1988 fall F2 season is somewhat like the old tale of the blind men describing an elephant. How one perceives it depends greatly on the location of the observer. In some parts of the world, it has been outstanding. In others, such as the US East Coast, where this observer is presently located, it has been "so-so" at best. The only openings this part of the world has had, so far, have been short scattered ones to Ecuador and Argentina. HC5K and HC2FG were in here for three days in a row, October 10-12 and again on November 6. LU8YYO put in an appearance October 19. Despite many days of 48.25 MHz video from Europe and Africa, reported by many East Coast stations, nothing above 50 has broken for us in either of these two directions sufficient to result in two-way QSOs. However, the southern states and the West Coast, as well as other areas of the world that normally experience better-than-average ionospheric conditions, have been partaking of some "world class" 6-meter DX morsels. Perhaps if the solar flux had been higher, as it had been a month earlier, we would have all fared better, but the 10-cm numbers hovered in the 150s and 160s during most of the period. However, judging from what can be heard on 28.885, it has been an excellent beginning for Solar Cycle 22. Some have taken the lack of European and South African openings as an indication that Cycle 22 is turning into a bust. However, looking back over columns from the late 1970s, it appears that the conditions we are experiencing are more analogous to the fall of 1978 than the fall of 1979. After all, the two periods are both approximately two years from the bottom of the previous cycle. The January 1979 column heralded "the first taste of real DX for most 50-MHz devotees—K4ERO/HC1." The same column also noted a transcontinental opening occurring October 31, 1978. As of this writing, we had not yet experienced one of those, but

the maximum usable frequency (MUF) has been close to 50 MHz on several occasions. For example, on November 8, N6AMG reported East Coast communications signals up to 47 MHz. And this was at 2200Z, very late in the day for such things. Also, WA8LLY/6 Santa Rosa, CA reported hearing weak W1s Saturday October 29th.

Mentioned last month were the beginnings of openings from the West Coast to the South Pacific. These have continued, with widening areas affected. WA6BYA writes from Santa Cruz, CA that on October 24th at 2159Z he worked ZL2KT. The following day, at 2341, it was ZL3TIC. On October 31st, beginning at 0135Z and lasting for an hour, Bob hooked up with VK4s DJB, DDB, KU and YBE plus VK2s XJ, BBR, FLI, ZXC and QF. Apparently through a sporadic-E link-up, at 0200Z VK2XJ and VE5LY managed a QSO with 449 signals both ways. On November 3rd at 2230Z, WA6BYA was one of many 6s who QSOed WY5L/KH3 on Johnston Island, who was in for over an hour with S9-plus-20-dB signals. In addition to the California stations, WY5L/KH3 also worked W5FF New Mexico. The following afternoon he worked N5JHV and K5FF plus several more California stations. October 30 brought 10 VKs plus an FK8 to the Bay Area including K6QXY and K6HCP. Signals ran as high as 20 dB over S9 and were in from 0100Z until 0400Z. The path to South America continues fairly active. On November 5th, OA8ABT put in an appearance, working a number of stations in the western states. One that worked the Peruvian station was K6QXY. It was a new country for Bob.

Many notable propagation events occurred around the world during October and early November and, while they were too numerous to mention all, here are a few. On October 25 between 2210Z and 2255Z W5UWB worked 5 ZLs on 51 MHz. K6QXY had three, two of them at 51 MHz. A very unusual opening occurred two days later on the 27th. It began

at 2130Z when K6STI worked KL7NO. Later a CQ brought JJKID followed by some 64 JAs over the next hour and 20 minutes. JAs were worked by a number of other California stations. Even N5JHV Las Cruces, NM got in on the action, working 5 JAs during a 4-minute opening beginning at 0001Z on the 28th.

On several days in October contacts have been possible between southern Europe and the Far East. On the 8th, 9th, 10th, 23rd and 29th CT1DTQ has worked into Japan. In all, Hanz has worked 30 different JA stations during these openings, in the 4, 5 and 6 call areas. All occurred in the late evening between 2345Z and 0130Z. Once during the month, 9H1CG heard KH6IAA but no contact resulted. On October 8 beginning at 0153Z, SV1DO heard the FY7THF beacon for about 2 hours with signals reaching S9 plus 20 dB. Can you imagine what next year will be like when we should be nearing the peak of Cycle 22? There should be plenty to work. According to K5ZMS's latest tally, there are now some 125 countries with at least some 6-meter activity.

Several DXpeditions added excitement to the period, although few US and Canadian stations were fortunate enough to work them. One was W6JKV's trip to Belize as V31IV. During his one-week stay, V31IV completed QSOs with 71 stations: 31 LUs, 15 PYs, 6 CXs, 1 CE, 2 HCs, 2 OAs, 1 TI, 1 KP4, 3 W4s, 5 W5s, 1 VP8 plus a single other Belize station, V31AB. Except for W5UWB, the 5s were worked on a short but intense E opening to the San Antonio area. W5UWB and the 4s, all in south Florida, were worked on scatter. The VP8 was VP8PTG, which was a great thrill for both of them. Jim further notes that 6 meters was open to South America every evening that he was there. When he wasn't busy working 6 meters or relaxing, Jim spent quite a few hours trying 2-meter EME. Using a single 5-wavelength M<sup>2</sup> Yagi, he managed QSOs with W5UN, SM7BAE, VE7BQH, DL8DAT, KB8RQ, WA6MGZ and

**2 Meter Standings**—For WAS holders, listing is WAS Number, call, state, call areas worked and grids worked. For others, call, state, states worked, call areas worked and grids worked. Call areas are the 10 US continental call areas plus KH6 and KL7 plus each VE and XE call area plus DXCC countries not located within the continental limits of the US, Canada or Mexico. Grids are the Maidenhead designators worked since the VUCC Award was instituted January 1983. In order to make the standings a true reflection of current 2-meter activity, those not reporting within the past two years are subject to being dropped. They will be reinstated upon presentation, in writing, of continued activity. It is not necessary to show additional states, call areas or grids worked to be reinstated. WAS holders are listed in any case. Compiled November 8, 1988. Updates for next listing must be received by May 5, 1989.

**WAS Holders**

1 K0MQS*	IA	---	---	56 KE5C*	TX	---	---	W2RS	NJ	38	13	129	W5FYZ	LA	38	11	156	
2 K5CM*	OK	---	---	57 WA4COG*	AL	---	---	N2PWK	NY	38	11	137	WASHNK	TX	36	10	---	
3 N8JA*	MO	---	---	58 WB9CAS*	IL	---	---	KE2N	NY	37	13	138	NUSF	LA	35	11	135	
4 K9HMB*	IL	---	---	59 W2CNS*	NY	33	---	W2UAD	NY	37	13	108	N5BBO	TX	32	10	50	
5 K1WHS*	ME	---	---	60 K8ALL*	ND	26	---	N2BJ	NY	36	13	114	W5IYX	TX	30	9	---	
6 WA4MVI*†	NC	---	---	61 K3XY*	WI	29	---	N2BCUT	NJ	36	13	---	W5DFU	OK	28	9	54	
7 K5JL*	OK	---	---	62 K1FO*	CT	18	98	K2OVS	NY	36	12	70	W5DEP	TX	28	---	74	
8 WA9DOT*	WI	---	---	63 W4DFK*	VA	---	---	WA2FGK	NJ	36	11	---	N6AMG*	---	32	37	---	
9 WB8ZXU*	IA	---	---	64 WD5CRK*	OK	---	---	K2GK	NY	35	11	124	K8PVS*	---	29	22	245	
10 K9CA*	IN	---	---	65 WB8PAT*	OH	39	97	K2LME	NJ	32	---	102	K8OXY*	---	20	14	---	
11 W8SD*	SD	---	---	86 KX00*†	CO	30	137	WA2ZPX	NY	31	8	---	W6LHD	---	20	9	81	
12 K5BMG*	LA	---	---	67 W7HAH*†	MT	55	206	W2WGL	NY	28	11	82	W6PFE	---	5	4	21	
13 K5GW*	TX	---	---	68 K1BKK	VT	---	---	WB2ZSY	NY	26	11	85	W7JF*	MT	46	---	---	
14 WB5LUA*	TX	23	---	69 K7KOT*	WA	---	---	KB3PD*	DE	49	21	139	W7RV*	AZ	44	24	169	
15 K4GL*	SC	23	---	70 K8BRQ*	OH	---	---	K13W*†	PA	48	49	208	A7A*	AZ	28	10	109	
16 W8VB*	MN	14	---	71 WA7BBM*	AZ	---	---	WA3JUSC*	MD	47	25	---	K7ICW*	NV	23	9	60	
17 WB5LBT*†	LA	50	---	72 SM2GGF*	---	---	---	WB3LJK	MD	39	14	132	WB8BKC	MI	40	12	170	
18 K4PKV*	NC	---	---	73 KD8SI*	OH	---	---	W3HMK*	PA	38	14	162	K8AXU	OH	40	9	---	
19 W8RWH*	MO	23	---	74 K2OS*†	NY	17	---	W3CWW	PA	38	12	185	K8WJK	MI	39	14	---	
20 W8IDU*†	MI	23	---	75 K1GVM*	MA	3	---	W3RUE	PA	38	12	112	K8RZB	OH	39	10	142	
21 K1MNS*†	NH	48	---	76 WA9OZN*	IL	---	---	W3ZZ	MD	37	12	135	W8NJR	OH	36	12	146	
22 WB9VEN*	IL	---	---	77 WA6MGZ*†	CA	59	232	W3XO	MD	37	12	52	W8NPNX	OH	35	9	120	
23 K5FF*†	NM	18	---	78 WDSAGO*	OK	38	---	AE3T	PA	37	12	---	W8PAG	MI	30	11	75	
24 W5FF*†	NM	22	149	79 WD4DGF*	TN	36	174	W3FJY	PA	37	11	149	K8SSG	MI	30	8	---	
25 W7FN*	WA	---	---	80 VE1UT*	NS	42	---	W3OTC	MD	34	11	61	W8WVM*	WV	15	23	---	
26 W1JR*†	MA	34	162	81 W8RRYJ5*	OK	30	---	W3WU	PA	32	11	76	W9UD	IL	46	14	164	
27 WB9QMN*	CO	---	---	82 WB8VYV*	IA	---	---	K3KEL	PA	32	11	64	WB9MSV*	IL	45	14	210	
28 WB4EXW*	NC	18	---	83 W5RCI*	MS	12	197	W3DMF	MD	32	11	57	NN9K	IL	45	11	184	
29 K9KFR*	IN	---	---	84 WA2GSX*†	NY	27	---	W3LNA	PA	30	8	73	K8NNM	WI	43	14	---	
30 K3VGX*	PA	---	---	85 WA8TKJ*	KS	25	171	W4ZD*†	FL	49	64	309	N9AQ	IL	42	13	201	
31 SM7BAE*	21	---	---	86 KB7Q*	MT	---	---	KC4EG*	KY	45	13	---	W8EP9	IN	41	13	105	
32 WA7BJU*	OR	---	---	87 AB3D*	DE	25	32	W4PCG	KY	41	11	---	WB9OJR	IL	41	9	170	
33 VE7BQH*†	57	---	---	88 KF0M*	KS	28	173	W4CPZ	SC	40	11	145	K9VGE	WI	39	11	131	
34 W6PO*	CA	---	---	89 WC2K*	NJ	38	233	W4HKK	TN	40	9	---	W9YCV	WI	34	11	113	
35 WA3V8J*	PA	27	---	90 N5BLZ*	TX	---	---	K4CKS	GA	38	14	162	W8UC9	WI	22	9	113	
36 AL7FS*	AK	20	---	91 K8AOD*	MO	---	---	K4KAE	SC	38	13	110	K8DAS*	IA	48	13	---	
37 WB8YSG*2	NE	---	---	92 WB4KMF*	TN	---	---	W4OWC	FL	38	13	---	W8EMS	NE	48	11	---	
38 N7NW*	WA	---	---	93 WB8SWD*	IA	---	---	NY4T	TN	38	12	175	N8LL	KS	46	15	233	
39 W5LUU*	TX	---	---	94 W7LJW*	AZ	47	129	W4LNG	GA	38	12	43	WB8SIL	MO	46	13	---	
40 W4HJQ*	KY	---	---	95 W8RT*	KS	27	150	K4QIF	VA	38	11	---	K8QQR	NE	45	11	173	
41 K5UGM*	TX	---	---	96 W2PGC*	NY	23	90	K14CI	FL	37	11	151	K8MA	MO	44	14	257	
42 W5UN*	TX	---	---	97 DL8DAT*	WI	50	---	W8QXO/4	GA	37	11	125	K8TLM	MO	44	11	180	
43 WA4LYS*†	FL	49	---	98 WD9ACA*†	AR	---	---	N4MW	TN	37	10	---	K8NNNO	CO	44	---	---	
44 WA1JXN7*†	MT	58	---	99 W5SUS*†	NH	24	---	W4ISS	GA	37	8	---	WB9ZYN*	NE	43	18	107	
45 W5JTL*	MS	14	---	100 AF1T*	KS	---	---	W4SBC	VA	35	13	107	W8PN	MN	43	11	52	
46 W8ANH*	MN	---	---	101 WB9YSG*2	IN	---	---	WD4AHZ	FL	34	12	156	W8FY	MO	43	10	124	
47 WA4NJP*	GA	---	---	102 WA8KRT*	IN	---	---	N14Z	FL	32	9	28	WB8DGF	NE	43	10	85	
48 W5HM*	NM	---	---	103 K9UI*	IL	---	---	NA4I	GA	31	12	55	N8EOQ	CO	42	---	---	
49 W7CI*	AZ	26	---	104 N4GJV	NC	---	---	W44MJD	TN	31	9	100	W8IZ	IA	41	12	164	
50 N5KW*	OK	13	---	105 W5UWB*	TX	39	---	K1FJM/4	FL	30	12	104	W8RAP	IA	40	10	114	
51 WB8TEM*	IA	23	---	WA1OUB*	NH	41	24	155	FL	29	9	82	W8PW	CO	38	9	---	
52 WD8FOY*	IA	3	---	W1A1M*	VT	39	15	103	FL	26	10	103	W8JRP	MO	35	11	142	
53 W8RWG*	MO	16	---	K1KA*	NH	34	12	93	FL	24	8	86	K80HH*	KS	30	9	116	
54 WB5ERD*	TX	---	---	N1AIS	MA	34	12	---	AL	24	7	64	W8KEA	CO	29	8	87	
55 W4WD7*	UT	---	---	N1BUG*	ME	33	23	125	GA	22	7	72	N8BTN	NE	28	10	104	
				W1EJ	NH	31	13	---	OK	49	26	176	WB8RJR	MO	27	8	---	
				W1RIL	MA	30	12	---	AR	48	17	351	K80KUY	KS	23	7	94	
				KA1DHO	MA	29	11	46	OK	47	15	229	VE3DSS*	---	38	12	---	
				K1SF	MA	29	11	---	OK	44	12	35	VE3FK*	---	36	10	---	
				K5MA/1	MA	27	11	106	W5UGO	OK	41	18	175	VE3LNX	---	26	10	75
				WA1AYS	MA	27	10	---	W5HN	TX	43	12	---	VE4AQ	---	18	7	18
				K1LPS	VT	25	11	82	KA5AIH*	TX	41	18	175	VE5LY*	---	31	13	92
				WA1TRE	ME	24	10	58	W5NZS	OK	41	13	182	W5SSXD	TX	40	11	97
													K6GDX*	---	22	---	67	

†WAS completed in NC, now in SC  
 \*WAS completed in both NE and KS  
 \*Some contacts made via EME.  
 †WAC.  
 ---Information not supplied.

**WA4NJP.** The other DXpedition was a jaunt to the Cayman Islands by N3AHI operating as ZF2MU. Jim found conditions to the north less than desired but nightly openings to the south made for great fun.


**K2QWD** wants it known that the 75-meter net, which meets each week to discuss 6-meter matters, has QSYed to 3880 kHz. The group gets together at 2000 Eastern time each Tuesday evening. Earl hopes that the new frequency will enable more to join in.

Just prior to submission of this column to Headquarters the afternoon of November 9, the first transcontinental F2 opening of Cycle 22 may have occurred. Signals were quite weak and there was a considerable amount of E<sub>s</sub> present in the country about the same time, which casts some doubt on the nature of the propagation. In any case, whether by F2 or double-hop E, a number of transcontinental contacts were made between about 1800Z and 2000Z. VE1YX reports working five 6s: K6PXT, K6STI, N6XQ, W6WVK and K6CH. Also, K6QXY contacted WA1OUB at 1940Z.

From his end of that QSO, WA1OUB commented that the lack of signals from the Midwest indicated propagation via F2. On the other hand, K7QXA/6 in extreme northern California said that he worked a  $\theta$  in Colorado at 1745Z, followed closely by two North Carolina stations. This scenario would lead one to conclude that double-hop E was responsible. It's just possible that we had both F2 and double-hop E that day. Whatever it was, we'll take it!

**2 Meters**—The 2 Meter EME Bulletin announces that it will be awarding plaques to the first three place winners on 2 meters in the Single-Operator EME category of the ARRL International EME Contest. In addition, 10 certificates will also be awarded to the top single-op stations. Copies of logs must be submitted by December 30, 1988 in order to qualify. Send to 14826 Daisy Ln, Tampa, FL 33613. For further information, call 813-960-4291.

**The Higher Bands**—K6LMN writes to proclaim that 33 cm is alive and well in California. Roger notes that, among the other VHF, UHF and microwave bands used during the early September trip to Baja by N6XQ/WA5LLG, 902 played an important part. In an effort to set a new West Coast 33-cm record, he journeyed up the coast to Point Conception where he worked the September VHF Contest, including completing QSOs with XE2GFH on both 23 cm and 33 cm. The distance: An impressive 599 miles! K6LMN's 10 W produced signals up to S9 in Mexico on both bands. Bet he and the others will be out after new marks next year.

VE4MA passes along word that he has recently worked SK6WM, F2TU, OE9XXI and LX1DB on 13-cm EME. Barry is using a 12-foot dish and 100 W (in the shack). The PA uses two water-cooled Y750s. With some improvements in the power supply, he hopes to be up to 150 to 200 W. VE4MA is also considering 33-cm EME. Would anyone care to encourage him? 

## 10-GHz DX News

In a recent phone call, Bruce Erickson, WBØHLC/6, described to me another 10-GHz DX contact made in California. On August 6, 1988, WBØHLC/6 worked Rich Rhymes, WB7ABP/6, over a 479-mile path from a site at 7000 feet above sea level (ASL) on Bonanza King Mt, California (grid locator CN81QC), to a site at 8000 feet ASL on Frazier Mt, California (DM04MS), along the California Sierra mountains. The Bonanza King Mt setup is shown in Fig 1. Contact was first made at 1156 UTC using the very weak-signal CW exchanges familiar in EME work. By 1300 UTC, signals were strong enough for an SSB contact, during which the signals peaked 20 dB above the noise. Signals peaked shortly after sunrise, and faded out completely by midday. A 1296-MHz contact was also made during the morning. On 10 GHz, WBØHLC/6 used a 32-inch dish with 1-dB-loss feed line, and WB7ABP/6 used a 48-inch dish with the transmitter mounted at the dish feed. Both stations had TX power of 28.5 dBm (708 mW) from solid-state amplifiers using NE9002 devices. Both stations had receiver NFs around 4.5 dB.

With the recent spate of DX records on 10 GHz, it is becoming difficult to keep track of things! At this writing (October 1988), the August 6th contact appears to establish a new US tropo 10-GHz DX record. It is particularly significant that relatively modest power (a few years ago it would have been considered very high power!) from a solid-state amplifier was used for this contact. The rigs were quite small and portable, and could run all day from a car battery—an important consideration when operating from a remote site.

Bruce, WBØHLC, also has a 10-GHz beacon located on Mt St Helena (38.7°N, 122.6°W) at an elevation of 4344 feet ASL. Modulation is 170-Hz shift FSK with WBØHLC/6 CW identification every 20 seconds. Two antennas are used simultaneously: The first provides an omnidirectional (vertically polarized) 10-dBm-ERP signal, and the second provides a 40-dBm-ERP horizontally polarized signal on a heading of 142°. This heading intercepts Mts Diablo, Pinos and Frazier in California. The beacon is at 10,368.020 MHz and uses an oven-mounted frequency standard.

Phil Lee, W6HCC, and Chuck Swedblom, WA6EXV, have also been busy on 10 GHz. On October 4, 1988, they made

a 147-mile contact from Blue Ridge, California (DM14), to Walt's Point, California (DM06). Contacts on both CW/SSB (10.368 GHz) and FM (10.250 GHz) were made. Both stations used

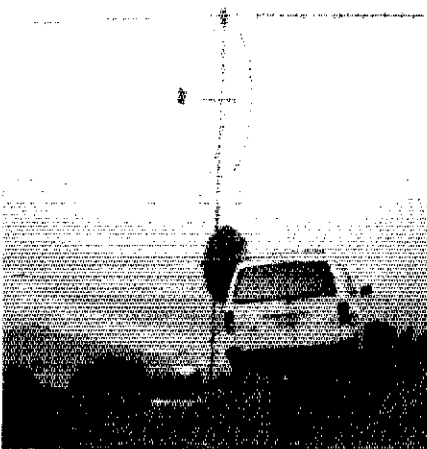


Fig 1—WB7ABP/6, 700 feet ASL on Bonanza King Mountain, California, set a new 10-GHz record of 479 miles with WBØHLC/6 using the setup shown here.

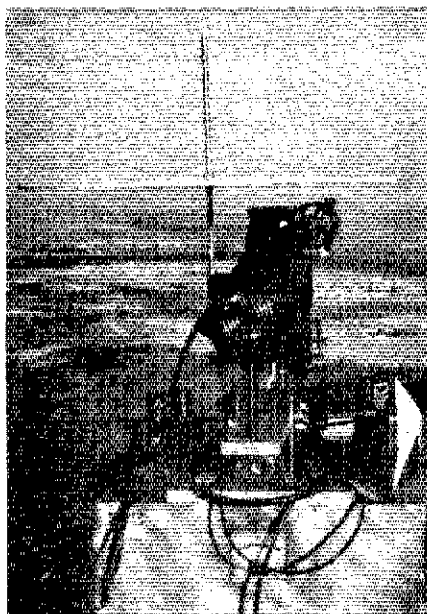


Fig 2—Laser activities have been stepped up in the western US: KY7B (South Mountain, Arizona) worked WA7LYI (Mount Lemmon, Arizona) over a 95.6-mile path using this 30-mW HeCd laser on August 7, 1988.

24-inch dishes. W6HCC ran 65 mW output on CW/SSB, and WA6EXV had from 300  $\mu$ W to 40 W output available. The 147-mile contact was Q5 on CW using only 300  $\mu$ W! On October 18, 1988, WA6EXV went to Low Pososi Mt (DM25) and worked W6HCC on Blue Ridge again for a 170-mile contact. W6HCC then moved around trying to find a different path. Heaps Peak and Strawberry Peak did not provide workable paths, but Keller Peak, at a distance of 154 miles, provided a site for solid SSB and CW contacts.

### More Laser News

Last month I reported a new laser DX record. Dave Chase, KY7B, sent along these details. The 95.6-mile contact was made between KY7B and Terry Wilkinson, WA7LYI, on August 7, 1988, at 0830 UTC. Equipment on both ends consisted of surplus 30-mW HeCd lasers operating at a wavelength of 442 nm (678 THz). Home-brew receivers used 19- $\times$  24-inch Fresnel lenses, photomultiplier tubes and high-gain op-amp audio amplifiers. A home-brew mount was used for positioning the transmitter.

For this contact, KY7B was located at South Mt, near Phoenix, Arizona (Fig 2), at 2600 feet ASL. WA7LYI was at Mt Lemmon, near Tucson, Arizona, at 9100 feet ASL. WA7LYI had to wait for about 4 hours for heavy rain and hail to blow over before the contact could be attempted. When the weather cleared, the equipment was set up. It took about 15 minutes of scanning the area where KY7B was set up before KY7B could find LYI's beam. This was no small feat—the laser beam was only about 100 feet in diameter at that distance! Laser-beam aiming was accomplished with the help of VHF hand-held rigs. After KY7B received WA7LYI's laser signal, it took about another 10 minutes to properly aim KY7B's signal, using the same procedure as before. When both signals were peaked, a two-way laser QSO took place. During the contacts, signals peaked about 20 dB above the noise, with occasional fades resulting from clouds between the two sites.

Dave and Terry report that they're planning a 175-mile contact using the same equipment, but that 175 miles is probably about as far as they can work with the present gear. Another problem makes laser contacts of more than that distance a problem: It's hard to find line-of-sight paths that long! Good luck!



## FBD & SASDM

Of course, you have heard of the SASE (also known as the self-addressed, stamped envelope). Well, when you are talking about obtaining free software, an SASE does not cut it. What you need is a formatted blank disk and self-addressed, stamped disk mailer, also known as an FBD & SASDM. And make sure the SASDM has enough postage on it to get it back to you (please, don't look the gift horse in the mouth by stiffing the free software distributor). Read on to find out what an FBD & SASDM (and/or nominal amounts of cash) will get you.

### Atari® CW Keyer

The WA5BDU Keyer for Atari 8-bit computers is software that allows CW operators to use their paddles, provides a degree of customized and personal "feel" and "sound" and the option of keyboard-generated code, including special features that only a computer-based keyer is capable of providing. Nick Kennedy, WA5BDU, wrote the software and its source code is available by sending an FBD & SASDM to Nick at 300 South Vancouver, Russellville, AR 72801.

### Color Computer Frequency Response Calculator

COCOFRAP is a BASIC program for the Radio Shack®/Tandy® Color Computer that calculates the frequency response of electronic circuits containing resistors, capacitors and inductors, with voltage or current sources. It also handles active devices such as op amps and transistors in small-signal models. To run the program, your computer needs at least 32 kbytes of RAM and Extended Color BASIC. COCOFRAP may be obtained from its author, Joseph A. Consugar, by sending \$10 to him at 1286 Graff Ct, Apt 2A, Annapolis, MD 21403. Please specify whether you want the disk or cassette version of the program.

### Commodore Wire Antenna Calculator

John Daebelliehn, KC9YQ, has a series of Commodore 64 programs that calculate the lengths for various wire antennas including a tilted and terminated folded dipole, an extended double Zepp, a four-element end-fire, a terminated Beverage, a Sterba curtain, a V-beam, an inverted-V, a twin-lead Marconi and a duo-band doublet. To obtain this collection of software, called Wire Antcalc, send John an FBD & SASDM plus \$5 to 1845-8th St, Moline, IL 61265. John's other collection of antenna design software, called Antcalc-64 (mentioned in January 1987 On

Line), is also available for the same deal, or both collections may be obtained for \$8 plus the requisite FBD & SASDM.

### PC Duper

Dupe is a general contest duping program for the IBM® PC (and clones) that was written by Jim Pearce, N6ESV. Dupe is similar to a program, also called Dupe, that Jim wrote four years ago for the Commodore 64™. The previous Dupe was mentioned here and was very popular (Jim still receives phone calls at midnight concerning the Commodore version). To avoid midnight phone calls and duplicating 1000 copies of the program, Jim has uploaded the PC-version of Dupe to CompuServe's HamNet under the name of DUPE-2.BAS (the program's documentation is called DUPE-2.DOC). Jim will also provide copies to any club or BBS SYSOP that sends him an FBD & SASDM at 4104 Earnscliff Ave, Fair Oaks, CA 95628 (no individual requests please).

### PC Field Day Logger

Field Day Calls is a Field Day logging and duping program for the IBM PC (and clones) that has been used by Wisconsin's Ozaukee Radio Club for over five years. Logging and duping is quick (no detectable time span between keyboard entry and duping completion occurs until several hundred calls have been logged). Stan Kaplan, WB9RQR, wrote the program and copies may be obtained from Stan by sending an FBD & SASDM to 11541 N Laguna Dr, Mequon, WI 53092-3119.

### PC Packet Radio Terminal

Its name says it all! Packet Terminal Program is a packet-radio terminal program that runs on an IBM PC (or clone) in conjunction with the AEA PK-232, AEA PK-87 and Heath® HK-232 TNCs (all modes of the PK-232 are supported except for FAX and NAVTEX). The program uses the TNC's "host mode" to provide on-screen status information, and separates incoming data, including monitored data, into separate "virtual terminal screens" that are displayed on demand. The program automatically merges lines that were split in two when the transmitting station failed to enter a carriage return, and it automatically word-wraps. Lynn Taylor, WB6UUT, wrote the program. To obtain a registered copy, contact Lynn at 463 Myrtle St, Laguna Beach, CA 92651.

### PC Terminal For AEA PK-232s

Hamcom is an IBM PC (and clone) terminal program that is optimized for

operation with the AEA PK-232 digital mode controller. Among its unique features is a built-in QSO card file which allows the user to do away with any hard-copy card file collection and provides near-instantaneous responses to call-sign searches. Another feature is the low level of RFI that is generated, which is especially noticeable on HF. Hamcom also supports voice synthesizer output for visually-impaired operators. For users that own a Kenwood TS-940 or TS-440 with a computer interface, Hamcom will display a simulated transceiver dial displaying operating frequency, offset frequency, operating mode, etc. To obtain a registered copy of Hamcom, contact its author, Dan Diehman, AE6G, at 5478 N Bond, Fresno, CA 93710.

### HELP!

- Packet-radio TNC emulator software for the Radio Shack Model III computer is sought by Mike Herr, WA6ARA, 613 Rebel Rd, Ridgecrest, CA 93555. Richcraft Engineering formerly sold such software, but they no longer have it, so Mike needs your help.
- Kenwood TS-940/440 radio control software for the Apple® IIe computer is needed by Bill Pritchett, K2QXS, 109-52 173 St, Jamaica, NY 11433.

### OREGON DIGITAL FREQUENCY COORDINATION

The Oregon Digital Network Coordination Council (ODNCC) is the frequency coordinator for packet radio and other digital modes in Oregon and Vancouver, Washington, the same jurisdiction as ODNCC's FM repeater counterpart, the Oregon Region Relay Council (ORRC). Any digital-mode station interested in coordination within the ARRL band plans may contact ODNCC by mail at 9358 SW Allen Blvd, Portland, OR 97223 or by telephoning ODNCC's chairman, Douglas S. McMurdo, W7XI, at 503-245-2571. (ODNCC has been in existence for two years and was recognized by ORRC in February, 1988 as the digital-mode frequency coordinator for Oregon.)

### NOVICE PACKET-RADIO HOT SPOTS ADDENDUM

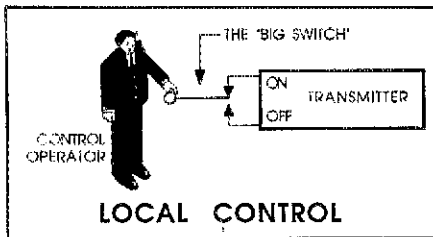
The listing of the packet-radio activity centers published in the November 1988 On Line contained errors with regards to 220-MHz operating frequencies. The corrected listings are:  
Connecticut, Central: 223.58 MHz: KC1J and K1TKP PBBSs/KA-Nodes New Hampshire, Nashua: 223.58 MHz: WA1OMM gateway to 145.05 MHz.

## Getting a Handle On Control

*Confusion concerning the control of repeaters and other Amateur Radio stations has caused many to dive into the rule book, often resulting in further confusion. This installment of FM/RPT attempts to sort out the rules.*

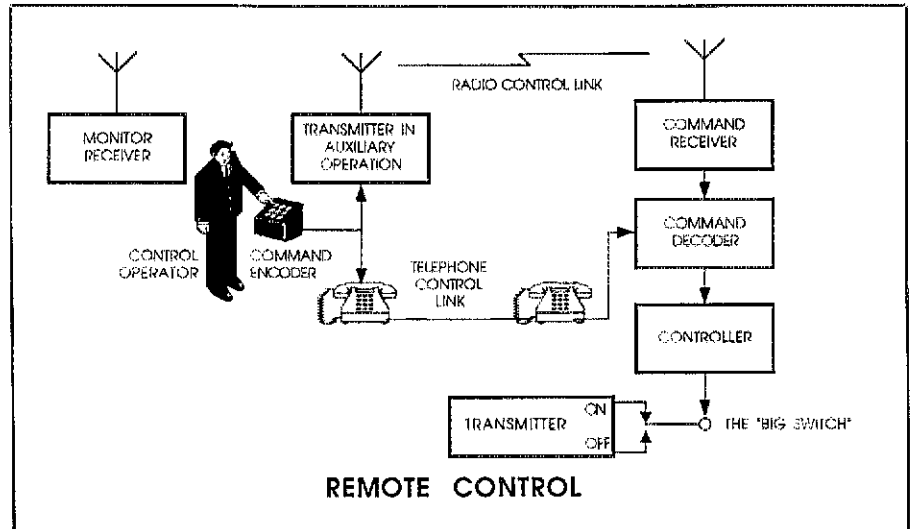
Let us start with the basics. *Control* of an Amateur Radio station is the ability to be aware of the transmissions being emitted by that station and, more importantly, the ability to stop the transmissions whenever they fail to comply with the rules. The location at which that task occurs is the *control point* of the station.

Control comes in a variety of flavors depending on where the control point is located and whether or not the control point is manned. The most common type of control is *local control* and that occurs whenever the licensee/control operator of an Amateur Radio station sits in front of the station's transmitter turning it *on* or *off* as required.



Control is not limited to the licensee of a station. He or she may select one or more other licensed Amateur Radio operators to act as *control operator* for his or her station. This facilitates 24 hour-per-day operations, such as repeaters, because it is impractical for the licensee to be in control round-the-clock. By selecting other hams to act as control operators, the task of controlling a 24 hour-per-day operation is shared in order that each hour of the operation is covered by at least one control operator.

Just as it is impractical for a licensee to be in control of a station on a 24-hour basis, it is also impractical to expect each control operator to be present at the transmitter site when that transmitter is located at a remote location, as are most repeaters. Instead of local control of a transmitter, *remote control* is possible. The control point of a remotely controlled station may be located anywhere that the control operator is able to monitor the operation of the station and control its transmitter when necessary. To remotely control a

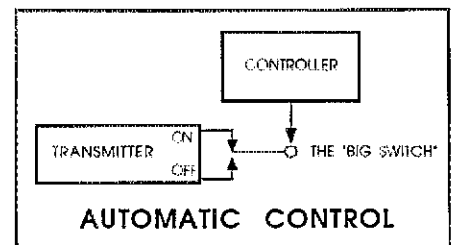


repeater, the control operator uses a *control link*, which may be by a telephone line, a radio link or any apparatus that permits the control operator to control the transmitter. (As a backup to the control link, a remotely controlled station must include provisions to limit each transmission to no more than three minutes, in case a control link failure should occur.)

When the control link is a radio link on an Amateur Radio frequency, such a link falls into the category of an *auxiliary operation* and, as such, may operate only in the Amateur Radio bands above 220.5 MHz (except the subbands of 431-433 MHz and 435-438 MHz) and may be used only to communicate with the stations indicated in the radio system's *network diagram*. Such a diagram shows each station and its relation to other stations and control points in a station network and is required in a station's records whenever a station has one or more repeater or auxiliary stations in operation. If a repeater is remotely controlled via an Amateur Radio control link, its input/receiving frequency may not be used for its radio control link. And, just as repeaters require special identification, auxiliary operations do too. When identifying by voice, the word **AUXILIARY** must follow the station's call sign and, when identifying by CW, /AUX or /A must follow the station's call sign (refer to FM/RPT in May 1988 *QST* for the complete story).


Whether a station is controlled locally or remotely, a control operator must always be present at the control point of the station. There is one exception to this rule that further facilitates repeater and other remote operations. If devices and procedures are

used to ensure compliance with the rules concerning control, and these devices and procedures do not require the attention of a local or remote control operator, then that station may be controlled automatically. This *automatic control* privilege applies not only to repeaters, but also to any auxiliary operations that are part of an automatically controlled repeater system, ie, auxiliary stations that are part of an automatically controlled repeater system may themselves be automatically controlled.



### REPEATER LOG

According to September 1988 reports received, repeaters were involved in the following public-service events: 496 vehicular emergencies, 25 fire emergencies, 13 medical emergencies, 12 public-safety events, 12 drills/alerts, 6 weather emergencies, 5 criminal activities and 1 power failure.

The following repeaters were involved (followed by the number of events): W1SGL 2, KIUN/K1ISR/WA1UCO 2, NK2W 18, WB2WPA 8, WA2ZWP 4, WA3BXW 8, W3LIF 3, WA4AOS 3, W4REW 3, WA4SWF 4, W5FC 52, WA6BJY 8, W6FNO 351, N6ME 102, K6TZ 11, WA7RPS 2. 

## On the OSCARs: Coping with Dr Doppler

One person I know refers to working OSCAR as the "English muffins of Amateur Radio . . . full of nooks and crannies of delightful surprises." He's referring to some of the fascinating phenomena and modes encountered in OSCAR work. Perhaps this is why so many who've grown weary of everyday, standard QSOs elsewhere find OSCAR work so refreshing and full of vitality. Last month, we looked at some of the lesser-known OSCAR operating practices and phenomena. This month, we'll focus on the natural phenomenon that is chief in the minds of most OSCAR operators: Doppler shift.

The effect known as *Doppler shift* or the *Doppler effect* was first described in 1842 by Johann Doppler (1803-1853). He predicted the frequencies of received sound waves were dependent on the motion of the source and the observer relative to the propagating medium. Experiments using trains as the moving source soon proved his prediction. Later, in his *Special Theory of Relativity* (1905), Einstein showed that for light waves, the Doppler shift depended on the velocity of the source relative to the observer. The Doppler effect accounts for the redshift seen by astronomers in receding galaxies. And Doppler shift similarly affects radio waves.

A handy way to visualize the way Doppler shift affects radio waves is to picture the waves as originating from an OSCAR and traveling across thousands of miles to your antennas. Let's say the frequency at which you receive the wave depends on the number of wave crests received in a given time. Since we know the speed of radio waves in a medium is constant, if the satellite is moving towards you, you'll receive more wave crests in that time period, and the frequency of the wave will be slightly higher. Conversely, if the satellite is moving away from you, the number of wave crests heard in that time will be fewer.

From the satellite's perspective, a similar argument could be made for signals you transmit to the satellite. If the satellite is moving towards you, it will hear your signal slightly higher than your actual transmit frequency. And, if the satellite is going away from you, the satellite will hear your transmitted signal downshifted slightly.<sup>1</sup>

Table 1 shows the Doppler Shift for some currently operational satellites; however, it shows the *one-way Doppler*

**Table 1**

**Maximum Doppler Shift Magnitude For Current Spacecraft\***

Height km (miles)	Shuttle (Or Mir)	UO-9	UO-11	RS-10/11	FO-12	AO-13	
	330 (205)	495 (307)	700 (435)	1000 (621)	1500 (931)	Perigee 2500 (1552)	Apogee 36,000 (22,356)
Freq	Maximum Doppler Shift (One-Way Link) in kHz						
21 MHz	0.51#	0.49	0.47#	0.44	0.40#	0.34#	0.03#
29 MHz	0.71#	0.68	0.65#	0.61	0.56#	0.47#	0.04#
145 MHz	3.54@	3.41	3.27	3.07	2.78	2.33	0.22
435 MHz	10.6#	10.3	9.81	9.22#	8.35	6.98	0.67
1269 MHz	31.0#	29.9#	28.7#	26.9#	24.4#	20.4	1.95
2401 MHz	58.7#	56.6	54.1	50.9#	46.1#	38.5	3.69
10.5 GHz	257#	247	237#	222#	202#	168#	16.1#

**Notes**

\*The Doppler shift shown includes only the Doppler shift contribution due to the motion of the satellite. An additional Doppler shift component is contributed by the motion of the earth relative to the satellite. The magnitude of this component depends on the observer's latitude and may be computed using equations provided in Chapter 10 of the *Satellite Experimenter's Handbook* (see note 1).

# This frequency is not actually used on this satellite. The Doppler magnitude is shown for reference purposes only. Use it as a guide to the Doppler shift expected from the spacecraft at the height indicated.

@ This value indicates the Doppler shift experienced during the SAREX (Shuttle Amateur Radio Experiment) when a 2-meter transceiver was used on the shuttle by astronauts Owen Garriott, W5LFL, and Tony England, W0ORE.

**Table 2**

**(Adapted from the *Satellite Experimenter's Handbook*, Table 10.1.)**

```

10 KEY OFF : CLS
20 C = 3E + 08
30 K = 3.986E + 14
40 R1 = 6371
50 INPUT "What is the satellite height in km" ; H
60 PRINT : PRINT
70 INPUT "What is the operating frequency in MHz" ; F1
80 F2 = F1 * 1000000!
90 R2 = (R1 + H)
100 V1 = SQR(K / (R2 * 1000))
110 V2 = V1 * (R1 / R2)
120 F3 = (V2 / C) * F2
130 PRINT : PRINT : PRINT
140 PRINT "Satellite Height (km)", "Operating Freq (MHz)", "Doppler Shift (Hz)"
150 PRINT
160 PRINT TAB(8) H;:PRINT TAB(35) F1; : PRINT TAB(57) F3
170 END
    
```

shift only. Use the BASIC program listing in Table 2 to calculate other Doppler-shift combinations for various operating frequencies and spacecraft heights. (The program is based on sample problem 10.1 of the *Satellite Experimenter's Handbook*.)

When you have a two-way link, ie, an uplink and a downlink, Doppler shift affects both links. How it affects what you hear depends on the design of the

transponder itself. Some of the early transponders—and particularly those that use Mode A (2 meters up and 10 meters down)—are noninverting. That means that a rise in frequency in the uplink results in a rise in frequency of the downlink. USB signals on the uplink result in USB signals on the downlink.

Mode B transponders (70 cm up and 2 m down) use inverting transponders. A rising

<sup>1</sup>Notes appear on page 90.

frequency on the uplink results in a falling frequency on the downlink in an inverting transponder. LSB on the uplink produces USB on the downlink. A benefit of the inverting transponder scheme is that it reduces Doppler shift. For example, the effective Doppler-shift frequency for a Mode B transponder is the *difference* between its uplink and downlink frequencies. Thus, for AO-13 Mode B, the effective Doppler shift frequency is  $435 - 146 = 289$  MHz. If a noninverting transponder had been used, the effective Doppler shift would have been  $435 + 146 = 581$  MHz. Thus, the use of inverting transponders reduces the effective Doppler frequency by one half for Mode B.

Operating OSCARs in a Doppler-shifted frequency environment can be unsettling at first, but most operators find it no real bother after a bit of experience. At most, the greatest "inconvenience" encountered amounts to sending a few CW dots on the uplink to allow you to hear the dots on the downlink. Occasionally, however, this can be tricky, especially if you're trying to drop into an open frequency between two QSOs without swishing through the activity.

Some of the new dual-tracking VFO, full-duplex radios (such as the Yaesu FT-736) allow you to assess the Doppler shift by plopping down a test signal in an unoccupied portion of the band. You then lock the transmit and receive VFOs in such a way that when you hear a station you want to call—or find an open spot you wish to occupy—you can transmit and know your downlink signal will be exactly where you're listening. This is a boon to rapid QSY with minimal disruption to others. Inexperienced operators spend a lot of time swishing through on-going QSOs making for unnecessary disruption and QRM.

### A Calculated Approach

M. W. "Maury" McMahon, K4GMJ, uses a home-brew method of ensuring he'll know precisely where his downlink will appear even before he keys his transmitter. His method doesn't require the dual-locked VFOs available on the new radios. Rather, he determines the net effect of Doppler shift and radio calibration first in a test in a vacant part of the passband. He knows that the sum of the uplink and downlink

**For more information on getting started on OSCAR and information on AMSAT membership and membership benefits, call AMSAT at 301-589-6062 or write: AMSAT, PO Box 27, Washington, DC 20044. Please include business-size SASE.**

frequencies is constant, so he develops a local standard for it and uses it to calculate frequencies. Maury says the results are quite accurate and allow you "to QSY and be precisely on [the desired] frequency." To be most useful using the K4GMJ method, your radios should have a digital readout with at least 100-Hz resolution.

K4GMJ describes his general method as follows.<sup>2</sup> "First determine the uplink-to-downlink frequency relationship. This will account for both Doppler shift and frequency calibration errors in your radios. To do this, select a frequency well away from other operators. Use an OSCAR frequency chart to roughly determine what your uplink frequency should be to generate a downlink in the open area you've chosen. First, use a CW tone on the uplink to locate your downlink. Then, switch to SSB and speak in a normal voice. Tune your receiver so that you hear your voice in a normal pitch. Always use earphones to prevent audio feedback."

Maury says to carefully note the uplink and downlink frequencies required to produce a normal voice pitch. Let's say your uplink frequency was 435.4241 MHz and it produced a downlink at 145.9751 MHz. Convert both these numbers to kilohertz, discard the numbers to the left of the commas and add the remaining numbers together. Thus,  $435.4241 \text{ MHz} = 435,424.1 \text{ kHz}$ ;  $145.9751 \text{ MHz} = 145,975.1 \text{ kHz}$ . And  $424.1 + 975.1 = 1399.2$ . This error-corrected constant forms the basis of your frequency calculations.

For example, let's say you want to plunk down on exactly 145.9455 MHz. Simply convert this to kilohertz (145,945.5), discard the 145, leaving 945.5. Then subtract this from the corrected constant of 1399.2. So:  $1399.2 - 945.5 = 453.7$ . You would then know that your transmit

frequency (in kilohertz) should be 435,453.7, or simply 435.4537 MHz.

Conversely, if you have your transmitter set at 435.4567 MHz, where will the downlink appear? Convert to kilohertz (435,456.7) and discard numbers to the left of the comma, leaving 456.7. Then, subtract this from the corrected constant:  $1399.2 - 456.7 = 942.5$ . You would then know your downlink will appear at 145,942.5 kHz (145.9425 MHz).

Knowing the corrected constant value, it's a simple matter to determine ahead of time where your downlink will appear, given a selected uplink. Conversely, if you see an open downlink frequency, you will be able to select the precise uplink frequency to land on that spot before you even key the transmitter, thus averting unneeded QRM.

Maury uses an inexpensive calculator to keep track of the numbers. He uses the calculator memory to store the corrected constant. Then all he does is subtract either the transmit or receive frequency's least-significant digits to learn the unknown frequency's least-significant digits. If he subtracts the transmit frequency, the receive frequency is revealed. If he subtracts the receive frequency from the memory, the transmit frequency is yielded.

Maury says: "Once the calibration has been made, you need only to check it periodically to see if the Doppler rate has changed. Also, since the calibration accounts for drift in your radio's frequencies as well, if they are still warming up, you'll need to re-calibrate more frequently." Maury says his method is "simple, fast and easy." He points out that while your computer program can provide a reasonable estimate for the Doppler shift to expect at that instant, the "computer tracking programs are not usable, as they don't factor in the calibration errors in your transmitter and receiver."

Next month we'll examine AO-13's Mode S transponder.

### Notes

<sup>1</sup>A complete description of the Doppler effect as it affects satellite radio links is provided in Chapter 10 of the *Satellite Experimenter's Handbook*, (Newington: ARRL, 1984).

<sup>2</sup>The method presented is based on K4GMJ's. It has been modified slightly for clarity. □

## Strays



### I would like to get in touch with...

□ anyone who has a service manual and schematic for a receiver labeled model RAO-73 radio receiving equipment, 1 CNA-46233 radio receiver, serial no. 1479, Navy Dept, Bureau of Ships, made by National Co Inc, Malden, MA. Samuel Galperin, CX8CX, PO Box 10.864 Suc 2, Montevideo, Uruguay.

□ anyone who has a schematic and or owner's/service manual for a Swan 700CX transceiver. Joe Blithe, WB3GVD, 2 Franklin Ave, Claymont, DE 19703, tel 302-792-2134.

□ anyone who has a repair technical manual for TV7D/U tube tester. Also any info on the M. C. Jones 262 and 261.1 Micro Match, Ed Deptula, KA3OTT, PO Box 751, Havertown, PA 19083.

□ anyone who has a circuit diagram for an Info-Tech model IOD CW keyboard. James Evans, W9DRV, 925 23 3/4 St, Chetek, WI 54728.

□ anyone who has info on using an audio oscillator to run a Sideband Engineers model 34 on CW. Also, anyone who uses this unit maritime mobile. Louis Linden, KB5BLV, c/o H. Bernard, 745 E Mulberry #350, San Antonio, TX 78212.

□ anyone who has a schematic for a Philco 7800C visual alignment and marker generator. Weldon M d'Allemand, KØUDW, Box 433, Arapahoe, NE 68922.

□ anyone who has a manual for the Heath IM-38 ac VTVM. Henry Knoll, WAØGOZ, 10081 103rd St N, Stillwater, MN 55082.



*President:* Richard L. Baldwin, W1RU  
*Vice President:* Carl L. Smith, W0BWJ  
*Secretary:* David Sumner, K1ZZ  
*Assistant to the Secretary:* Naoki Akiyama,  
N1CIXJH1VRQ

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Greenwich, CT 06830  
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Masayoshi Fujioka, JM1UXU  
Secretary, IARU Region 3 Association  
PO Box 73, Toshima  
Tokyo 170-91  
Japan

The International Amateur Radio Union—since 1925 the federation of national Amateur Radio societies representing the interests of two-way Amateur Radio communications.

## The Seventh Conference of IARU Region III

The XXIVth Olympiad of the Modern Era ended on October 2, 1988, in Seoul, Korea. The VIIth Conference of the IARU Region III commenced on October 10, just eight days later.

The world certainly knew of the first happening, but perhaps was not so aware of the second.

And yet there was a connection.

Both events concerned people from many diverse lands getting together to know each other better in the cause of international goodwill and understanding.

The VIIth Conference of the IARU Region III Association was, of course, a much smaller event than the Olympics, but nevertheless, for radio amateurs it was an important and significant meeting.

Hosts for the Conference were the officers and members of KARL—the Korean Amateur Radio League. A dedicated band of helpers ferried delegates, observers and families from Seoul Kimpo Airport to the Conference hotel, and organized an office and a special-event station (6K3IARU), as well as a reception one evening during the Conference. KARL members also assisted the Secretariat in many ways to ensure the smooth running of the logistics during the Conference. It was superbly done.

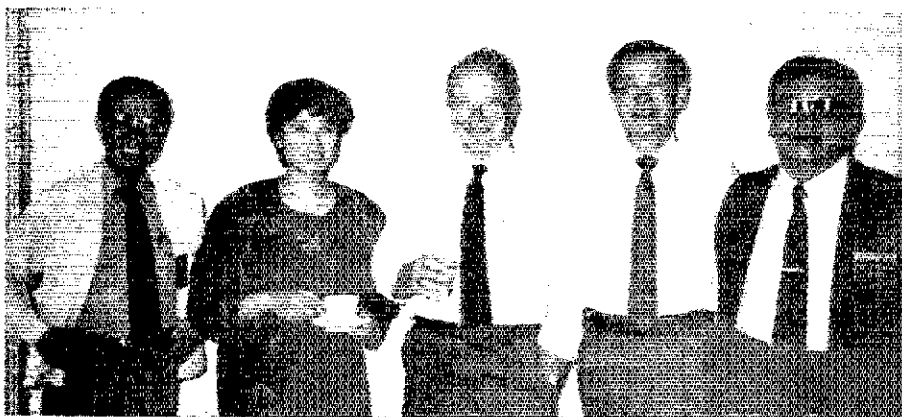
KARL, as the IARU member society for Korea, takes its responsibilities of representing Amateur Radio interests in Korea very seriously and also very successfully, as evidenced by the presence of the Minister for Communications, Dr Oh Myung. Dr Oh graciously consented to open the Conference and also hosted a reception on the first evening for all conference attendees and foreign visitors.

Later, through the Ministry, Dr Oh kindly presented gifts to all delegations, directors of the Association, and out-of-region visitors. This gesture was much appreciated by all and vividly illustrated the excellent rapport between the Administration and KARL. Other social functions held over the week of the Conference included receptions hosted by ARRL/IARU and JARL as well as a ladies' program.

The Conference itself was a very busy one with a full agenda. Eleven member societies had delegates present, some with



The opening ceremonies of the Conference. Present were not only the delegates and designated observers, but also a number of representatives of the Korean administration, plus members of KARL and spouses of the conference attendees. The guest of honor was Dr Oh, Minister of Communications.



(l-r) BV2A; Mrs Yu Wenting, director of international relations for CRSA; W1RU; Wang Xun, deputy secretary general of CRSA; and JA1HQG, director of JARL. (How many countries would you say were represented in this photo? W1RU likes to think 126.)

observers. Three member societies had proxies (one each) for sister societies that could not send delegates. There were 104 different documents formally considered by delegates, while another four or five unnumbered documents covered matters of logistics.

A total of three working groups and five committees were set up to carry out specialized work during the conference. The work involved consideration of HF

and VHF band plans, with particular emphasis on 1.8, 3.5 and 14 MHz, packet-radio standards and frequency allocations, and preparation for a possible future WARC. The latter was considered to be of prime importance, and the working group assigned the task was made up not only of Region III personnel, but also experienced amateurs from the International Secretariat, Region I and Region II. Although the working group developed a



Dr Oh, Minister of Communications, Republic of Korea. In his prepared remarks, Dr Oh expressed great support for the amateur service.

position for Region III, this was done with the needs of the other two Regions in mind.

The work of the committees involved the internal workings of the Conference and

the Association, the most important result being that since the finances of IARU Region III were in good shape, there would be no increase in subscription rates for the next triennium.

One new director (David Wardlaw, VK3ADW) was elected because of the retirement of Mr M. J. Owen, VK3KI. Michael was one of the founding secretariat officers of the Association, and with his leaving, one more link with the founding of the Association is broken. All other Directors were re-elected unopposed. Masayoshi Fujioka, JMIUXU, was also re-elected unopposed to the position of Secretary. The Secretariat will thus remain in Tokyo, Japan for the next three years.

ORARI, the member society from Indonesia, will be host of the VIIIth Conference, which will be held sometime during September 1991. The venue within Indonesia (possibly Bandung) and the exact dates will be announced later.

Amateurs from over 15 countries met together in Seoul for five full days of discussion on world and Region III amateur affairs. Understanding prevailed and goodwill was generated. Just as the



W1RU and Young Soon Park, HL1IFM, president of the Korean Amateur Radio League. Mr Park is a prominent Seoul businessman who devotes a substantial portion of his time to KARL.

XXIVth Olympiad was judged successful, so was the VIIth Conference of IARU Region III.—David H. Rankin, 9V1RH/VK3QV, Director, Region III Association

## ARRL Sends Delegation to Seoul Conference

While the US is located in Region 2, ARRL is also a member of IARU Region 3 by virtue of its representation of the radio amateurs of Guam, American Samoa, Wake Island, and the area previously known as the Trust Territory of the Pacific Islands. There are 32 ARRL Full Members residing in these Region 3 territories, which are a part of the ARRL Pacific Division and Pacific Section. The Trust Territory is now divided into four political jurisdictions. The Commonwealth of the Northern Mariana Islands is a commonwealth of the US; the Republic of the Marshall Islands and the Federated States of Micronesia have entered into free association with the US; and the Republic of Palau remains under trusteeship, pending completion of negotiations which are expected to lead to the signing of a Compact of Free Associa-

tion. Ultimately, the Associated States will have their own licensing authorities; in the interim, it is the US Department of the Interior.

Beginning with the founding of IARU Region 3, it has been ARRL policy to support this regional organization and to participate in its activities. For the Seventh Regional Conference, ARRL sent a delegation headed by First Vice President Jay A. Holladay, W6EJJ. Jay was assisted by International Affairs Vice President Tod Olson, K0TO, Executive Vice President David Sumner, K1ZZ, and International Programs Manager Naoki Akiyama, N1CIX. ARRL was also proud to carry the proxy of the Philippine Amateur Radio Association.

A number of the member-societies along the Pacific Rim reported impressive growth in Amateur Radio. Particularly impressive was Indonesia, with an estimated 60,000 radio amateurs! Others included the People's Republic of China, Hong Kong, our host the Republic of Korea, Malaysia, Singapore, and Thailand. While Taiwan is not a member of IARU, Region 3 Correspondent Tim Chen, BV2A, was present and reported good progress toward licensing new operators there.

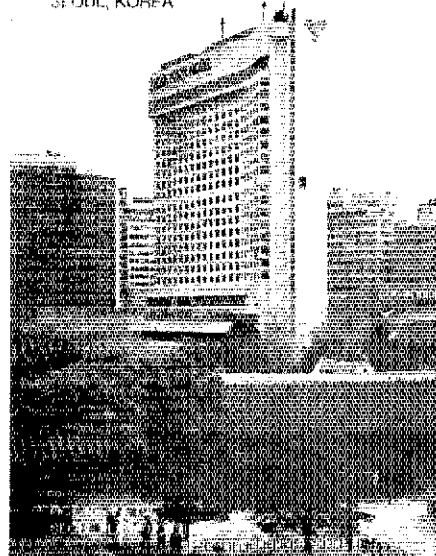
ARRL submitted papers on the international aspects of packet radio, mutual support among IARU member-societies, and the rights of member-societies. The objectives of these papers were all achieved at the Conference, along with the most important decision of all: the adoption of



W6EJJ, K0TO, and K1ZZ of the ARRL delegation. (N1CIX photo)

6K3 IARU

IARU Region III Association Conference  
SEOUL, KOREA



a set of objectives and an action plan for preparations for a possible future allocations WARC. If there is to be such a WARC in the early 1990s, the next Region 3 Conference will be too late to make plans. By the time of the Region 2 Conference, now scheduled for October 16-20, 1989, we will know if there is to be such a WARC, and what is likely to be included in its agenda.—K1ZZ

## Fuzzy Rabbits Versus Quacking Baby Ducks

Fuzzy Rabbits versus Quacking Baby Ducks is not a one-sided wrestling match on late night TV. It's not one of Aesop's fables either. It is, however, a friendly Field Day challenge between two clubs.

Each year, the North Augusta-Belvedere Radio Club (NABRC) in North Augusta, South Carolina, and the First State Amateur Radio Club (FSARC) in Wilmington, Delaware, try to outscore the other in the single-transmitter class.

The idea for the challenge was born in 1984 when a stalwart NABRC member moved from South Carolina to Delaware. He joined FSARC and participated in the club's Field Day activities. It was only natural for him to compare contact totals and scores with his former club.

Prompted by the fact that the clubs were evenly matched, the FSARC issued a challenge to the NABRC. The club with the higher Field Day total score would win bragging rights for the following year, plus a trophy to be designated later. These provided added incentive for both clubs to improve their Field Day performance.

Each club uses phonetics of cuddly little animals for their calls. NABRC traditionally uses the call sign K4FR held by Hugh Minton, a long-time club member. The most popular phonetic for this call during Field Day is Kilo Four "Fuzzy Rabbit." FSARC uses its long-time club call sign, K3QBD, or Kilo Three "Quacking Baby Ducks," in the heat of battle. This sets the stage for a race between the rabbits and the ducks.

In 1986, the ducks defeated the rabbit to win the first challenge. For their trophy, FSARC suggested NABRC give up its mascot, a fuzzy stuffed rabbit, but NABRC felt that losing its beloved mascot was too great a price to pay. Not being able to agree on a suitable trophy, FSARC sent another little animal, a rubber chicken, to NABRC to serve as the loser's trophy! This meant war!

As the 1987 Field Day weekend approached, NABRC prepared in earnest. They buttressed themselves with sturdy code operators and ran up their score by using mostly CW. Even though FSARC used a new, rotatable triband beam, they couldn't match NABRC's effort. NABRC had the last laugh and returned the rubber chicken to its original roost.

For this year's contest, in a move towards good taste, the club employed more sophisticated trophies. The essence of the challenge remained the same, but two new trophies were constructed, one for each club. The two clubs agreed that each



These Field Day trophies produce fun and friendly competition for the North Augusta-Belvedere (South Carolina) Radio Club and the First State Amateur Radio Club (Wilmington, Delaware).

club would mark its trophy designating each year it won the challenge.

The 1988 challenge was close: The rabbit hopped by the ducks by a mere 50 points.

But trophies aside, the most important product of this yearly challenge is the incentive to NABRC and FSARC members

to participate in Field Day activities. Spurred on by the thrill of the hunt, they become better operators individually and, as a club, better prepared to set up a station in an emergency.—(Story, photos by Chet Thayer, KQ5G, and Randy Carlson, WB0JXX)



No grass grows under the feet of members of the Young Amateurs of Colorado Net (YAC), shown here on one of their monthly field trips, this time to ETO, Inc, the amplifier manufacturer. YAC meets every Monday night at 8:00L on the Colorado Repeater Association's 147.225 repeater. The repeater is hardlinked to the 224.98 machine, allowing access by Novice members. Started in October 1987, the net now boasts a membership of 40. They discuss school and radio activities such as experiments, projects, antennas, 10-meter DXing and anything else they can think of. You might say they really "YAC" it up. (Nancy Malm, KB6IGN, Malm Modulation Monitors)

# Hamfest Calendar

Administered By Bernice Dunn, KA1KXQ  
Convention Program Manager

**Attention:** The deadline for receipt of items for this column is the 5th of the second month preceding publication date. Hamfest information is accurate as of our deadline; contact sponsor for possible late changes. For 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.

**Alabama (Greenville)—January 29.** Sponsor: Butler Co ARC. Time: 7 AM-2 PM. Place: Beeland Park Recreation Ctr. Features: refreshments, forums, VE exams, parking, tailgating. Talk-in: 146.07/67. Admission: free. Tables: \$5. Contact: Randolph Walter, KW4B, tel 205-382-3496.

**Florida (Crystal River)—January 28.** Sponsor: Sky High ARC. Time: 9 AM-4 PM. Place: Rte 19 and Seven Rivers Dr, which is the south side of Crystal River Airport at the Florida National Guard Armory. Features: seminars, VE exams, refreshments, RV parking, outdoor tailgating. Talk-in: 146.355/955. Admission: advance \$3, door \$4. Tables: \$5. Contact: Bob Gordon, WIKUL, tel 904-628-5045 between 9 AM-9 PM.

**Florida (Fort Myers)—January 21.** Sponsor: Fort Myers ARC. Time: 9 AM-4 PM. Place: Moose Hall, 1900 Park Meadow Dr. Features: forums, refreshments, dealers, swap tables. Talk-in: 146.28/88. Admission: \$3. Tables: \$10 each. Contact: Pint Cornwell, N4PSU, 4342 Tufts Ave, Ft Myers, FL, 33901, tel 813-936-2000.

**Illinois (Danville)—January 14.** Sponsor: Vermillion Co ARA. Time: setup 6 AM, public 8 AM. Place: UAW Civic Ctr, follow I-74 to Gilbert St, North exit. Features: auction, refreshments. Talk-in: 146.22/82. Admission: free. Contact: Rod Pruitt, WD9HXG, PO Box G, Catlin, IL 61814, tel (D) 217-442-4416, (N) 217-431-0110.

**Illinois (Wheaton)—January 29.** Sponsor: Wheaton Community RA. Time: 8 AM-3 PM. Place: Odeum, Villa Park. Admission: advance \$4, door \$5. Tables: all tables reserved. Contact: Wheaton Community Radio Amateurs, PO Box QSL, Wheaton, IL 60189, tel 312-629-8006.

**Kentucky (Cave City)—February 11.** Sponsor: Mammoth Cave ARC. Time: setup 6 AM, public 8 AM. Place: Cave City Convention Ctr, just off I-65 at the Cave City exit. Features: DX forum, packet forum, antenna forum VE exams (walkins welcome), test bench, refreshments, free parking. Talk-in: 144.81 and 146.52 simplex. Admission: \$3. Tables: advance \$5, door \$6. Contact: SAMI (Hamfest), PO Box 791, Glasgow, KY 42141, tel 502-678-3660.

**Louisiana (Hammond)—January 21.** Sponsor: Southeast Louisiana ARC. Time: 8 AM-4 PM. Place: Southeastern Louisiana University Recreation Ctr. Features: VE exams, wheelchair accessible. Talk-in: 146.40/147.00. Admission: free. Contact: Joe Farris, N5HDW, 390 Piney Woods, Ponchatoula, LA 70454, tel 504-386-8393.

**Massachusetts (Westborough)—January 14.** Sponsor: Minuteman Repeater Assn. Time: sellers 8:30 AM, public 10 AM-3 PM. Place: from I-495 take Rte 9 West 1.5 miles to bottom of hill, exit right onto Rte 30 West "Westborough," proceed 1.8 miles going straight through the circle to stay on 30 West, the Westborough Senior High School will be on your left ¼ mile west of the circle. Features: flea market. Talk-in: 146.01/61. Admission: \$2. Tables: advance \$10, door \$13. Contact: Scott Bullock, KA1CLX, 26 Willis St, Apt 21, Framingham, MA 01701, tel 508-872-4961, or Andrew Morrison, N1BHI, tel 508-481-3878.

**Michigan (Southfield)—January 22.** Sponsor: Southfield High School ARC. Time: vendors 6 AM, public 8 AM-3 PM. Place: Southfield High School, 24675 Lahser. Features: parking, refreshments. Admission: \$3. Tables: reserved tables are \$20 for two 8 ft tables (paid in advance), additional reserved tables \$10. Contact: Robert Younker, Southfield

High School, 24675 Lahser, Southfield, MI 48034, tel 313-746-8637, answering machine for last minute information 313-746-8675.

**Ontario (St Catharines)—February 4.** Sponsor: Niagara Peninsula ARC. Place: CAW Hall, 125 Bunting Rd. Features: dinner dance. Talk-in: 147.84/24. Admission: \$3. Tables: \$12 commercial, \$5 noncommercial. Contact: Niagara Peninsula ARC Inc, PO Box 692, St Catharines, Ontario L2R 6Y3 or tel 416-937-0590.

**South Carolina (Greenwood)—January 14.** Sponsor: Greenwood ARS. Time: 8 AM-5 PM. Place: National Guard Building on Emerald Rd. Features: flea market, swap shop, refreshments, VE exams. Talk-in: 147.765/165. Admission: \$3. Contact: Jack Wheless, AA4TZ, 141 Cherokee Dr, Greenwood, SC 29646.

**Virginia (Richmond)—January 15.** Sponsor: Richmond Amateur Telecommunications Society. Time: 8:30 AM-3:30 PM. Place: Exhibition Hall at the Virginia State Fairgrounds, take exit 17 off I-95 and follow signs. Talk-in: 146.28/88, 144.83/145.43. Admission: advance \$4, door \$5. Contact: Mark Huff, WA4DHY, 5003 Meredith Woods Rd, Glen Allen, VA 23060, tel 804-747-0227 between 7 PM-10 PM (reservation cut off date is December 31, 1988).

**Wisconsin (Waukesha)—January 14.** Sponsor: West Allis RAC. Time: 8 AM-3 PM. Place: Waukesha Co, Exposition Ctr Forum, take I-94 to Co Hwy J, follow south to Hwy FT, then west to Expo. Features: packet radio, VE exams, refreshments. Admission: advance \$2, door \$3. Tables: reserved tables \$3, 4 ft tables \$4 (as available), electrical outlet \$5 (if available), advanced deadline January 2. Contact: West Allis RAC Swapfest, PO Box 1072, Milwaukee, WI 53201 (send SASE please).

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.

alternate hotel is the Airport Lakes Holiday Inn. Rates are \$50 single or double. Checks for tickets, tables or campsites should be made payable to Dade Radio Club, Inc, and forwarded to Chairman, Evelyn Gauzens, W4WYR, 2780 NW 3rd St, Miami, FL 33125. For exhibit booth rates and further information call Evelyn at (H) 305-642-4139, (W) 305-233-0000.

## Attention Hamfest and Convention Sponsors

ARRL HQ maintains a date register of scheduled events that may assist you in picking a suitable date for your event. You are encouraged to register your event with HQ as far in advance as your planning permits. Note that the hamfest and convention approval procedures for ARRL sanction are separate and distinct from the date register: Registering dates with ARRL HQ does not constitute League sanction, nor does it guarantee there will not be a conflict with another established event in the same area.

We at ARRL HQ are not able to approve dates for sanctioned hamfests and conventions. For hamfests, this must be done by your Division Director. For conventions, approval must be made by your Director and, additionally, by the Executive Committee. Application forms can be obtained by writing to or calling the ARRL Convention Program Manager, tel 203-666-1541 ext. 283.

## Exam Info

### NEW FEE FOR 1989

The FCC has announced an increase in the maximum allowable reimbursement fee that can be charged each exam candidate. The \$4.75 maximum test fee will be in effect from January 1, 1989 through the rest of the 1989 calendar year.

The FCC authorizes each Volunteer Examiner Coordinator (VEC) to charge a test fee up to, but not exceeding, the established maximum. During 1989, all applicants who are administered tests, other than Element 1A and 2, at ARRL/VEC-coordinated sessions will be charged \$4.75 for all elements that they take during the same session.

Test fees are collected exclusively to offset expenses that are directly incurred in administering the VE Program. Only the FCC may establish the maximum allowable reimbursement fee that VECs may charge. No VE or VEC may otherwise derive any kind of compensation for their services. Additional information can be found in Section 97.36 of the FCC Rules.—Jim Clary, WB9IHH, Manager, ARRL/VEC

## Coming Conventions

February 4-5  
Florida State, Miami

February 25-26  
Ohio State, Cincinnati

### ARRL NATIONAL CONVENTIONS

June 2-4, 1989—Dallas/Fort Worth, Texas

June 8-10, 1990—Kansas City, Missouri

### FLORIDA STATE CONVENTION

February 4-5, 1989, Miami

The Florida State Convention will be sponsored by the Dade Radio Club Inc. It will be held at the Tamiami Park Fairgrounds, 10901 SW 24 St (Coral Way), from 9 AM-5 PM Saturday and 9 AM-4 PM Sunday. Admission will be \$5 in advance and \$6 after January 30th. Features will include exhibits, programs, and VE exams on Sunday at 9 AM for all classes. Also, there will be a 300 space campground with full facilities for \$12 per night, advance reservations advised. Swap tables are \$16 each (no power); with power, it's \$10 per user. Prices quoted are for tickets and tables; power is for both days. The Headquarters Hotel is the Miami Airport Hilton. Rates are \$75 single or double. The

## Strays



### QST congratulates...

□ Dr Susan Gorsky, KH6XN, of Honolulu, Hawaii was selected as one of the recipients 1988 Excellence in English Teaching awards by the Hawaii Council of Teachers of English.



## Young Ladies' Radio League Celebrates 50th Anniversary

This year marks YLRL's 50th anniversary year, and its members will gather in our 50th state, Hawaii, during June to commemorate the organization's important milestone. To many of the founding members, it seems like only yesterday when in the May 1939 issue of *QST* an advertisement for the late W1CBD's book *Two Hundred Meters and Down* included the statement "Goodness knows—and you won't tell—how many of you YL key-twitchers are there..." One amateur radio operator, W7FWB, Ethel Smith (now K4LMB) saw the ad and wrote to ARRL, "That lace-bordered ad of *Two Hundred Meters and Down* brought up a point that has had my curiosity aroused for some time! How many "YL key-twitchers" are there? Nobody seems to know, but I think we would tell. I should like to have you publish this letter or some kind of a request to have the YLs make themselves known. I'd like to know how many there are, how old they are, how they got interested, whether they're key-twitchers or tonsil-busters, how long they've had their tickets and what they think we should do about these authors. So how about it YLs? Please send all the dope to me. Perhaps we should band ourselves together in a YLRL or something to that effect and make these women-ignoring authors sit up and take notice."

Twelve women responded to Ethel's published letter! One of the founding members, Enid Carter, W9NBX (now Enid Aldwell, W6UXF), worked on a proposed YLRL Constitution and Bylaws which was dated September 1939. YLRL was formed, and the following were its charter members: W1GQT, W5HYF, W6RGX, W7GXI, W8SBB, W8TAY (now W4JCR), W9CHD (now W6NAZ), W9NBX (now W6UXF), W9NLW, W9UA, W9WWP (now W6WSV), VE2HI and W7FWB (now K4LMB). YLRL's first officers were president, W4FWB; VP and activities manager, W9WWP; secretary-treasurer, W9NBX and activities chairman, W8TAY. Membership was a bargain at 25 cents per year!

In order to publicize YLRL and attract new members, district representatives were appointed for each call area. In November 1939, YLRL published its first newsletter, a monthly bulletin entitled *YL News*. The one-page document called for new members and requested suggestions for naming the newsletter. Response was enthusiastic, and in December 1939, *YL Harmonics* was born. In this same issue, a "Get Acquainted" CW QSO Party on 40 and 80 meters was announced. The January *YL Harmonics* told the world that W1GQT had won the December QSO Party with a total of 8 YL contacts!

As YLRL membership continued to

grow, so did the idea to form local YL clubs. The first was organized in Kenosha, Wisconsin and was called the Keno YL Club. By 1940, *YL Harmonics* was telling its membership about nets on 160 and 20 phone, as well as 80 and 40 CW. That year YLRL welcomed Great Britain and Alaska as its first DX country members. One year after K4LMB made her request to *QST*, the magazine published an article entitled "The YL's Unite!" in its May 1940 issue. During the first anniversary year, a second chapter affiliate, the Greater St Louis branch, was added to the YLRL umbrella. The famous "33" signature, originated by W8KYR, came to be used to express "love sealed with friendship between one YL and another YL." Official YLRL meetings were held at the Central Division Convention during September 1940 and at the New England Division Convention in October.

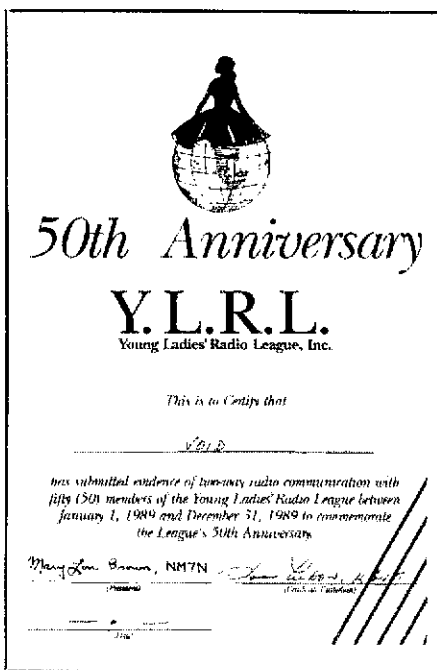
As YLRL continued to grow, the organization came to the attention of Eleanor Roosevelt, who saw W8TAY's article "YLRL QRV!" in a 1941 issue of *QST*. The First Lady, who was then the assistant director in the Office of Civilian Defense, applauded YLRL members on their enthusiasm for their work and stated in a letter to W8TAY it "will prove of inestimable value should the need for active defense arise." Shortly thereafter came Pearl Harbor and YLRL's motto "QRV—I am ready." YLs throughout the country participated in defense work, the Red Cross, worked at commercial and broadcast stations, and taught code and theory.

When YLRL's 10th anniversary arrived, the organization could claim over 300 members. *YL Harmonics* had grown to 31 pages. In 1950, the internationally popular YL-OM contest came into existence. Today, YLRL sponsors contests including YLAP (YL Anniversary Party), DX-NA YL, Howdy Days, East Meets West and the Summer Sprint. The organization offers a variety of challenging awards including WAS/YL, WAC/YL, DXYL, YLCC and YL-DXCC, as well as a Continuous Membership Certificate. Members receive the bi-monthly publication, *YL Harmonics*, which features contest announcements and results, YL sponsored events, net listings and district membership information.

In this, our 50th year, YLRL hopes you will renew your membership, if you haven't already, and take time to introduce a new YL to the organization. Membership is open to all licensed women amateurs. For more information, contact YLRL's Membership Chairman, Jan O'Brien, K6HHD, PO Box 700, Rio Linda, CA 95673-0700. (All quoted material was taken from the 3rd edition of *CQ-YL* by Louisa B. Sando, W5RZJ)

### YLRL's 50th ANNIVERSARY CERTIFICATE

The Young Ladies Radio League would like to invite you to join us in the celebration of our 1989 50th Anniversary. We are offering a special award in recognition of the event. The YLRL 50th Anniversary Award is available to any licensed amateur in the world. Two-way communications must be established on the Amateur Radio bands with fifty (50) YLRL members during the calendar year 1989. Any and all Amateur Radio bands may be used. Crossband, repeater or net contacts do not count.



Work 50 YLRL members during 1989, and you can earn the YLRL's 50th anniversary certificate.

Applications must be received no later than December 31, 1990 and should include a list of contacts including date, call sign, time, RS(T), band and mode. Please indicate and sign on your log that you have operated in a manner consistent with the rules of the award and your license privileges. Include your name, call sign and mailing address. Applications should be accompanied by \$4 US or 5 IRCs. Any proceeds over and above the cost of printing and distributing the certificates will be transferred to the YLRL Scholarship Fund. Decisions of the Certificate Custodian, regarding interpretations of these rules as here stated or later amended, shall be final. All inquiries regarding applications or the certificate should be addressed to the Custodian as follows: Joan M. Gibson, KG1F, RR1, Box 1465, Waterbury, VT 05676.

It is with deep regret that we record the passing of these amateurs:

WA1AEJ, Gerald R. Cline, Nashua, NH  
 W1AFL, Charles F. Pope, Everett, MA  
 W1CFO, Orion P. Derick, South Dennis, MA  
 W1CFY, Neal F. Fogg, Union, ME  
 K1CLM, Joseph E. Gaudet, Salem, NH  
 W1DM, Arthur C. Goodnow, Darien, CT  
 W1GXB, Norbert G. Saegaert, St Petersburg, FL  
 W1JTD, Harold A. Bubb, Clinton, CT  
 KA1LEF, Francis J. Stas, Jr, Kingston, MA  
 W1LOV, Basil Wright, Harmony, RI  
 WA1MHE, Lester R. Brace, Brunswick, ME  
 WA1PJI, Charles A. Sanborn, Kittery, ME  
 W1PYY, Guy L. Wood, Pittsfield, ME  
 W1SDC, Donald E. Urban, Newburyport, MA  
 K2AGC, Franklin P. Hinman, Burdett, NY  
 WB2DLT, Gilbert W. Rose, Monmouth Beach, NJ  
 WB2DSR, Blanche H. Nail, Rochester, NY  
 N2FI, Elmer J. O'Connor, Pittsford, NY  
 KB2FM, Clyde W. Van Dusen, Rochester, NY  
 \*W2GN, Fred J. Merry, Port Charlotte, FL  
 W2IEA, Thomas P. Bierds, Congers, NY  
 W2IYP, Robert S. Seeley, Belford, NJ  
 W2NVJ, Paul L. Hammann, Madison, NJ  
 W2OGA, Harold Hayflick, Palm Coast, FL  
 KA3FDK, Patrick T. Komiske, Silver Spring, MD  
 W3IRY, Richard V. Mulvihill, DuBois, PA  
 KA3MNC, Bernard R. Pollard, Aliquippa, PA  
 K3SVM, Edwin B. Weaver, Clarks Summit, PA  
 W3VVK, Richard S. Gilbert, Brooksville, FL  
 W4ADH, Earl C. Bortoff, Jeffersonville, IN  
 W4AO, Ross Bateman, McLean, VA  
 WA4CAP, Kimberley W. Parham, Maggie Valley, NC  
 WB4CYN, Claude W. Coggin, Badin, NC  
 W8TKR, Frederick W. Chapman, Lakeland, FL  
 KC4DTA, Anthony J. Rini, Sr, Dunedin, FL  
 W4FAD, Edwin F. Klar, Tampa, FL  
 WD41DH, Merrill D. Marks, Palm Bay, FL  
 W4IIS, Walter H. Stock, Lauderhill, FL  
 K4IM, Henry B. O. Davis, Dayton, TN  
 N4JOO, Ernest E. Tealey, Stuart, FL  
 W4JSP, John B. Hinger, Alexandria, VA  
 N4KDO, William B. Nugent, Pinehurst, NC

KJ4MN, Edward K. Gafford, Memphis, TN  
 AE4O, George H. Markowitz, West Palm Beach, FL  
 W4OAE, Stephen C. Manning, Jr, Virginia Beach, VA  
 KB4VOX, Jim R. Maynard, Lexington, KY  
 W4VXV, John Pcheny, Fort Walton Beach, FL  
 W4YTP, Harry M. Jones, Columbus, GA  
 W4ZXG, Earle J. Pysher, Jackson, AL  
 K5C1R, Odia L. Musgrove, Pine Bluff, AR  
 W5FAY, Lewis F. Jaggi, Dallas, TX  
 W5JJ, Carl C. Drumeller, Warr Acres, OK  
 K5KIE, Paul W. Oliver, Durant, OK  
 WA5LUW, Evert E. Moody, Pine Bluff, AR  
 WB5NCL, William N. Rheams, Metairie, LA  
 KC5NL, John E. Williams, Carlsbad, TX  
 KC5RO/CT4IM, Arthur W. Stewart, San Antonio, TX  
 NG5S, John B. Colby, Albuquerque, NM  
 W5TYM, Ralph R. Holden, Denison, TX  
 KA5VYV, Jeffrey L. Jones, Houston, TX  
 W5XL, Elbert G. Barrett, Organ, NM  
 KA5YSJ, Ronald G. Cooper, Norman, OK  
 \*W6BWG, G. Wesley Parr, San Gabriel, CA  
 W6CYM, L. James Tomer, Paradise, CA  
 W6DHK, Harry J. Parker, Jr, Lone Pine, CA  
 W6DLL, Reginald Neelds, Los Angeles, CA  
 KH6DTN, Charles A. Andrews, Pearl City, HI  
 K6DVL, Jack Dykman, Palmdale, CA  
 \*WB6DXH, Roger E. Gentry, Fairfield, CA  
 W6ENC, George E. Elliott, Arcadia, CA  
 W6FSN, Joseph D. Smith, San Gabriel, CA  
 WA6HRX, Betty Kaiser, Phoenix, AZ  
 KA6JAO, Kenneth D. Lerum, Fresno, CA  
 K6JJP, Leslie Zelver, Roseville, CA  
 WB6YAR, James R. Reese, Fresno, CA  
 W6ZKU, Lester W. Tryce, Bakersfield, CA  
 KA7AZK, Hugh B. Currin, Klamath Falls, OR  
 KA7DRL, Elden N. Cuffin, West Richland, WA  
 WA7DRP, Dale R. Devlin, Portland, OR  
 W7FFP, H. Myron Swarm, Seattle, WA  
 W7OCX, John H. Sampson, Jr, Ogden, UT  
 W7PX, Edward P. Coulter, Missoula, MT  
 W7QY, Ralph L. Norgard, Portland, OR

WA8ABS, Alfred M. Rente, Grosse Pointe, MI  
 \*K8BYY, Larry Galvin, Lansing, MI  
 W8HNX, William F. Burks, Cincinnati, OH  
 WA8LWZ, William G. Lahetta, Lorain, OH  
 WB8MYU, Merlin V. Greenthal, Marshall, MI  
 W8NRM, John W. Brown, San Antonio, TX  
 WB8PRF, James E. Stewart, Royal Oak, MI  
 W8SLB, Elmer J. Helmig, Cincinnati, OH  
 KB8TM, Raymond L. Boik, Orchard Lake, MI  
 W8WPB, Charles J. Gunderman, Middleburg Heights, OH  
 W8YBM, Joseph F. Green, Jr, Redford, MI  
 N9FPP, William C. Whitehouse, Bloomington, IL  
 KA9QS, Charles T. Woods, Indianapolis, IN  
 K9MZZ, Carl H. Hunsley, Sr, Decatur, IL  
 W9PM, Jay W. Seymour, Rockford, IL  
 W9SNK, H. Charles Kaetel, Menomonee Falls, WI  
 W9TDJ, A. C. Hyde, Quincy, IL  
 K0JTP, H. W. Morgan, Clear Lake, IA  
 W0LRL, Don O. Cummings, Pella, IA  
 K0ODH, William R. Campbell, Jr, Chadron, NE  
 W0QIH, John J. Scott, Englewood, CO  
 KA0WEA, George Laswell, Rapid City, SD  
 WA0YVL, Ruby E. Moore, Topeka, KS  
 GM4SQH, Iain H. P. Doherty, Midlothian Scotland

\*Life Member, ARRL

In order to avoid unfortunate errors in the Silent Keys column, reports of Silent Keys are 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. Canadian reports should be sent to the CRRL HQ address on p 9.

**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.

## 50 Years Ago

January, 1939

- Reviewing events of 1938, the Editor says our license total reached 50,000 for the first time. Other highlights: Outstanding performance in disaster communications, the first national convention in years, and some basic technical advances.
- W2DKJ has used vertical antennas at a number of QTHs, and shares with us his acquired knowledge of these space-saving devices, including some with multiple elements for directivity.
- W2QY has returned from a weather-reporting Arctic expedition, during which the ship was frozen in ice for months. Many QSOs from OX2QY took place in between official duties.
- W9UVC says that distortion in an audio driver stage (particularly third-harmonic distortion) causes more phone splatter than simple overmodulation, and he shows us some of the remedies.
- Under the new international regulations adopted at the Cairo conference, QSA now relates only to the strength of a signal, and a new "QRK" with ratings from 1 to 5 reports the actual readability of the transmission. (Hams will undoubtedly still stick to the RST system.)
- Primary keying has the advantage of "softness" which prevents thumps and clicks, but the disadvantage of bad key contact sparking. W1JPE describes the use of a controlled rectifier tube for keying of rectifier circuits.
- Since most of us are rockbound (crystal controlled) these days, Communications Manager Handy suggests we adopt our own "Q" signals to

indicate where we will tune after a CQ; e.g., "QLM" means the CQer will tune from the low end of the band to the middle. QML, QLH, QMH are self-explanatory.

- Under the new F.C.C. regs, hams who use a modulated oscillator on five meters, push close to band edges, or are in the 900-watts or more input category, need to make certain they comply with stricter new requirements. Technical Editor Grammer offers some suggestions, with a detailed bibliography.
- With the same concern over observance of band edges, W8CQQ describes an inexpensive device for indicating 100- and 1000-kc. points in the high-frequency spectrum.
- Only A.R.R.L. members are eligible to take part in the 2nd annual "QSO Party" this month, with fun and fraternalism the theme rather than high scores.

## 25 Years Ago

January, 1964

- This year marks the fiftieth anniversary of the League's founding, and each issue will have a special section which will serially describe the organization's history. This month features co-founder Clarence Tuska's tale of his first meeting with Hiram Percy Maxim.
- Reviewing events of 1963, the Editor says our numbers have now reached 250,000. Other highlights: Moving Hq. into a new building on the W1AW property, and intensive debates on the

incentives (or lack of them) in our licensing system, with particular attention to the Board of Directors' decision to ask FCC to upgrade the standards.

- W3HWZ's frequency synthesizer (or crystal v.f.o.) uses only three tubes and inexpensive standard crystals. Its 5-Mc. output is designed to work into sideband gear using 9-Mc. filters.
- With commercial frequency calibrators so expensive, W4DFR searched his junk box and found most of the parts necessary to build an oscillator-multivibrator unit with outputs at 10-kc. intervals.
- At last autumn's Midwest Division Convention in Wichita, League President Herbert Hoover, Jr., W6ZHH, detailed the basic ARRL program for improvement of the amateur service in both technical and operating fields. His complete address is reprinted in this issue.
- An IARU team of representatives, in observer status at the 1963 Geneva Space Conference, worked hard to win international recognition of 144 to 146 Mc. for amateur space activity. Strong opposition by countries suspicious whether Oscar activity is truly amateur, however, stymied attempts to obtain approval for other higher-frequency bands as well.
- Though based primarily on v.h.f. experience, W1HDQ's series, beginning this month, on antenna facts and fallacies will provide useful hints for improvement of antennas, transmission lines and matching devices on most any band.
- As a part of amateur radio's entrance into a new era of public service consciousness, WINJM announces new message precedences of *emergency*, *priority* and *routine*, and illustrates their practical application.
- If a neighbor ham causes blocking and cross modulation in your receiver, the neat little T-pad circuit devised by W2PF may alleviate the problem.—W1RW

# Results, 1988 September VHF QSO Party

Au = Gold = Aurora = Buzz-buzz = VHF DX!

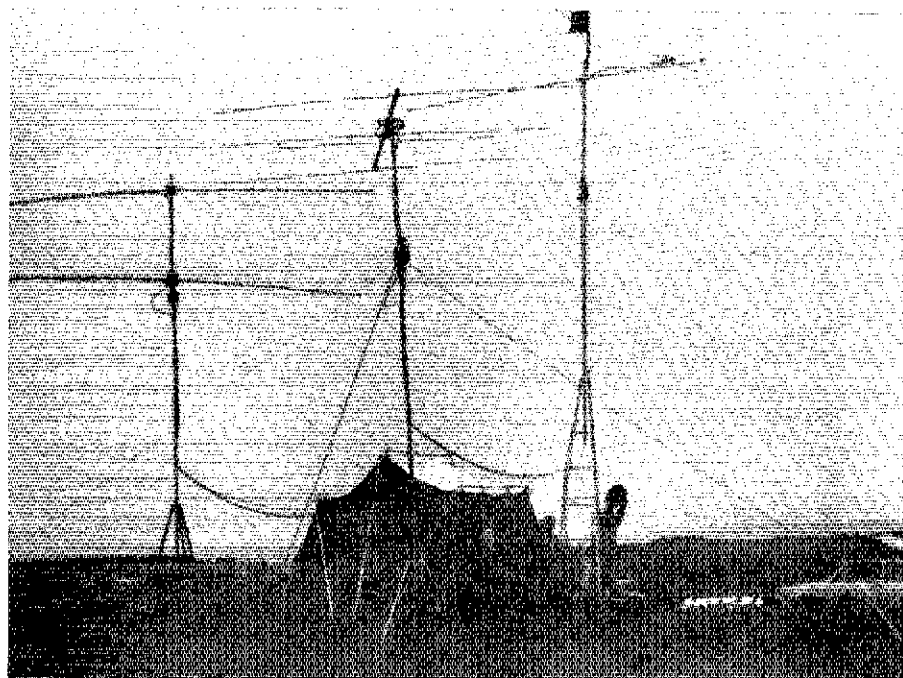
By Billy Lunt, KR1R and Mark Gamble, N1FOZ  
Contest Manager Assistant Contest Manager

Going for the gold was the battlecry of participants in the 24th Olympiad in Seoul. Likewise, Mother Nature provided the golden opportunity for DX in vast areas of the continent in the September 1988 VHF contest. According to Mendeleev's periodic table of the elements, the chemical symbol for gold is Au. To the VHF world, Au means AURORA. Yes, aurora—the buzzsaw mode—which made a dramatic appearance in the September fracas, much to the delight of the world above 50 MHz. Joy was not confined to just the northern latitudes either, as such well-equipped stations as WQ4V in North Carolina experienced extensive golden Au propagation.

The aurora was certainly the highlight of the contest, as WB2JSJ facetiously offered: "I found the aurora on 50, 144, and 220 MHz very annoying. Here I was ready for a nice quiet Sunday afternoon of painfully slow QSO rates when, all of a sudden, all hell broke loose and I didn't know which mike or keyer, on which band, to grab first." "The aurora was fantastic. This goes to show you that if you're patient the propagation gods will eventually smile upon you."—N8DGN. From 9-land: "Sunday morning was wild—all bands were open with simultaneous aurora and tropo! The three aurora openings totaled about nine hours here."—W0UC/9. WA4VWV rasped: "It sounded like spark gap!"

DX was also to be had by other routes, as WB8K took advantage of "very short and selective tropo openings on 432 MHz." In the Southwest, some limited F2 6-meter openings were recorded by W5FF, whose "contest highlight was logging LU8YYO," and K5CM, who found it "great to hear some rare South American grids coming in at the end of the contest."

Amazing as it may seem to the VHF contest faithful, some have not yet discovered the joy of VHF competition. N4LBJ here destroys the myth that you will get a nosebleed above 29 MHz. "After 32 years on HF exclusively, I decided to take the VHF plunge only recently. I was afraid



The Northern Michigan hilltop location of the KB8JI team.

if I operated above 10 meters, I would get altitude sickness. In fact, it was a blast. Having duked it out in many a DX and 160-meter contest, I found I could take time off to be civil to the family, and eat three meals a day, without blowing the whole thing." Let's all work to get a few more converts from the dc bands.

In our regular "rare squares" feature, marine mobile WITUM earned the coveted 52<sup>2</sup> award with 52 contacts from FN52, off the coast of Cape Cod, Massachusetts. Running 6-meters through 432 MHz, Dex reports nobody got seasick! Please give us your rare square escapades for future consideration (and a player to be named later).

The ultimate measure of success of the contest is in the scores produced. This one saw eight Division records tumble: single ops K0IR in Dakota, K5CM in West Gulf, and VE3ASO in Canada; multiops W1XX/3 in Atlantic, NV2D in Hudson,

WB0DRL in Midwest, W2SZ/1 in New England and VE3LNX in Canada.

Multiop W2SZ/1 on Mt Greylock utilized the microwave bands extensively to break all previous September records with 751k points. This superlative effort illustrates what happens to the scores with a little propagational enhancement. W1XX and his band of merry men put on the Central Pennsylvania rare square FN00 in a big way, finishing second with just over 600k. This effort beat out a fine performance by the K3YTL group at 554k, finishing in show position. Of special note is the big Roan Mountain effort of WQ4V, making the top ten listing.

In the single-op category, we're glad to note that contest regular WA2TEO made it to the top, edging out a very competitive field. Jeff was the only station to break the 100k mark. Hats off to VE3ASO, KB3QM, W9IP/2 and N2WK who finished two through five in that order, all bunched in

### Single Operator Top Ten

Call	Score
WA2TEO	109,475
VE3ASO	99,188
KB3QM	95,850
W9IP/2	94,872
N2WK	90,216
K1RZ	88,128
WB3JYO	82,137
K2UOP/4	76,076
W3IP	67,539
W1RIL	65,611

### Multioperator Top Ten

Call	Score
W2SZ/1	751,215
W1XX/3	600,655
K3YTL	554,000
K1TR	367,310
WQ4V	331,890
W2DRZ	301,653
WB0DRL	267,384
KA1ZE	249,613
K1WHS	199,690
VE3LNX	189,435

### QRP Portable Top Ten

Call	Score
WA5NFC	2,166
K6LMN (CM94)	1,911
N1EWB (FN32)	1,470
KH8CP/1 (FN31)	1,160
KB4NFY	943
N1EWB (FN42)	585
NN1G	560
KB8MEG	200
K6LMN (DM04)	91
KA1LMR	84

at 90k points plus.

Although QRP portable entries did not yield big scores this time, the fun factor was nonetheless S9. Finishing one-two were WA5NFC and K6LMN, the latter operating from two different grid squares. Incidentally, this category has been extended to the January Sweepstakes, although this will probably appeal only to

### Single Operator QSO Leaders By Band

50 MHz		432 MHz	
W3EP/1	159	K1FO	130
W9IP/2	157	K2OS	103
VE3ASO	136	WB8K	90
WA1TRE	129	WA2TEO	77
WA2TEO	125	WB2DNE	75
WA1VRH	105	KB3QM	71
K9ES	104	N8DGN	69
KB3QM	100	K1RZ	68
WB2DNE	92	N2WK	67
K3ZO	91	KD5RO	66
K1RZ	85	W1RIL	65
K2UOP/4	84	K2UOP/4	62
WB1GQR (WB2JSJ,op)	84	W9IP/2	61
K5CM	77	K9ES	57
WA4NJP	75	W2HRW	57

### 144 MHz

WB2QQQ	294
KA1KRJ	283
WA2TEO	269
K9ES	251
KA2WKA	250
WB1BXS	249
VE3PCW	239
WA1VRH	214
N3FYD	211
VE3ASO	208
VE3QZB	204
K1RZ	202
KB3QM	201
WB1GQR (WB2JSJ,op)	189
N8DEJ	188

### 220 MHz

WA2TEO	66
KA2WKA	53
N2WK	52
WB3JYO	51
K1RZ	45
WB1GQR (WB2JSJ,op)	45
K2UOP/4	45
KB3QM	44
K9ES	42
WB0WAO/8	41
W1RIL	40
W3ZZ	40
W9IP/2	39
W3IP	38
WB2YEH	37
W6CPL	37
WA1HYN	37

### 902 MHz

W1RIL	24
KD5RO	23
WB3JYO	17
N2WK	16
WB2YEH	15
WB1FKF	13
N5WS	12
WA3JUF	12
K2GAL	11
VE3ASO	10
AB1U	10
W0RAP	10
W3IP	9
KF6AJ	8
WA1MBA	8

### 1296 MHz

W1RIL	41
WA2TM	41
K2GAL	38
KB3QM	36
WB3JYO	35
KD5RO	31
K2UOP/4	28
WB2YEH	26
WA3JUF	25
WA2TEO	25
N2WK	22
W3IP	22
WB1FKF	21
K1RZ	21
W6CPL	19
W3ZZ	19
K1PXE	19

### 2304 MHz

WB3JYO	12
WA3JUF	10
WB2YEH	9
KD5RO	9
WB1FKF	8
W1RIL	7
W1JR	3
N1W	3
WA1MBA	3
N2WK	3
W5RCI	2
WA4GPM	2
VE3ASO	2

### Single Operator Multiplier Leaders By Band

50 MHz		432 MHz	
VE3ASO	60	WB8K	43
W9IP/2	59	K2OS	40
W3EP/1	47	N8DGN	36
WA1TRE	45	K1FO	36
KB3QM	41	K1RZ	31
WB2DNE	40	KB3QM	29
KU8P	40	WB2DNE	29
WA4NJP	39	W9IP/2	28
K9ES	38	N0LL	28
WA1VRH	38	K2UOP/4	27
K2UOP/4	37	N2WK	26
WD4MGB	36	WA2TEO	26
W9IP/2	34	W3ZZ	26
K1RZ	33	W3IP	26
VE3QZB	33	KD5RO	26
K3ZO	33		

### 144 MHz

N8DEJ	76	N2WK	15
W9IP/2	65	KD5RO	15
KD9JQ	64	WB3JYO	9
VE3QZB	63	W0RAP	9
VE3ASO	62	VE3ASO	9
N8DGN	61	W1RIL	9
K1RZ	54	WB2YEH	8
VE3PCW	54	WA3JUF	8
K0IR	53	N5WS	7
W3ZZ	52	K2GAL	6
W3IP	52	AB1U	6
WA2TEO	51	WB1FKF	5
WA8TJL	51	KF6AJ	5
WA4VWV	51	WA1MBA	5
WB9MSV	50	W3IP	4
KD5RO	50		

### 1296 MHz

K2GAL	16
WA2TM	16
N2WK	15
KD5RO	15
KB3QM	14
WB3JYO	13
K2UOP/4	13
W3ZZ	13
W1RIL	12
WB2YEH	12
WA3JUF	11
K1RZ	11
WA2TEO	10
WB9MSV	10
W0OHU	10
WA3EOQ	10
K2GK	10

### 2304 MHz

KD5RO	7
WB3JYO	4
WA3JUF	4
WB2YEH	4
W1RIL	4
WB1FKF	3
N1W	3
W1JR	2
WA1MBA	2
N2WK	2
W5RCI	2
WA4GPM	2
VE3ASO	2

### Division Leaders

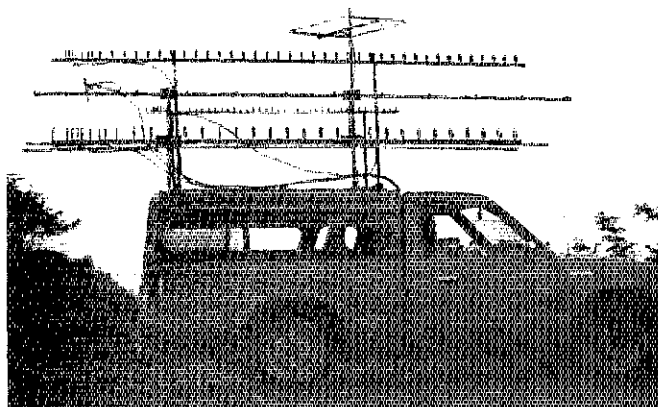
#### Single Operator

Call	Score	Division
KB3QM	95,850	Atlantic
WB9MSV	32,292	Central
K0IR*	21,944	Dakota
W5RCI	13,600	Delta
WA8TJL	33,580	Great Lakes
N2BJ	22,308	Hudson
K0IFL	17,952	Midwest
WA2TEO	109,475	New England
KE7CX	4,050	Northwestern
W6RXQ	7,880	Pacific
W5FF	3,195	Rocky Mountain
K2UOP/4	76,076	Ronoke
WA4NJP	31,740	Southeastern
W6CPL	19,778	Southwestern
K5CM*	43,470	West Gulf
VE3ASO*	99,188	Canada

#### Multioperator

Call	Score
W1XX/3*	600,655
W0UC/9	170,680
—	—
KG5MD	10,011
WB8ISK	171,580
NV2D*	140,524
WB0DRL*	267,384
W2SZ/1*	751,215
—	—
WB6PFJ	7,359
N6ENU	138
WQ4V	331,890
—	—
K6MEP	46,136
WB5VYE	10,912
VE3LNX*	189,435

\*Denotes new Division record



Dean, WA0TKJ, operated on 7 bands and from 16 different grids totaling over 900 miles.

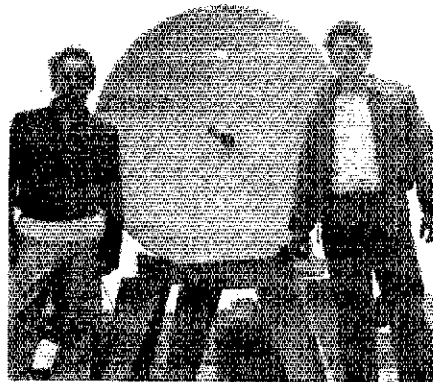
## Multioperator QSO Leaders By Band

50 MHz			902 MHz		
K1TR	338		K3YTL	40	
W2SZ/1	297		W1XX/3	38	
W0UC/9	246		W2SZ/1	32	
K3YTL	237		K2BWR	29	
W1XX/3	230		K1TR	28	
KA1ZE	220		W2DRZ	27	
W2DRZ	193		VE3LNX	25	
WQ4V	186		K2XR	24	
K1WHS	170		WB0DRL	19	
N2CEI	155		KA1ZE	18	
N4EQT	155		WD8ISK	17	
NV2D	150		W2DMC	17	
K2XR	145		WB2PSI	12	
VE3LNX	116		K1WHS	11	
W4BFB	106		NM8X	11	

144 MHz			1296 MHz		
W1XX/3	573		W1XX/3	66	
K3YTL	551		K3YTL	64	
W2SZ/1	523		W2SZ/1	59	
K1TR	483		K1TR	54	
KA1ZE	383		WB0DRL	47	
W2DRZ	383		KA1ZE	36	
WQ4V	368		K1WHS	35	
K1WHS	345		K2XR	34	
NV2D	340		WQ4V	31	
WD8ISK	313		NV2D	31	
VE3LNX	289		W2DRZ	30	
N4EQT	276		W2DMC	30	
W18L	271		VE3LNX	25	
W3KWH	267		W3KWH	22	
W1QK	254		K6MEP	21	

220 MHz			2304 MHz		
W2SZ/1	138		W2SZ/1	53	
K3YTL	127		K3YTL	21	
K6MEP	118		W1XX/3	16	
K1TR	108		WB0DRL	16	
W1XX/3	107		VE3LNX	13	
WQ4V	77		K2XR	9	
KA1ZE	73		N2CEI	9	
K1WHS	73		K1WHS	7	
WD8ISK	63		WB2PSI	7	
K2XR	61		WQ4V	7	
W2DRZ	58		W2DRZ	6	
N2CEI	58		K1TR	1	
NV2D	56				
VE3LNX	49				
WB0DRL	48				

432 MHz		
W2SZ/1	207	
K3YTL	201	
W1XX/3	200	
K1TR	141	
KA1ZE	136	
WQ4V	123	
WD8ISK	102	
W2DRZ	101	
WB0DRL	99	
K1WHS	96	
W2DMC	93	
VE3LNX	80	
K2XR	64	
NM8X	64	
NV2D	61	



Jack, N6XQ, and Dennis, WA5LIG, the operators of XE2GFH, set a new North American record of 595 miles on 10 GHz.



Bruce, WD4JQV, racks up some of the 51 grids that WQ4V earned on 432 MHz during their 5th place overall finish.

## Multioperator Multiplier Leaders By Band

50 MHz			902 MHz		
W0UC/9	95		W1XX/3	23	
WQ4V	76		W2DRZ	19	
W2DRZ	73		WB0DRL	18	
W1XX/3	69		K3YTL	18	
K1TR	67		VE3LNX	17	
W2SZ/1	63		W2SZ/1	16	
N4EQT	58		K2BWR	16	
WB0DRL	56		WD8ISK	15	
K3YTL	54		K1TR	12	
W4BFB	51		K2XR	12	
KA1ZE	50		KA1ZE	10	
K1WHS	47		WB2PSI	10	
NV2D	47		NM8X	9	
N2CEI	47		W2DMC	8	
VE3LNX	44		N2CEI	8	

144 MHz			1296 MHz		
WD8ISK	102		WB0DRL	36	
WQ4V	93		W1XX/3	30	
W1XX/3	88		K3YTL	28	
W2DRZ	85		W2SZ/1	25	
WB0DRL	84		WQ4V	19	
W0UC/9	82		W2DRZ	18	
K9MRI	82		K1TR	17	
N4EQT	77		WD8ISK	16	
W3KWH	75		KA1ZE	16	
K3YTL	74		W3KWH	14	
VE3LNX	74		K1WHS	14	
W2SZ/1	71		VE3LNX	13	
W18L	71		W2DMC	13	
KA1ZE	66		NV2D	13	
K1TR	65		K2XR	12	

220 MHz			2304 MHz		
W1XX/3	51		W2SZ/1	15	
WQ4V	49		W1XX/3	12	
WD8ISK	45		WB0DRL	12	
WB0DRL	41		K3YTL	10	
W2SZ/1	40		VE3LNX	9	
K3YTL	37		WB2PSI	6	
W2DRZ	33		W2DRZ	6	
KA1ZE	33		K2XR	5	
VE3LNX	32		WQ4V	5	
K1TR	31		N2CEI	3	
W0UC/9	30		K1TR	3	
K1WHS	29		K1WHS	2	
W3KWH	25				
NV2D	24				
N2CEI	23				

432 MHz		
W1XX/3	62	
WB0DRL	62	
WQ4V	51	
WD8ISK	51	
W2SZ/1	43	
K3YTL	43	
W2DRZ	43	
KA1ZE	36	
W0UC/9	33	
K1TR	32	
W3KWH	32	
VE3LNX	30	
W0RPK	30	
NV2D	29	
K2XR	29	

those in the warm-weather climes. Or do we have some hardy souls out there with snow shoes and dog sleds?

Speaking of the VHF Sweepstakes, that event is the next stop on the VHF contest calendar, January 14-16—the weekend before the Super Bowl. Get ready to “CQ SS.” C ya!—W1XX

## SOAPBOX

How about that aurora! It was here in central Connecticut only Saturday and Sunday night, but I could hear stations not much further north running aurora Sunday morning, too. I was also on the edge of the western tropo Sunday evening as well. But what more could a September weekend offer—even if everyone couldn't get in on the aurora and tropo (W3EP/1). After getting off to a slow start, aurora activity Sunday provided me with my best 2-meter DX to date, when I worked W18L (EN82) and N8DEJ (EN74) using an indoor beam! (WAINLD). Shared the trip with KH6CP/1. At one point we

were both on 2 meters at the same time, but we didn't think to work each other (NN1G). K1WHS was putting out a big signal on 3456 MHz, 59 + 20, from over 80 miles away! (WB1FKF). Since upgrading to Technician this past February, and purchasing my first 2 meter hand-held in June, this contest was the first in which I was eligible to participate. Although I probably hold the record for the fewest contacts and points, I still had a lot of fun participating and look forward to trying again next year (KAI1OD). A new 6-meter stacked antenna system was put to good use although there was little DX to be worked. A good aurora Sunday night enabled the 144-MHz and 220-MHz stations to work quite a few DX stations (K1WHS). I missed operating on Sunday, so naturally the bands opened up (N11W). If it wasn't for the FB aurora on Saturday and Sunday night, this would have been a very dull contest! (W1BDC). 6-meter and 2-meter aurora contacts were very interesting. Other than aurora, 6 meters was mostly dead. 2 meters was also not as active as the June contest (K9ES). Conditions were pretty good and grid square totals on 2 meters were excellent because of the aurora. Contacts were hard to make though (WA2SLY). First aurora of the season . . . what timing! (WB2ZSY). I tried to get my 2-year-old daughter to do logging on the computer for me, but the only thing she typed was

GX\*/R2B7DHJ! (WA2YEI). The aurora was great in the north, but the 6-meter kW decided to go south (NV2D). The K2XR group is back, a little older and wiser! (K2XR). The aurora was very good to me (W9IP/2). It was a great contest; I had my all-time high on 220 MHz (N2WK). Good to have an aurora during a contest (K2GK). This was my first contest using 432 MHz. I was pleasantly surprised that I did so well using low power (W2WGL). Not much of a score, but we did have fun operating from FM14 (W2HAX). The aurora was the icing on the cake! (WB3JYO). The aurora was a nice surprise. It was still difficult, however, to break through some of the stations on 2 meters (K3ZO). Best DX was N4EQT in EM86. Too bad we didn't stick around for the aurora opening! (K3HKK). Would have been great to have the conditions experienced on September 8th (WA4LIT). Poor conditions, low activity and limited operating time made for a dull contest (WA4CQG). Good activity level on 2 meters, but propagation was nothing special (AB4JA). Everyone in our crew had a great time (WQ4V). Not much action, but still it was fun (WA4JNE). Not bad for a September

contest, except that I had to towel dry my 432 Yagi after the rain on Saturday. Special surprise was the three contacts from Argentina, one to Honduras and an opening to Texas, Oklahoma and Louisiana (WD4MGB). This was my first time on 220 MHz (W4DO). No exceptional conditions were observed here, but working the old regulars is always fun! Maybe the January contest will give us a break (W5FYZ). Conditions were poor as usual this September. Activity lower on 144 MHz than last year (W3FF). I wish people would spread out from 144.2 to 144.2 ± 10-20 kHz. It's a real mess sometimes (K9MK/5). There was good tropo Sunday morning to the north, but 50 MHz was dead the entire contest (W5NZS). This was my first contest. I'm 11 years old. I plan to participate in more contests like this, because everyone was so nice (N5JWD). I had a good time on the Glendora Mountain road up out of the smog. I'm looking forward to the next contest (W7ERH/6). Thanks to all the stations who pulled me out of the noise. Due to budgetary constraints, I couldn't get the antenna and amps I wanted. Next contest watch out! To all my friends in 2-land, I'm back! (WY6U). I would like to thank the local cable company for all that interference to the east and west (WB6VYH). There wasn't much activity, but I still managed new grids on 144 and 432 (N7CFC). I missed the aurora opening Sunday afternoon while taking a coffee break, I should swear off the stuff (WB7A1P). This is not like the Northeast corridor in terms of making QSOs (WA1KIR/7). This was the first time on 902 and 1296 MHz for both NM8X and VE3CKU—it worked out great! (NM8X). Excellent conditions from our hilltop location. There was no Murphy amazingly enough (KB8JI). Some of the locals made a special effort to get on 220 MHz in an effort to save 220. Even though not as many turned out as hoped, some of us plan to send a copy of our logs with an explanation to our Senators and Congressmen (N8CCC). I hadn't intended on entering, but things got so wild by Sunday that I decided to give it a shot (KD9JQ). Things were rather dead

until the aurora came along (WA9LZM). This is the third time we've placed EN28 on the air, but the QSLs keep rolling in. We'll be there again in June 1989 (W0RPK). Had a great time, there were a lot of stations on the air (N0IGZ). The VE gang's activity on 50, 144 and 432 MHz is great. Let's get

more Canadians on 220, 903, 1296 and 2304 MHz (VE3DSS). My first contest of any kind (VE3OYH). We had a poor location for VHF contesting. There aren't enough hams nearby (VE7PRC). We had a great cruise and a great day, but the number of QSOs was a disappointment (W1TUM/MM).

## AURORA

The aurora borealis, or "northern lights," is a beautiful spectacle which is seen occasionally by those who live in Canada, the northern part of the USA and Europe. . .

. . . The aurora is caused by the Earth intercepting a massive number of charged particles thrown from the Sun during a solar "storm." These particles are funneled into the polar regions of the Earth by its magnetic field. As the charged particles interact with the upper atmosphere, the air glows, which we see as the aurora. And, important to VHFers, these particles also provide an irregular, moving curtain of ionization which can propagate signals for many hundreds of miles.

You'll notice Au by its characteristic hiss. Signals are disturbed by reflection and scattering off the rapidly moving curtain of ionization. They sound like they are being transmitted by a leaking high-pressure steam vent rather than radio. SSB voice signals are so badly distorted that often you cannot understand them unless the speaker talks very slowly and clearly. The amount of distortion increases with frequency. Most 50-MHz Au contacts are made on SSB, where distortion is the least. On 144, 220 and 432 MHz, CW is the only really useful means of communicating via Au.

If you suspect Au. . . listen with the antenna to the north. . . Try swinging the antenna as much as 45 degrees either side of due north to peak signals. In general, the longest-distance DX stations peak the farthest away from due north. . . to work stations far south of you. . . your antenna is often pointed north.—*The ARRL Operating Manual*, 1987, p.12-10, 12-13.

## Scores

Scores are listed by ARRL Sections. Within each section, single-operator scores are listed first and then multioperator scores. From left to right, each line lists: call, score, QSOs, multipliers and bands worked (A = 50 MHz; B = 144 MHz; C = 220 MHz; D = 432 MHz; 9 = 902 MHz; E = 1296 MHz; F = 2.3 GHz; G = 3.4 GHz; H = 5.7 GHz; I = 10 GHz; J = 24 GHz; K = 48 GHz; L = Light). An asterisk before the call sign denotes a QRP-Portable station. Among the single-operator stations, the single-band winners are noted with band letter(s) being in boldface print indicating the band won. For example, in Connecticut, WA2TEO is the section winner as well as the single-band leader on 144, 220 and 1296 MHz. W3EP/1 is the single-band leader on 50 MHz. AB1U is the single-band leader on 902 MHz. K1FO is the single-band leader on 432 MHz.



<b>1</b>	
<b>Connecticut</b>	
WA2TEO	109,475-562-145-ABCD E
W3EP/1	26,670-284-84-ABD
WA1VRH	25,201-319-79-AB
K1PYE	24,450-205-75-ABCDE
AB1U	22,200-186-75-ABCD9E
KF6AJ	10,251-129-51-ABCD9E
WB1BXS	9,711-249-39-B
K1FO	9,380-130-36-D
WA1NLD	1,808-67-24-B
*KH6CP/1	1,180-38-20-BD9
W1WHL	840-38-17-A
K1WVX	570-38-15-B
*NN1G	560-40-14-AB
KH6CP/1 (FN31)	308-15-11-ABCE
KE1A	160-20-8-B
KA1ZE (+AC1T,N1DPM,N011,WB1FVS)	249,613-866-211-ABCD9E
W1QK (+KA1RLX,KB1US,N1ABY,NA1S, WA1WXX,WB1CVW)	47,090-439-85-ABCE
<b>Eastern Massachusetts</b>	
WB1FKF	22,081-166-71-ABCD9EFG

W1JR	16,472-135-71-ABCD9EF
KX1C	9,163-145-49-ABCD
K1TO	2,844-82-36-ABCD
K1VZI	2,147-73-19-ABCD E
W1GXT	1,085-34-15-CE
KA1DHO	756-34-18-ABDE
*N1EWB (FN42)	585-28-13-BCDE
<b>Maine</b>	
WA1TRE	5,805-129-45-A
W1PLX	2,117-73-29-B
KA11OD	14-7-2-B
K1WHS (+K1s LL,MNS,TOL,KK1W,KY1K,WA1s NIE,TFH,W3HQT,K82K)	199,690-745-190-ABCD9EFGHIJ
<b>New Hampshire</b>	
AC1J	18,626-200-67-ABCE
N11W	6,930-96-42-ABCD9EF
K1KA	4,998-119-42-B
W1BDC	2,324-83-28-AB
WA1YZN	1,536-64-24-B
*KA1LMR	84-11-6-ABCD
<b>Rhode Island</b>	
WA1HYN	11,770-114-55-BCDE
KB1EM	1,216-50-19-BCD
W1AQ (K1s AGA,CH,IM1X,N1HS,N01U, WA1VEK,WA1VPC,ops)	19,668-240-88-ABCD
<b>Vermont</b>	
WB1GQR (WB2JSJ,op)	53,788-372-113-ABCE
K1LPS	21,504-173-84-ABCE
W1AIM	16,356-147-87-ABCE
<b>Western Massachusetts</b>	
W1RIL	65,611-378-103-ABCD9EFG

K9ES	49,217-454-88-ABCD
KA1KRJ	8,773-283-31-B
WA1MBA	4,828-76-34-BD9EF
NA1W	4,290-77-36-BCDE
*N1EWB (FN32)	1,470-47-21-BCDE
W1KK	1,083-57-19-A
K1JG	63-9-7-B
W2SZ/1 (K1DH,KA1DZV,WA1s UGE,ZMS,K2s MM,TR,KA2FWN,N2GXH,W2ARQ,WA2s AAU, GFP,SCA,SPL,WB2KMY,AK4L,WA8USA,ops)	751,215-1426-305-ABCD9EFGHIJ
K1TR (+K1s BA,BIG,EA,N1ARQ,NR1E,WA1s PBU,VFJ,K9WM,KM3T)	387,310-1160-230-ABCD9EFGHI
<b>2</b>	
<b>Eastern New York</b>	
N2BJ	22,308-239-66-ABCD9E
WA2BAH	12,670-171-65-ABCD
WA2FUZ	10,030-141-59-ABD
WA2MJP	9,016-184-49-B
KD2IX	1,596-84-19-B
W2DMC (K2MME,KA21BV,K2s EMB,DJJ, N2s BJ,HIG,W2GQ,WA2s EHI,KFS,WB2NEC, W2E,ops)	87,483-496-121-ABCD9E
<b>NYC—Long Island</b>	
WB2CMI	5,694-146-39-AB
WA2EIO	5,824-116-37-BD
WA2SLY	4,379-125-35-B
K2C0VS	2,892-72-34-ABD
WB2ZSY	2,175-75-29-B
WA2EUS	912-74-16-DE
WA2YEI	488-36-13-AB
WA1OUB/2 (+ops)	2,093-91-23-B

<b>Northern New Jersey</b>	
W5ZQ00	13,230-284-45-B
K4BNC	8,642-119-58-ABD
N3AHF	2,385-55-43-B
WA2LTM	1,968-41-18-E
WA2LDT	1,924-60-26-ABC
WB2BPY	1,173-51-23-AB
NV2D (+KX2O,N2WMM,WE2Z)	140,524-638-172-ABCE
K2XR (K2s JWE,OWR,KA2UHS,KB2ENE,KC2PX, KT2B,N2GUF,ops)	128,370-510-165-ABCD9EF
N2CEI (+WB2ONA)	94,752-475-144-ABCD9EF
<b>Southern New Jersey</b>	
WB2YEH	48,195-278-105-ABCD9EF
KA2WKA	48,100-377-100-ABCD
K2GAL	41,370-246-105-ABCD9E
W2HRW	24,786-249-81-ABD
W2EIF	23,023-209-77-ABCD9E
W2PAU	7,984-108-55-ABD
N2BCF	544-46-14-B
K2BWR (+K2ZRJ)	46,410-252-119-ABCE
<b>Western New York</b>	
W9IP/2	94,872-436-177-ABCD
N2WK	90,216-333-168-ABCD9EF
KD5RO	50,850-249-113-BD9EF
K2GK	22,500-169-90-ABCE
KU2A	12,920-134-76-ABCD9E
K2OS	8,240-103-40-D
NM2J	4,078-95-58-ABCD
K2MPF	1,165-85-49-AB
W2AWF	1,053-39-27-B
W2WGL	800-25-16-D
W2DRZ (+K2s SMN,TXB,K2s CQ,FLO,NY2Z, N3X)	301,853-798-277-ABCD9EF

WB2PSI (KA1AVC,K2OEO,KD2CM,N2s  
AJX,AJY,W2AV,WA2ZKD,WB2s (KA,O,CQ,ops)  
55,544-287-131-ABD9EFIL  
NA20 (+WB3JSU)  
7,300- 95- 50-BCDE  
W2HAX (+NV2S)  
1,092- 39- 28-AB

**3**  
**Delaware**  
KB3OM 95,850- 452-150-ABCDE  
**Eastern Pennsylvania**  
WB3JO 82,137- 385-131-ABCD9EF  
WA3JUF 14,787- 115- 43-BCD9EF  
KZ3X 10,773- 142- 57-ABD  
WB3LNZ 9,630- 135- 57-ABCD  
K3YTL (WA1MKE,KD2NW,NA2T,K3MKZ,  
KA3EEO,KB3QI,KS3Y,WA3s JWP,JWV,NV5,  
YQN,WB3s FAA,FYT,WZ,ops)  
554,000-1281-277-ABCD9EFGHIJ

**Maryland—DC**  
K1RZ 88,128- 421-153-ABCDE  
W3IP 87,539- 327-141-ABCD9E  
W3ZZ 63,510- 304-146-ABCDE  
WB2DNE 45,942- 328-114-ABD  
K3ZO 20,636- 268- 77-AB  
WA3EOQ 12,383- 117- 61-BCDE  
KB3HH 3,330- 78- 30-BD  
W6AYX 2,269- 84- 27-B  
N3FHD 1,100- 50- 23-AB  
W3GN 570- 31- 19-ABD  
KA3CXG 528- 33- 18-B  
WA3GYW 476- 26- 17-AB  
W3MSN 253- 21- 11-ABD

**Western Pennsylvania**  
N3FYD 9,495- 211- 45-B  
W3GHD 2,144- 87- 32-A  
W3JKM 560- 28- 20-A  
W1XX3 (+K1s GX,JX,W1OD,AA2Z,KA3s JRI,  
MMM,WA3FC)  
600,655-1230-335-ABCD9EF  
W3KWH (K3s RYA,TP,KA3SD,N3EQP,W3s HH,  
SVJ,WA3TS,WB3EML,ops)  
127,282- 476-187-ABCD9EFHI  
K3HKK (AF1T,KA3RRF,KB3KJ,ops)  
651- 31- 21-B

**4**  
**Alabama**  
WA4LIT 5,508- 86- 51-BD  
WA4CQG 3,002- 61- 38-ABCD  
KD4ZO 84- 12- 7-B  
WA4VUG 60- 10- 6-B  
**Georgia**  
WA4NJ 31,740- 212-115-ABCDE  
KX4R 8,614- 112- 59-ABCD  
KJ4BF (EM74) 6- 2- 2-BD  
**Kentucky**  
KC4EG 3,157- 52- 41-BCD  
KX4BD 2,048- 64- 32-B  
N4EQT (+KA6SSB,WBULC,WF8Z)  
113,322- 518-187-ABCD9E  
WB8IGY (EM77) (+WA8NJR)  
858- 27- 22-ABCD9E  
WB8IGY (EM87) (+WA8NJR)  
510- 20- 17-ABCD9E

**North Carolina**  
N2CJP 5,400- 96- 45-ABCD  
AB4JA 2,112- 64- 33-B  
KJ4BF (EM95) 286- 11- 11-BD9E  
WQ4V (+N3AFI,AA4S,N4s AH,OOT,WB4s NMA,  
SLM,WQ4s IFS,JQV,MBK,WS4F,WW4T)  
331,890- 802-299-ABCD9E  
N4DT (+AJ4N,KJ4X,N5AYD)  
34,776- 248-108-ABCD9E

**Northern Florida**  
WA4JNE 1,092- 34- 28-ABD  
**South Carolina**  
NB4S 2,077- 67- 31-B  
N4LBJ 1,352- 52- 26-AB  
WA4LDU 416- 19- 16-ABD  
KJ4BF (EM84) 77- 8- 7-ABCD  
W4BFB (WB2NHQ,AA4Z2,K4s JQU,TP,KB4UFO,  
KC4s AIG,ALJ,FSC,KK4L,WB4s PCS,QCS,ops)  
65,512- 337-152-ABCD9E

**Southern Florida**  
WD4MG 5,671- 101- 53-ABD  
WBHT 1,827- 57- 29-ABD  
K1FJM/4 1,457- 44- 31-ABD  
K4SC 920- 40- 23-A  
WD4AHZ 768- 40- 16-BD  
**Tennessee**  
K4RWP 4,459- 79- 49-ABD  
KF4FL 3,280- 82- 40-AB  
WB8IGY (EM76) (+WA8NJR)  
1,728- 42- 27-ABCD9E

**Virginia**  
K2JOP/4 76,076- 369-143-ABCDE  
W4DO 16,536- 161- 78-ABCD  
WA4SBC 14,058- 150- 66-ABCD  
K3OYD/4 10,230- 132- 62-BD  
KAFTQ 4,264- 85- 41-ABD  
WD4GXN 4,251- 109- 39-B

W4DR 1,479- 51- 29-A  
N4BDH 1,127- 49- 23-B  
\*KB4NFY 943- 41- 23-B  
W4LMJ 165- 15- 11-A  
WA4MMP 30- 5- 5-ABD  
K4HWG (+KB8I)  
32,738- 280- 88-ABCD9E  
KB4VIR (+KB4WYR,KD8R,NO4Q)  
2,858- 67- 38-ABCD

**5**  
**Arkansas**  
\*WA5NFC 2,169- 46- 38-ABCD  
KG5MD (+KA5NTT,NSDL,WDSACP)  
10,011- 115- 71-ABD  
**Louisiana**  
N5KWB 741- 35- 19-BC  
W5FYZ 405- 29- 14-B  
**Mississippi**  
W5RCI 13,600- 102- 85-ABCDE  
**New Mexico**  
W5FF 3,195- 71- 45-AB  
KNSS 910- 85- 26-AB

**North Texas**  
K9MK/5 27,090- 252- 86-ABD9E  
N5WS 26,481- 211- 97-ABDE  
AA5AM 8,004- 119- 58-ABD  
KF5PE 900- 33- 20-BE  
KY5N 55- 11- 5-A  
WB4GWX/5 (+KC5ST)  
840- 48- 15-ABD  
NQ5X (+KB5GBN,NSMLJ)  
798- 42- 19-AB

**Oklahoma**  
K5CM 43,470- 284-120-ABCDE  
W5NZS 10,626- 109- 66-ABCD  
NSJWD 2,928- 74- 38-AB  
W5UGO 1,431- 42- 27-BD  
KB5FOH 1,350- 34- 27-ABCD  
KA5ZKI 544- 29- 16-ABD  
WB5VYE (+K5BZH,WA6ZKO)  
10,912- 144- 62-ABD9

**South Texas**  
WB5OBS 5,811- 110- 39-BCDE  
W5UWB 4,005- 69- 45-ABCD  
W5SERG 425- 22- 17-ABD  
WA5S (+KC5FP)  
2,325- 60- 31-ABCD

**West Texas**  
W8CM 1,770- 53- 30-ABD

**6**  
**East Bay**  
WB6P/J (+WB6LRV)  
7,359- 174- 33-ABD  
**Los Angeles**  
WB6PL 19,778- 215- 58-ABCD9E  
KB6PHX 2,200- 87- 22-ABCD  
NS6NV 440- 55- 8-AB  
W7ERH/6 429- 30- 13-ABC  
WB2ODH/6 369- 41- 9-B  
W6PFE 240- 24- 10-AB  
W6UE (DM84) (N6DLU,op)  
4- 2- 2-AB  
N6RMJ (+WA6HXD)  
17,940- 205- 60-ABCD9E

**Orange**  
WB6PCS 8,800- 138- 50-ABCD  
K6BYB 4,142- 80- 38-ABCD  
N6NJI 2,574- 64- 33-ABCD  
K6DQ 1,235- 50- 19-BD

**Santa Barbara**  
\*K6LMN (CM84)  
1,911- 64- 21-ABCD9E  
WD6BCN 792- 37- 18-ABD  
N6QQA 464- 29- 16-B  
N6MA 462- 27- 14-BCD  
\*K6LMN (DM84) 81- 12- 7-ABC  
K6MEP (N56X,W6YLZ,WA6s DJS,FPX,HSI)  
46,136- 385- 79-ABCD9E

**Santa Clara Valley**  
WB6RXQ 7,880- 127- 40-ABCD9E  
K6KM (CM87) 868- 52- 14-ABCD  
WY6U 572- 41- 11-BCD  
N6RER 85- 11- 5-ABCD  
K6KM (CM97) 2- 1- 1-C  
**San Diego**  
WA5BNH 4,290- 99- 30-BCDE  
WB6VJ 363- 27- 11-B  
\*K6MEG 200- 20- 5-C

**San Francisco**  
WB6FFC 336- 20- 16-ABD  
**San Joaquin Valley**  
WB1JE (DM85) (N6DLU,op)  
1,387- 48- 19-ABCD9E  
WB6COT (+AA6AH,N6PNZ,WA6YDL,WB6ITM)  
3,132- 79- 27-ABCD  
**Sacramento Valley**  
WB6VYH 150- 15- 10-A

**7**  
**Arizona**  
WA6PZL (+N6ENU)  
552- 36- 12-BD  
WB70HF (+KB7CRT)  
98- 14- 7-A  
**Idaho**  
KC7J 25- 5- 5-A  
**Nevada**  
W7LQV 1,518- 53- 22-ABD  
N7CF 1,320- 50- 20-BD  
K7KYT 420- 35- 12-B  
KD7YZ 9- 3- 1-E  
**Oregon**  
K7CX 4,050- 113- 30-ABCD9E  
NR6E7 975- 32- 26-ABDE

**Utah**  
WA4GPM 180- 10- 9-ABDEF  
N6ENU (+WA6PZL)  
138- 19- 6-BD  
**Washington**  
WB7ATP 152- 19- 8-B  
\*WA7KIR/7 75- 13- 5-BE  
**Wyoming**  
WA7KYM 1,406- 56- 19-ABD

**8**  
**Michigan**  
N8DGN 33,330- 249-101-BD  
WB8WAO/8 31,627- 206-113-ABCD  
KU8P 27,621- 245- 89-ABD  
N8DEJ 14,268- 188- 76-B  
N8FUJ 4,329- 93- 39-BD  
WB8OOA 4,200- 105- 40-B  
WA8GVK 2,240- 80- 28-B  
N8IOV 522- 29- 18-B  
NM8X (+VE3CKU)  
80,631- 378-153-ABCD9E  
KB8J (+N8ITY,WB8CPW)  
34,809- 214-123-ABCD  
WB8L (+WB8G)  
19,241- 271- 71-B

**Ohio**  
WA8TJL 33,580- 236-115-ABCD  
WB8K 22,594- 196- 79-BD  
KE8FD 6,077- 103- 59-AB  
N8CCC 3,815- 79- 35-ABCD  
WB8BG 3,239- 69- 41-BD  
N8ZM 2,664- 74- 36-B  
WD8CTX 2,280- 60- 38-AB  
WB8IGY (EM88)  
966- 24- 23-ABCD9E  
N8HBF 792- 35- 22-ABC  
WB8IGY (EM89)  
371- 38- 7-BC  
242- 11- 11-ABCD9E  
WD8ISK (WA3OJX,KB4QZH,KABIFC,N6GYE,  
WA8s OGS,R,WB8GEX,W9VNE,ops)  
171,380- 512-230-BCD9E  
WB8IGY (EM78) (+WA8NJR)  
819- 23- 21-ABCD9E  
WB8IGY (EM79) (+WA8NJR)  
228- 13- 12-ABCD9E

**9**  
**Illinois**  
WB9MSV 32,292- 187-117-ABCD9E  
AF8Z 18,252- 186- 78-ABD  
KD9JQ 11,392- 178- 64-AB  
NC9F 3,526- 61- 41-ABCD  
NSAQ 1,764- 49- 36-B  
N9HSP 360- 24- 15-B  
NSJF 273- 21- 13-B

**Indiana**  
WA4VWV 8,109- 159- 51-B  
K9MRI (+K9TVZ)  
48,824- 312-136-ABCD9E  
WB8EEA (+N9KC)  
4,988- 79- 43-ABCD9E  
W9YB (KA9CCR,KC9RG,ops)  
364- 26- 14-B

**Wisconsin**  
WA9LZM 4,450- 80- 50-ABD  
W9YCV 4,418- 83- 47-BD  
WA9OKB 3,040- 76- 40-AB  
KD9TH 2,856- 64- 34-B  
WB9QCY 1,268- 47- 27-B  
KB9ZQ/9 (EN44) 1- 1- 1-A  
WBUC/9 (+K8s FVF,GJX,N8s AKG,BSH)  
170,680- 565-251-ABCD9E

**0**  
**Colorado**  
W1XE 1,968- 66- 24-ABCD  
WBKJY 1,955- 51- 23-BCDE  
WB0MY (DM78)  
637- 33- 13-ABCD  
WB0MY (DM89)  
264- 15- 12-BD  
WB0MY (DM88)  
144- 11- 9-BD

**10**  
**Idaho**  
WB8AP 12,166- 110- 77-BDE  
N8CIH 6,684- 83- 56-ABCD  
KA8TLJ 6,460- 170- 38-B  
KD8BT 154- 14- 11-A  
WB8PK (+WA8s BGU,JFS)  
24,582- 190-102-ABDE

**Kansas**  
NBLL 16,016- 143- 88-ABD  
K8SMI 15,048- 131- 72-BCDE  
WB8T 11,778- 121- 78-ABD  
K8VUA 3,003- 62- 39-BD  
WD8G 2,232- 62- 36-AB  
N8IGZ 1,769- 61- 29-B  
WA8TKJ (EM19)  
646- 22- 17-ABCD9E  
WA8TKJ (EM18)  
312- 13- 13-ABCD9E  
WA8TKJ (EM89)  
276- 13- 12-ABCD9E  
WA8TKJ (EM88)  
231- 11- 11-ABCD9E  
WA8TKJ (DM98)  
200- 10- 10-ABCD9E  
WA8TKJ (DM97)  
200- 10- 10-ABCD9E  
WA8TKJ (EM97)  
112- 7- 7-ABCD9E  
WB8DRL (+K8XO,NOBY,WABD,WB8HYV)  
267,384- 527-312-ABCD9EFG

**Minnesota**  
K8IR 21,944- 173-104-ABDE  
WB8V 11,592- 90- 72-BCDE  
WB8OH 2,982- 43- 34-BDE  
KB8OZ (EN34)  
2,728- 60- 44-ABD  
WA8BWE 1,748- 38- 29-D  
NB8JZ (EN14) 128- 14- 9-B  
NB8JZ (EN24) 80- 12- 5-B  
NB8JZ (EN15) 40- 12- 5-B  
NB8JZ (EN25) 30- 6- 5-B  
NB8JZ (EN16) 20- 5- 4-B  
NB8JZ (EN26) 12- 4- 3-B

**Missouri**  
K8IFL 17,952- 134- 98-ABCD9E  
KM8A 18,992- 140- 98-ABCD  
WB8JP 5,885- 83- 57-ABCD  
WA8V 544- 32- 17-B  
AJ8E (+NSJL,K8TLM,N8HOB,NJ8X,WB8ROQ)  
26,656- 174-112-ABCD9E

**North Dakota**  
KB8LL 2,368- 48- 37-ABCD9E

**Nebraska**  
NB8TN 10,362- 110- 65-BCD  
WA8TKJ (DN90)  
420- 16- 15-ABCD9E  
WA8TKJ (EN86)  
364- 14- 14-ABCD9E  
NB8JU 352- 22- 16-AB  
WA8TKJ (EN11)  
253- 11- 11-ABCD9E  
WA8TKJ (EN81)  
231- 14- 11-ABCD9E  
WA8TKJ (DN92)  
300- 10- 10-ABCD9E  
WA8TKJ (DN92)  
300- 11- 10-BCD9E  
105- 7- 7-BCD9E  
WA8TKJ (DN91) 72- 6- 8-ABCD9E

**VE**  
**Maritime—NFLD**  
K1GVMM/VE1 198- 22- 9-B  
**Ontario**  
VE3ASO 99,188- 425-181-ABCD9E  
VE3OZB 42,721- 310-119-ABD  
VE3DSS 15,056- 137- 81-ABCD9E  
VE3PCW 12,906- 239- 54-B  
VE3SMA 6,468- 104- 49-ABDE  
VE3OAT 2,496- 64- 39-B  
VE3DJ 758- 30- 18-BD  
VE3QYH 465- 31- 15-B  
VE3FVW 192- 16- 8-BD  
VE3LNX (+VE3s ADJ,NSQ)  
189,435- 597-219-ABCD9E

**Saskatchewan**  
VE6LY 100- 10- 10-AB  
**Alberta**  
VE6AFO 1,326- 84- 13-ABD  
VE6BOJ 740- 74- 10-B  
VE6KC 84- 21- 4-B

**British Columbia**  
VE7PRC (+VE7s BEE,EHQ,GSB,SKP,TAJ)  
287- 41- 7-B  
**Marine Mobile**  
W1UTM/MM (+KB1KM,W1ZNY,WA1s YFZ,ZVA,  
WB1AB1) 1,679- 52- 23-ABCD

**DX**  
XE2GBO 1,224- 61- 17-ABCD  
XE2GFH (WA5LIG,N6XQ,ops)  
150- 8- 5-9I

# Rules, 1989 Novice Roundup

1) **Object:** For Novice and Technician operators in the United States (and possessions and territories) to contact and exchange QSO information with as many stations as possible on the Novice bands. All authorized emissions modes may be used (see scoring information). Higher-class licensees 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 0000 UTC Saturday, January 28, 1989, and ends 2400 UTC Sunday, February 5. Operate no more than 30 hours during this nine-day period. Nonoperating periods must be at least 15 minutes; listening time counts as operating time. Times on and off must be indicated in your log.

### 3) Entry categories

(A) **Single Operator:** One person performs all transmitting, receiving and logging functions during the contest period.

(B) **Multioperator:** Single transmitter only. This category includes stations making use of any form of assistance, such as help with logging or relief operator, during the contest period.

4) **Exchange:** Signal report and ARRL/CRRL Section (country for DX stations). Both stations must receive and acknowledge the complete exchange for the contact to count. 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 voice QSO and two points for each complete CW QSO. Voice modes include SSB and FM; CW includes all authorized digital modes such as RTTY and packet radio. You may work stations only once on a voice mode and once on a digital mode, regardless of frequency band.

(B) **Multiplier:** Each ARRL/CRRL Section, plus VE8/VY1, plus each DXCC country.

Do not write above this line.

## NOVICE ROUNDUP

CALL USED: KALSER/N ARRL SECTION or COUNTRY: CT

CALL OF OPERATOR IF DIFFERENT FROM CALL USED

CHECK ONE: Single Operator Station  Multioperator Station

If multioperator, show calls of all operators, loggers

MHZ	CW QSOs	PHONE QSOs
3.7	175	N/A
7.1	90	N/A
21	23	N/A
28	32	504
222		5
1270		7
<b>Total</b>	<b>320</b>	<b>510</b>

For QSO Points:  
CW includes—CW, RTTY, Packet  
Phone includes—SSB, FM

SCORING: 1150 Total QSO points (+) 10 CP credit (x) 68 Total multipliers (=) 78,880 Claimed score

**78,880** Claimed Score      **23** Hours of Operation

"I have observed all competition rules as well as all regulations for Amateur Radio in my country. My report is correct and true to the best of my knowledge. I agree to be bound by the decisions of the ARRL Awards Committee."

Date: 2-10-89 Signature: Angela Beere Call: KALSER

Please enclose log, photos, comments, ideas, etc. with your entry and mail within 30 days after the contest to:  
ARRL Contest Branch, 225 Main St, Newington, CT 06111.

MULTIPLIER CHECK-OFF LIST												
1 AK	2 EA	3 EM	4 EU	5 FK	6 GM	7 HA	8 HU	9 IA	10 LA	VE LAKE	DX GW	
11 JA	12 KB	13 KC	14 LD	15 MA	16 NA	17 OB	18 OC	19 OD	20 OE	21 OF	22 OG	
23 OH	24 OI	25 OJ	26 OK	27 OL	28 OM	29 ON	30 OO	31 OP	32 OQ	33 OR	34 OS	
35 OT	36 OU	37 OV	38 OW	39 OX	40 OY	41 OZ	42 PA	43 PB	44 PC	45 PD	46 PE	
47 PF	48 PG	49 PH	50 PI	51 PJ	52 PK	53 PL	54 PM	55 PN	56 PO	57 PP	58 PQ	
59 PR	60 PS	61 PT	62 PU	63 PV	64 PW	65 PX	66 PY	67 PZ	68 QA	69 QB	70 QC	
71 QD	72 QE	73 QF	74 QG	75 QH	76 QI	77 QJ	78 QK	79 QL	80 QM	81 QN	82 QO	
83 QP	84 QQ	85 QR	86 QS	87 QT	88 QU	89 QV	90 QW	91 QX	92 QY	93 QZ	94 RA	
95 RB	96 RC	97 RD	98 RE	99 RF	100 RG	101 RH	102 RI	103 RJ	104 RK	105 RL	106 RM	
107 RN	108 RO	109 RP	110 RQ	111 RS	112 RT	113 RU	114 RV	115 RW	116 RX	117 RY	118 RZ	
119 SA	120 SB	121 SC	122 SD	123 SE	124 SF	125 SG	126 SH	127 SI	128 SJ	129 SK	130 SL	
131 SM	132 SN	133 SO	134 SP	135 SQ	136 SR	137 SS	138 ST	139 SU	140 SV	141 SW	142 SX	
143 SY	144 SZ	145 TA	146 TB	147 TC	148 TD	149 TE	150 TF	151 TG	152 TH	153 TI	154 TJ	
155 TK	156 TL	157 TM	158 TN	159 TO	160 TP	161 TQ	162 TR	163 TS	164 TT	165 TU	166 TV	
167 TW	168 TX	169 TY	170 TZ	171 UA	172 UB	173 UC	174 UD	175 UE	176 UF	177 UG	178 UH	
179 UI	180 UJ	181 UK	182 UL	183 UM	184 UN	185 UO	186 UP	187 UQ	188 UR	189 US	190 UT	
191 UU	192 UV	193 UW	194 UX	195 UY	196 UZ	197 VA	198 VB	199 VC	200 VD	201 VE	202 VF	
203 VG	204 VH	205 VI	206 VJ	207 VK	208 VL	209 VM	210 VN	211 VO	212 VP	213 VQ	214 VR	
215 VS	216 VT	217 VU	218 VV	219 VW	220 VX	221 VY	222 VZ	223 WA	224 WB	225 WC	226 WD	
227 WE	228 WF	229 WG	230 WH	231 WI	232 WJ	233 WK	234 WL	235 WM	236 WN	237 WO	238 WP	
239 WQ	240 WR	241 WS	242 WT	243 WU	244 WV	245 WX	246 WY	247 WZ	248 XA	249 XB	250 XC	
251 XD	252 XE	253 XF	254 XG	255 XH	256 XI	257 XJ	258 XK	259 XL	260 XM	261 XN	262 XO	
263 XP	264 XQ	265 XR	266 XS	267 XT	268 XU	269 XV	270 XW	271 XZ	272 YA	273 YB	274 YC	
275 YD	276 YE	277 YF	278 YG	279 YH	280 YI	281 YJ	282 YK	283 YL	284 YM	285 YN	286 YO	
287 YP	288 YQ	289 YR	290 YS	291 YT	292 YU	293 YV	294 YW	295 YZ	296 ZA	297 ZB	298 ZC	
299 ZD	300 ZE	301 ZF	302 ZG	303 ZH	304 ZI	305 ZJ	306 ZK	307 ZL	308 ZM	309 ZN	310 ZO	
311 ZP	312 ZQ	313 ZR	314 ZS	315 ZT	316 ZU	317 ZV	318 ZW	319 ZX	320 ZY	321 ZZ	322 AA	
323 AB	324 AC	325 AD	326 AE	327 AF	328 AG	329 AH	330 AI	331 AJ	332 AK	333 AL	334 AM	
335 AN	336 AO	337 AP	338 AQ	339 AR	340 AS	341 AT	342 AU	343 AV	344 AW	345 AX	346 AY	
347 AZ	348 BA	349 BB	350 BC	351 BD	352 BE	353 BF	354 BG	355 BH	356 BI	357 BJ	358 BK	
359 BL	360 BM	361 BN	362 BO	363 BP	364 BQ	365 BR	366 BS	367 BT	368 BU	369 BV	370 BW	
371 BX	372 BY	373 BZ	374 CA	375 CB	376 CC	377 CD	378 CE	379 CF	380 CG	381 CH	382 CI	
383 CJ	384 CK	385 CL	386 CM	387 CN	388 CO	389 CP	390 CQ	391 CR	392 CS	393 CT	394 CU	
395 CV	396 CW	397 CX	398 CY	399 CZ	400 DA	401 DB	402 DC	403 DD	404 DE	405 DF	406 DG	
407 DH	408 DI	409 DJ	410 DK	411 DL	412 DM	413 DN	414 DO	415 DP	416 DQ	417 DR	418 DS	
419 DT	420 DU	421 DV	422 DW	423 DX	424 DY	425 DZ	426 EA	427 EB	428 EC	429 ED	430 EE	
431 EF	432 EG	433 EH	434 EI	435 EJ	436 EK	437 EL	438 EM	439 EN	440 EO	441 EP	442 EQ	
443 ER	444 ES	445 ET	446 EU	447 EV	448 EW	449 EX	450 EY	451 EZ	452 FA	453 FB	454 FC	
455 FD	456 FE	457 FF	458 FG	459 FH	460 FI	461 FJ	462 FK	463 FL	464 FM	465 FN	466 FO	
467 FP	468 FQ	469 FR	470 FS	471 FT	472 FU	473 FV	474 FW	475 FX	476 FY	477 FZ	478 GA	
479 GB	480 GC	481 GD	482 GE	483 GF	484 GG	485 GH	486 GI	487 GJ	488 GK	489 GL	490 GM	
491 GN	492 GO	493 GP	494 GQ	495 GR	496 GS	497 GT	498 GU	499 GV	500 GW	501 GX	502 GY	
503 GZ	504 HA	505 HB	506 HC	507 HD	508 HE	509 HF	510 HG	511 HH	512 HI	513 HJ	514 HK	
515 HL	516 HM	517 HN	518 HO	519 HP	520 HQ	521 HR	522 HS	523 HT	524 HU	525 HV	526 HW	
527 HX	528 HY	529 HZ	530 IA	531 IB	532 IC	533 ID	534 IE	535 IF	536 IG	537 IH	538 II	
539 IJ	540 IK	541 IL	542 IM	543 IN	544 IO	545 IP	546 IQ	547 IR	548 IS	549 IT	550 IU	
551 IV	552 IW	553 IX	554 IY	555 IZ	556 JA	557 JB	558 JC	559 JD	560 JE	561 JF	562 JG	
563 JH	564 JI	565 JJ	566 JK	567 JL	568 JM	569 JN	570 JO	571 JP	572 JQ	573 JR	574 JS	
575 JT	576 JU	577 JV	578 JW	579 JX	580 JY	581 JZ	582 KA	583 KB	584 KC	585 KD	586 KE	
587 KF	588 KG	589 KH	590 KI	591 KJ	592 KK	593 KL	594 KM	595 KN	596 KO	597 KP	598 KQ	
599 KR	600 KS	601 KT	602 KU	603 KV	604 KW	605 KX	606 KY	607 KZ	608 LA	609 LB	610 LC	
611 LD	612 LE	613 LF	614 LG	615 LH	616 LI	617 LJ	618 LK	619 LL	620 LM	621 LN	622 LO	
623 LP	624 LQ	625 LR	626 LS	627 LT	628 LU	629 LV	630 LW	631 LX	632 LY	633 LZ	634 MA	
635 MB	636 MC	637 MD	638 ME	639 MF	640 MG	641 MH	642 MI	643 MJ	644 MK	645 ML	646 MM	
647 MN	648 MO	649 MP	650 MQ	651 MR	652 MS	653 MT	654 MU	655 MV	656 MW	657 MX	658 MY	
659 MZ	660 NA	661 NB	662 NC	663 ND	664 NE	665 NF	666 NG	667 NH	668 NI	669 NJ	670 NK	
671 NL	672 NM	673 NO	674 NP	675 NQ	676 NR	677 NS	678 NT	679 NU	680 NV	681 NW	682 NX	
683 NY	684 NZ	685 OA	686 OB	687 OC	688 OD	689 OE	690 OF	691 OG	692 OH	693 OI	694 OJ	
695 OK	696 OL	697 OM	698 ON	699 OO	700 OP	701 OQ	702 OR	703 OS	704 OT	705 OU	706 OV	
707 OW	708 OX	709 OY	710 OZ	711 PA	712 PB	713 PC	714 PD	715 PE	716 PF	717 PG	718 PH	
719 PI	720 PJ	721 PK	722 PL	723 PM	724 PN	725 PO	726 PP	727 PQ	728 PR	729 PS	730 PT	
731 PU	732 PV	733 PW	734 PX	735 PY	736 PZ	737 QA	738 QB	739 QC	740 QD	741 QE	742 QF	
743 QG	744 QH	745 QI	746 QJ	747 QK	748 QL	749 QM	750 QN	751 QO	752 QP	753 QQ	754 QR	
755 QS	756 QT	757 QU	758 QV	759 QW	760 QX	761 QY	762 QZ	763 RA	764 RB	765 RC	766 RD	
767 RE	768 RF	769 RG	770 RH	771 RI	772 RJ	773 RK	774 RL	775 RM	776 RN	777 RO	778 RP	
779 RQ	780 RR	781 RS	782 RT	783 RU	784 RV	785 RW	786 RX	787 RY	788 RZ	789 SA	790 SB	
791 SC	792 SD	793 SE	794 SF	795 SG	796 SH	797 SI	798 SJ	799 SK	800 SL	801 SM	802 SN	
803 SO	804 SP	805 SQ	806 SR	807 SS	808 ST	809 SU	810 SV	811 SW	812 SX	813 SY	814 SZ	
815 TA	816 TB	817 TC	818 TD	819 TE	820 TF	821 TG	822 TH	823 TI	824 TJ	825 TK	826 TL	
827 TM	828 TN	829 TO	830 TP	831 TQ	832 TR	833 TS	834 TT	835 TU	836 TV	837 TW	838 TX	
839 TY	840 TZ	841 UA	842 UB	843 UC	844 UD	845 UE	846 UF	847 UG	848 UH	849 UI	850 UJ	
851 UK	852 UL	853 UM	854 UN	855								



# Novice Roundup

log sheet L of 5

CALL USED KAISER

ARRL SECTION or COUNTRY CT

50 QSOs per side  
Number each new multiplier as worked

FRQ.	MODE	DATE TIME UTC	STATION WORKED	COMPLETE EXCHANGE		LIST NEW MULTIPLIERS	POINTS
				SENT	RCVD		
23	SSB	1-25-89 1400	GWJDBLE	59 CT	59 4.1.89	GW (1)	1
		1405	FLBEE	59 CT	59 France	F (2)	1
		1535	ATFOZT	59 CT	59 CT	CT (3)	1
		1600	W3A2D	59 CT	59 CT		1
23	FM	2-1-89 0824	W1ALW	59 CT	59 CT		1
		1804	N2GIB	59 CT	59 CT		1
26	RTTY	2-18-89	P39J	599 CT	599 Dsh Ant	P12 A	2
		2130	KC4LLA	599 CT	599 SC	SC (3)	2
27	CW	2-2-89 1200	J52US	579 CT	579 Guss-Ben	TC (3)	2
		1205	JF6DX	589 CT	589 Kew-Geo	7P (3)	2
		1730	K7C-LW7AJ	599 CT	599 SCY	SCY (3)	2
		1742	K8BATA/T	599 CT	599 IA	IA (3)	2
7	CW	2-3-89 0400	W9QDZ/T	599 CT	599 IL	IL (3)	2
		0430	K12Z	599 CT	599 CT		2
223	FM	0308	0412	59 CT	59 CT		2
		0504	W6TCRH	59 CT	59 CT		2

Log sheet

(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, this issue.

(D) **Final Score:** Add your Code Proficiency credit to your total number of QSO points. Multiply that total by your ARRL Section/DXCC country total for your final score.

6) **Miscellaneous:** Crossband and cross-mode contacts are not permitted. Novices and Technicians work any amateur stations;

others work Novices and Technicians only. Contacts made through repeaters (or locally used repeater output frequencies) are not permitted. Packet radio contacts made through digipeaters are not permitted.

7) **Reporting:** Contest forms (log sheets, summary sheet, dupe sheet) are available from ARRL HQ for an SASE. Official forms are recommended. Any entrant making more than 200 total QSOs must submit duplicate check sheets (an alphabetical listing of stations worked). Incomplete or late entries will be classified as check logs and are not eligible for competition or awards. Logs should indicate dates, QSO times, on and off times, complete exchange sent and received for each contact, and band. Postmark your entry within 30 days after the contest ends (March 7, 1989). Send entries to: ARRL Contest Branch, 225 Main St, Newington, CT 06111.

8) **Awards:** Certificates to every Novice and Technician entrant who submits a valid entry. Endorsements for top Novice and Technician entrant in each ARRL Section/Division. Non-Novice/Technician entries 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 page 104 of this issue.

## Strays



### SEMPER FI

I am currently doing my second tour in the Marine Corps. My primary job is a Communicator, but at the time the following incident occurred, I was participating in an exercise in Yuma, Arizona in charge of a security team. On October 8, 1988, my team had to go out and guard a helicopter that had to make an emergency landing in the Californian desert due to mechanical problems. We were taken out in another helicopter and dropped off with enough provisions to last us through the night and the first meal in the morning, at which time they said they would be back to pick us up. I also had a military HF radio, with the frequencies for which to contact them in case we ran into any trouble. While the night went by without incident, the day held a few surprises for us. At about 0500L, I lost communications with my contact. I didn't worry about it too much because they were supposed to pick us up at 0700. I really didn't expect them to show up until 0800, so I let my team sleep in. As they got up, I started letting them know about certain doubts I had about being picked up until about 1300, so I made them wait before they ate their last meal. As the morning rolled by, my doubts became reality, so about 1200,

I let my team eat their last meal with the feeling that we would be picked up at noon. I tried to raise my contact and inform them that we had only one more meal each and about three gallons of water left, but it was to no avail. After 1300 came and went, I started to get a little nervous about our situation. We had about two gallons of water left, and it was getting hotter. I tried to raise them every half hour in hopes that I could get through. At about 1430, I switched to the the Novice voice section of 10 meters and started looking for someone, *anyone*. After listening for about 10 minutes, I heard CQ CQ CQ FROM KILO CHARLIE FOUR CHARLIE YANKEE VICTOR, KC4CYV CALLING CQ. I figured what could I lose, so I called back, KILO CHARLIE FOUR CHARLIE YANKEE VICTOR THIS IS KILO CHARLIE FOUR FOXTROT UNIFORM ALFA SLANT SIX, and to my surprise he came back. We rag chewed for a couple of minutes and he told me his name was Amos. He said that he was 13 years old and his QTH was North Carolina. I told him where I was and asked him to do me a big favor. I explained my situation and gave him a phone number to call. He said he would relay my message and to stand by, and he would get back to me. After what seemed like an eternity (actually about 10 minutes), he came back and said that he had gotten through and passed on what I asked him to. We rag chewed a little more, and I promised him a QSL, then I had to go listen up for my ride. We were picked up at 1600, and they relayed to me that Amos said

"Hi." I want to thank Amos for a job well done. And to think, we still had a gallon and a half of water left.—Cpl Branko C. Resanowitch, KCAFUA

### QST congratulates...

- radio amateurs on 60 years as ARRL members:
  - Richard E. Nebel, W2DBQ, Hempstead, New York
  - Henry J. McDade, W1LMU, Waban, Massachusetts
  - Orin C. Levis, Jr, W6DZ, Sacramento, California
  - Carl A. Felt, Jr, N2XJ, Chatham, New Jersey
  - Earl D. Dryer, W0DHN, Kansas City, Missouri
- the following radio amateurs on 50 years as a ARRL members:
  - Walter P. Bernadyn, W2FP, Mahwah, New Jersey
  - Geoffrey S. Vore, W9QBJ, Sister Bay, Wisconsin
  - Victor W. Paounoff, N4XR/1, Woodstock, Connecticut
  - William C. Pease III, W4AYF, Columbus, Georgia
  - Marvin E. Juza, W6FGD, Sunnyvale, California
  - Lt Col Harry W. Robinson, W2AZ, Vineland, New Jersey
  - Reid H. Burrows, W5TGU, Madison, Wisconsin

# Club Competition Rules and Contest Disqualification Criteria

The 1989 contest season is upon us. Three of the ARRL-sponsored contests during 1989 include an ARRL-affiliated club competition—January VHF Sweepstakes, February/March International DX Contest and the 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 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 score 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. (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 must attend at least two club meetings per year to be eligible to submit an entry. If, however, they have not been a member for a year's time, they must have attended a meeting as a member prior to the contest. 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 175 miles may not compete in the club competition. The club must be ARRL-affiliated.

2) **Medium:** Any club submitting 50 or fewer entries 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 or fewer entries. All members must reside within 20 miles of the club's center. There is no attendance requirement. Again, the club must be ARRL-affiliated.

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 for the score to count for that club.

In conjunction with the two meetings per year 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 (for example, if a club with 100 members submits only the 10 highest scores, even if more than 10 of its members wish to compete.)

It is not within the intent of these rules that a club should vote out a member or that a member resign and then be voted back into the club later so the member-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 (ARRL International DX Contest and ARRL November Sweepstakes) in any club entry will be awarded 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 2 percent or more, the entry may be disqualified. Score reduction does not include correction of arithmetic errors.

Score reduction may be made for taking credit for unconfirmed QSOs and/or multipliers, duplicate contacts and/or other scoring discrepancies.

An entry with more than 2-percent duplicate contacts left in the log or an entry in which more than 2-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; for example, disqualification from the 1988 phone SS prohibits submission of an entry for the 1989 phone SS, but 1989 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 2-percent disqualification criteria.

In all cases of question, the decisions of the ARRL Awards Committee are final.

## 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	May 1988, p 55
Club Contest Rules	This issue, p 104
Considerate Operator's	
Frequency Guide	This issue, p 77
DXCC Annual Listing	This issue, p 71
Frequency/Mode	
Allocations	This issue, p 77
Hamfest Calendar Rules	Apr 1988, p 73
License-Renewal	
Information	This issue, p 76
Major ARRL Operating	
Events and	
Conventions—1989	This issue, p 65
Packet-Radio Frequency	
Recommendations:	
Below 225 MHz	Sep 1987, p 54
Above 225 MHz	Mar 1988, p 51
QSL Bureaus	
Incoming	Dec 1988, p 74
Outgoing	Sep 1988, p 71
Reciprocal Operating	
Agreements	Oct 1988, p 63
First ARRL RTTY Roundup	
Announcement	Nov 1988, p 88
Third-Party-Traffic	
Agreements	Oct 1988, p 63
VUCC Annual Listing	Dec 1988, p 85
What is Amateur Radio?	Dec 1988, p 88

## Strays



I would like to get in touch with...

anyone with info on modifying the Clegg FM27B transceiver for 144 MHz. Michael Klein, KC3NE, 721 Strahle St, Philadelphia, PA 19111.

anyone who has a technical manual (Army TM-5815-???) for Army or Air Force teletypewriter set TT-44/TG, by National Cash Register. Adjustment procedures of a high level needed. Heard Lowry, K4VFA, 915 Madison St, Manchester, TN 37355.

## Dec 31-Jan 1

**ARRL Straight Key Night**, 24-hour period UTC (from 7 PM EST Dec 31 until 7 PM EST Jan 1). This is a friendly meeting on the air using straight keys. Suggested areas of operation of 80, 40 and 20 meters are 60 to 80 kHz from the lower band edges and 10 kHz from the lower Novice band edges. When participating in SKN, use SKN instead of RST preceding the three-digit report to clue in passersby. Following SKN, send a list of stations worked plus your vote for best fist heard (not necessarily one you've worked) during that period. This is not a contest; quick contest-like exchanges are discouraged. Vote also for the most interesting QSO. Mail your report by Jan 10 to ARRL HQ.

## January

**West Coast Qualifying Run**, 10-35 WPM, at 0500Z Jan 5 (9 PM PST Jan 4). W6OWP prime, W6ZRJ alternate. Frequency is approximately 3.590 MHz. Underline one minute of highest speed you copied, certify that your copy was made without aid and send to ARRL HQ for grading. Please include your full name, call sign (if any) and complete mailing address. A large SASE will help expedite your award or endorsement.

## 7-8

**ARRL RTTY Roundup**, Nov QST, p 88.  
**Hunting Lions in the Air Contest**, CW, Dec QST, p 105.

## 13

**WIAW Qualifying Run**, 10-35 WPM, at 0300Z Jan 14 (10 PM EST Jan 13). 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 further details.

## 14

**Mid-Winter Contest**, CW, Dec QST, p 105.

## 14-15

**Hunting Lions in the Air Contest**, SSB, Dec QST, p 105.

## 14-16

**ARRL January VHF Sweepstakes**, Dec QST, p 104.

## 15

**QRP ARCI Fireside Sprint**, Dec QST, p 105.  
**Mid-Winter Contest**, SSB, Dec QST, p 105.

## 21-22

**Texas QSO Party**, sponsored by the West Texas DX Assn, from 0000Z Jan 21 until 1800Z Jan 22. Phone and CW. Single operator only. Work stations once per band and mode. Mobiles may be worked again in each county. Exchange serial number and state/province/country (county for TX stations). Score 1 point per phone QSO, 2 points per CW QSO, 5 points per phone QSO with TX mobile station (non-TX stations only) and 7 points per CW QSO with TX mobile station (non-TX stations only). TX stations multiply by total number of states/provinces/countries and TX counties. Others multiply by total number of TX counties worked (max 254). Suggested frequencies: CW—3.565 3.710 7.065 7.110 14.065 21.065 21.110 28.065 28.110; phone—3.940 7.260 14.280 21.370 28.600. Certificates and plaques. Send logs to be received before Mar 14 to Les Bannon, WF5E, 3400 Bedford, Midland, TX 79703.

**North Dakota QSO Party**, Dec QST, p 105.

**Michigan QRP Club CW Contest**, Dec QST, p 105.

**AGCW-DL QRP Winter Contest**, Dec QST, p 105.

## 26

**WIAW Qualifying Run**, 10-35 WPM, at 2400Z Jan 26 (7 PM EST). See Jan 13 listing for further details.

## 27-29

**CQ World Wide 160 Meter Contest**, CW, Dec QST, p 105.

## 28-29

**REF French Contest**, CW, sponsored by Reseau Des Emetteurs Francais, from 0600Z Jan 28 until 1800Z Jan 29 (phone 0600Z Feb 25 until 1800Z Feb 26). 80-10 meters. Single operator and multioperator. Work French stations, including overseas territories and DA1/2 French military stations. Exchange signal report and serial number. Count 1 point for QSOs with own continent, 3 points for other continents. Multiply by total of French departments, (Corsica-TK-has 2 departments: 2A and 2B), FFA (DA1/2), DOM-TOM per band. F6REF/00 gives one special multiplier. Entries must be received by March 15 (phone by April 15) to REF French Contest, c/o Pacchiana Christian, F6ENV, 7 Chemin des Ecoles, Quartier St Jean, 13110 Port-De-Bouc, France.

**YL-SSB QSO Party**, CW, Dec QST, p 105.

**UBA Contest**, CW, Dec QST, p 106.

## 28-Feb 5

**Novice Roundup**, this issue, p 102.

## 31

**West Coast Qualifying Run**, 10-40 WPM, at 0500Z Feb 1 (9 PM PST, Jan 31). See Jan 4 listing for more details.

## February

## 4-5

**Vermont QSO Party**, sponsored by the Central Vermont ARC, from 0001Z Feb 4 until 2400Z Feb 5. Stations may be worked three times per band (once each on CW, phone and RTTY). All QSOs must take place in the appropriate mode subbands. Exchange signal report and QTH (county for VT stations; state/province/country for others). Suggested frequencies: phone—lower 25 kHz of the 80-15 General bands, 50.110 144.200; CW—3.540 3.720 7.040 7.120 14.040 21.040 21.140 28.040; RTTY—3.620 and 90 kHz from lower band edges. Count 1 point per phone QSO. Multiply by number of states/province/countries for VT stations; others multiply by number of VT counties worked (max 14). 20 point bonus points for working W1BD. Awards. Official log sheets available for SASE to sponsor. Mail entry by Mar 1 to D. Loverin, WA1PDN, 50 Liberty St, Montpelier, VT 05602.

**Ten-Ten International Net Winter Phone QSO Party**, sponsored by the Ten-Ten International Net, from 0000Z Feb 4 until 2400Z Feb 5. Open to all amateurs but only paid-up 10-10 members are eligible for awards. Single operator only. SSB, AM and FM. Work stations once on 10 meters only. Contacts must be in the phone subband. Exchange call, name, state and 10-10 number (if member). Count 2 points for each QSO with a member, count 1 point for each QSO with non-member. Final score is total QSO points. Awards. Send logs along with cover sheet and dupe sheet before Mar 1 to Fort McHenry Chapter, c/o Fred Plitt, W3DCN, 2271 Four Seasons Dr, Gambrills, MD 21054.

**New Hampshire QSO Party**, sponsored by the NH ARA, from 1900Z Feb 4 until 0700Z Feb 5 and 1400Z Feb 7 until 0200Z Feb 8. Work stations once per band and mode. Exchange signal report and QTH (county for NH stations; state/province/country for others). Suggested frequencies: phone—1.875 3.935 7.235 14.280 21.380 28.380 50.115 144.205; CW—1.810 and 35 kHz above band edges; Novice—35 kHz above lower Novice band

edges. Count 1 point per phone QSO, 2 points per CW/RTTY QSO and 5 points per Novice/Tech QSO. NH stations multiply by total states/provinces/countries worked. Others multiply by total number of NH counties worked (max 10). Count 20 bonus points each for working WBICAG, N1BYQ, W1FN, W1GXM, N2BD, W1GUA and W1WQM. Awards. Must be postmarked by Mar 10 (include SASE for results). Send logs to Mt Moriah RS, c/o Bud Valcourt, N1BYQ, 19 Teague Dr, Salem, NH 03079.

## 5

**North American Sprint**, CW, sponsored by the *National Contest Journal*, from 0000Z-0400Z Feb 5 (phone contest 0000Z-0400Z 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 multipliers are Maritimes (VE1, VO1, VO2) and VE2 through VE8 (max) Non-NA countries do not count as multipliers. Special QSY rule: Stations soliciting a call by sending CQ, QRZ and so on, 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, 651 Handley Trail, Redwood City, CA 94062. Phone entries go to Rick Niswander, K7GM, 910 W Claremont, Phoenix, AZ 85013.

## 11

**WIAW Qualifying Run**, 10-40 WPM, at 0300Z Feb 12 (10 PM EST, Feb 11). See Jan 13 listing for further details.

## 11-12

**PACC Contest**, sponsored by VERON, from 1200Z Feb 11 to 1200Z Feb 12. CW and phone, 160-10 meters. Work PA PB PI stations. Single and multioperator categories. Exchange signal report and serial number. Dutch stations will send signal report and province (GR FR DR OV GD UT NH ZH FL ZL NB LB). Work stations once per band, regardless of mode. Count one point per QSO and multiply by number of provinces worked per band for final score. Mail logs by March 31 to PACC Contest, F. Th. Oosthoek, PA0INA, PO Box 499, 4600 AL Bergen op Zoom, Netherlands.

## 11-13

**YL-OM Contest**, phone, sponsored by YLRL, from 1400Z Feb 11 until 0200Z Feb 13 (CW portion will be 1400Z Feb 25 until 0200Z Feb 27). Phone and CW are separate contests. YLs work OMs, OMs work YLs only. Use all bands; no cross-band operation. No net contacts or repeater contacts. Work stations only once per band. Exchange QSO number, signal report and state/province/country. Count one point for each station worked and multiply by the total number of states/provinces/countries worked. Stations running 150 W CW or

200 W PEP SSB or less multiply final score by 1.25. Entries with more than 200 QSOs must submit dupe sheets and must score each band separately. Time limit is 24 hours and logs must indicate rest periods. Suggested frequencies: CW—3.540-3.570 7.040-7.070 14.040-14.070 21.120-21.150 28.120-28.150; phone—3.940-3.970 7.240-7.270 14.250-14.280 21.380-21.410 28.380-28.410. Awards. Logs must be received by Mar 30. Mail them to Carol Schrader, W14K, 4744 Thoroughgood Dr, Virginia Beach, VA 23455.

12

North American Sprint, phone, see Feb 5 listing for further details.

18-19

ARRL International DX Contest, CW, Dec QST, p 103.

24

WIAW Qualifying Run, 10-35 WPM, at 2100Z Feb 24 (4 PM EST). See Jan 13 listing for further details.

24-26

CQ World Wide 160 Meter Contest, phone; Dec QST, p 105.

25-26

REF French Contest, phone, see Jan 28 listing for further details.

25-27

YL-OM Contest, CW, see Feb 11 listing for further details.

**Deadline:** The deadline for receipt of items for this column is the 1st of the second month preceding the publication date. For example, your information would have to reach HQ by Feb 1 to make the April issue. Please include name of contest, dates, times (Z) and complete rules. Send to Contest Corral, 225 Main St, Newington, CT 06111.

## Special Events

Conducted By Mark Gamble, N1FOZ  
Assistant Contest Manager, ARRL

**Pasadena, California:** The Relay Repeater ARC will operate KG6AX, starting Dec 29, until Jan 2, each day between 1600Z-0400Z to commemorate the 100th anniversary of the Tournament of Roses Parade and the 75th anniversary of the Rose Bowl Game. Suggested Frequencies: 3.885 7.260 14.260 21.335 28.450 and 28.550. For certificate, send QSL and 9- x 12-in SASE to Relay Repeater Club, PO Box 81, Arcadia, CA 91006-5019.

**Houston, Texas:** The Houston ARC will operate W5DPA through the year of 1989 to commemorate its 71st year. Operations will be on all bands including the WARC bands. A plaque will be awarded to those who work W5DPA on all bands using 7 of the 8 following modes: SSB, CW, AMTOR, ASCII, Baudot, packet, FAX and SSTV. A total of 15 contacts with W5DPA will also earn the plaque. A certificate will be awarded to any station who works W5DPA on all bands regardless of mode.

**Duluth, Minnesota:** The Beargrease AC will operate KA8TMW on Jan 12 to Jan 16 from 1400Z-0200Z each day, in conjunction with the 6th annual Beargrease Sled Dog Race. Operations will be in the lower portions of the General 80-10 meter phone and CW bands. For QSL, send a QSL and SASE to Loren Kuhnly, 4702 Lavaque Bypass, Duluth, MN 55811.

**Jamaica, New York:** The Hall of Science ARC will operate WB2JSM on Jan 16 to celebrate their 17th anniversary. Suggested frequencies: CW—14.065 21.135; SSB—14.335 21.365. For a certificate, send a QSL and a large SASE to HOSARC QSL Manager, Arnie Schiffman, WB2YXB, 81-22 250th St, Bellrose, NY 11426.

**Coloma, California:** The El Dorado County ARC will operate WA6LYE from 1600Z Jan 22 until 0200Z Jan 23 to commemorate the discovery of gold in California on Jan 24, 1848. Suggested frequencies: CW—7.050 14.050 28.050; SSB—the lower 25 kHz of the general 40- and 20-meter bands and the Novice 10-meter band. For a QSL, send an SASE to El Dorado County ARC, PO Box 451, Placerville, CA 95667.

**Marshall Islands:** The Kwajalein ARC will operate KX6BU from 0600Z Jan 27 until 0600Z Feb 6 to commemorate the 45th anniversary of the battle of Kwajalein and Roi-Namur. Suggested frequencies: CW—7.025 14.050 28.050; SSB—14.250 21.350 28.550. For a QSL and book on the battle of Kwajalein and Roi-Namur, send a large SASE to ARS KX6BU, Box 444, APO San Francisco 96555-0008.

**Deadline:** The deadline for receipt of items for this column is the 1st of the second month preceding the publication date. For example, your information would have to reach HQ by Feb 1 to make the April issue. Please include the name of the sponsoring organization, the location, dates, times(Z), frequencies and call sign of the special-event station. Requests for donations will not be published.

**QSLing Special-Event Stations:** To get your QSL or certificate from any of the special-event stations listed here, follow these simple guidelines. (1) After working the station, carefully fill out a QSL card for the QSO. Show the date and time accurately using UTC. (2) Prepare a self-

addressed, stamped envelope. If sending for a certificate, use a 9- x 12-in envelope if you want an unfolded certificate, or a no. 10 envelope if folds are okay. Include enough postage for return of your envelope. (3) Mail both your QSL and your

SASE to the address listed, or to the address given on the air by the station you QSO. Be patient. Special-event stations will often print their cards and/or certificates after the operation is over so they will know how many to order.

## W1AW Schedule

October 30, 1988—April 2, 1989

MTWThFSSn = Days of Week

Dy = Daily

W1AW code practice and bulletin transmissions are sent on the following schedule:

UTC	Slow Code Practice	MWF: 0300, 1400; TThS: 0000; TThSSn: 2100; Sn: 0300
	Fast Code Practice	MWF: 0000, 2100; TTh: 0300, 1400; S: 0300; Sn: 0000
	CW Bulletins	Dy: 0100, 0400, 2200; MTWThF: 1500
	Teleprinter Bulletins	Dy: 0200, 0500, 2300; MTWThF: 1600
	Voice Bulletins	Dy: 0230, 0530
EST	Slow Code Practice	MWF: 9 AM, 7 PM; TThSSn: 4 PM, 10 PM
	Fast Code Practice	MWF: 4 PM, 10 PM; TTh: 9 AM; TThSSn: 7 PM
	CW Bulletins	Dy: 5 PM, 8 PM, 11 PM; MTWThF: 10 AM
	Teleprinter Bulletins	Dy: 6 PM, 9 PM, 12 PM; MTWThF: 11 AM
	Voice Bulletins	Dy: 9:30 PM, 12:30 AM
CST	Slow Code Practice	MWF: 8 AM, 6 PM; TThSSn: 3 PM, 9 PM
	Fast Code Practice	MWF: 3 PM, 9 PM; TTh: 8 AM; TThSSn: 6 PM
	CW Bulletins	Dy: 4 PM, 7 PM, 10 PM; MTWThF: 9 AM
	Teleprinter Bulletins	Dy: 5 PM, 8 PM, 11 PM; MTWThF: 10 AM
	Voice Bulletins	Dy: 8:30 PM, 11:30 PM
MST	Slow Code Practice	MWF: 7 AM, 5 PM; TThSSn: 2 PM, 8 PM
	Fast Code Practice	MWF: 2 PM, 8 PM; TTh: 7 AM; TThSSn: 5 PM
	CW Bulletins	Dy: 3 PM, 6 PM, 9 PM; MTWThF: 8 AM
	Teleprinter Bulletins	Dy: 4 PM, 7 PM, 10 PM; MTWThF: 9 AM
	Voice Bulletins	Dy: 7:30 PM, 10:30 PM
PST	Slow Code Practice	MWF: 6 AM, 4 PM; TThSSn: 1 PM, 7 PM
	Fast Code Practice	MWF: 1 PM, 7 PM; TTh: 6 AM; TThSSn: 4 PM
	CW Bulletins	Dy: 2 PM, 5 PM, 8 PM; MTWThF: 7 AM
	Teleprinter Bulletins	Dy: 3 PM, 6 PM, 9 PM; MTWThF: 8 AM
	Voice Bulletins	Dy: 6:30 PM, 9:30 PM

Code practice, Qualifying Run and CW bulletin frequencies: 1.818, 3.58, 7.08, 14.07, 21.08, 28.08, 50.08, 147.555 MHz.

Teleprinter bulletin frequencies: 3.625, 7.095, 14.095, 21.095, 28.095, 147.555 MHz.

Voice bulletin frequencies: 1.89, 3.99, 7.29, 14.29, 21.39, 28.59, 50.19, 147.555 MHz.

On Monday, Wednesday and Friday, 1400 through 2200 UTC, transmissions are beamed to Europe on 14, 21 and 28 MHz.

Slow code practice is at 5, 7½, 10, 13 and 15 WPM.

Fast code practice is at 35, 30, 25, 20, 15, 13 and 10 WPM.

Code practice texts are from QST, and the source of each practice is given at the beginning of each practice and at the beginning of alternate speeds. For example, "Text is from July 1988 QST, pages 9 and 87," indicates that the main text is from the article on page 9 and the mixed number/letter groups at the end of each speed are from the contest scores on page 87.

On Fridays, UTC, a DX bulletin replaces the regular bulletin transmissions.

On Tuesdays and Saturdays at 2330 UTC, Keplerian Elements for active amateur satellites will be sent on the regular teleprinter frequencies.

Teleprinter bulletins are 45.45-baud Baudot, 110-baud ASCII and 100-baud AMTOR, FEC mode. Baudot, ASCII and AMTOR (in that order) are sent during all 1600 UTC transmissions, and 2300 UTC on WThFSn. During other transmission times, AMTOR is sent only as time permits.

CW bulletins are sent at 18 WPM.

W1AW is open for visitors Monday through Friday from 8 AM to 1 AM EST and on Saturday and Sunday from 3:30 PM to 1 AM EST. If you desire to operate W1AW, be sure to bring a copy of your license with you.

W1AW is available for operation by visitors between 1 and 4 PM Monday through Friday.

In a communications emergency, monitor W1AW for special bulletins as follows: voice on the hour, teleprinter at 15 minutes past the hour, and CW on the half hour.

W1AW will be closed on December 25 and 26, January 1 and 2, February 20 and March 24.

Major reconstruction at W1AW is expected to begin soon. Some or all of the scheduled transmissions and visitor operating periods may be preempted at times. Check W1AW bulletins for up-to-date information.

## The ARRL Field Organization Forum

### ATLANTIC DIVISION

**DELAWARE:** SM, Hal Low, WA3WY—ASM: Walt Dabell, KD3GS. There has been a change in Section Managers. Bob Pegritt (KC3TI) has left Delaware to chase a rainbow. Hal Low (WA3WY) has been appointed Section Manager for the remainder of Bob's term. Walt Dabell (KD3GS) will be doing the leg work for Hal as his assistant. We wish Bob good luck, and thank him for a job well done in his short term as SM. Congratulations to all who helped with the October Air Force emergency simulation for a job VERY well done. In the test, hams were assigned to buses transporting simulated wounded to area hospitals. The test involved the entire state and showed some great teamwork, organization, and cooperation. A MERRY CHRISTMAS TO ALL, AND TO ALL, GOOD DX! October net rpt: DTN stns 356 tlc 21 sessions, DEPN stns 48 tlc 6 in 4 sessions, SEN stns 48 tlc 2 in 4 sessions. Traffic: W3QQ 57, K3YBW 42, WB3DUG 39, K3JL 20, KA3GRQ 20, WA3WY 16, W3FEG 10, KC3FW 3.

**EASTERN PENNSYLVANIA:** SM, Kay Craigie, KC3LM—ASM: WA3PZO, KA3A, K3BZ, K3ZFD, SEC: KB3YS, ACC: KC3OB, OOC: W3IS, SGL: WA3IAO, STM: BM: KB3UD, TC: W3FAF, PIO: W3ZVY. Happy New Year! To spread out the workload for our ARES leadership, Philadelphia and Delaware Counties are now ARES Dist. 1, with DEC KD3DE, Bucks, Chester, and Montgomery Counties are now Dist. 2, with DEC WB3IPX. Previous Dist. 2 is now number 11; Districts 9 and 10 have swapped numbers. Welcome two new EC's: in Dist. 4, N3PHI has succeeded WB3HVJ as EC Leigh, and in Dist. 2, KA3MEI is now EC Bucks. SEC KB3YS visited South Mountain Repeater Assn. in November. KC3LM enjoyed talking about DX with OES W3PTM at the RF Hill hamfest. To all ARES/RACES volunteers, our best New Year's wishes and thanks. Doesn't matter what you call it — what matters is that you DO it. Attention all hamfest sponsors: as soon as your 1989 date and place are firm, write to ARRL HQ for an application for ARRL approval. Approval does NOT carry over from year to year. There is no application fee or other cost to the sponsor. ARRL's local Awards Managers in EPA are KU3A, KA3GHA, WB3DNA, K3NTD, W3IIT, WA3CKA, and WA3WBJ. They can certify a number of popular HF and/or VHF operating awards (not DXCC). Please contact them with an SASE to inquire before sending applications. In the technical area, ATC WA3DSP spoke about radon at a Warminster ARC meeting. ATC W3OQF will give a program on antennas at this month's Mid-Atlantic ARC meeting. Reading RC's W3UQC was honored by fellow amateurs and representatives of state, county, and local government for more than 30 years of community service through Amateur Radio. A feature appeared in the Philadelphia Inquirer about the ham group sponsored by W3CBF at Inghis House, a residence for the disabled. This is another excellent example of how ham radio brings out the "can do" in people. Happy 25th anniversary to the Warminster ARC. RF Hill ARC's 5-night Halloween community patrol was successful, with N3EYM, WB3ABH, WB3UR and XYL, N3FGH, K3UEI, and the family of N3NFI/N3GM/harmonics participating. Delaware-Lehigh's new officers are W3PYF, W3TDF, NQ3D, and KA3MNY. You may recall W3PYF as SCM a few years back. Good to see a few new calls in the traffic list. SCESN is Schuylkill County Emergency Services Net. Traffic (October): N3AZW 588, N3DRM 192, W3JKX 140, N3COY 99, N3CD 88, KD3AO 76, KA3DLY 73, AA3B 58, K3WPI 51, W3DP 32, W3KAG 32, W3KOD 31, KU3R 31, WA3CKA 30, W3IPX 30, K3TX 30, WB8KPE 30, W3AQN 27, W4UQ 27, W3BUR 24, N3EFW 23, W3FAF 16, W3BNR 14, W3VA 14, KA3RGF 12, W3GJC 8, KA3QYH 8, W3ADE 6, W3HK 3. Sept. W3IPX 50. Nets (October QNI/QTC): EPA 470/127, EPAENT 556/132, PTTN 249/92, SCESN 90/2, MARCTN 147/41, MARCAES 54/7, SEPA/TN 90/17, D5ESN 75/11. PBBS: K3FLI 286, WA3TSW 260, KB3UD 232, WB3JOE 78, WA7SSO 71.

**MARYLAND-DC:** SM, Philip E. Battay, W3FZV—Hams who helped during the recent violent hurricane Gilbert are to be thanked and commended. This section is at the hub of concern in our country, and, as usual, hams did all that they could to help. Amateur Radio received some good words in the U.S. Senate relative to this service. A mini-SET was held in Oct. by the N and S PG Cty ARES organizations. Their scenario was that a hurricane had knocked out all power in the area. Another, larger, SET involving hams from several areas was held at Patapsco State Park on Nov. 19. The Frederick Co. ARES net meets Mon. at 0030z on 147.06/56 MHz. The manager is N3RO. The Mountain ARC and the Goddard ARC have been renewed as SSCs. The Metrovision ATV and the Kent ARCS are in good standing for another year. NFX3 helped in a triathlon, a road show, and the Hagerstown Air Show. Sad to report that W3LMZ, Lawrence Fraser, is a Silent Key. He was a real OT with 68 years on the air. Walt, KX3U, has completed a big job in issuing a complete list of all POs in the MDD area, with a cross-reference map. If you need a copy, please let Walt know. Jeff, K3ZF, and John, KV3B, have passed the Amateur Auxiliary exam and are now OOs. A listing of upcoming licensing exams is given each month in Auto Call magazine. The ARRL is trying hard to get the WARC 18 MHz band opened to us. Art, WA3CVG, knows about NICAD batteries. The word from ASM KJ3E is that we need more dedicated formal traffic handlers in packet radio. He sez "... It is not very complicated it is a lot of fun, and it is going to overwhelm SSB and CW in the future..." WB3KHQ writes a column on packet for the MARC News. There's a nice article about packet in the Nov. Auto Call. KJ3E is getting new equipment to enable him to be a BBS. MSN draws lots of out-of-state members. WA3TID and WB3EVS won a foxhunt. WA3SCW was in DU land; lots of voice and packet activity. New officers of the Bay Area ARS are W3QLP, KC3ZM, KA3PQR, and N3EYV, in the

usual order. Happy New Year to all. WITH THE NETS: NET/MGR QND/QTC/QNI: MSN/KC3Y 31/47/385, PON/WB3BFF 26/18/264, MDD/W3FA 62/273/588 (TOP BRASS W3QQ/92, W3FA/91, K3GHH/87, NC3V/59, WA3YLO/58), MEPN/K2EB (SEP) 31/118/820, MEPN/K2EB (OCT) 30/135/825, HOCARES/WA1QAA 2/1/13, MAVEN/W3YVQ 1/0/3, PSHR:WA3YLO 96, W3FA 91, N3EGF 83, W3YVQ 81, KCSY 79, KJ3E 79, NC3V 78, K3GHH 81. Traffic: W3WI 841(BPL), NC3V 279, KJ3E 238, NB3P 192, K3GHH 140, K3RXK 110, W3FA 107, KX3U 103, KC3Y 98, WA3YLO 85, N3EGF 80, K3F38 38, W3YVQ 87, WB3BFF 34, KA3DX 33, K2EB 32, K3NNI 31, W3FZV 27, NC3Z 19, KD3JK 17, NFX3 16, W3DQI 16, K3DWD 11, W3LDD 10, WA1QAA 7, W3ZNN 4, WA3GYW 4, WA2WDT 0.

**SOUTHERN NEW JERSEY:** SM, Richard Baler, WA2HEB—ASM: N2CER, SEC: K2QJ, STM: WB2UVB, ACC: K2JXE, TC: N2BQT, PIO: KA2RAF, SGL: VACANT, BM: WB2JUV, OOC: WA2HEB, ATCS: K2JF, KA2RJA, and WB2MNF. Best wishes to you and your families for a safe and healthy 1989. As some of you might guess, my New Year's Resolution is to get us an exemption from the Scanner Law. We are making slow, but seemingly steady progress. Please remember that the SNJ ARES Section Net meets every Sunday morning at 8 AM local time on either the 145.47 (600) Chatsworth repeater, or the 147.15 (+600) Mount Holly repeater. The net is open to everyone. If you're interested in ARES, this is the place to check in. You are under NO obligation. JSARS VE testing January 21, 10 AM at the AMVETS Post #2 on Rt. 571 in Jackson. For further info contact Bill Haldane, AC2F at (201) 269-5859. VE testing in Belmawr on Jan. 19 at the Basement Training Room of the Belmawr Community Bldg., Browning Rd. at Lewis Ave. Test begin at 7 PM sharp. For further info contact Bill Helmatag, WA2VQG at (609) 546-7710 or 939-3032. Until next month, 73. Traffic: WB2ZJF 262, WA2HEB 15.

**WESTERN NEW YORK:** SM, William W. Thompson, W2MTA—Field Day Congrats: 1A KD2A WB2ELW K2ZWI; 2A Battery W2LZ (#9); 2A W2FR (#2) W2TZ (#12) W2SB K2IC N2BZ KE2T W2UXC K2JD N2FZS K2Y; 3A K2SA (#37) K2MP (#38) W2SAM W2VDC W2LZ N2CO N2AX N2DM; 3A Commercial W2RCX (#1); 4A W2SEX (#43); 4A Commercial W2PE (#1); 7A W2GR (#11); 1C W2MTA (#18). Yep, Jim and urs truly had fun! New York State Hams' census: 25,809 (4th in US) with CA, FL and TX ahead! (US totals 436,912.) Silent Keys had W2SNF become an eternal member; John was Rochester RRA President (former W9KFC) and will be greatly missed. CLUB OFFICERS: Lockport ARA KB2CXM WB2BGA K2CYN K2BX6; No. Chautauque ARC WB2SNH W2ELH WADPTV K2OAD; Rome RC W4BNY N2GNH KA2JXA KA2LFH. Chautauque Co. Amateur FM Association has renewed for a fourth year. CCAFMA is one of two of the earliest SSC in WNY. Congrats! Net information:

NYSEMO	SSB 119/010/05	NYSR	CW 019/005/05
NYSM*	CW 378/240/31	TIGARDS	FM 054/008/05
WDN/M*	FM 299/112/33	WDM/E*	FM 401/180/31
NYPON*	SSB 558/320/31	NYS/E*	CW 391/176/31
ESS	CW 393/070/31	BLUELINE	FM 240/033/28
NYSPTEN	SSB 522/084/31	VHF THIN	FM 031/004/04
LCARES	FM 048/000/05	BRVSN	FM 296/002/31
ORTN	SSB 018/000/04	CNYTN*	FM 215/081/31
OCTEN/E*	FM 063/145/31	OCTEN/L*	FM 223/081/31
O NET	FM 336/002/31	WDLN/L*	FM 399/108/33
STAR*	FM 245/084/31	NYS/L*	CW 316/176/31
Pathfinder	270/000/31		

\*NTS Net. Section Packet Node Stations (6PNS) Reports: WB2ACV 17. All four SPNS in Western New York Section are requested to send monthly reports of ST and KT to W2MTA. (Other WNY SPNSs are NA2B, KC3BQ and W2ICZ.) Reports received from other PBBSs in WNY: KA2JXI had 8 from Ogdensburg area. PSHR: N2ABA N2EIA N2EJV WA2FJJ W2FR W2GJ KC2HJ W2MTA WB2OWO KA2QOO ND2S KD2UV N3JV K2YAI KA2ZNN. No October BPL. RAGS Hamfest was big success. The K2KJR "Roast" honoring Bud's 25 years as Eastern Area Net Manager saw long-time associates meet to give Bud a turn "over the coals." W3ABC W2ABV W2BCH W2E3CYR NT2D N2DC N2EIA W2FR KN1K W2MTA W8PMJ WB2QIX KA1T KA2UBD W4UQ and K2WC the Master of Ceremonies. Champlain Valley ARC honored WA2HSB in TELENEWS. WNY club newsletters received are tops in my estimation. If your club wants to exchange, I recommend these: Chenango Valley ARA "Bullthistle Bugle," Champlain Valley ARC "Telenevs," GRAM News, Kodak Park ARC, "RAGS Review," RARA FLAG," No. Chautauque ARC "Static Sheet," Liverpool ARC, "Longwire," Salt City DXA "Salt Tablet," Tompkins County ARC "Hilltopper," "WNYDXA Report." RAWNY has honored W2YE with life membership. New STAR Net Manager is KA3SDB. Reports: (OO) KA2CHX. Traffic (Oct): W2MTA 454, N3JV 410, WB2OWO 375, N2EIA 352, KC2HJ 257, K2YAI 215, KA2QOO 198, N2ABA 164, WA2FJJ 161, WB2JH 161, ND2S 157, W2FR 155, KA2ZNN 103, WB2QIX 85, KA2UBD 88, N2GJ 68, KD2UV 61, NN2H 57, KA2DBD 55, WB2QAP 53, KC2JW 39, AF2K 32, N2EJV 29, WB2OEV 29, KE2EA 22, WB2ACV 17, K2QR 17, W2PPS 16, WB3CUF 13, KA2JXI 8, KA2TWY 6, WA2OEF 2, K2VR 1. (8pm) W2PHQ 4. Happy New Year!

**WESTERN PENNSYLVANIA:** SM, Otto L. Schuler, K3SMB—SEC: WA3JFN, STM: N3EMD, BM: KC3ET, TC: N3EFN, OOC: KX3V, ACC: AK3J, SGL: KA3OEM, PIO & ASM: N3DOK.

Net	QNI	QTC	Sess	kHz	T/D	NM
WPACW	238	118	31	3585	7:00 P/D	WA3UNX
WPAPT	527	82	31	3983	6:00 P/D	WA3HLN
KFN	231	70	23	3985	1:00 P/D	KA3OEM
PFN	192	151	31	3958	5:00 P/D	WA3THT

WPA2MTN 244 83 31 146.28/88 8:00 P/D KA3BGC  
NWP2MTN 571 29 29 44.53/45.13 9:00 P/D KC3NY  
On October 25, a simulated drill was held at the Beaver Valley Nuclear Power Plant. An accident releasing nuclear fuel into the atmosphere caused the alarms to be activated. The emergency services in the various towns in Beaver County were put on standby. Evacuation was put on standby to be implemented as soon as it was deemed necessary. The Beaver County EME Director asked the radio officers and the local EC to ask the amateurs to take their assigned posts. Frank Cole, KC3TN, (RO) and Dave Leiser (EC) were at the County EME Headquarters to direct the amateur effort. 67 operators were on duty in Beaver County to assist in any necessary evacuation. The following counties were to be host counties for evacuees. They were Allegheny, Lawrence, Butler and Westmoreland. Each county had EME offices set up and the American Red Cross had teams set up at the designated shelters. The Allegheny County EME Office now has a good set up. We have a Ten Tec Corsair, two two-meter transceivers and one 220, one 440 transceivers. October traffic: KQ3T 315, N3EMD 181, W3OKN 181, NQ3M 105, N3CFM 98, W3JGQ 88, N3AES 72, K3SMB 65, KA3OEM 48, KC3YE 40, W3KUN 29, N3COR 26, KA3EGE 7, WA3DBW 6, WA7SSO/3 142 (BB), WA3JUNX 64.

### CENTRAL DIVISION

**ILLINOIS:** SM, Dave Carlson, AA9D—SEC: W9UBQ, STM: K9CNP, OOC: W9TT, BM: K9EUI, SGL: K9IDQ, PIO: N9EWA, ACC: WB9SFT, TC: N9RF, DEC: WD9EBQ Illinois Section Sets

NET	FREQ	TIMES (LOCAL ILLINOIS)
ISN	3905	1800 DAILY
ILN	3690	1830 & 2200 DAILY
ITN	3750	1900 DAILY
CTN	147.69/09	2100 DAILY
ILARES	3905	1830 1ST & 3RD SUNDAYS

Illinois Independent Nets  
IEN 3940 0900 SUNDAYS  
ILPN 3855 1645 M-F; 0830 SUNDAY  
NCPN 3915 0700 MONDAY-SATURDAY  
NCPN 7270 1215 MONDAY-SATURDAY

(continued on page 112)

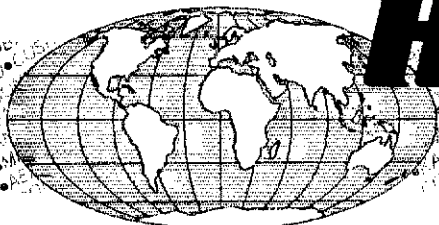
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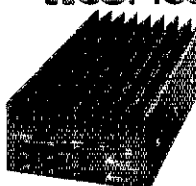
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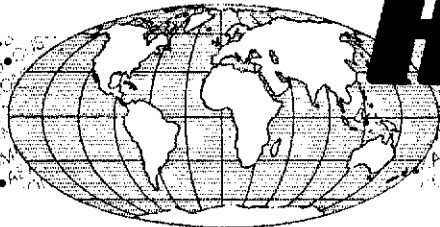
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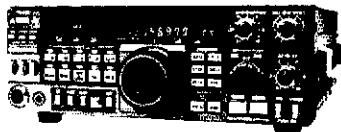
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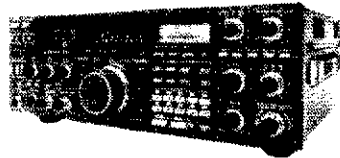
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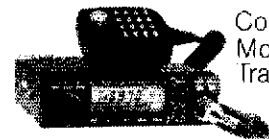
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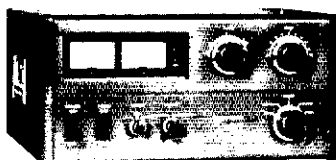
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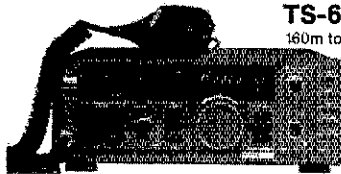
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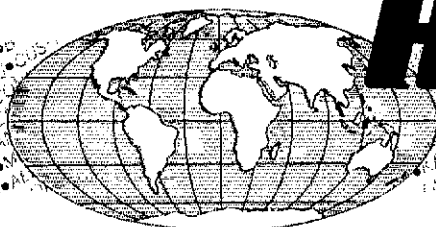
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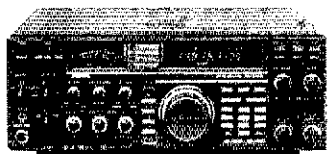


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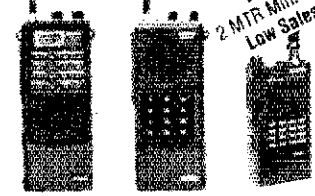
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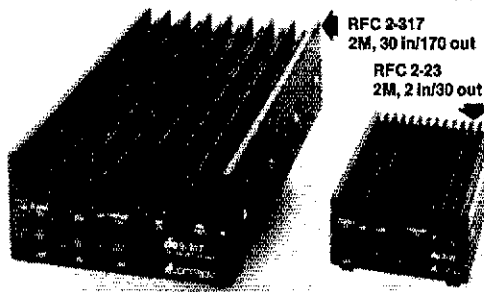
- RFC 2-23, 2W in = 30 out
- RFC 2-217, 2W in = 170 out
- RFC 2-117, 10W in = 170 out
- RFC 2-317, 30W in = 170 out
- RFC 2-417, 45W in = 170 out

**220 MHz Amps**

- RFC 3-22, 2W in = 20 out
- RFC 3-211, 2W in = 110 out
- RFC 3-112, 10W in = 120 out
- RFC 3-312, 30W in = 120 out

**440 MHz Amps**

- RFC 4-32, 3W in = 20 out
- RFC 4-310, 30W in = 100 out
- RFC 4-110, 10W in = 100 out



RFC 2-317  
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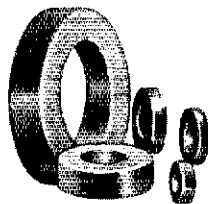
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I'm still receiving very few club newsletters directly. WD9EBQ has been kind enough to forward the ones he continues to receive each month, but this takes an extra step that slows the process and should be unnecessary. I cannot publicize/recognize your activities if I don't know about them. Enuf said! Many Central Illinois hams helped with communications for the MS-150 Bike Tour to Hannibal, Missouri. The list (my apologies if anyone's left out) includes: N9CBW, WB9VFS, W9SKO, W1HTA, KA9JPT, WA9DKO, WD9IRE, W9HNL, KA9YMD, K9SC, KA9YSE, N9FAM, WD9HYL, WD9HQW, W9KVI, W9ACU, N9FTZ, KE9KS, K9EZZ, K89BHB/KT, K89BHC/KT, and KA9UFX. Hats off to everyone who took part! The Northwest Cook ARES group has been busy! Their assistance was requested by Hanover Park ESDA for shelter and evacuation when a fire destroyed 7 townhomes on October 15. Responding were WB9URA, N9BHU, N8INO, N9APM, N9BFR, and KY9N. The Fox River Radio League will be collecting canned goods on behalf of Hased House, an agency which serves the needs of the less fortunate in the Fox Valley. W9ZUV, K9EED, W9BNR, W9CA, N9AIB, KA9JGN, WD9FEN, K9CIC, N9HJ, K9PBN, K2VSP, and K9UVN provided necessary communications during the Eight Mile Race at Kennedy School. Thanks to these members of the Hamsters Radio Club who donated their time and effort. Traffic: KA9FEZ 262, W9LWH 144, NN9M 118, W9HLX 114, WA9RUM 109, WA9VLC 65, NC9T 62, KA9QXI 60, WB9TVD 54, K9CNP 48, W9KR 38, W9OBU 27, W9HBI 25, KA9UEX 16, K9WMP 16, KA9TWT 9, KA9BBV 7, W9HOT 7, W9VEY/M 7, W9LNU 6, W9UHD 4, WD9CIR 3, WD9EBQ 3, WA9AXL 2.

**INDIANA:** SM, Bruce Woodward, W9UMH—SEC: WD9AVQ. STM: NX9I. ACC: K9ZBM. TC: WA9JWL. SIGL: WA9VCO. BM: W9OCL. PIO: KA9WXT. OOC: KJ9G. Net Managers: ITN: KA9EIV. QIN: KJ9J. ICN: KD9ER. VHF: W9PMT. IWN: KA9ERC. October Net Reports:

NET	FREQ	TIME/DAILY/UTC	QNI	QTC	QTR	SES
ITN	3910	1330/2130/2300	3341	411	2384	93
QIN	3656	1430/0000/0300	437	191	1096	90
ICN	3705	2315	162	40	740	30
IWN	3910	1310	1337		340	31
IWN VHF BLOOMINGTON			843		227	31
IWN VHF KOKOMO			940		229	31
IWN VHF LIGONIER			774		218	31
HOOSIER VHF NETS (17)			3263	267	4503	162

D9RN for October 282 QTC 62 ses. 85% K9GCS, W9UEM, N9DWU, K9BSU, W9KHK, W9WGF. CAND 577 QTC IN 31 ses. D9RN 100% N9DWU. 9RN Cy 4 QNI 292, QTC 325, QTR 921 IN 62 ses. IN 92% N9VA, W9CEG, N9HZ, KJ9J, N9SK, W9QCF, W9SUYU, K9WJ, and W9UJL. Appointments: PIA James Panticuff N9VF. EC Greene County Frank E. Tolon, K9FEI. EC Wabash County Donald G. Spangler W9HNO. EC Vermillion County Jim Schmittgans, KD9LK. EC Clay County Wayne Sloops, NG9J. EC Union County Kathleen Ballinger, N9GOS. EC Sullivan County Pete C. Crasher, WB9DRB. EC DeMotte County Glen Hill, W9HYV. EC Brown County Noah Cox, K9PTS. EC Jennings County James A. Green, W9YDP. EC Davles County Mark Jones, N9ENC. EC Lawrence County Larry S. Shaver, W9QGT. EC Dubois County Paul E. Kralein, KA9NGT. Wayne County Donald A. Cook, K9GT. OES Arthur L. Cornelius. SILENT KEYS: W9SSN, KA8MFI, AND K9AAR. OO REPORTS: KA9DZM, K9FW, WA9VCO, KA9QYK, WA9VLC, WA9JWL, N9GSX. Packet BBS reporting procedures need to be standardized. I have decided to list Packet BBS reports separately and add up all categories and report a total for each BBS. Those stations reporting in the NTS format (originated, sent, received, delivered, total) will be counted in the regular station activity section. I encourage all BBSs to send in a report. Several awards for 1988 were represented at the Fort Wayne Hamfest: ITN Ben Mullins, NX9I, QIN Addison Scholes, NR9K, ARES Howard Hine, W9QVI, Eagle award to Ron Kozur, K9TUS, and Wet Net award to Frank Tolon, K9FEI. N9DUZ EC for Elkhart County reports that their ARES/RACES organization was active when a tornado struck an area near Napanea Indiana. I appreciate all public service activity reports. PACKET BBS REPORTS: WA9UXP 7190, KD9QB 2155, WB9SYK 356, N9BAC 345, KA9LQM 278, Traffic: N9BAC 536, WB9MDS 271, KJ9J 176, W9UMH 166, NR9K 150, WA9QCF 94, W9ZGC 94, W9UEM 88, KA9QMI 83, K9ET 48, WA9OHX 45, N9DWU 45, K99IH 40, N9DGT 35, NX9I 36, K9SBW 35, W9PPO 35, WD9DWD 34, W9CNE 28, WB9QPA 27, KD9DU 25, W9BT 24, K9FEI 22, KA9EN 20, K9WC 18, KA9QME 18, N9DOP 17, W9PMT 16, WA9GVH 16, N9DFU 15, N9FMO 13, W99JHR 12, WD9CIV 12, N9HZ 11, WB9DZZ 11, WA9DKK 11, W9XD 10, K9ZLS 9, W9KMY 5, N9ZS 4, W9POF 4, KA9RTD 3, K99GK 3, W9HMS 3, W9RTH 3, W9BDP 1, WA9OIZ 1.

**WISCONSIN:** SM, Richard L. Regent, K9GDF—SEC: W9ZAG. ACC: KA9FOZ. BM: WB9JSW. OOC: NC9G. PIO: K9ZZ. TC: K9GDF. Fox Cities ARC bought complete set of ARRL books and several copies of Tune In the World for Roosevelt Junior High School students to use. The FCARC Volunteer Examiner Team has been accepted to stock forms for ARRL test and exams. N9GHZ compiled Directory of Taylor County Area Amateurs. According to net records kept by K9UTC: most active nets during 1988 were WINE on CW with 1,800 messages cleared and BWN on SSB with 18,700 messages. Green Fox ARC now has 10 members on packet radio. West Allis RAC Midwinter Swapfest January 14th at Waukesha County Exposition Center Forum, Highways J and FT, with Amateur exams by Badger Examiners available, packet radio meeting, and free coffee and donuts before 9 AM. Please get the dates and particulars of your group's hamfests, picnics, dinners and special events planned for 1989 to me immediately, so we can let everyone know what you're doing — QST is delivered to over 1,800 Wisconsin amateurs each month. The Novice Roundup begins the end of January; help Novices in your town to get on-the-air and have some fun. New OO K1PLR. New ATC WD9HAS. Sorry to report Silent Keys KA9UXM, N9GYC, WD9IKS, and W9TQ who was licensed since 1922. They will all be missed. Traffic: WB9YPPY 2013, KC9CJ 903, W9YCV 193, W9LKN 189, K9GDF 177, W9QBE 173, N9BDL 112, N9BCX 110, WA9WYS 97, KA9BHL 94, W9IEM 94, K9AKG 79, W9UCL 70, W9NGP 67, AG9G 64, K9UTQ 57, KA9RII 51, KA9KZL 49, WB9ICH 43, W9UW 38, N99Q 35, K9FHI 31, K9BED 27, W9ODV 24, K9GB 22, W9PVD 4.

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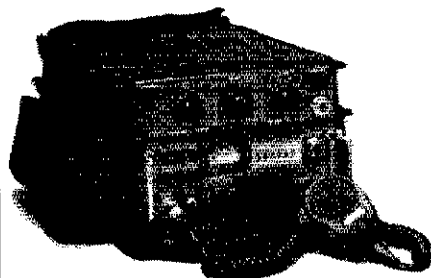
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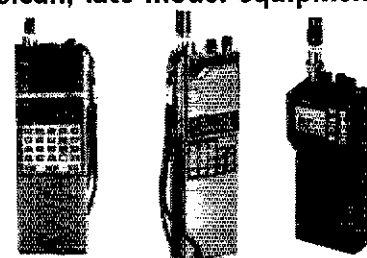
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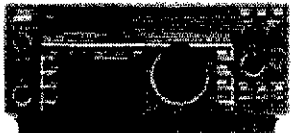
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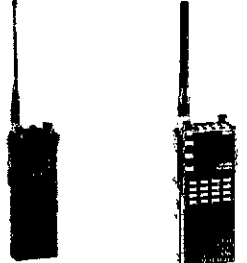
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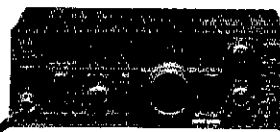
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all who sent in SAR's and PSHR's for the month. Now the question is how to get more stations to send me these reports... at least the SAR's. We run about 20 - 22 SAR's each month and I know we can do better than that! By the time this reaches you, we'll no doubt be winding up the Holiday Season traffic load and it's not too soon to say thanks to all for what I know will be a great job of moving traffic. The details will come later of course, but it will be interesting to see how it all turns out. It's been a long time coming, but it really is a special pleasure to announce that Dale Filch, WD0BAC, Little Falls has been chosen by the Section Leadership as the October Amateur of the Month. Congratulations Dale and this wasn't only for October but for many months of great work. Keep it up Dale! Jim Stodolka, W0TV, tells me that at a recent Tuesday Lunch Bunch meeting that the eleven Hams attending averaged 56 years of Hamming. How about that? Here's one for CW ops. Have trouble with your key or paddle moving around on your desk, especially when dust accumulates? Recently Geb, W0GRW, Shoreview sent me a sample piece of "SticKum". This is a thin (1/16 inch or so), no "stickum" or adhesive plastic material available at RV supply dealers. Anyway all you do is slip a piece of this material under your key or paddle and it will slide around no more, even with a heavy fist... it won't move unless you decide to reposition. As I said, no "stickum" or adhesive. Works great gang - give it a try. And thanks Geb for the tip. And so with that, 73 es GL. See you next time, Jim Swisher, KA0EY, STM, MN EMERGENCY FREQUENCY 3860 kHz BULLETINS 3860.

NET	FREQ	TIME	QNI/QTC/SESS	NR
MSN/1	3685	6:30P	369/81/31	NR08
MSN/2	3685	10:00P	361/42/31	KD0NH
MSPN/N	3860	12:05P	474/168/31	WB0WVJ
MSPN/E	3860	5:30P	829/220/31	K0AT
MSSN	3710	8:00P	284/19/31**	KA0SBY
MAWN	3860	8:00P	339/182/21	KD0CI
PAW	3925	9:00A	2787/418/117	WD0BAC

\* MSSN handled 75 training messages not counted. Traffic: WB0WVJ 981, WA0TFC 463, KA0EY 330, N0FOO 173, KA0ARP 151, KA0SBY 103, W0GRW 89, KD0CI 72, N0YE 88, WD0GUF 60, K0OGI 52, K0EBE 51, NR08 51, W0TV 44, K0C7 43, N0JP 42, KD0NH 42, W0G8 35, W0FQ 24, N0HWD 17, KA0PDM 17, W0KYV 15.

**NORTH DAKOTA:** SM, Bill Kurtz, W0CM—19 Minot-area hams responded to a call from Burlington city officials to search for a 78-year-old woman who had wandered from her grandson's home at midnight Oct 16. Devils Lake area hams have had a busy year providing communications for dog sled races, fishing tournaments, Boy Scouts, March of Dimes & SKYWARN. They also held Field Day and a well attended hamfest with a testing session. Congratulations to the following upgraders: Tech: K0CCKV, KA0PXC, KA0PXX, K0BAUS & K0BCTN. General: KA0ZVT. Advanced: N0JLL. Extra: WA0JKI at the F0RX Hamfest. ND hams from Grand Forks, Fargo, Bismarck & Dickinson had a fun-filled week operating The People event. Anyone needing ND should have got it there. VEC reminder: If you are planning a testing session, please contact W0DH, Bob Tracey, and he will help coordinate it so it will not interfere with other testing sessions. Traffic: KA0FSM 19.

NET	FREQ	TIME	SESS/QNI/QTC	MGR
COOSE RIVER	1890 kHz	9AM SU	5/18R3	W0CDO
DATA	3885 kHz	6:30P DA	29/655/11	W0GFE
WX NETS	3885 kHz	resumed operation		W0GFE
STORMNET	3885 kHz	DURING STORMS ONLY		W0CM

**SOUTH DAKOTA:** SM, R.L. Cory, W0YMB—Asst. SM: N0ABE, WA0FPR. Sec: KA0PKY, STM: KD0YL. S. Dak Section Emergency Test was run on Nov. 5 and due to bad band conditions, East River was run on 75 meters and West River on 40 meters with into going into Sioux Falls and put on packet to the National WX service and the exercise was a success. Aberdeen VEC test on Oct. 1. KA0ZEE to Tech, KA0CUH to Advanced, K0B0U to Tech, and N0JML to Advanced. South Dakota has 20 two-meter repeaters. STM KD0YL reports a decline in checkins on the S. D. Novice Net. Net meets Sunday on 3725, 7 PM CST. Official Observer reports for 1988 were 31 per cent for out-of-band followed by 15 per cent for chirp with most on 20 meters followed by 40 meters. SEARC at Sioux Falls have improved coverage of their packet station by moving it to their repeater site. Total SD traffic reported for Oct was 416. Traffic: N0DFF 162, KA0AIE 116, K0ERM 88, W0MZI 42, WA0VRE 38, W0COMF 31, KD0YL 23, W0YMB 19, KA0PKY 17.

## DELTA DIVISION

**LOUISIANA:** SM, John "Wondy" Wondergem, K5KR—ASM: K5BCX, SEC: NS4DF, ACC: K5DPP, SGL: K5DSL. TC: W5RWF. OOC: K5GK. Packet: NE5S. The Acadiana DX Association 1988 officers are Pres: Noel, KA5WOO, VP: Bodie, W5GJB, Sec/Tres: Francis, W5LWP. Very interesting that the club's ethics committee consisting of Bob, W5RRK, Howard, K5BLV, and Boyd, KA5DGX all lay claims to wearing the proverbial "Golden Halo." Sandy, W5TVW in the New Orleans area runs an experimental trader PBBS on 145.01 MHz. It is open to everyone within digi range of the Slidell (SLI) or the New Orleans (MSY) digipeaters. No general bulletins as the BBS carries only swap/sell amateur related items. The BBS operates 24 hours a day. Now is the time to plan for the annual Southeastern LA. ARC Hamfest in Hammond being held on Saturday 21 January 1989 in the Old Man's Gym on the SLU Campus. Joe, NSHDW is this year's Hamfest Chairman. The 1988 SELARC officers are: Pres: Joe, W0SR, VP: Joe, NSHDW, Sec: Phil, AA5FI, and Tres: Dave, KA5UAI. I need help from ARRL members with technical experience to accept ARRL Field Volunteer appointments as Technical Assistants and help as "Eimers" and RFI advisors. For more details contact Bill, W5RWF the ARRL LA. Technical Coordinator in Baton Rouge or "Wondy," K5KR listed on page 8 of QST. Seasons Greetings to all.

**MISSISSIPPI:** SM, Jim Davis, K5ZS. ASM: W5TRD. SEC: KA4PKA. SGL: KA5WRV. STM: W5MS. TC: K5B5. BM: W5EPW. TC: KF5DE. OOC: K5KIC. ACC: NCSY. Congrats to following upgrades: To Extra: N5MMI. Advanced: Charles Wood: N5MWY. General: W5DCK, K5B5FU, K5B5CP, K5B5FT, KASZIN. To Tech: Robert Cauther, Sam Oberlin, Clem Guillot, K5B5HLV, Reg Moody, K5B5ENG, K5B5GRH, K5B5FH, K5B5GMR, K5B5FDJ, K5B5FFL, KA5GDF, and K5B5HU. To Novice, Melving Stacey, James Yelverton, CAND (NS5M) Sess 31, QTC 577. DRN5 (W5BYDD) Sess 62, QTC 503. Miss rep 95% by KT5Z, W5HKW, K5B5W, W57CQO.

**NS5M,** and N5HBB. Walk-ins WB accepted at Helena, AR, on 10 Jan 89, 1000 hours, at Central High School. Contact A15K for info. MS CW Tlc Net: (KB5W) Sess 31, QNI 982, QTC 41. Miss CW Slo Net (W5YRX) Sess 21, QNI 98, QTC 6. Mag Sec Net (W5YRX) Sess 31, QNI 476, QTC 10. Miss/Lou Net (N5EZX) Sess 5, QNI 109. ARRL Info Net (K5KZ) Sess 1, QNI 10. MSBN (KF5DE) Sess 31, QNI 2071, QTC 39. GCSBN (W5JHS) Sess 31, QNI 1152, QTC 7. COAST ARES (N5LST) Sess 6, QNI 153. Mni tks to all who attended ARES forum at Biloxi Hamfest. To date, we have all DEC's, 9 x 9 and 61 x 82 EC's tks to KA4PKA, SEC: MISS ARRL. Traffic: NS5M: S-43, R-43, O-5, Total 91. W5DEJ: S-10, R-11, D-26, A-4, Total 51. W5JDF: S-33, R-33, O-5, Total 71. KB5W: S-219, R-247, O-7, D-3, Total 468. KT5Z: S-47, R-41, D-1, Total 89.

**TENNESSEE:** SM, Harry Simpson, W4MI—Eastern Assistant SM and PIO W4TVY. Central Assistant SM WA4GLS. Western Assistant SM and ACC: K4CYX. STM: NG4J. SEC: K4UVH. OOC: K4LSP. SGL: N4POY. TC: WA4HKH. The TN Phone Net is on 3980 kHz with early sessions at 6:40 AM Eastern. Regular sessions at 7:45 AM Eastern Monday thru Friday, at 9 AM Eastern on Saturdays, Sundays and Holidays. Evening sessions are Monday thru Saturday at 7:30 PM Eastern. CW Net Sessions are on 3635 kHz at 8 PM Eastern, Monday thru Friday. It is with a great deal of regret that I report two silent keys this month - W4SNX Murray Bynum of Jackson, and KA4UVJ John Ray of Athens. John was longtime Net Manager for the Evening Net. Both will be sorely missed by their friends. WA4HKU Wyldont England has agreed to manage the Evening Net until STM NG4J is able to make a replacement. Now for a bit of GOOD news! I received a call from the TN Motor Vehicle Bureau. I was asked to spread the word to all TN amateurs that you do not need to reapply for automobile license tags each year if you have your ham tags, you will simply renew by mail each year until your license expires. When you get an FCC license renewal, you will send the state a copy and reapply at that time. Only if you do not have your tags will you apply to the state. The month of October was one of Hamfests in TN. First, Memphis, then TN-Cities, and finally Chattanooga. Memphis was in the Convention Center for the first time, and had plenty of room to grow. TN-Cities, at Gray, was excellent, with super facilities and a good crowd. My hearty congratulations to the Chattanooga group for the best (in my humble opinion) TN Hamfest of the year. The camaraderie, friendship, displays, crowds, and cooperation were outstanding. Traffic: WA4FMR 137, W4DDK 47, W4WOP 33, W4TVY 27, W4MI 26, K4CXY 19, W4PFP 18, W4PSN 3.

## GREAT LAKES DIVISION

**KENTUCKY:** SM, John Thernes, W4MT—ASM: K44WN. SEC: WB4NHO. STM: KA4MTX. PIO: WA4SWF. (OCTOBER) Preliminary numbers indicate that the simulated emergency test was again very successful. I will be publishing another edition of the KSN in January and hope to include the SET results. Mammoth Cave ARC publishes a very fine newsletter. An informal meeting was held at the Louisville Hamfest on repeater coordination for Western KY. A report will also appear in the January KSN.

NET	QNI	QTC	SESS	MGR
MKPN	1467	281	33*	W44RWJ
KTN	882	136	33*	W44RWJ
KYIN(E/L)	336	144	63*	K4AVY/KZ8Q
TSTMN	445	49	32*	KZ8Q
KNTN	349	119	52*	W44EBN

\*Includes simulated emergency test sessions. Traffic: (Oct.) W44RWJ 248, K4VHF 176, N4GNL 146, WA4EBN 92, N4PET 73, K4QX 83, WA4SWF 56, KA4MTX 48, K4AVY 47, K4UJA 44, K4C4W 33, WB4JUN 22, K4HOE 20, WA4NOG 15, N4PEK 14, K4UJA 9, WA4HLW 8, W4DCQF 3. PSHR: N4GNL 120, K4QX 104, KA4MTX 78. (Sept.) WA4SWF 23.

**MICHIGAN:** SM, George E. Race, W8BBG (N8FTY)—ASM: W4LRL (W4LFL). STM: W8KQC (N8TB). SEC: N8AYQ (TVC). SGL: N8CNY. TC: W8YZ. OOC: WA2AJC. ACC: N8JVA. PIO: KA8ZOV. Silent Keys, with deep regrets: W8LX and W8OC. Please help me welcome the newest member of the ARRL MI Staff, Diane Penn, KA8ZOV. Diane is our new Public Information Officer. The position of the PIO is a very difficult job to undertake. Diane will be putting together a state-wide public program that will highlight Amateur Radio and the MI Amateur. Diane is looking for others to join the PIO Staff as Public Information Assistants (PIAs). Please contact her if you would like to take up the challenge in your area. The 1988 winner of the Olinghouse Michigan Field Day Award goes to the Motor City Radio Club. My congratulations to all involved in this all-out effort. As I am going to be vacationing during the deadline period for the column, I have asked our STM, W8BKQC, to provide what follows. Our SEC, N8AYQ, says that preliminary reports indicate that activity and participation in this year's SET were at an all-time high. Adding interest to the exercise was the fact that several of our most active ARES organizations were involved in "live" public service events on SET Saturday. The NTS Net Managers agreed unanimously that the liaison stations from local ARES Nets performed in an exemplary manner on the traffic nets. Well done; now please don't "disappear" until next year's SET! Your participation throughout the year is very much welcomed. MNN Manager, KA8QVH, has reinstated the 8:00 PM session of the Michigan Novice Net. Please encourage Novices and Techs in your area to join in. Regular on-the-air activity is the best way to sharpen those CW skills in preparation for that upgrade, learn traffic handling procedures and have a great time, all while performing a valuable public service. It is a pleasure to report that N8HC has accepted the appointment as Assistant Manager for SEMT. This net is a vital part of our Section traffic organization, and with constantly increasing participation and traffic volume, its daily administration has become a more than one-person job. Congratulations, also, to the following newly-appointed Official Relay Stations: N8FPN, N8FTY-PBBS, N8HSC, N8LIC, N8JAT-PBBS, W8BYP and W8WM. These PBBSs are the first in Michigan to be appointed ORS; more will surely follow. As we enter a new year, it is appropriate to reflect on the very substantial progress made in all areas of League activities in the Michigan Section during the past year. Thanks are extended to the many who contributed so generously of their time, effort and expertise to bring this about. A solid foundation has been laid for even greater achievements in 1989. Your Section Staff sends best wishes to all for a Happy and Prosperous New Year. Please support the following MI area nets:

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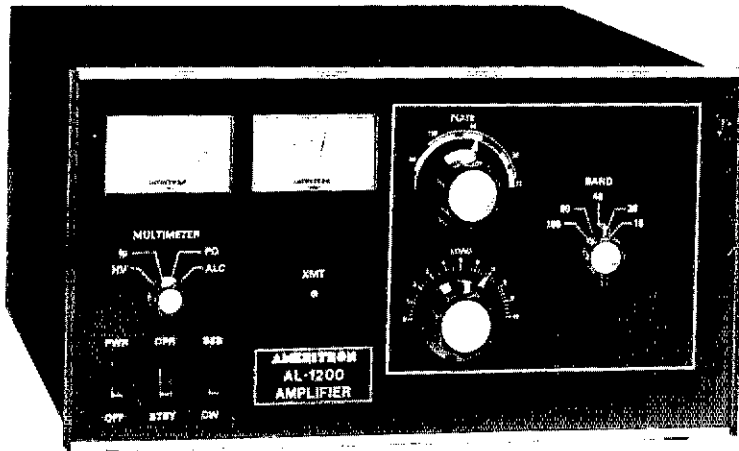


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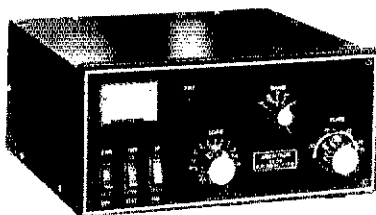
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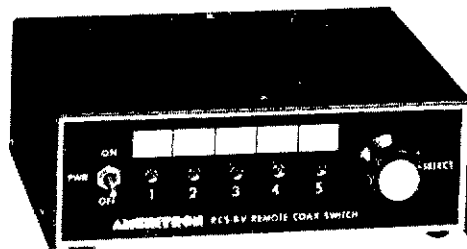
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NET	FREQ	TIME/DAY	QNI	QSP	SESS	MGR
UPN*	3921	5:00PM Dy	1165	47	36	WBADHB
MACS*	3953	11:00AM M-Sa	381	141	32	K8OCOP
MITN	3953	7:00PM Dy	638	209	33	WDSEIB
QMN*	3963	6:00PM Dy	865	220	95	WB8R
SEMTN	145.33	10:15PM Dy	489	142	34	N8HSC
MNN*	3722	5:30PM Dy	108	9	31	KA1QVH
GLETN	3932	9:00PM Dy	1220	45	31	KA9EIZ
WSSBN	3935	7:00PM Dy	631	24	30	WBNDI

VHF ACTIVITY REPORT No Report. NO8Q

\*Q MN Fast-6:30PM Dy; QMN Late-10PM Dy.; MACS-1PM Sun.; UPN-12PM Sun. Traffic for October: WDBKQC 371, K8BCPS 337, N8FTY\*PBB5-247, N8JAT\*PBB5-184, WBBR-163, WBB8GY 152, NW8M 116, N8HSC 104, KA8QVH 92, NY8W 77, KBGXV 74, N8IIC 67, WBBYDZ 66, W8CUP 60, WBBYYP 57, N8FPN 56, WD8EIB 53, W8ADHB 50, WBB8YA 46, W8BEZ 43, K8HAP 42, K8UPE 39, W8EOI 37, W8YIQ 37, K8ZJU 36, N8JS 35, W8RNP 32, N8CNY 32, W8IHX 28, N8JIT 27, WBBWJV 25, K8OCP 23, N8XS 20, W8K 19, KA8LAR 18, W8CSO 16, N8HHH 14, W8MJJB 11, K8Q 10, N8EXS 8, N8FIZ 6, W8BMVH 5, W8W 4, KA8HZO 3, W8URM 3, W8VIZ 2, N8JIO 2. (Sept.) WBBYDZ 94, (Aug) N8JCL 118, W8BLUH 39, KE8KB 9, K8C9N 6, N8AYQ 6.

OHIO: SM, John Haungs, WA8STX—Phone: (513) 563-7373. ASM: David Karsten, N8AUH. SEC: W8BMPV. STM: KF8J. ACC: K130. BM: W8ZM. TC: K8BMU. OOC: W8ZCE: SGL: N8CVK.

NET	QNI	QTC	SESS	TIME(LOCAL)	FREQ	MGR
BN(E)	253	113	31	2345Z	3.577	WD8C
BN(L)	186	93	31	0330	3.577	K8TVG
BMR	295	85	31	1800	3.805	W8EG
BSSN	200	83	29	1900	3.873	KA8JUN
CSN	309	84	31	1819	3.768	WD8KWB
CSSN	2052	832	97	1030, 1815, 1830	3.9725	KA8CGF
CSSN	183	79	31	0645M-F	3.577	K8DHB
				0805S-SN	3.768	K8DHB

OHIO SECTION ARES NET/700SUN 3.878 W8BMPV  
COTN 347 100 32 0015Z DAILY 147 24 K8R8SO  
BRTN 298 71 25 0230 DAILY 146 46 W8HED

A big THANK YOU should go to Jeffrey Maass, K8ND, for serving the past four years as Ohio Section Manager. I don't know how he got his four-year summary of accomplishments condensed down to 70 lines of text. The ARRL Section Mgr's Survival Guide that he helped write and edit is a fantastic guide for a new Section Manager, and I am glad I have it to refer to. Jeff has left the Ohio Section Mgr position with a feeling of pride in his accomplishments, and has made a real contribution to the amateurs of the section. I am glad Jeff will continue to serve in other appointments and will now have time to enjoy other interests in Amateur Radio. Thanks to clubs who have added the new Section Mgr to their mailing list. OSN, Zanesville ARC, Silvercreek ARA, Alliance ARC, Champaign-Logan ARC, Fairfield ARA, Findlay RC, Central Ohio Amateur Radio Emergency Service & Canton ARC. Canton ARC's monthly calendar of events is a great idea by K8JZN. A former Sharonville patrolman, Steve Hasty, W8SNUN, a SK 11/3. Many Ohio ARES organizations participated in the Oct. SET exercise. Traffic was light into State agencies in Columbus. Local activities are important and need to be exercised; however, there is also a need to be sure there are effective communication paths to the State agencies. Hamilton Co. is preparing for more ARES exercises with Civil Defense and Dept. of Defense because of conditions at Fernald, the uranium processing plant. Paul Krugh, N2NS, of Reynoldsburg (Columbus) did a fantastic critique of the SET with comments and suggestions for the Section's improvement. Congratulations to Triple States Radio Amateur Club for being renewed as a Special Service Club. Frank Martinjak, N8FSC, an Ohio Air National Guard pilot flew an F14 from Wright Field to St. Louis for a record flight at 1000 MPH with sonic booms over Ohio on Sept. 21. The Stations listed below have practiced their traffic handling skills during October 1988: K8TVG 319, K8BKJ 303, W8ZOL 221, W8BO 209, N8AX 200, KA8CGF 198, W8PMJ 188, W8BMPV 177, N8AUH 174, W8KFN 168, K8JDI 157, K8DHB 149, W8QZK 137, K8C8R 107, KA8JV 103, N8EFB 100, W8BJGW 99, W8SP 98, W8HED 95, W8EK 92, K8DHD 87, W8SSP 83, W8BDPZ 82, N8FWA 77, K8ECV 68, N8GEC 62, W88RW 60, N8CEJ 55, N8AUG 51, W8RIB 44, K8CJV 43, W8LDU 43, N8JDH 42, W8HHZ 41, K8ALV 38, W8BQXT 36, N8CPY 32, KA8BNQ 31, KJ3Q 29, W8KWC 28, K8EDQ 26, K8C8V 24, N8HSE 23, N2NS 23, K8LQM 22, K8ES 21, W9SWM 20, NW8E 20, N8GOB 20, K8EIV 18, N8C8 17, W8WZX 16, KA8SJH 15, K8BXL 15, N8CV 14, W8MEK 14, K8DEB 14, KA8YIT 14, N8AJU 12, KA8SOM 12, W8DCTX 11, K8BFMC/KT 11, W8DJYE 10, N8HRW 10, KA8QCF 9, N8IDA 9, N8FP 9, W8RG 8, W8WGB 8, KA8SON 7, KA8RHX 7, K8BEF 7, K8CKY 7, W8XT 6, W8LDQ 6, W8BHL 5, K8DXZ 5, K8BIC 5, W8BA 2, KA8VYT 2, W8BFWG 1, W88BDM 1, W8CSP 1. (Sept) N8GEC 39, K8EDQ 14, N8HF 3.

## HUDSON DIVISION

EASTERN NEW YORK: SM, Paul S. Vydareny, WB2VUK—ASM & STM: K2ZM. SEC: WA2ZYM. BM: WB2IKR. PIO: KB2TM. OOC: N2DVQ. ATC: WA2VGM. SGL: KB2HQ. ACC: KV2A. ASM & NWSLTR ED: WB2NHC. ASM FOR PACKET: N2FTR. NET REPORTS FOR OCTOBER (QNI/QSP): AESN 40/4 CDN 835/57 ESS 393/70 HVN 129/18 NYPON 558/320 NYS/E 391/176 NYS/L 316/188 NYS/M 378/240 SDN 275/112. CLUB NEWS: Albany ARA held their annual auction in November. They welcome new members WA2JWP WA2MKJ W8DGT. AARA's WA2YBM reports WA2YBM W2CJO N2EXU WB2CXZ WA2WQZ WB2FMB assisted in the Juvenile Diabetes Walk on Oct 23 and W2CJO KA2SKG WB2BEJ KC2VC KB2EIK WB2VXS WB2FMB WA2WQZ WB2ZCM KA2MJL NB2Q WA2YBM WB2SBO KA2DDK KD2ID KA2SJH NC2G WB2VJ K2AFE in the Pumpkin Patrol on the 30th and 31st. The Catskill Mtn. ARA had some films lined up for the Nov. meeting. CCNR heard W2DSQ explain HT operation and repeaters. Overlook Mtn. ARA held elections. Report next month. W2XL was awarded the gavel for 1st place finish in the 87 ARRL DX contest. They report upgrades KB2GHW KB2CCY. WB2GZR spoke to Saratoga RACES on digital proportional ratio equipment (radio control). They welcome new member K2EJ and report that K2GH WA2QCY KA2DKX K2DLL WB2NSC W2HCW helped with communications for the Clifton Park Stampede. Schenectady ARA had W2ODC talk all about the K2AE repeaters. They welcome new members KB2GHF KE2EF KB2FOX N3GIA KB2FTX N2JUS KB2FSN KB2FOY K2JIK. They have new treasurer WB2EAR upon



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# ALL BAND ANTENNAS

## MULTI BAND TRAP ANTENNAS

### TRAP DIPOLES

Model	Bands	Traps	Length	Price
D-42	10/15/20/40	2	55'	\$64.95
D-52	10/15/20/40/80	2	105'	69.95
D-56	10/15/20/40/80	6	82'	114.95
D-68	10/15/20/40/80/160	8	146'	149.95

### TRAP VERTICALS "SLOPERS"

Model	Bands	Traps	Length	Price
VS-41	10/15/20/40	1	28'	49.95
VS-52	10/15/20/40/80	2	49'	64.95
VS-53	10/15/20/40/80	3	42'	74.95
VS-64	10/15/20/40/80/160	4	73'	94.95

\*Can be used without traps

\*Feedline can be buried if desired

\*Permanent or Portable Use

ALL TRAP ANTENNAS are Ready to use - Factory assembled - Commercial Quality - Handle full power - Come complete with: Deluxe Traps, Deluxe center connector, 14 ga Stranded CopperWeld ant. wire and End Insulators. Automatic Band Switching - Tuner ready to use, not included. For all Transmitters, Receivers & Transceivers - For all class antennas - One feedline works all bands - Instructions included - 10 day money back guarantee!

## SINGLE BAND DIPOLES (Kit form):

Model	Band	Length	Price
D-10	10	16'	\$17.95
D-15	15	22'	18.95
D-20	20	33'	19.95
D-40	40	66'	29.95
D-80	80/75	130'	25.95
D-160	160	260'	34.95

Includes assembly instructions, Deluxe center connector, 14ga Stranded CopperWeld Antenna wire and End Insulators.

## LIMITED SPACE DIPOLES

- Reduces overall length over 40%
- "Shorteners" are enclosed, sealed, weatherproof and lightweight.
- Complete with Deluxe Center Connector, 14 ga. CopperClad antenna wire, end insulators, and assembly instructions.
- Use as inverted "V", or flat-top.
- Excellent for all class amateurs.

Model	Band	Length	Price
LS-40K	40	38'	\$44.95
LS-80K	80/75	69'	\$49.95
LS-160K	160	100'	\$49.95

• Any single band, or Trap antenna with "Pro-Balun" instead of Deluxe Center Connector; Add \$8.00 to antenna price.

## COAX CABLE: (includes PL-259 connector on each end)

Type	Length	With antenna purchase	Separately
RG-58	50'	\$9.00	\$11.95
RG-58	90'	13.00	16.95
RG-8	50'	21.80	25.95
RG-8	100'	36.00	39.95
RG-8X	50'	11.95	14.95
RG-8X	100'	18.95	20.95

## "PRO-BALUN"

PB-1

- 1:1 For Dipoles, Beams & Slopers \$17.95
  - Handles Full legal power
  - Broadband 3 to 35 Mhz.
  - Lightweight, Sealed & Weatherproof
  - Deluxe connectors require NO soldering
  - NO jumper wires
  - Minimizes coax & harmonic radiation
- Pro-Balun PB-4, 4:1 ratio, \$19.95**



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- Sealed, weatherproof lightweight shorteners utilize NO rust terminals
- Perfect match for your Antenna Tuner with balanced line output
- Handles Full Power
- Works with all transmitters, transceivers, receivers, etc.
- Completely Factory assembled - Ready to install - NO adjustments necessary
- INCLUDES 100 feet of 450Ω Feedline
- Feedline can be shortened

- Only 70 feet overall length!
- Works ALL Bands 160 thru 10 Meters
- Perfect for ALL classes of Amateurs
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- Shorteners provide full 135 feet electrical length; with only 70 feet physical length
- Utilizes Heavy 14 gauge stranded CopperClad (CopperWeld) antenna wire, 100% copper, 70% high-strength steel NO rust, Will not stretch like copper

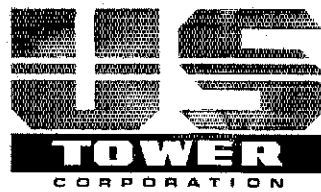
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MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD Top	SEC. OD Bot.	SUGGESTED HAM PRICE
MA-40	40'	21'6"	2	242	3" sq.	4 1/2"	\$ 809.00
MA-550	55'	22'1"	3	435	3" sq.	6"	\$1369.00
MA-550MDP*	55'	22'1"	3	620	3" sq.	6"	\$2909.00
MA-770	71'	22'10"	4	645	3" sq.	8"	\$2509.00
MA-770MDP*	71'	22'10"	4	830	3" sq.	8"	\$3969.00
MA-850MDP*	85'	23'6"	5	1128	3" sq.	10"	\$5349.00

\*MDP models complete with heavy-duty motor drive with positive pull down.

## FREE STANDING CRANK-UP TOWERS

Will handle 18 sq. ft. antennas at 50 MPH winds.

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD Top	SEC. OD Bot.	SUGGESTED HAM PRICE
TX-438	38'	21'6"	2	355	12 1/4"	15"	\$1019.00
TX-455	55'	22'	3	670	12 1/4"	18"	\$1539.00
TX-472	72'	22'8"	4	1040	12 1/4"	21 3/4"	\$2529.00
TX-472MDP*	72'	22'8"	4	1210	12 1/4"	21 3/4"	\$4069.00
TX-489	89'	23'4"	5	1590	12 1/4"	25 3/4"	\$4399.00
TX-489MDPL*	89'	23'4"	5	1800	12 1/4"	25 3/4"	\$6599.00

\*TX-472MDP includes heavy-duty motor drive with positive pull down. TX-489MDPL comes with heavy-duty motor drive with dual level wind and positive pull down. (Both motor drive models include limit switch brackets).

## FREE STANDING HEAVY-DUTY CRANK-UP TOWERS.

Will handle 30 sq. ft. antennas at 50 MPH winds.

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD Top	SEC. OD Bot.	SUGGESTED HAM PRICE
HDX-538	38'	21'6"	2	600	15"	18"	\$1319.00
HDX-555	55'	22'	3	870	15"	21 3/4"	\$2309.00
HDX-572	72'	22'8"	4	1420	15"	25 3/4"	\$3959.00
HDX-572MDPL*	72'	22'8"	4	1600	15"	25 3/4"	\$6049.00
HDX-589MDPL*	89'	23'8"	5	2440	15"	30 3/4"	\$7919.00

\*Includes heavy-duty motor drives with dual level wind and positive pull down. HDX-572MDPL includes limit switch brackets only. HDX-589MDPL includes limit switches and limit switch brackets.

## FREE STANDING "LOW PROFILE" COMPACT CRANK-UP TOWERS.

Will handle 18 sq. ft. antennas at 50 MPH winds. (TMM-433HD handles 24 sq. ft.)

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD Top	SEC. OD Bot.	SUGGESTED HAM PRICE
TMM-433SS*	33'	11'4"	4	315	10"	18"	\$1089.00
TMM-433HD*	33'	11'4"	4	400	10"	20 3/4"	\$1319.00
TMM-541SS*	41'	12'	5	430	10"	20 3/4"	\$1429.00

\*Hy-Gain and some Alliance rotors when installed inside tower will restrict retracted height by approx. 24". Most Kenpro models allow full retraction.

Tower ratings to EIA specifications.

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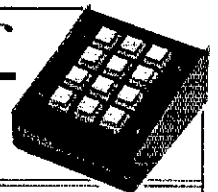
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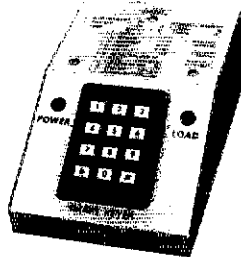
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retirement of WB2OCZ. W2SZ ARC had KA2HTU of AARA talk about the latest in amateur radio. WARA had an antenna presentation. K2ZVI demonstrated making printed circuit boards to WECA. OCT. PSHR: WB2VJK WE2G WA2JBO N2HIF K2ZVI WB1BTJ KB2EPU. OCT. Traffic: N2HIF 252, K2ZVI 135, WB2VJK 115, WB2EAG 79, WB1BTJ 77, WA2JBO 83, KB2EPU 49, WA2YBM 44, WE2G 38, K2ZM 35, N2FTR 30, WA2GY 27, W2CJO 16, K2HNW 13.

NEW YORK CITY-LONG ISLAND: SM, Walter M. Wenzel, KA2RGI-ASM Admin.; N2GQR, ASM VE; W2NL, ACC; KA2WJ, STM; K2MT, SEC; WA2UJ, OOC; NB2T, TC; WA2YNH, BM; W2JUP, PIO; KA2LCC. On behalf of all of the NYC-LI ARRL Section Leadership, we hope that the New Year finds everyone well, and we wish for the best for everyone throughout its days. The following are traffic nets in and around the section that handle NLI messages:

NET	FREQ	TIME	DAY	MGR.	SES	QNI	QTC	QSP
RAVHF	145.350/R	2000	DLY	K2YQK	...	...	...	...
NCVHF	146.745/R	1930	M-F	K2HPG	...	...	N/A	...
SCVHF	145.370/R	2000	S-F	KA2JMA	27	545	52	52
NYPCN	3.913 KHz	1700	DLY	KA2UBD	31	558	354	320
NYS/M	3.677 KHz	1000	DLY	N2EIA	31	378	267	240
NYS/E	3.677 KHz	1900	DLY	KU2N	31	391	187	176
NYS/L	3.677 KHz	2200	DLY	KU2N	31	318	207	176
NLT	28.450 KHz	2100	WED	KB2BKE	...	...	N/A	...
FSS*	3.590 KHz	1800	DLY	W2WSS	31	393	70	70
PNS	145.01	24hr	DLY	A1Q-4	...	...	N/A	...
PNS(alt)	145.03	24hr	DLY	WB2IBO-4	N/A	...	...	...

\*Independent Net, recognized by NTS, all times are local. Access A1Q-4 (Packet Node Station) via WB2QB-2 Net-Rom Node. Please check into the NYC-LI Ten Meter Net (NLT) for additional traffic handling training. Novices please take note that this net is designed for your participation. EVERYONE THAT HANDLES TRAFFIC MESSAGES PLEASE TAKE NOTE: make sure that any traffic you handle to or from the USA is for third-party agreement countries only, there has been some messages going around that should not have been handled. I want to thank Dom, WA2UJ, for taking over as SEC. Mitch, KB2CLI has taken on the responsibility of EC for the township of Babylon. EXAM SESSIONS: LIMARC-second Saturday of each month at NY Inst. of Technology, Old Westbury-contact Joe, N2NL, 516-541-2450; SUFFOLK COUNTY VE TEAM-second Saturday of each month at Suffolk County Community College, Selden-contact George, WA2VNV 516-751-0894; GRUMMAN ARC-second Weds. of each month (until June) at the Bethpage High School, Bethpage-contact Howard W2QUV 516-354-6861; GREAT SOUTH BAY ARC-every month on the fourth Sunday at the Babylon Town Hall Annex, North Babylon-contact Walt, KA2RGI 516-957-5726. If your group holds regularly-scheduled license exam sessions and/or classes, let me know at least three months in advance so they can be added to the column before the printing deadline. New Novice classes are starting at the Nassau County ARC and the Great South Bay ARC within the next few weeks. Please contact me for any last-minute additions as there is usually a few more new classes that start in the spring. EC/DEC reports: K2TWZ WA2UJ. If you need more information about your club's activities and would like to see them printed here, please send me the information and, space permitting, I'll add it to the column.

NORTHERN NEW JERSEY: SM, Robert R. Anderson, K2BJG-ASM's: N2CXX (SE), N2WMM (NW), WB2NCV (SW), N2XJ (CEN AND VE), SEC: N2BMM, STM: KA2F, COA/AC: KA2BZS, ACC: WB2HDB, SGL: W2KB, TC: K2BLA, BM: WA2UPK, PIO: NW2L, NNJ Ham Radio Inc. Line 201-680-1585. New appointments effective 1/1/89 are EC's: Montclair K2HDX, Fairview N2HCQ, Nutley WA2MHA, and East Orange W2FC. OBS: Raritan Bay ARC club station K2GE and N2HCQ. OBS: Raritan Bay ARC club station K2GE. PIA: N2ZT. Appointment endorsements for the next two year term starting 01/89 are DEC Passaic County N2DZZ. ATTENTION NNJ Clubs! The annual meeting of the Hudson Amateur Radio Council (HARC) will be held starting 9:30 AM January 7, 1989 at the Fire Training Center Valhalla, NY. Send your delegates. Congratulations to the following who were newly licensed or upgraded during October sessions conducted by: Northeast NJ Testing Assn. (2/2), Raritan Bay ARC (10/16), NNJ VE Board (2/1/16), Ramapo Mountain ARC (3/2), Bergen ARA (5/2/3), and Ocean Monmouth ARC (35/20). Novice (7): D Cooke, D Frantz, C Miller, J. Miller, J. Abreu, P Merritt and R. Lenehan. Technician (29): D Overcrash, KB2GIV, A Feldner, M Fenik, J O'Shea, E Worral, KA2ARL, KB2GHI, KB2GJS, KB2GHZ, KB2HDB, R Tubitz, KB2FTR, KB2FVM, KB2FZI, KB2GDV, KB6NHF, KA2UZP, WA2WMX, W Ayala, M Barabas, KA2ELH, KB2FOK, KB2GJB, KA2TQO, KA2ZA, KA2ZSK, R Skettini and T Kenny. General (7): KB2FID, KB2GDN, J Hancock (G4TAK), KA2BBR, KB2GHI, KB2GHI AND N3FVG. Advanced (13): KD2PM M Cangro, N2EER, K Lee, N2EAA, N2EQK, N2GGH, KA2UZT, N2HIA, N2HJP, KB2JIC, WB2OPA, AND K2YWI. Extra (13): WA2UWJ, KB2FOJ, WA2DWB, N2HDV, KE2HK, KE2IS, WA2LWA, KA2NKH, KA2BOP, WA2CYU, K3FNW, N3FVW AND WA2UHH. Total applicants (121). Total new or upgraded (69). 57%. The State Line HC provided communications for the 15th annual "Crop Walk for the Hungry" of the Upper Pascack Valley. Traffic Nets and Statistics for September 1988:

NET	MGR	FREQ	TIME	SESS	SES	QSP	QNI
NET							
NJM	WB2ZJF	3695	1000	DY	30	123	235
NJPN	W2CC	3950	1800	DY	34	102	273
NJNE	OPEN	3695	1800	DY/P	28	95	191
NJNL	WA2OPY	3695	2200	DY/P	...	...	...
NJSN	KA2INE	3735	1830	DY	30	23	147
OBTTN	KA2F	147.12	2000	DY	30	111	210
NJTTN	N2DXP	223.88	2100	DY	30	40	232
NJVN/E	WB2FTX	148.895	1930	DY/P	30	90	523
NJVN/L	N2FGC	146.49	2200	DY/P	...	...	...
NNJ/PL	W2QNL	145.01	24HR	VIA	WA2SNA-1	...	...

Packet NTS activity for October, 1988: Total 190. WA2SNA-1 auto forward (68) plus liaison (122) by N2ZT (18), N2HCQ (7), W2QNL (83), WB2FTX (6), WA2EXX (7), and KP2J (1). SAR/PSHR for September: W2RRX 281/124, W2QNL 382/138, K2VX 141/90, KB2BNW 27/47, W2XD 13/, W2CC 20/, N2XJ 278/104, N2DXP 182/82, KA2INE 71/78, WB2FTX 138/65, WB2QMP /69, ND2K 11/.

## MIDWEST DIVISION

IOWA: SM, Wade Walstrom, W8EJ-ASM; WB0AVW, SEC; KD0BG, STM; KC0XL, ACC; NU0P, OOC, WA0QMU, BM; K0IIR, TC; KD0AS, PIO; W0EM. The upcoming Section Manager election is, so far, a W0EJ and WB0AVW rematch.

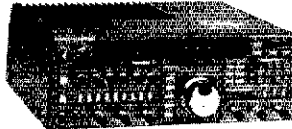


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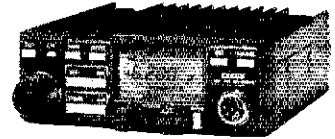
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BARRY KB8ASM, MIKE KB8CPB, KENNY KB8BVS, WOODY N8ECH,  
TONYA N8IUS, DENISE, MARIE, DEBBIE.

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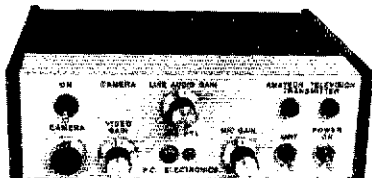


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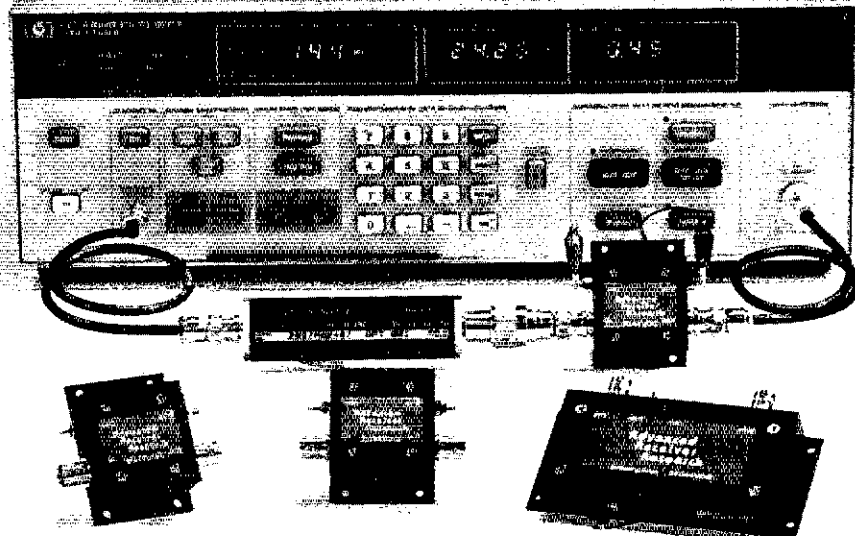
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P50VDG	50-54	<0.5	24	+12	GaAsFET	\$79.95
P144VD	144-148	<1.5	15	0	DGFET	\$29.95
P144VDA	144-148	<1.0	15	0	DGFET	\$37.95
P144VDG	144-148	<0.5	24	+12	GaAsFET	\$79.95
P220VD	220-225	<1.8	15	0	DGFET	\$29.95
P220VDA	220-225	<1.2	15	0	DGFET	\$37.95
P220VDG	220-225	<0.5	20	+12	GaAsFET	\$79.95
P432VD	420-450	<1.8	15	-20	Bipolar	\$32.95
P432VDA	420-450	<1.1	17	-20	Bipolar	\$49.95
P432VDG	420-450	<0.5	16	+12	GaAsFET	\$79.95

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SP28VD	28-30	<1.2	15	0	DGFET	\$59.95
SP50VD	50-54	<1.4	15	0	DGFET	\$59.95
SP50VDG	50-54	<0.55	24	+12	GaAsFET	\$109.95
SP144VD	144-148	<1.6	15	0	DGFET	\$59.95
SP144VDA	144-148	<1.1	15	0	DGFET	\$67.95
SP144VDG	144-148	<0.55	24	+12	GaAsFET	\$109.95
SP220VD	220-225	<1.9	15	0	DGFET	\$59.95
SP220VDA	220-225	<1.3	15	0	DGFET	\$67.95
SP220VDG	220-225	<0.55	20	+12	GaAsFET	\$109.95
SP432VD	420-450	<1.9	15	-20	Bipolar	\$62.95
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Be sure to vote! New officers of the Davenport RAC are Pres. NUBG, V.P. KAWVOW, Secy WDBAMA, and Treas. WAJOEW. The Davenport group also held an open-house at their Disaster Services Club Station. About 40 people toured the station and some new members were recruited. The Cedar Valley ARC helped local authorities monitor errant hobgoblins for this year's Halloween Witch Watch. The Fort Madison ARC held a Simulated Emergency Test on October 31. The Fort Dodge ARC has been accumulating a fine selection of club programs on video tape. The Clinton ARC was busy helping out with that city's Mardi Gras parade. Linn County ARES people were treated to the annual Duane Arnold Nuclear Energy Center emergency exercise on November 9. K0EGA, N0EUN, and K9CPG sprang into action early, demonstrating traffic handling capability with the State Emergency Operations Center in Des Moines as well as raising the ECs in Johnson and Cedar counties plus 22 local checkins and 8 relays from the Davenport area. I hope everyone had a joyous Christmas season and my sincere wishes to all for a prosperous 1989. Traffic: K0PT 156, W0SS 86, W0LYS 67, W0MCK 62, K0ADF 56, W0BAVW 32, K0GMP 23, K0WMO 20, K0VBA 9, K0KQJ 5 W0BOKA 2.

KANSAS: SM, Robert M. Summers, K08XF—SEC: N0BLD. STM: W00YH. ACC: K08XF. TC: K08HEP. BM: K0JDD. SGL: N0BLD. NM's: CW-W0B0ZY, VOICE-W0FRG, RTTY-OPEN, SLOW SPEED CW-W0MYM, WX NET-W0B0YWZ. PIO: W0B0VSG. DEC's: W00AG, W0EB, W0BYJT, W0FRG, NK0V, W0B0MDF, W0B0CVR. Sorry to hear that N0DWD's vacation in Oklahoma ended in a stay at a hospital. Also reported in the hospital at report time is W0TQ. Best wishes for speedy recovery to both. W0KL reports that 10 members of the Chippewa ARC furnished communications for the KC Regional Aerobatics contest this past month. New officers for the Kansas Nebraska ARC: Pres N0ALB, VP W0TQ, Sec K0UJAR, Treas W0WXY. New officers for Kansas Chapter 110 QCWA, Pres W0WXY, VP W0CBK, Sec K0JDD. Net activity for September.

NET	QNI	QTC
KSNB	1226	115
KPN	375	23
KMWN	959	675
KWN	708	585
CSTN	1953	65
QKS	509	66
QKS-SS	49	8

I am happy to report that Jim, NX0R, has consented to help coordinate the PACKET activity in the state of Kansas. A group did meet at the state convention in Wichita and decided to form the KsPRG, (Ks Packet Radio Group). Already information is on the Packet network and more will be following with reference the intended plans concerning traffic handling etc. Traffic: K08XF 190, N0ZM 174, W0F1R 170, W0FRG 152, W00YH 114, W0B0ZNY 82, W0FDJ 68, N0Z 58, K08RCH 58, W0QMT 46, KX0I 29, W0MYM 19, N0BDG 13, W0RBO 8, N0LL 2.

MISSOURI: SM, Ben Smith, K0PCK—After several years of faithful duty as Net Manager of the Missouri Emergency and Weather Net, Glen, K0DSQ, has resigned from that position. Ed, W0DELL, who had been acting as Net Manager has accepted a permanent appointment. I want to thank Glen for his work with the net, and I know Ed will keep the net going as it has been. The net meets every evening on 3.963 KHz at 2330 UTC. The Kansas City Amateur Radio Club has a new repeater on the air. The frequency is 444.25 MHz. The St. Charles ARC has announced they will hold their 1989 Hamfest Sunday August 27 at Blanchette Park. K0BJX and N0HMZ are co-chairmen. Amateurs in the Kansas City area have been busy providing communications for different fund-raising events in their community. On Oct 13, hams were on hand to help with the 1988 "Walk for the Hungry." W0AIB organized the amateur operation. On September 10 and 11, 33 amateurs assisted with the Multiple Sclerosis "150" bike tour. W0BZY was primary NCS with W0BEJJ, W06RED, W0B0VX, K0ME and W0B0G doing NCS duty. Six members of the Heart of America ARC provided safety support for the Armour Hills 5 K Race. K0ME organized the amateur participation. Amateurs in the St. Louis area also helped with the Multiple Sclerosis "150" bike tour. Twelve hams were involved with W0BDDK in charge. K0BAH and K0BJU provided communications for the 6th Mo. River Bike Trek on Oct. 1. Faiber Moran, 9N1MM was guest speaker at the Oct 6 dinner meeting of the Kansas City DX club. I received a very interesting and informative letter from N0CAD/K02XAE, the only experimental licensee in the Missouri Section and one of the very few in the US. Fred described the activity on the 17 meter band. He has a weekly schedule on 18.111 at 1900 UTC with other experimental stations in the US, Greece and South Africa. Everyone is invited to copy the mail. Silent Key report: W0MTI, W0N0X and K00AS.

NET	SES	QNI	QTC	DAY	TIME(PM)	FREQ	MGR
MOSSB	31	674	153	D	6:00	3.963	K0ORB
MEOW	31	602	112	D	6:30	3.963	W0DELL
MON	62	202	98	D	7:45	3.585	A1B0
HBN	21	355	25	M-FR	12:05	3.880	K0DSQ
RRABN	25	260	19	D	9:00	147.69	K0BANP
HARC	4	67	8	---	---	---	K0BSXY
CMEN	5	28	4	W	3:00	146.76	K0PCK
SLARES	5	348	3	M	8:00	146.91	K0WEX
PHD	---	---	---	M	9:00	146.43	W0BKUH
ZAEN	4	44	3	---	---	---	W0DELL
LOZBC(AUG)	28	484	0	M-Sa	6:30A	146.73	N0HVO
LOZFM	4	88	0	F	---	146.73	N0HVO
K0ARES	5	52	0	---	---	---	K0JAA
TRICOUNTY	4	51	0	---	---	---	---
SEIDARES	3	32	0	---	---	147.03	W0ENW
MXARES	4	31	0	Th	9:00	147.255	K0BACG
JC10M	4	16	0	Sn	---	28	N0SB
CARL	3	13	0	W	8:30	146.46	W0BWLU
MOFO	4	10	0	W	8:15	224.02	A1B0
JCRC	---	---	---	W	8:00	147.00	W0ORI
MCARES	---	---	---	Th	---	---	N2BS
SWMSW	---	---	---	---	---	---	K0KCC

Traffic: N0Q8 532, W0BYJX 258, A1B0 170, W0HTN 112, N0BN 101, W0U0D 48, K0PCK 39, K0UCO 33, W0BTVV 15, K0VNB 10, W0RL 8, K0EAB 8, N0MU 1.

NEBRASKA: SM, Vern Wirka, W0BQOM. STM: Jerry Kohn, W0BEGK. SEC: Michael Ruhdranz, N0FER. The Nebraska Unicameral will convene this month. Please listen for information on the amateur license plate legislative bill that will be introduced. Information will be distributed through the section nets, local nets, packet BBS and Official Bulletin

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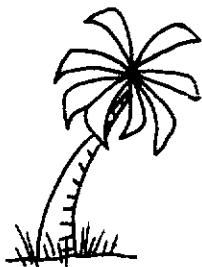


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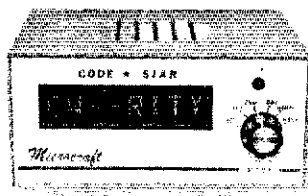
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Stations. Please contact your local state senator and let him or her know your opinion. As of this month, your Section Manager begins another two-year term. I am looking forward to serving the Nebraska section again. All of the current section level and Field Organization appointments will remain in place. Remember there is always room for more volunteers in the Field Organization. Thanks for a job well done to Kenneth Albright, WB0GMQ, of Orleans, NE for all of his efforts in his former capacity as Harlan County EC. WB0GMQ continues to serve as the Net Manager for the Nebraska Com-husker Net which meets everyday at 12:30 PM central time on 3.980 MHz. The Omaha area QCWVA monthly luncheon location is now Denny's restaurant, 515 North 98th Street, (east side of the westroads shopping center) in Omaha. The QCWVA group will meet on the fourth Wednesday of the month at 11:30 AM central time. Dodge County ARES members participated in an October 1 drill organized by EC Christensen, W0NNL, of Fremont. The drill consisted of a scenario where a young girl is reported missing and local amateurs are asked to help in the search. To add realism to the drill, W0NNL obtained a Mannequin from a local dept store, dressed it like a young girl and actually hid the Mannequin in a Cornfield, according to the Pioneer Radio Club newsletter. The Pioneer Club also reports that during a September cross country meet in the rural north bend area, Steve Narans, WB0VNF, and his wife witnessed a participant collapse. WB0VNF called for assistance on the W0RCH 146.07-67 MHz repeater. Steve Benke, N0LLA, answered and called 911. The North Bend rescue squad was on the scene in ten minutes. The teenage girl had a high blood sugar level. Because of the quick response of Amateur Radio and rescue personnel, the girl received the proper medical attention at a local hospital and was treated and released. On September 22, Omaha area amateurs participated in a drill that tested capabilities of Omaha hospitals to deal with receiving large numbers of patients from a disaster in another community. Traffic: K0DKM 580, K0BXQ 44, W0B0K 28, W0KBS 25, W0B0T2 25, K0MZV 17, N0DA 9, W0B0GM 6, W0CO 2.

### NEW ENGLAND DIVISION

CONNECTICUT: SM, Caesar Rondina, N1DCS—ASM: KB1H, STM: K1E1C. SEC: N4GAA. OOC: N41L. ACC: NK1J. BM: N1EE. PIO: WA1CMF. TC: W1HAD. SGL: K1AH. As we enter a new year, I hope everyone will look back and remember all the good that 1988 brought them. We wish to all, the best of the holiday seasons and a most healthy and Happy New Year. I've had the great opportunity to visit many clubs since I took the reins in October, and have found a great deal of enthusiasm in the section. This spring, we will be planning a CT Section gathering of all clubs in CT. The purpose will be to meet each other and get to know some of our counterparts in other areas of the state. There will be more info as the time comes closer. Also, I strongly urge each and every CT club to become involved with the Connecticut Council of Amateur Radio Clubs. They meet every Tuesday of the month at 7:30 PM at ARRL Headquarters. The group's sole purpose is to swap ideas and to be a common ground for each club helping one another. I have been attending, and the idea is super!! For more info, contact Les, KA1KRP. Let's show our spirit; get involved. KA1ION and members of WARC went to Mattatuck Boy Scout Camp to set up and operate two stations for JOTA. Congrats to FARA for a place in the New England Division Newsletter competition. Congrats to SCARA for another successful flea market. Way to go... congrats to N1EEE for his appointment to Bulletin Mgr. He can be reached at 288-8444. Remember all, our field appointees are always ready and willing to speak at any one of your club functions. Just call them. Members of TSARC, please make note of the address change for your records: TSARC-P.O. Box 415, Farmingville, NY 11738. Remember, support your clubs, help them to make it happen till the next time. 73.

NET	SES	QNI	QTC	NM
CSN	22	112	40	WB1GXZ
WESCONN	35	473	132	NQ1P
RASON	31	217	59	NK1N
NUTMEG	31	649	178	NM1K
CPN	35	432	144	KY1F
TMRCN	5	101	4	NM1K

Traffic: NM1K 406, N1DMV 378, WB1GXZ 236, KA1GWE 163, KA1JAN 120, N1API 107, KA1FVY 91, KY1F 76, N1FNN 56, W1WP 54, NK1N 53, KY1T 33, KB1ZC 32, N1BOW 25, W1YOL 25, NK1J 22, W1BDN 22, WB4FCC 19, KA1RVI 16, KA1SJU 10, KA1SBI 8, W1CUH 8, W1QV 7, WB2SGI 7, K1HEJ 3.  
MAINE: SM, Bill Mann, W1KX—SEC: KABUQV. STM: WAZERT. ASM (PACKET): N1AHH. ACC: W1RWG. BM: W1JTH. SGL: K1NIT. TC: KQ1L. Maine observed the annual Simulated Emergency Test on Oct. 28 in conjunction with NVOAD - National Voluntary Organizations Active in Disaster. Red Cross, Me. Emergency Management Agency, Salvation Army, etc. participated in various counties and messages were handled on their behalf. Kennebec Co. EC KA1LPW reported 23 Amateurs participated and handled 19 messages in their exercise. A Mini PBBS, N1CBA-8, is now operating in Augusta and dedicated solely for ARES. Boy Scouts from around the state participated in this year's Jamboree-On-The-Air, Oct. 15-16. Amateurs toured the new National Weather Service office at the Portland Jetport on Oct. 29 at an open house which was set up by N1DEE. The following Augusta ARA members participated in a United Way Marathon on Sept. 27: N1ESW, KA1DLZ, N1CBA, KA1RFD, KA1LPW, KQ1AC, W1TGY, W1JTH and N1JFL. The Sea Gull Net celebrates its 60th year in 1989. K1GUP is collecting copies of old logs, etc. Anyone with anything that relates to SGN history or with ideas to help celebrate the event should contact K1GUP. Congratulations to Augusta ARA's "The Augustan" for winning an Honorable Mention for News Reporting in the 1988 New England Division Newsletter Competition. The State of Maine YLs (SMYLS) held their fall meeting in Old Orchard Beach. Any YLs interested in joining SMYLS should contact W1TGY. Silent Keys: KA1CS, W1WDX, VE Exam: Jan. 7, Rockland (Know Co. Court House), 8:30 AM (K1CGG). Six OBSs sent 14 ARRL Bulletins and 7 Me. Bulletins during Oct. Happy New Year!

NET	SESS	TFC	QNI	MGR
AROOSTOOK EMERG NET	4	1	88	W1AYNZ
CENTRAL ME EMERG NET	8	3	163	N1EUK
CUMBERLAND CO ARES	5	0	96	KA1OOT
HANCOCK CO NET	5	2	50	WAZERT
KENNEBEC CO ARES/RACES	7	19	119	KALPW

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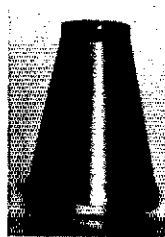
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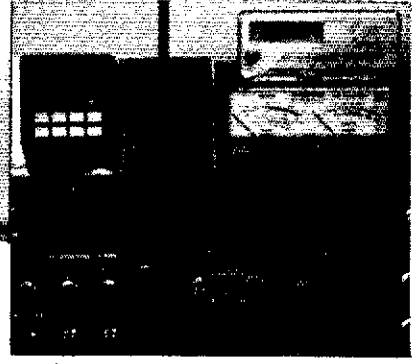
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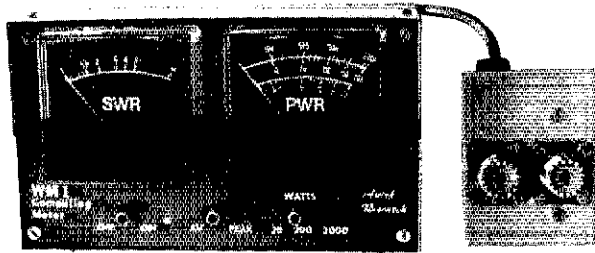
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N1BCF 40, N1BJW 33, W1BMX 27, KA1ODT 15, W1OTQ 10,  
WA1YNZ.

**NEW HAMPSHIRE:** SM, Bill Burden, WB1BRE—TC: W1JY, SGL: N1AIX. Recently, I got a call from someone I had worked with 20 years ago and had seen only once in the intervening years. He had been a Ham, but had "dropped out" years ago. He is now living in Plymouth and both he and his wife decided to get back into the hobby. After he recovered from technology shock of a visit to a local Ham Store, he said they were ready to go for their licenses. I contacted Johnny, W1JY, who was the closest contact. As it turned out, he and John had worked together 25 years ago. Johnny channeled their enthusiasm into preparing for the Novice classes in Laconia and helping them get information. Within a matter of days of the initial inquiry, these folks had information, training packages, help from area Hams and were preparing for classes! It was clear that we have the training material and facilities to get people started, but more important—we have Hams like Johnny throughout the section willing to put the effort in to follow up and make sure that it all happens! Our ability to grow is directly related to the effort we personally put into the hobby. Help someone get into Ham Radio—it's a good feeling! My travels this month took me to Boxborough convention to see many of you. It was a full weekend and I enjoyed the opportunity to speak with many NH Hams. Dot and I joined a group from the IRS on a dinner trip aboard the "Mt Washington" on a cruise around Lake Winnepesaukee. Later in the month, we attended a luncheon meeting of the 10-10 White Mountain Chapter in Manchester. I was invited to speak on current FCC actions and Section activities by host John, KA1LEV. Novice classes are now in full swing in Rochester, Derry, Manchester (4H) and soon to start in Manchester (GSARA), Contoocook and Central NH. Contact your club officers for more information. New GSARA officers are Pres: N1FIL, VP: N1FIK, Treas: KA1FRS, and Sec: K1HH. New GBRA officials are Pres: KC1KA, VP: N8AYZ, Sec: WB1ALO, Treas: WA1PEL. Thanks to all who put time in to make our clubs work! K1ACL and KA1GOZ represented our ARRL section at the NH chapter meeting of the Volunteer Organization Active in Disasters (VOAD). This will strengthen our links to statewide disaster relief and support organizations. Clubs and groups around the state participated in the SET and in the Scouts Jamboree on the Air. Both activities were on the same weekend, providing opportunities for some exposing scouts to Ham radio. New section appointments include ORS-WB1HBB, KA1NXT, and KA1OU: EOS-NE1V. WB1HBB reports that the IRS provided a Halloween Pumpkin Patrol for the Derry police dept. Net control NM1D reported that 20 on-the-road Hams provided "eyes and ears" for the police who reported a measurable decrease in disruptive activities in the areas patrolled by the Hams. Are you putting something back into your community? Mt Moriah Repeater Soc. reports that 8 of 21 applicants at their October VE session upgraded. Congrats to the Contoocook Valley Radio Club and Pres, K1OPQ, on becoming our latest ARRL Affiliated Club. This club began on the day that Novice Enhancement went into effect, and hasn't stopped since! Alan, W1FYR, and Bruce, WA1YZN, were featured speakers at the Souhegan Valley club 88/89 kickoff meeting with a presentation on ARES. FOR FUTURE PLANNING—the NH QSO party will be held Feb. 4-6, 1989. For more info, contact Pete, K1IM. The Concord Brasspounders have setup a winter schedule of speakers and programs and are working to expand membership. Contact them via PO Box 2214, Concord, 03302-2214. New CNHARC officers: Pres: KJ1O, VP: NT1Q, Sec/Treas: W2JQL. Pres. Dick presented KA1QVP with a First Contact Award for his QSO with Anguilla. Our section had 100% rep on FRN and 91% on 1RN/3 in October for a fine showing by the NTS staff October traffic summary: Nets: G5FM 133, G5PN 116, NHN 47, NHNTN 23. Stations: W1PEX 1879, KB4N 1538, WA1FHB 834, N1CPX 388, K1TOY 192, KK1E 80, W1FYR 73, NE1J 64, W1ALE 48, WA1YZN 48, N1ALM 43, KA1ROH 37, KA1OU 33, KA1GOZ 27, KA1NXT 25, KH6GR 10, KA1HPO 9, N1FYD 8, KA1OLK KA1JOU KA1LBW 4, N1DQA KA1KFX 3, K1M 2. BPL: W1PEX, KB4N, WA1FHB. PSHR: KA1HPO, N1CPX, W1PEX.

**RHODE ISLAND:** SM, William M. Foss, KA1JXH—Dave Chandler, N1BED, is interested in starting a new club. He is also looking for anyone that would be interested in joining and getting started. Call him at 949-4556. Anyone interested in ARES call Bill Boyce at 738-2624. On Oct 2, the NCRIC provided comm. for an all-day bicycle race in Middletown. E. Bay & NRIRC provided comm. for the Barrington International Soccer Tournament. BVARC has its own pocket BBS on 07. New officers: Pres N1CFE, VP WA1FOX, Treas K1EHV, Sec WB1HGL. Contact me or Bob Vota, WB1FDY, RI ACC, with your club's new officers. Traffic: W1EOF 312, KA1JXH 155 (PSHR 79), WA1CRY 29. Hope everyone has a Happy New Year.

**VERMONT:** SM, Jonathan P. Maguire, N1CQE—ASM (RFI): W1CTM, ASM (Education): WB2MIC, ASM (Packet): K1AUE, SGL/SEC: W1KRV, STM: KT1Q, TC: W1AIM, PIO: WA1YOY. Now that the holiday season is over, it's time to think about doing some serious operating! There are many contests coming up—the Novice Roundup, and the 1st RTTY contest. Check your QST magazines for details. WB2JSJ reports the following activity at the Oct. 14 exam session: Adv: N1EOZ. Tech: KB2FUJ, KB2GCS. Gen: KA1NWI, N1FKT. WA1JVV reports these upgrades at the 11/7 Border ARC session: Adv: KA1PYK. Gen: N1FYC, KA1QZR. Tech: KA1QZP, new ham Larry Messier. Congratulations to all and happy hamming! The results of the Oct 15th SET are in. W1KRV reports that we had a fairly good showing. However, more people are needed to make this thing work. VTN handled over 25 pieces of traffic. A good place for training is the VT Phone Emergency net, 0830 local, Sunday, on 3976 kHz. Please check in. Due to the efforts of W1KRV, we have 227 ARES members. If you're not a member, why not join now. PSHR Stations: WA2SPL, KT1Q, NB1A, WA1JVV, N1DHT, WA2SPL earned another BPL, and Vermont had 100% on 1RN/2 and 1RN/3, and 98.4% on 1RN/4. Fantastic! October traffic: WA2SPL 2277, KT1Q 416, WA1JVV 190, WA1VXW 190, N1DHT 150, KC1K 130, W1KRV 83, NB1A 71. Net reports: CN 26/454/48, CVPMN 5/100/14, GMIN 26/455/23, TwinSFMEN 4/45/0, TRSFM 4/66/6, VTN 32/153/173, VPN 5/81/7, VT Slow Speed 11/75/9.

**WESTERN MASSACHUSETTS:** SM, Bill Voedisch, W1UD—



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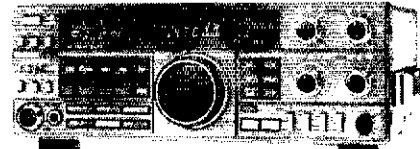
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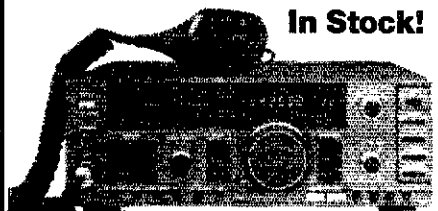
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01/89

QO/R/F: N1CM, PIO/ACC: K1BE, SEC/SGL: WB1HH, TC: KA1JUM, STM: W1KK. It's been a busy month. Clubs in the sections are back in the swing of things. Thanks to Chris, WA1QVF, the Cycle 1 WMTN had an impressive 189 check in during the first month of operation. Her 10 AM slot on Mt. Greylock (K1FFK/R) cleared over 50 messages. Join her! Outlets needed. Jean, KA1FC, is now Packet Net Manager. An impressive traffic score (875) was totaled between her, KA1EXJ and KB1TH. Great job! Since Jean assumed the job of Packet Net Mgr, traffic is flowing throughout the section on packet as well as the other modes of communication. I have a FMS operating on 145.07 that is operating 24 hours. Drop your section news and other information into the PMS. It is programmed for third party use, and if an answer is expected, you can pick it up off the PMS. N1CQ spoke to the members of the Mt. TomARA on propagation predictions. It was an interesting program and the members enjoyed it. On October 8th, the MtARA provided communication for the Mt. Holyoke Regatta. Great job. W1NY-2 will be moving to N1EUZ's QTH in Feeding Hills. That still can be accessed through W1NY-1. W1NY is the official packet gateway station of Western Mass. Section. They will be using new software. That should enhance and expand its operation. The guys and gals from NOBARC did it again. They found a downed plane on Greylock. Considering the ceiling was at 1200 feet and the plane crashed at 2500 feet. Cooperation between CAP, MSP, NYSP, US Coast Guard, EMTs, DEM and NOBARC made the find possible. Great job. Great PR also as the media covered rescue. I'm very proud of the inter-agency cooperation. This just illustrates that it is possible to work together. The WMEI ARES nets meet Sunday morning on 3.957 MHz at 8:30 AM, on 146.910 MHz at 9:00 AM, on 53.230 MHz at 9:15 AM on 224.1 MHz at 9:30 AM. The WMPN meets at 6:00 PM Mon-Fri on 3.937 MHz and Sunday at 8:00 on 28.450 MHz. The WMN (CW) meets at 7:00 PM daily on 3582 KHz. These are your section nets. Participate in them. Traffic: KA1FC 621, KA1EXJ 162, WB1HH 79, KB1TH 92, WA1YK 90, K1JHC 33, W1BJV 31, KA1QVF 89, W1KK 85, WA1OPN 12, K1ZL 22, K1JFU 23, W1ZPB 8, W1UD 200.

## NORTHWESTERN DIVISION

IDAHO: SM, Don Clower, KA7T—ASM: K7REX, STM: W7GHT, OOC: WB7CYO, ACC: N7BI, PIO: W67E. I attended the Emmett ARC meeting last month and they should have their repeater up in a couple of weeks. The freq. is 147.700/100 and will have phone capabilities. The Twin Falls ARC is getting a new antenna for their repeater. Twin's Xmas party is Dec. 10 at 7 PM at the Mandarin House in Twin. I would like to wish all of you a merry Xmas and hope you have a safe and happy New Year. Traffic: W57U 68.

MONTANA: SM, Ken Kopp, K0PP—FVARC (Kalispell) gives first year membership to its new Novices. Their K7GL SK on 20th Oct. GHRFC's N7GDM replaces retiring W4ST as EC for Gallatin County. Their N7VY authored Nov QST article. YARC's N7FFA (Glasgow) is EC for Valley County. HARC's (Missoula) K0720 has info (biz base) to use C-64 or 128 as packet TNC. GFAARC (Great Falls) provided comm for Lick Creek fire and for 900 runners during Sept. You'll get ballots for SM election in early Jan. Ever wonder how size of QST Section News columns are set? Depends on member count; our section gets about 16 lines. Traffic: W77GU 504, (PSHR) W7BKB 4.

NET	SESS	QNI	QTC	MGR
IMN	31	315	101	KA7EEE
MSN	54	58	0	K0PP
MTN	31	1643	83	K67R

OREGON: SM, Randy Stinson KZ7T—ASM: KM7R, STM: W7VSE, SEC: W7FBP, PIO: KC7YN, SGL: KA7KSK, ACC: W7FQ, R/F: AK7T, OQ: W7N7W, STC: N7ENI. We have a new Emergency Coordinator in Linn County. His name is Jason Conolly and his call is N7IME. The unusual thing about this appointment is that Jason is 14 years old. He wrote and asked if it were possible for him to be the EC. I talked it over with my SEC Dale W7FBP and we felt that if Jason had an Assistant EC who could handle some of the adult situations, there would be no reason for him not to be the EC. I would think that Jason has to be one of the youngest ECs in the country. There are some interesting stories coming out of the fires in Oregon. Some hams in Lane County called LAPS (Lane Amateur Public Service) set up a two meter phone patch for the fire fighters at the Hills Creek Spike camp. Over four evenings they handled 142 phone calls around the United States. How it all got started was Gary, KB7EOQ, the Emergency Manager of Lane County, contacted Fran, F7TWD, to see if something could be worked out. Fran contacted Stan, W7CLN, Emergency Coordinator for Lane county, and between them they set up the patch. Fran and a group of hams worked at the site and Stan did the phone patch at home. Fran said it was a joy to see how happy the weary fire fighters were to get to talk home. Bob, KA7EF, Josephine County EC, reported in the Grants Pass area there were twenty hams who manned an evacuation center for the Mt. Walker fire. They drove 240 miles and spent 148 hours in manning the center. Traffic (P) = Packet W7VSE 340, N7BGW 247, WB7VSN 238, W67H 161, KA7EEE 155, W7X 150P, W7LNE 145, W7LRB 140, WB7VMS 120P, K7IFG 77P, W7ODG 59, KA7SYG 57, W17E 56, KV7F 53, WB7EIMO 43P, KZ7T 38P, KD7YJ 17P, KA7ID 16, W7BUD 11P, N7CPA 11P, N7IXS 6P. (Sept.) N7CPA 239P, W17E 65, W7ODG 41.

WASHINGTON: SM, Brad Wells, KF7L—STM: KD7ME, SEC: KA7INX, TC: W7BUN, OOC: N7DVR, SGL: KD7AC, BM: N7CAK, PIO: N7FKV, ACC/ASM: KC7PH, ASM: KA7C6P, ASM: W7UOF, ASM: K7CLL. How about a New Year's Resolution to try a different operating specialty? Nothing so dramatic as buying a bunch of new equipment, but rather doing something different with your operating time. If you're active in traffic handling, why not try chasing a little DX? How about a little casual contesting? If you have never done any public service operating, why not check into a traffic net once a week? After spending some time in amateur radio, many of us become single specialty operators. Our hobby becomes DX, or contesting, or traffic handling, or ARES, or something else. We should use our existing equipment to periodically investigate other operating modes. This will provide a fresh perspective and maintain an appreciation for what others are doing with their time and equipment. Another excellent resolution is for each of us to recruit one new amateur into our ranks. More hams provide additional political muscle at both state and federal levels. The VHF Sweepstakes is this

month. While this contest generates a lot of activity on the East Coast, there is only moderate activity from this Section. Why not give 6 meters a try? The MUF may reach 50 MHz on this weekend and provide some rare DX opportunities. Don't forget the RTTY Roundup on January 7th and 8th. The driving force behind the creation of this event was the Inland Empire DX Assn. Expect lots of competition from the Spokane area in this one. Effective January 1, the ARRL/VEV will charge \$4.75 for amateur examinations. The resolution to split this Section, east and west, may see action at this month's ARRL Board of Directors Meeting. North Kitsap ARC is now meeting at the Silverdale United Methodist Church, 9982 Silverdale Way (2nd & 4th Tuesday @ 7:30 PM). Our Section Traffic Manager, KD7ME, offers the following update on packet traffic handling in Washington Section: "Incoming traffic usually comes through the HF Gateway stations WB7DCH. Due to schedule constraints, he permits no user connects. He forwards all incoming packet mail to a hub BBS, N7HFZ. The hub BBS permits only limited user connects other than BBSs. Packet mail is forwarded to all major BBSs serving the Section. We use ZIP code routing. Fifteen 3 digit ZIP codes exist for Washington. All but two have been assigned to a specific BBS. Incoming NTB traffic moves towards its destination through the packet network using the automatic routing capabilities of the store-and-forward BBSs. Outgoing traffic follows the reverse route: BBS to hub BBS to HF Gateway BBS or adjacent Section BBS. In-section traffic is sent directly to adjacent BBSs or to the hub for routing." The Western Washington DX Club is working to develop a packet DX spotting network. Look for another WWDXC 10 meter dash in May. This has become a semi-annual, low power, 2 hour contest open to all. Congrats to Bob Brunkow, K7NHE, for being elected the Seafair President for 1988-89. The Northwest DX Convention will be July 28-30 at the Renton Holiday Inn. 622 hams signed the register at the W7DK booth in the Hobby Hall at the Western Washington State Fair in September and 373 radiograms were transmitted through the NTS utilizing CW, SSB, FM, and packet. One result of the Section's formal agreement with the FCC has been a dramatic increase in our RFI/TVI caseload. We need additional Assistant Technical Coordinators to help resolve these problems. If you're interested in volunteering and helping your fellow amateurs, contact our Section Technical Coordinator: W7BUN. PUBLIC SERVICE: Astin 3; Benton 40; Franklin 4d; Garfield 1; King 145; Pierce 22. Traffic: WA7CBN 92, K7CLL 4, N8EQZ 108, K7RF 38, KF7FF 60, W7GB 112, W7GGJ 55, K7GXZ 137, W7IEU 8, W7IG 188, W7LKB 30, K7PMD 34, K7SUX 63, KA7TTY 28, K7UQH 45, WB7WOW 81, WA7YEN 97, KD7ME; KR7L. PSHR: KD7ME, WB7WOW.

## PACIFIC DIVISION

EAST BAY: SM, Bob Vallo, W6RGG—ASMs: W6ZF, W63FCV, SEC: W6LKE, STM: K6APW, OOC: NY6Z, TC: N8AMG. The CCCC welcomes new members N6PXY & N6SPY and congratulates K6BYQJ on his upgrade to N6SQD. MDARC membership now stands at 293, and they have 45 in their Novice class plus 8 in their Tech/Gen class! EBARC's "The Blown Fuse" has taken on a new look in which they and editor, W6DGGC, can take pride. Member W6DLR is currently giving Novice classes to 15 members of the Richmond Yacht Club. LARK reports the following upgrades — N6SCJ/ADY, N6SYP & N6SLE/GEN, & K6BYW/TECH; and welcomed new member N6SRT. BARC is once again involved in collecting items for the orphanage in Mulege, Mexico. Among the most sought after are eyeglasses and sunglasses, which will be prescribed by the Rotarian doctors at Mulege. If you have spare pairs of either type, please contact K6BIA on their Monday night nets on 147.735 (-600) and 442.750 (100.0 PL), or give Dave a call at 707-745-4939. HRC's newsletter contained an informative article by Section OQ, N76V, as well as the general rules for the JARL Awards Program. Oct. traffic: WB6DOB 223, W6VOM 144, K7VA 12, (Sept.) K7VA 35.

NEVADA: SM, Joe Lambert, W8IXD—ASM: Curly Silva, K7HRW. Thanks to all who contacted their congressmen relative to FCC NPRM 87-14. All four congress persons were co-sponsors of resolutions in the Senate and House supporting the amateur position. Can any other state match that?? SIERA is holding training sessions for emergency net control operation and also VEC exams. Contact W6FTT about either. Truckee Meadows Amateur Radio Association is making extensive preparations, including installing 4 repeaters in northwestern Nevada, for upcoming Special Olympics on April 1-8. If you can help with this event, contact WA7UJB, NARA, WADG and FARS all operated W200 Bicentennial stations and made thousands of contacts. RACES needs net control stations for its Monday night 75 meter net. Contact K7HRW if interested. IARA now has a voice mailbox on NR7A repeater. All of the clubs report a very successful 1988. We wish you an even better New Year!

PACIFIC: SM, Wayne Jones, NH6GJ—Greetings to all from the land of Aloha! The first coordinated statewide SET was held Oct. 22. The event was coordinated by AH6CP, State RACES Officer, and was well done. Amateurs on all major islands participated, and we all learned a lot! Congrats to KH6HU who opened the Waimea High School ARC station for the first 8 hours of the CQ WW SSB contest. 15 students participated and made 20 contacts. W1YHRM, KH2CC, AH2BY, KH0AH and WH2AEN provided support to the SUN-ZEN/USO Bike race on Oct. 29. New officers for EARC: President-KH6NJ, VP-KH6BJ, Secy-KH6CV, Treas-NH6QY, Directors-KH6CJZ, NH6GJ, AH6BJ, NH6LF, KH6TB. Traffic: KL7IVQ 94, KH6S 39, KH6H 38. Aloha from all of us to all of you!

SACRAMENTO VALLEY: SM, Bob Watson, W6IEW—This month's report has some bad news and some good news. The bad news is the illness of some of the prominent members of our Section—the good news is that they are recovering. Alan Christian, W6WB, president of the River City ARCS, suffered a brain aneurism after hitting his head in a bicycle accident and spent several weeks in the hospital. He is up and about and by the time your read this should be back at work. Chet Almond, N6DRU, the Northern California MARS Emergency Coordinator, was really hit with the flu and pneumonia. He ended up in intensive care for several days but latest reports have him improving. I am sorry to report that John Szucs, WA6ZGS, an Assistant Technical Coordinator for years has resigned for health reasons. John has given a great deal of technical help to many hams and has served



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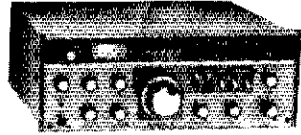
TA-33	CLASSIC 33
TA-34	PRO-67

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HD-73.....CALL	MR 750 PE.....CALL

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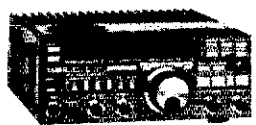
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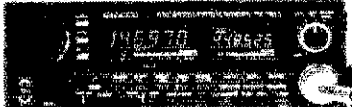
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the community in many other ways including maintaining the Lifeline equipment as an unpaid volunteer. Take a well-deserved rest, John, and know that you have the thanks of many people. Might as well finish this column in the same vein noting that Andy, WA6WGC, is doing nicely recovering from his surgery and Wes, W6PI, claims that he can see better than ever after having cataract surgery. The REALLY good news is that the rains are here, and we should not have to respond to calls from the USFS or the California Department of Forestry for communications help at wildfires for several months. Traffic: WA6WJZ 430, N6LJY 178, WA6ZUD 68, W6RFF 35, W6CFQ 33, K6SRF 33, W6BSRQ 16.

**SAN JOAQUIN VALLEY:** SM, Charles McConnell, W6DPD—SEC: W6CU. STM: N6AWH. TC: W6EXV. ACC: W6DDP. Asst. SMs W6TRP and K6YK. Appointments renewed; ORS W65YAB, EC KA6HAB. The Turlock ARC operates a link to Yosemite National Park. The link output is 147,000 MHz with the input on 147,500 MHz. The link is tied to W6BXN/R 147,030/444,700 MHz. The link operates 24 hours per day. The Turlock ARC invites all amateurs to check in when visiting Yosemite National Park. New officers of the Central California DX Club are Pres. WA6UOR, VP W6YGO, S/T W6QON, KA6AMD, K6JLA, W6YTT, and W6ZLA are Extra. KA6ADP, WA7PEZ, and N6SIZ are Advanced. KB6VAG, KA6HUG, N7IRV, N6RSS, and N6SIX are General. K6BSZV, KB6ZPH, KB6ZPO, and KB6YZZ are Tech. KB6ZNV is N6TJF. KB6ZNU is N6TLB. W66VPG has an IC32AT. Traffic: N6AWH 94, WA6YAB 12, N6MXG 9, K6RAU 7.

**SANTA CLARA VALLEY:** SM, Glenn Thomas, WB6W—SEC: WA6OCV. TC: WA6PWW. STM: N6JLJ. PIO: WB6OML. ASM: N6JQJ. ACC: W6MGM. BM: (vacant) OOC: KA6S. JULY — First, a reminder. There is a telephone number that has information on Amateur Radio License classes. Well, it only has the info that I put on it, and I can only put on it what I know about. PLEASE, let me know about any classes your group or club is sponsoring so that I may include them on the recording. My phone number is on page 8 of this issue of QST and is (408) 263-9450. Some folks have wondered what the number in parenthesis after each call in the traffic totals is. That is the number of messages originated or delivered. The most important part of traffic handling is contact with the public, and origination/delivery is the ONLY real contact the public has with NTS. The additional number is recognition for those who have made the public contact and spread the good word about Amateur Radio. As many of you have noticed, the SCV column wasn't in the last couple of issues. My apologies. My time was spent motivating people to speak to their Congressmen and Senators concerning 87-14, the 220 grab. Hopefully, we will not have another crisis like that any time soon. We now have an Official Observer Coordinator in the section. He is Steve Wilson, KA6S. I am confident that the OO program will now move ahead at a much more satisfactory rate now that Steve is at the helm. I saw and met many of you at the ARRL Pacific Division Convention, Pacific '88. Those who were there had a wonderful time. Thanks to all of the convention committee for their hard work and dedication, and especially to Shorty AEZ who pulled the whole thing together as Chairman for the third year in a row! The Simulated Emergency Test (SET) was moved from October to early November to avoid conflict with the convention. I had a message already waiting for me from the excellent SET held on Monterey in October. Also, county wide coordinated SETs were held in Santa Clara and San Mateo Counties. Thanks and well done to all who participated, and especially to the "Murphy Committees" who scripted and coordinated the SETs for all the ECs involved. JUNE: NR7E 128 (0). JULY: W6KZJ 100 (5), NR7E 32 (5). AUGUST: NR7E 111 (1), W6KZJ 59 (3), KA6SXW 18 (0), K6BIWG 10 (1), WA6HAD 4 (3) SEPTEMBER: AB9B 95 (19) OCTOBER: NR7E 47 (0). Phone numbers: Amateur Radio Classes (408) 971-1424. License Exams (408) 984-8353 (ARRL VEC) or (408) 255-9000 (Sunnyvale VEC).

## ROANOKE DIVISION

**NORTH CAROLINA:** SM, W. Reed Whitten, AB4W—ASM: AB4S. SEC: N4MYB. STM: K4NLK. BM: K4IWH. ACC: WC4T. TC: K4ITL. SGL: KE4ML. PIO: AB4FW John Chan, KE4ML, has been SGL since 1985. Under John's leadership the General Assembly enacted legislation which reduced the extra fee for an Amateur Radio license plate by 80%. In addition to keeping aware of pending legislation, the SGL acts as liaison to all State agencies. John has been very active in emergencies and exercises and has a key role with the State Emergency Response Team (SERT). John's XYL, Anne, is a KB4ZLU and his father is W4CTP. Jack, KE4ML has done an excellent job for the Amateurs of our section and I appreciate his help. [BT] Good luck to the newly organized North Carolina Packet Radio Council (NCPRC) which held its second meeting on November 12 at the State EOC in Raleigh. There were about 18 present. The purpose of NCPRC is to advance the general interest and welfare of Amateur Radio digital communications in NC. The next meeting is planned for February 11, 1989, again at the State EOC in Raleigh. NCPRC officers are: N4CLH (P), W4WOP (VP), KA4CJN (S), WB2LEI (T) & KK4L (newsletter editor). Think about joining this group if you have an interest in packet radio. [BT] All ECs please don't forget to turn in your SET reports. K4CF, EC of Moore County, reports an extensive SET which involved virtually every town in the county and over 100 messages composed by the county EM director. Total score for this one county's effort was 560 points. Walt's group had the highest score in the section last year, looks like they will repeat again. Congratulations to Walt and his ARES group. [BT] Recent hurricane activity in the Caribbean resulted in good publicity for Amateur Radio throughout the section. TV and radio stations were looking for stories with a local interest and sought Amateurs involved in H&W traffic to the area. Many Amateurs appeared in TV news stories. Don't pass up an opportunity to be on TV, their skillful editing can even make me look good. [BT] October traffic: K4NLK 438, AA4TE 203, KA4EYF 148, K4IWH 144, WD4HTE 115, AA4ZV 102, N9CGD 76, WB4WII 51, AB4EO 43, N4JRE 42, WD4MRD 39, W4EHF 33, N4UE 31, W4LWZ 30, W4MNR 29, N4SVZ 28, K44KGZ 28, W4AFKF 25, K44YV 23, N4LST 21, WA9N2W 20, WA2EDN 17, NT4K 16, AB4W 9, WD4LS 7, AJ5F 3, N4TCH 3 [AR]

**SOUTH CAROLINA:** SM, Charles Moeller, N4FVU—To our outgoing SM, Jimmy Walker, WD4HLZ, TNX for a job well done! Congrats & good luck, Jimmy, in your Roanoke Division Vice Director assignment. We shall continue to rely on your

valuable guidance. As your SM, I want to establish channels of communications with all of you. This Section News column is yours. In this column we want information that will encourage our unique global fraternity of licensed Radio Amateurs to grow more in South Carolina. I want you to look forward to reading this column each month! Send me your Newsletters, schedule of VE exams nets, hamfests, special events, etc. I want to hear from you! You can reach me by mail, phone, or Packet; N4FVU @KK4L. Include requests for South Carolina ARRL Information about appointments, applications, forms and activities. I want to establish a full roster of state-wide appointments. Present appointees and others are invited to send me their thoughts on how we can achieve our goals and their personal plans to continue serving. Traffic: N4MEJ 98, W4ANK 93, K44LRM 30, K4JDT 28, W4DRF.

**VIRGINIA:** SM, Glynn Coates, KB4WT—SM: AB4U. SGL: W4UMC. PIO: AA4VP. TC: WX4C. STM: KB4WT. SEC: N4EXQ. ACC: NT4S. OOC: W4HU.

NET	TIME	FREQ	MGR
VTN	1 PM	3907	KB4NGO
VSN	6 PM	3947	K4IBR
VSN	6:30 PM	3680	N4KSO
VN(EARLY)	7 PM	3680	N4GHI
VN(LATE)	10 PM	3680	WB4KSG
VLN	10:15 PM	3947	WA4LS
SVEN	7:15 PM	148.82	NT4S
STARES	8 PM	148.97	KJ4VT
DEC/ED	9:45 (3RD WED)	3910	K4ANRW

For those of you who have not attempted to write a column that will appear two months hence and are still attempting to report NEWS, it is quite an experience. Therefore, I would like to ask each of you who read this column to send me (KB4WT) any information you might have from your corner of Amateur Radio in the Virginia Section. Send me letters, club newsletters, newspaper clippings, radiograms, and packets. If I don't hear from you out there, it is likely that the only news you will see is from those parts of the Virginia Section that I know the best—Southeastern Virginia, Packet Radio, and Traffic. I promise you I will attempt to make the column as representative of what is happening in the Section as I know it, and that will depend on what I hear from you. I am interested in knowing your club activities, any local/regional/state legislation affecting Amateur Radio, local Hams making the news, local DX operators who have distinguished themselves, new PBBS's, local Ham activity involving emergency/public service, and any interesting tidbits regarding Amateur Radio in the Section that you think ought to be shared. By the way, when you put me on the mailing list for this information, please include AA4VP on the list also. He has a difficult task of putting together the VIRGINIA HAM, and he has the same problem I have, he needs information from out there where it is happening. I have been requested of N4SS, 4RN Packet Manager, to name a Section Packet Manager/Coordinator for the Section. Although the duties of this position have not been specified, it appears that the SPM/C will monitor packet activity in the section to offer suggestions as to modifications or procedures to expedite orderly movement of packet traffic. In accordance with this request, I have appointed Steve, WB4ZTR, as the Virginia Section Packet Manager/Coordinator. Please assist Steve in this new, undefined position by sending suggestions for the orderly flow of packet traffic through the section. Just to show you the neat information gleaned from Club Newsletters, I notice that Curt Holsapple, K9CH, formerly Club Services Department Manager at ARRL Headquarters is currently serving as Editor of the Massanutten Amateur Radio Association Newsletter. Welcome to the Virginia Section, Curt and Edie. Nice to see that the leadership flow to Headquarters runs both ways. If you receive this column prior to it, I look forward to seeing all of you in Richmond for the Frostfest. Traffic: N4GHI 2070, WB8TAX 918, N4EXQ 278, K4DOR 194, WB4PNY 193, K4MTX 183, W3ATQ 181, WA4LS 164, AA4AT 162, KJ4VT 150, KB4WT 141, WD4MIS 97, WB4KSG 86, K4BGZ 77, WB4ZNB 68, KK4FV 62, N4KSO 57, WB4ZTR 46, WA4OHX 38, K4IBR 37, KK8L 35, N4SMB 33, K4IWH 30, W4HDW 26, KB4OPR 24, K4IUV 22, WB4UHC 16, WA4CCK 15, WA4LT 10, W4TZZ 14, N4TJT 14, WB4EDB 13, WB4KIT 12, AA4GL 12, K4GR 11, K4VWK 10, KB4UED 10, K4MLC 7, W4YE 6, WA4TVS 4, N4FNT 3, K4JST 3, N4RC 2, W4V1R 2.

**WEST VIRGINIA:** SM, Karl S. Thompson, K8KT—SEC: K8QEW. STM: N8FXH. ACC: WA8CTO. SGL: K8BS. TC: K8LG. REPT. COORDINATOR: WB8GDY. Charleston Area H. F. will be April 15, at Civic Center. Mark your calendars now! Contact N8AJC for details. Sorry to report that Bernard Dodd, WB8TF has become a silent key. In years past Dodd had been an active NCS on WVFN and was a friendly voice to all. We shall all miss him. I enjoyed my recent QSO with N8JPR on 2 Mtrs. Happy Holidays to all from Becky and me.

NET	FREQ	TIME	QNI	CTC	SESS	NM
WVFN	3865	6:00	1032	118	31	WB8DHC
WVFN	3567	7:00	266	67	31	K2R8Q
WVMD	7235	11:45	765	55	31	WB8V
WVFN	3640	6:30	217	27	31	K8LG
WVNN	3730	7:30	95	15	31	WB8D
Hillbilly	14290	NoonSun	162	20	5	WB8Y

Traffic: K8TPF 223, KA8WNO 192, WD8V 174, W8YP 154, WD8DHC 93, KA8ZXP 90, W8FZP 56, K8QEW 53, WD8LDY 44, N8FXH 42, K8KT 31, N8CG 9, N8JPR 7.

## ROCKY MOUNTAIN DIVISION

**COLORADO:** SM, Bill Sheffield, K9BJ—ASM: KA8MQA. SEC: WB8TUB. STM: KB8Z. ACC: WB8DUV. TC: W8LJF. PIO: N8DZA. SGL: WB8FQB. OOC: KA8CDN/W8NJR. Bob Gobic, WA6ERB, Rocky Mountain Packet Radio Assn President and SYSOP of the metro area BBS, has been transferred to Calif. We will miss Bob; his leadership in RMPRA has been very instrumental in building up the packet network, not only in Colo., but in the surrounding states of our Division. W1HAB assumes the office of RMPRA President, and WB2ENA assumes the Denver Lan BBS as WB2ENA-1 Good luck to all in your future endeavors. A new DX BBS is now on 144.930 as KE8LT-4 with many new packeters coming on the scene from Mile-Hi DX Clubs. Look for Colo Springs to host the 1989 ARRL Amateur Radio Computer Networking Conference. Congrats to KX0Q who on the third try set a new 3456 MHz record from Pikes Peak of 454 miles to WB5AFY in Texas.

(continued on page 134)

here is the next generation Repeater

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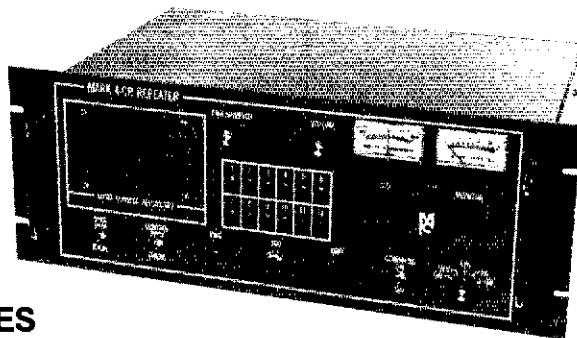
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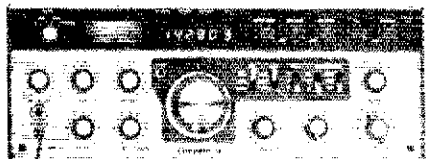
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961 Deluxe 22A ps w/speaker	239.00	219 <sup>95</sup>
256 FM transceive module	65.00	
257 Voice synthesizer	89.00	
258 RS-232 interface	65.00	
282 250 Hz 6-pole CW filter	69.00	
285 500 Hz 6-pole CW filter	69.00	
288 1.8 KHz 8-pole SSB filter	69.00	
700C Electret hand microphone	37.00	
705 Electret desk microphone	69.00	
1140 18/24.3A DC circuit breaker	18.00	



CORSAIR II	List	SALE
561 9-band digital transceiver	1445.00	1249
961 Deluxe 22A ps w/speaker	239.00	219 <sup>95</sup>
263G Remote VFO	269.00	249 <sup>95</sup>
282 250 Hz 6-pole CW filter	69.00	
285 500 Hz 6-pole CW filter	69.00	
288 1.8 KHz 8-pole SSB filter	69.00	
603 KR-1B Dual keyer paddle	69.00	
700C Electret hand microphone	37.00	
705 Electret desk microphone	69.00	
1140 18/24.3A DC circuit breaker	18.00	

ACCESSORIES	List	SALE
2510B SSB/CW Mode B satellite conv	695.00	629 <sup>95</sup>
209 300w dry dummy load	29.00	
229B 1.8-30 MHz 2KW PEP tuner	349.00	319 <sup>95</sup>
3229 Balun kit for 229B	18.00	
3180 80m mobile 78" high	34.00	
3175 75m mobile antenna	34.00	
3140 40m mobile antenna	31.00	
3130 30m mobile antenna	28.50	
3120 20m mobile antenna	27.50	
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3110 10m mobile antenna	24.50	
3101 42" top section stinger	7.75	
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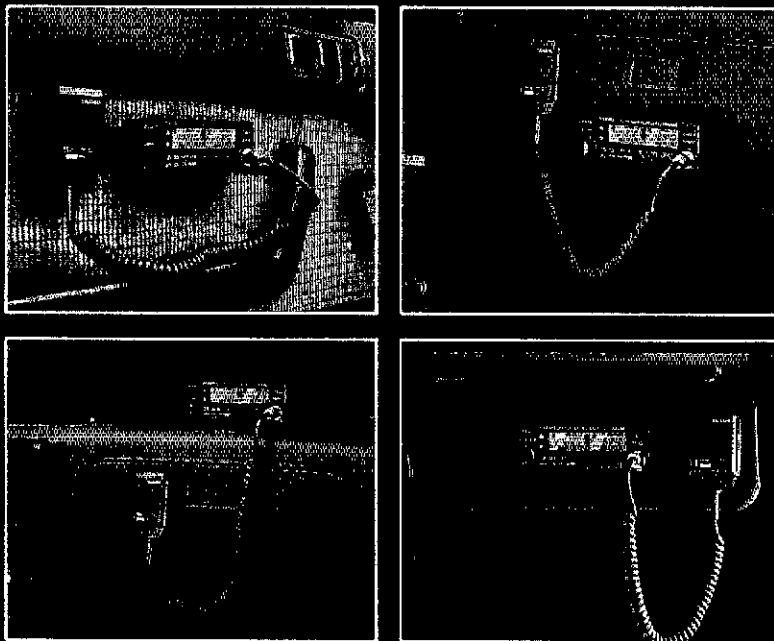
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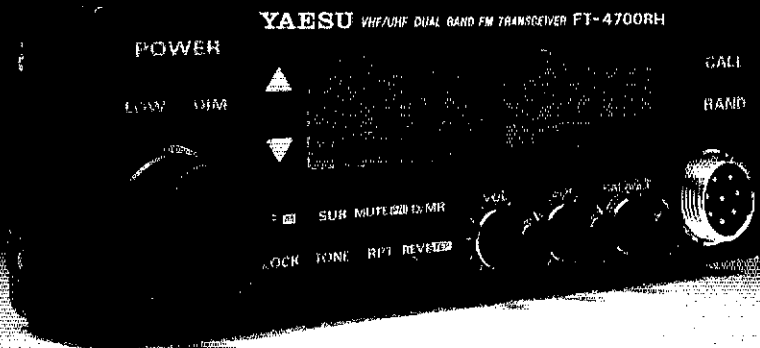


4700RH design. The ten-button front panel keypad includes a "do-re-mi" audible command verification, and all important controls are backlit for night operation. Plus you get extended receive coverage of 140-174 MHz (MARS/CAP permit required for transmit on 140-150 MHz), or 430-450 MHz on 70 cm. Nine memory channels on each band. High/low power selection (low power: five watts). One-touch reverse repeater shift button. Optional CTCSS module. And 16-key DTMF microphone.

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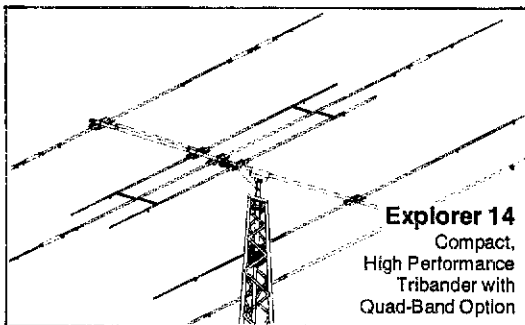
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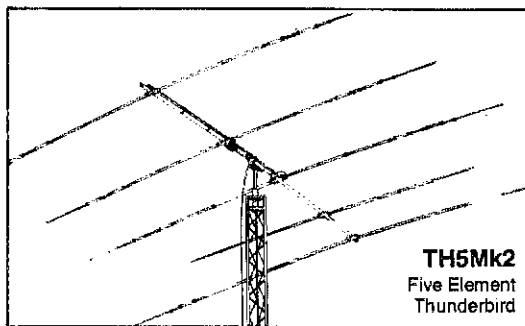
Unique PARA-SLEEVE design (patent pending) achieves exceptional broadband performance in this compact antenna. Forward gain and front-to-back ratio outperforms other antennas of the same size. Surface area is 7.5 sq. ft. (.69 m<sup>2</sup>). With a 14 ft. (4.3 m) boom the turning radius is only 17 ft. (5.3 m). The ideal choice where space is limited. Great for roof mounts or small towers. Optional kit for 30 or 40 meters.



**Explorer 14**  
Compact, High Performance Tribander with Quad-Band Option

### Five Element Thunderbird TH5Mk2

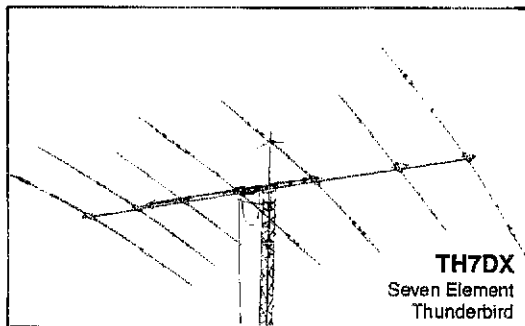
Broadbanding is achieved with our unique dual driven element system. Five elements on the 19 foot boom (5.8 m), with four active elements on each of the three bands. A rugged antenna with 7.4 sq. ft. (.68 m<sup>2</sup>) of surface area. Turning radius is a manageable 18.4 ft. (5.6 m).



**TH5Mk2**  
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The Parker Marathon had members of ARA handling communications under coordination of KD9NT. Thanks also to members of PPRAA for communications coordinated by W0MCT during the Teller Hill Climb in Divide. 73, KC0L. Nets: Col: QNI 948 QTC 49-106, QNF 965, 29 sess. CWN: QNI 61, QTC 43, QNF 277, 27 sess. HNN: QNI 1711, QTC 118-542, QNF 1100, 31 sess. NCTN: QNI 168, QTC 29, QNF 224, 29 sess. 6CTN: QNI 277, QTC 46, QNF 304, 30 sess. Traffic: N0HFZ 392, KH0A 312, KB0Z 64, WB0FFV 53, KA0WIE 52, KE0WC 33, WB0NFW 9.

**NEW MEXICO:** SM, Joe T. Knight, W5PDY—ASM: K5BIS. SEC: K6YEJ. DEC: WD5HCB. STM: ND51. NMs: WASUNO, KASNNG, W5QNR. TC: W8GY. ACC: KA5BEM. Southwest Net meets daily, 3583 @ 0230 UTC, handled 79 msgs with 197 checkins. NM Roadrunner Net meets daily 3939 @ 0100 UTC, handled 96 msgs with 1125 checkins. NM Breakfast Club meets daily, 3939 @ 8:30 AM, handled 157 msgs with 957 checkins. Yucca 2-mtr Net, 78/18 handled 23 msgs with 293 checkins. Caravan Club 2-mtr Net, 66/08 with 148 checkins. SCAT Net, 68/08 handled 9 msgs with 568 checkins. Info Net 12/72, with 60 checkins. ZIA Packet Net with 73 checkins. El Paso Hamfest was a great success with good reports. Congrats to Pecos Valley ARC's new officers, W5VTL, KG5EP & N5MOH. Vy sorry to report the passing of K1RGD of Socorro who was very active in SAR activities. He will certainly be missed. Tnx so much to K5BIS for gathering info for these reports. WASUNO, K5BIS & K6YEJ for picking up NC8 when I can't make it. Traffic: W5DAD 76.

**UTAH:** SM/STM: Jim Brown, NA7G—SEC: Rich Fisher, NS7K. A correction from a recent Section News column: Laura Zitting, WE7B, and Vilate Zitting, WJ7M, are sisters; Laura, WE7B, won the award from UAFC. My apologies to both for the confusion. Scott, WA7VJ reports that the new TC/ATC manual is a valuable resource. Bob, WA7KHE is recovering from recent eye surgery. Kevin, N7IUN, has been getting UCN members together for breakfast one Sat. every month. QNI UCN for details. The BUN now has 100 members on the roster—steady growth for the thirty yr old net. 73 de NA7G. Traffic: WA7MEL 54, WA7KHE 53, N7JLC 44, N7IUN 43, N7ASV 27, NA7G 25, NS7K 21.

**WYOMING:** SM, Jim Flaister, N7GVV—ASM: Steve Cochran, WA7H. SEC: Jim Anderson, W7TVK. STM: Dan Ransom, K7MM. It's time to look back on 1988 and think about that one HAM who should be crowned Ham of the Year. Please drop me a letter with ur nomination. Larry Hudson, KD7BN, is proposing a statewide FM system to be able to tie Cheyenne and Casper to other towns through out the state. I'm sure Larry would like to hear from u with ur ideas, etc. Traffic: NN7H 192, W7SQT 126, W7TZK 173.

NET	FREQ	TIME	QNI	QTC	SESS	NM
Cowboy	3923	5:45PM	853	20	21	KOTAR
Pony Ex.	3923	*OOAM	285	2	5	W7MZW
Area 5	2 Mtrs		54	--	5	W7ILL

73 till next month.

### SOUTHEASTERN DIVISION

**ALABAMA:** SM, James Spann, W04W—ASM: W4XI. SEC: KB4GDN. STM: N4RT. PIO: KB4KCH. ACC: AA4BL. OOC: KF4VS. SGL: N4FRQ. BM: KA4ZXL. Two of my main projects for 1989 will be a continued emphasis on establishing our new ARES district system, and development of the "ALP"—the Alabama Linking Project, a plan to link all of our ARES districts using FM repeaters and links. Our SEC, KB4GDN, and TC, N4QLI, are helping greatly to coordinate this, and we will be needing help from every club in the section. Watch your local packet BBS or club newsletter for more details. Tuscaloosa has a new packet BBS—W04DAT on 145.01. The Mobile ARC set up a ham radio display at a local mall to handle holiday messages. Many of our ARES districts had a busy night on Nov. 4 with a number of tornadoes reported all across the state. New Shelby County ARC President is KB4TUE, with N4SSI serving as VP. The East Ala. ARC has a new 10 meter net that meets Mondays at 8 PM on 28.330 MHz. All check ins are welcome! Over 25 amateurs from across the state helped with Christmas On the River in Demopolis in December. Good to see many of you at the Montgomery hamfest. If your club would like an ARRL program, please contact me—I will be glad to come if my schedule allows! Don't forget to support our traffic nets—AENB on 3575, AEND on 3725, and ATNM on 3965. BPL: WA4JDH 755, W4PIM 168, W4CKS 109, W4ZJY 41, W4DGH 10, W04W 5.

**GEORGIA:** SM, Eddy Kosobucki, K4JNL—SEC: NC4E. STM: WB4WQL. BM: WB4ZCJ. OOC: W4TG. PACKET: W4QO. PIO: WB4DEB. SGL: WB4UVW. TC: WD4PAH. As we begin another year, we are without an ACC. WA4ABY has resigned as of 31 Dec due to an extra workload. Tnx Sandy for all that u have done for the section. As of this writing, I haven't made a new appt. I have just returned from Lawrenceville where the Stone Mt club did it agn. A FB affair as usual. This concluded the HAMFEST SEASON for 1988. A quick reminder for the 1988 season, get ur paperwork NOW from Bernice Dunn at ARRL HQ if u want a SANCTIONED hamfest. She keeps records on all hamfests, so she can tell u if u have any competition nearby. Also remember that if u want to be listed in the HAMFEST COLUMN in QST, the info should be in at least THREE months before ur scheduled affair. P5HR honorees for the month of Oct are: WB4DZV, WD4COL, KJ4NK, WB4WQL, W4RWB, K44HE, KB4JPN, W4HON & K4ZJY. 1988 was a banner year for the GA section. We now have over 8500 hams in the section, 1100 ARES members, over 3000 ARRL members, more local ARES nets & I could just go on & on. All this happened because of u who are the greatest hams on earth. To the GA OMs and YLs who make up this section: once again my heartiest thanks for helping make it this way. I do want to say a word to club officers. PSE fill out & send in to ARRL HQ the annual report form that is sent to u. The tag issue should be resolved by the time u read this. If not, let's still give all we can to help resolve it. WB4UVW & many more have give their time & efforts in the best way they knew how to get some new legislation to help preserve what many states do to identify us as PUBLIC SERVICE volunteers. A HAPPY NEW YEAR TO U & UR FAMILY... GOD BLESS. Traffic: WB4DZV 171, WD4COL 165, KJ4NK 112, K44HE 80, WB4WQL 46, WA4TXT 38, K4ZJY 23, W4HON 17, K4JNL 16, N4MWR 12, N4UZ 11, W4RWB 7.

**NORTHERN FLORIDA:** SM, Roy Mackey, N4ADI—STM: Rip, AA4HT. BM: Dave, N4GMU. TC: Ed, W0RAO. SGL: John, KC4N. OARC gave Ham of the Year to Chris, NX4N, for his efforts which led them to Number 1 in the Nation for Class 6A of FD. Great Job, OARC! Also Ham of the Month to Ralph,



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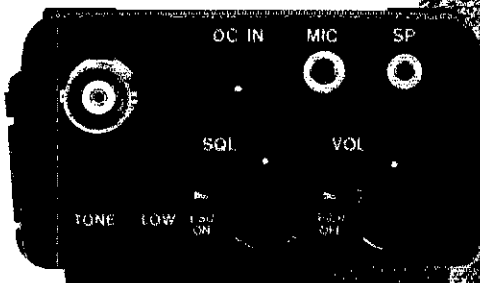
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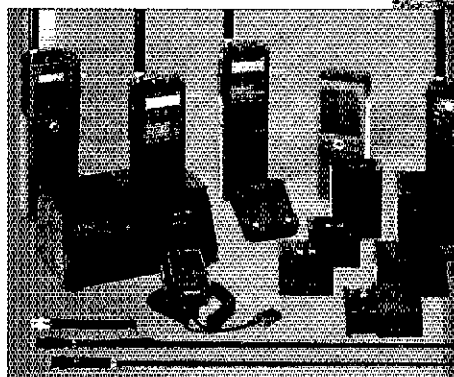
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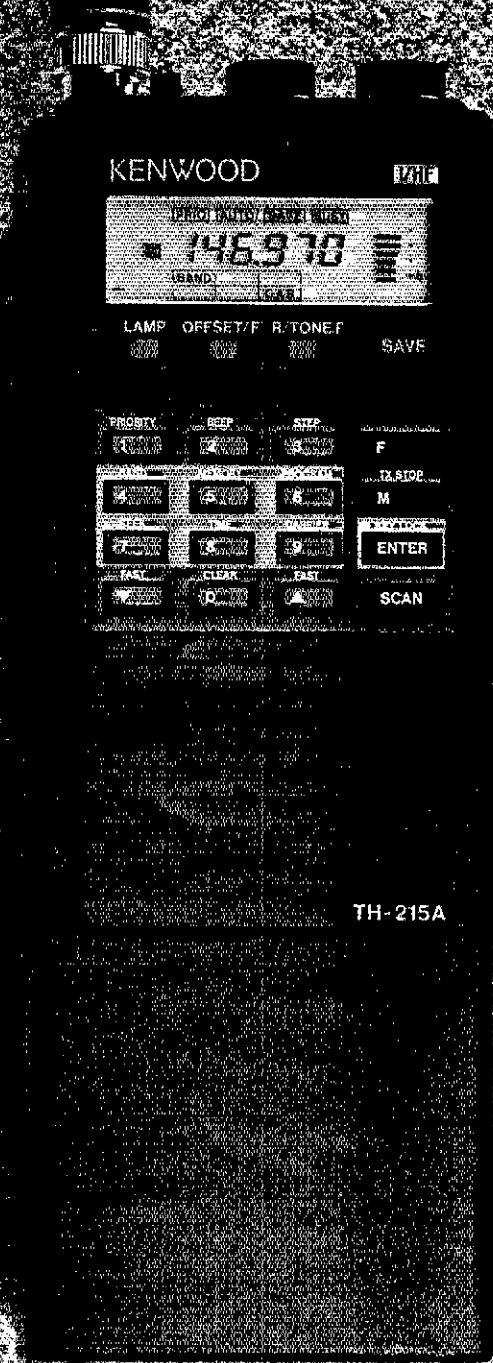


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- PB-4: 7.2 V, 1600 mAh NiCd pack (1.5 W output)
- BT-5 AA cell manganese/alkaline battery case
- BC-7 rapid charger for PB-1, 2, 3, or 4
- BC-8 compact battery charger
- SMC-30 speaker microphone
- SC-12, 13 soft cases
- RA-3, 5 telescoping antennas
- RA-8B StubbyDuk antenna
- TSU-4 CTCSS decode unit
- VB-2530: 2m, 25 W amplifier (1-4 W input)
- LH-4, 5 leather cases
- MB-4 mobile bracket
- BH-5 swivel mount
- PG-2V extra DC cable
- PG-3D cigarette lighter cord with filter



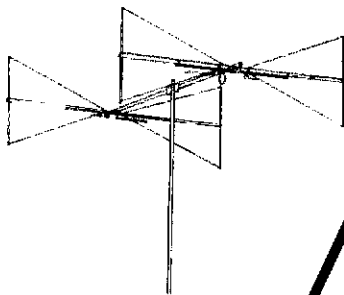
TH-215A

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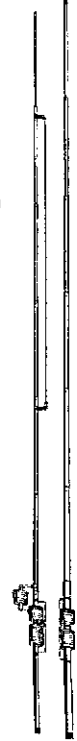
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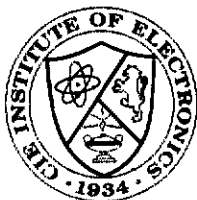


N4HTU and Carol, N4OWW, for their help in Jamaica with traffic. Bob, N4MHV, also helped there for a week. They all gave of their time to help the Hams of Jamaica get the materials they needed. Congratulations to all who aided the efforts! Our ACC, Giff, W4RIQ, has asked to be replaced. His work is very interesting since it requires contact with the many clubs in our section. If you are interested, please send your name and phone to N4ADI so he can talk to you about it. We all want to thank Giff for the good job he has done for our Section. We wish him well in all his future endeavors. HAMM- RAMM has elected Buzz, W4UJL, as Pres; Hank, K4RLH, VP; Jack, W4DAKL, for Treas; and Lamar, W44DFA, Secy. Good Luck for 1989 to all! This is the time of year that most clubs have chosen their officers for the coming year. If your club does not have a copy of the ARRL Club President's Workbook, get in touch with HQ and purchase a copy. It will be of help to all the clubs and will make your organization run much more smoothly. It has schedules for each month and more ideas than you could use in any one year. Get all Seasons Greetings to all. Have a great '89! 73, Roy, Traffic: WX4H 517, N4SS 313, KB4LB 303, AA4HT 282, WA4QXT 281, WC4D 184, K4CY 144, W7YWF 135, AA4FG 132, N4GMU 124, KC4FL 83, N4JAO 81, KB9L 79, N4DY 69, WB3AVZ 65, WA4EYU 62, W4MGO 54, WA4PUP 54, W4UEA 53, K4JNN 48, NF4O 48, N4UF 47, N4JHI 43, WB4TZR 40, WA4STZ 38, K4CQ 34, N2AOX 30, KB4FTY 29, N4QYS 28, W4DVT 23, WA4SXW 18, N4NKK 16, W6IM 13, W4AT 8, N4OZD 5, WB4FJY 5, WB4JJH 2.

**SOUTHERN FLORIDA:** SM, Richard D. Hill, W44PFK—SEC: W4SS. STM: K4ZK. TC: K4AT. BM: WD4KBW. PIO: N4PBF. SGL: KC4N. OOC: W4TAH. ACC: K4EUK. WD4KBW reports 113 bulletins received and 173 sent by AA4BN 22, W4DL 66, WA4EIC 73, WT4F 36, K4IEK 25, WD4KBW 26 and WA9VND 34. The big news this month is that the Memorandum of Understanding between the FCC and the Northern and Southern Florida Amateur Auxiliary has been signed by all three FCC Florida offices and both section managers. Many thanks to Swede, W4TAH, the OOC for SFI who was the driving force behind the achievement of this goal. KB4XE sent the following: Joel Kandel, K14T, and Bill Manley, KB4XE, were invited guests of the Jerry Wichner show on WNNW on September 18. That evening the show featured Amateur Radio. Many phases of the Amateur Service were discussed and questions were answered for listeners who called in to the station during the four-hour production. KB4XE also reported that for the third consecutive year, Coral Springs amateur radio operators, assisted by members of the IBM ARC, Motorola ARC and Rascal-Milgo ARC, helped their city celebrate the annual Our Town Festival by serving as parade marshalls. Coral Springs Mayor Ben Geiger came up on the net to personally thank the amateurs for their participation—those assisting were AB4BC, WS4G, WR4M, N4SYL, N4SYK, N4ORX, W4NFJ, KC4GSX, WB4QLN, K4BFO, KB4XE, W4AAZP, KC4HDW, KE4PT, and KT1G. K4SCL writes, "I am in the process of modernization of my HF facilities. The old Collins S-Line, which served me so faithfully for 15 years, has been traded in on an ICOM IC-761. An ALPHA 86 linear will replace the 30L-1. The 761 was received about 10 days ago, but a failure occurred after 2 days of operation so it has been sent off for warranty repairs. The ALPHA 86 was shipped, from Colorado, Oct. 27, so it should arrive any day. The 761 may be back any day, too, but no information yet. In the meantime, I am on the air with my "stand-by rig," a Kenwood TS-520, driving the old 30L-1 amplifier. This set up works surprisingly well, but VOX QSK is not really satisfactory for traffic. The new equipment, although loaded with many "bells and whistles," will probably perform better and be easier to operate. I expect to be able to hear better and be able to put out a full 1500 watts when needed. The IC-761 boasts "full break-in, as does the ALPHA 86. I am active on VHF Packet at present. I may get on HF Packet soon, as I am seriously considering a new PK-232 to use with the 761 and my Leading Edge computer. I use the Commodore 64 on VHF Packet. K4SCL was Section Communications Manager for many years before retiring from that position. WV5Z reports that the Port Everglades Navy Appreciation Day results included 518 messages and 616 HF QSO's. Thanks to the following for their help: WB3LSW WV5Z N4OMB N4HHP WD4BWC KC4GER KB4TCS N4TUR N4PDM KC4GEO KB4THK N4TUS N4QEG N4ORN KB4KXV WA4PWT KB4NHR WA9VND and N4ORZ. N4TUS produced an absolutely outstanding videotape of the Port Everglades activities—it was available for viewing at the Broward Hamfest. Congrats to the Platinum Coast ARS which has been officially renewed as a Special Service Club. The Palm Beach Repeater Assoc., Inc. Hamfest was great fun — especially the guided tour by W4SS through the brand new Emergency Communications Mobile Unit. There is a very informative brochure which describes the vehicle in detail. In part, the brochure reads "six operating positions with high-density synthesized radio equipment are programmed to each serve a specific task—yet the equipment is flexible enough that it can be easily programmed to allow each position to operate on any other position's assignment when needed for coordination. An important feature of ECOMM is its ability to interact with emergency services." Club bulletins received this month included the Motorola ARC, "Builders of the First Ham Station in Space"; Tampa ARC—AL7DL, the editor of QRM, is leaving for Thule and a new editor is needed—congrats on a FB job. Bryce; Palmetto ARC (in Broward County); Manasota Repeater Assoc., Inc.; Platinum Coast ARS—WA4NBE spoke on traffic handling and QSLing. Headquarters reports the appointment of K1JOY as the HF Awards manager for the Platinum Coast Club; Everglades ARC—they are designing a new club QSL card; Ft. Myers ARC—NBEI hamfest chairman reports everything is moving along smoothly with HAMFEST '89. The committees are working, and everything is on schedule for January 21st. A very nice and very detailed letter was received from AB4BC, President of the Rascal-Milgo ARC. The letter described in detail the club's activities and organization. One of the items of interest is the donation of an "HF radio room" by the company for the club's use. They are now addressing the acquiring of suitable equipment and antennas. K4FQU, manager, of the Southwest Florida Traffic Net reports that their "TRAFFIC DAY" generated a good deal of traffic as well as interest in traffic handling. 73 de WA4PFK. Traffic: W3CUL 3032, WA9VND 1302, W3VR 785, WA4FFK 400, K4SCL 337, WV5Z 323, AA4BN 288, K4AFZ 261, KB4KY 247, W4NFK 227, N4HAP 225, N4ORZ 221, W4DL 206, WA4EIC 202, K4IA 185, W3TLV 144, WB4WYG 129, K4EUK 122, KD4GR 108, KA4YHS 102, K4ZK 93, WA4RUE 88, N4MML 78, WD4KBW 72, N4ET 72, KA4NXF 66, K4FQU

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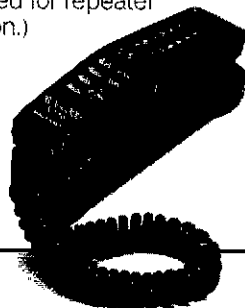
- **TM-321A** covers 220-224.995 MHz, **TM-421A** covers 438-449.995 MHz, and the **TM-521A** covers 1240-1300 MHz. (Specifications guaranteed for Amateur band use only.)
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For TM-221A/321A/421A/521A. Optional telephone-style handset remote controller RC-10 is specially designed for mobile convenience and safety. All front panel controls (except DC power and RF output selection) are controllable from the RC-10. One RC-10 can be attached to **a combination of two transceivers** with the optional PG-4G cable. When two transceivers are connected to the RC-10, **cross band, full duplex repeater** operation is possible. (A control operator is needed for repeater operation.)



#### Optional Accessories:

- **RC-10** Multi-function handset remote controller
- **PG-4G** Extra control cable for second transceiver
- **PS-50/PS-430** DC power supplies • **TSU-5** Programmable CTCSS decoder • **SW-100A** Compact SWR/power/volt meter (1.8-150 MHz)
- **SW-100B** Compact SWR/power/volt meter (140-450 MHz) • **SW-200A** SWR/power meter (1.8-150 MHz) • **SW-200B** SWR/power meter (140-450

- MHz) • **SWT-1** Compact 2 m antenna tuner (200 W PEP) • **SWT-2** Compact 70 cm antenna tuner (200 W PEP) • **SWC-4** 1200 MHz Directional coupler, • **SP-40** Compact mobile speaker
- **SP-50B** Mobile speaker • **PG-2N** Extra DC cable
- **PG-3B** DC line noise filter • **MC-60A, MC-80, MC-85** Base station mics. • **MC-55** (8-pin) Mobile mic. with gooseneck and time-out timer • **MA-4000** 2 m/70 cm dual band antenna with duplexer (mount not supplied) • **MB-201** Extra mobile mount

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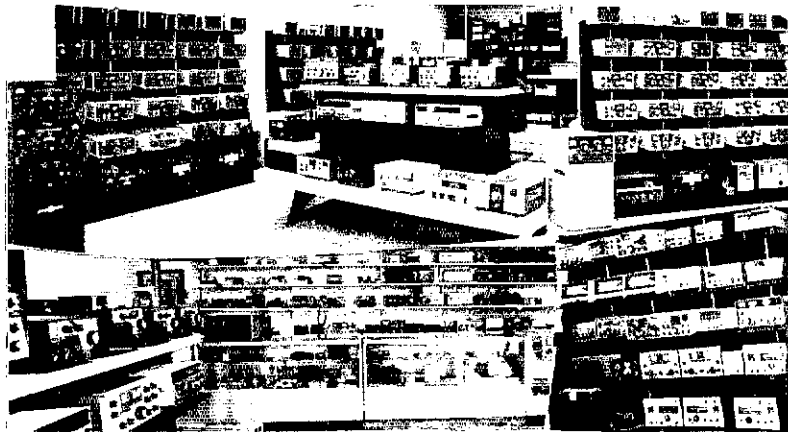
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**VIRGIN ISLANDS:** SM, Ron Hall, KP2N. ASM: Lou Bean, KV4JC. SEC: John Ellis, NP2B. NM: Bob Dennison, VP2V/WB0X. Congratulations to the new upgrades: WB3EDO to Extra and is now NP2E, WP2AFU to General. St. Croix ARES reports QNI of 72 for the month with St. Thomas/St. John QNI of 24 and 1 QTC. Visited the St. Croix ARC on Oct. 8 and had 15 members in attendance. They will host the first VI section convention. KV4CR has left Water Island and is now full time in Texas. 22 in Novice Class on St. Croix and 18 in class on St. Thomas. New Section Managers met Monday at 2230Z on 146.810. Traders not follows. NP2E has been appointed EC on St. Thomas. Any member seeking Section leadership appointment see SM or ASM. Merry Christmas to all.

## SOUTHWESTERN DIVISION

**ARIZONA:** SM, Jim Swafford, W7FF—STM: W7EP. NMs: K7POF, K6LL, K1EZH. OPRCs. Tucson hamfest was a big success with approx. 500 hams attending. They hope to make it an annual event and expand it to a two-day affair. J-B, WA7AHF was sparkplug. W1PHX, Green Valley is a recent Silent Key. (tnx, WO7H). Ray, W7LQM, Sun City has been named HF and VHF Awards manager for West Valley ARC, a Special Services Club. W7LVB sent in nice report on recent activities of the London Bridge ARA, Lake Havasu. Their new officers are: W7FZ, Pres., KB7AOC VP, WA1SPA Treas., KB6DPE SEcy., and W7IRC activities Mgr. Club meets second Mondays of the mo. at Lake Havasu H.S. and they are an affiliated club. (Tnx, Lee). Green Valley ARC participated in annual GV fair with W7EHV, W7IRH, KC7MF, KA7NBM, WB7ORC, W8SXX, KB6KP, and W8ROD manning a command station and six outlying posts along the parade route. (Tnx, W8ROD). K7KYW, Pima Co. DEC sent in FB report on recent SET test with 95 amateurs participating and 110 third-party SET messages handled. 74 stations were using emergency power. Congratulations to all who participated. Also received 1988 annual EC reports from Yavapai Co. EC, WC7R, as well as K7KYW, KQ7T. DEC for Yavapai sent several individual reports on public service activities of the Verde Valley hams, including an off-the-air tape recording of their recent simulated emergency drill. Good work, John. W6S and KQ7T were both interviewed on local BC station about ham radio in the Cottonwood area. Program was taped and was very well done. These folks really are promoting Amateur Radio up there. Keep up the good work, John. Your SM visited the Prescott ARC club meeting in Oct. Good group. W7SA worked 3W8CW for a new and rare one. ARCA planning their annual South Mtn. Swapfest for Phoenix in March. Dates not firm yet, but they need help from volunteer "hosts" to help out. They are requesting the dates of July 28, 29 and 30, 1989 for the Ft. Tuthill affair. The ARRL advises that their recent VE testing at the hamfest was "second only to Dayton" as far as number of applicants tested. Congrats to all AZ Section VEs who participated. For you convention goers, you might want to plan on the ARRL Diamond Jubilee National in Dallas-Ft. Worth, June 2-4, 1989. Also the YLRL 50th Anniv. convention in Kauai, Hawaii, June 27-30, 1989. Our own 1989 SW Div'n Convention will be at L.A. at the LAX Hilton late in August. Details later. Am trying to drum up support for having the 1991 SW div. Convention in Tucson. Would OPRC be interested in hosting? Rich, NN7D, of Coconino ARC in Flagstaff is busy coordinating Amateur Radio communications for a proposed river rafting trip down the Colorado thru the Grand Canyon by a group of USSR young people. If it materializes, it will be for August 1989 and should provide some good publicity in the media for Amateur Radio. More later on this. Many AZ Section clubs had their annual Christmas dinners and parties. Hope Santa was good to all of you. Any new rigs out there? Ten meters has been hotter than a pistol lately, with all kinds of Europe stns rolling in during mid-morning. Easy to work, 60 watts and a dipole will do it when the band is open! Your SM is ensconced back in Tucson at home QTH for the winter. Please report fall and winter activity as I want to hear from all of you. 73. Jim.

NET	QNI	QTC	SESS
SWN	—	—	—
ACN(HF)	483	51	31
ACN(VHF)	269	57	31
ATEN	964	129	31

Traffic: W7EP 167, W7KCM 97, W7LVB 61, K7VVC 54, K7POF 38, WY0IF 36, KA7ARZ 24, K7JKM 18, N7ETP 14, W7GAQ 9, W7KXE 9, KE7EO 6. (Sept.) W7KCM 74.

**LOS ANGELES:** SM, Phineas J. Icenbice, Jr., W8BF—This is the season for signing CONTRACTS in the Los Angeles Section. We have just signed contracts with the City of Los Angeles for Emergency Communications — ARES, thanks to the efforts of AK6Y Ron, K6YMJ Hank and KA6GSE Dennis. We have many good friends at City Hall who have our mutual Emergency Communications interests at heart. Chief Cone of LAPD, Chief Gates of LAPD, Councilman Hal Berman and many staffers are among our loyal supporters at City Hall. Things don't just happen — they must be pushed a little. Which reminds me that we need some political and/or legal help to push for a good Antenna ordinance. Marty Wolf, N6VI has prepared a page of very good information on this subject. Write or call Marty N6VI, 17780 Ridgway Rd., Granada Hills, CA 91344, (818) 360-N6VI. A contract was signed by Joe Cirz, KB6AXK, Chairman for HAMCOON 89 with the Los Angeles Hilton Hotel located a few blocks east of LAX. The LA Airport HILTON hotel is located north of the TRW Swapmeet location. (5711 W. Century Bl.) Special parking and a Dayton Hamfest atmosphere for HAMCOON 89 with bus service between the Hilton Hotel and the Swap-meet are scheduled for Aug 25/26 & 27 - 1989. Planning meetings are scheduled every month at the Hilton Hotel for the club delegates who are members of the Los Angeles Council of Amateur Radio Clubs, Inc. Send suggestions to your Club delegate. We want this HAMCOON 89 to be a super Hamfest but your committee needs your help. If Dayton is #1 — HAMCOON 89 IS TOO. (two) Oh! Well it is up to US. — E. Forrest Boyd, Jr., M.D. "Frosty" KB6FNW

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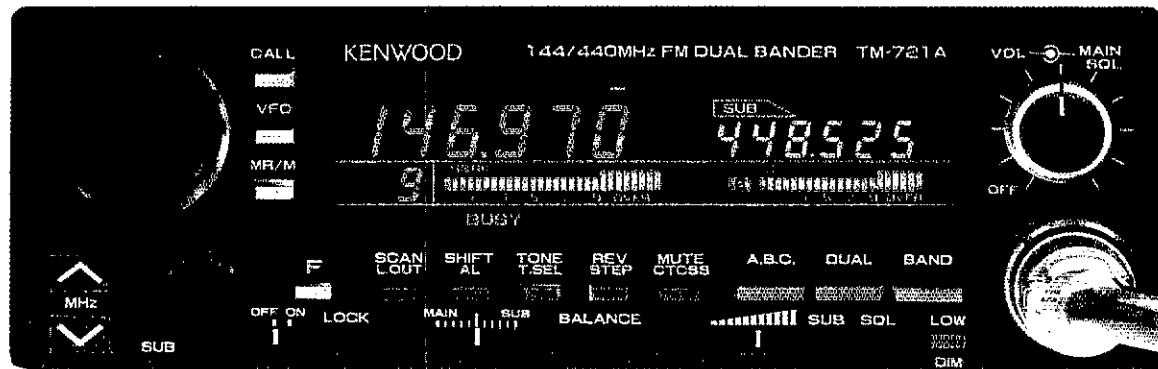
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- **Separate frequency display for "main" and "sub-band."**
- **Call channel function.** A special memory channel for each band stores frequency, offset, and sub-tone of your favorite channel. Simply press the CALL key, and your favorite channel is selected!

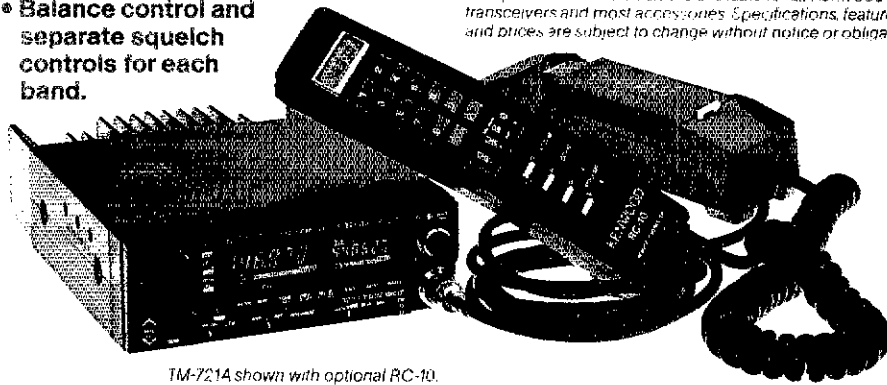
#### Optional Accessories:

- **RC-10** Multi-function handset/remote controller • **PS-430** Power supply • **TSU-6** CTCSS decode unit • **SW-100B** Compact SWR/power/volt meter • **SW-200B** Deluxe SWR/power meter • **SWT-1** 2 m antenna tuner • **SWT-2** 70 cm antenna tuner • **SP-40** Compact mobile speaker • **SP-50B** Deluxe

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- **Dual watch function allows VHF and UHF receive simultaneously.**
- **Programmable memory and band scanning, with memory channel lock-out and priority watch function.**
- **Balance control and separate squelch controls for each band.**

- **Dual antenna ports.**
- **TM-621A has auto offset.**
- **Full duplex operation.**
- **CTCSS encode/decode selectable from front panel or UP/DWN keys on microphone.** (Encode built-in, optional TSU-6 needed for decode.)
- **Each function key has a unique tone for positive feedback.**
- **Illuminated front panel controls and keys.**
- **16 key DTMF mic. included.**
- **Handset/remote control option (RC-10).**
- **Frequency (dial) lock.**
- **Supplied accessories:** 16-key DTMF hand mic., mounting bracket, DC cable.

Complete service manuals are available for all Kenwood transceivers and most accessories. Specifications, features, and prices are subject to change without notice or obligation.



TM-721A shown with optional RC-10.

- mobile speaker • **PG-2N** DC cable • **PG-3B** DC line noise filter • **MC-60A, MC-80, MC-85** Base station mics. • **MA-4000** Dual band 2 m/70 cm mobile antenna (mount not supplied) • **MB-11** Mobile bracket • **MC-43S** UP/DWN hand mic. • **MC-48B** 16-key DTMF hand mic.

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PN2222	NPN TO-18	5 for 75¢
2N2904	PNP TO-18	3 for \$1.00
2N2906	PNP TO-18	5 for 75¢
PN2907	PNP TO-18	\$1.00 each
2N3055	NPN TO-18	\$1.00 each
PN3569	NPN TO-18	5 for 50¢
2N3594	NPN TO-18	5 for 75¢
2N3906	PNP TO-18	5 for 75¢
2N4400	NPN TO-18	5 for 75¢
2N4402	PNP TO-18	5 for 75¢
2N5400	PNP TO-18	4 for \$1.00
2N5800	PNP TO-18	\$2.00 each
2N5832	NPN TO-18	\$2.00 each
MU2955	PNP TO-18	\$1.50 each
MU2955T	PNP TO-18	75¢ each
MU2955ST	PNP TO-18	75¢ each
TP30	PNP TO-220	75¢ each
TP91	NPN TO-220	75¢ each
TP92	PNP TO-220	75¢ each
TP94	NPN TO-220	75¢ each
TP121	NPN TO-220	75¢ each
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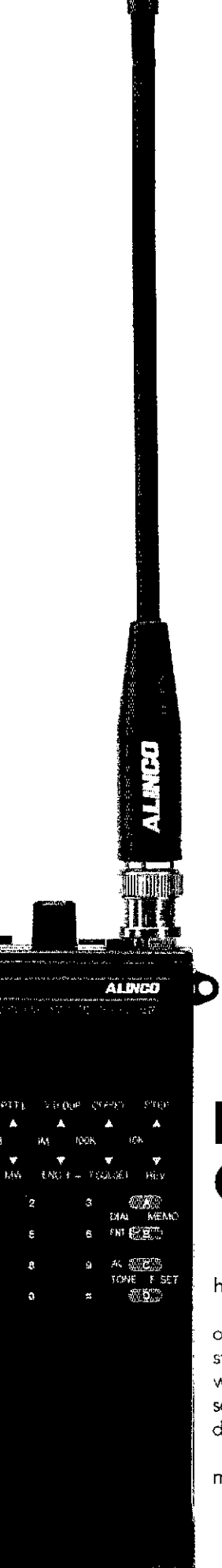
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(818) 952-2693 is the EC (Emergency Coordinator) for the Kaiser Hospital Net. Biweekly drills are scheduled on 145.560 simplex. The first drill was on 7 Sept. 1988 at 12:15 PM local time and Net Control was Jerry Hawkins, WB6CKN with nine Kaiser Hospital checkins. New ideas for this Hospital Net are always welcome. Write or call Frosty Boyd if you have some new inputs. Hopefully the Kaiser Foundation Hospital Net can become a valuable addition to Interfacility coordination, disaster response assistance, community assistance and planning with medical and civil authorities to save lives and aid in human and economic recovery. If you can't find Frosty call Ron Boan, AK6Y, Dave Otley, WB6NER or your local ARES DEC or EC. Some suggestions are emerging for interfacing with Northern California in a cross band 40 (meters) operation. The Los Angeles Shrine Hospital Net at eight AM on Sunday mornings is a potential starting point (7.242 MHz). — Lockhead Employee's Rec. Club ARC, 2814 Empire Ave., Burbank, CA 91504 is offering a deal. They have a stock of used QST, Ham Radio, CQ and 73 magazines for sale. 75 cents each for pre-1978 issues and one dollar each for 1978 or later issues. Ken Henke, KESAR (818) 349-0927 or the Oct 88, LEFC ARC CLUB BULLETIN will provide more details. This is also a good place to donate your old magazines. The Southern Cal. Six Meter Club is a sparkplug operation. They are sponsoring the HAMCN 99 "HUNT". Any suggestions or help for the Aug 25, 26 & 27, 1989 "HUNT" — SEND THEM TO: Gracie, N6FSL, 854 Bernard Dr., Fullerton, CA 92635. You may have a prize that you would like to donate — see Gracie Hastings. Have you ever tried a DX pedition? Well if you want to try one in Africa call Spud Monahan, K6KH or if you just want a local QRP run call Frank Hovey, N6RNX. Frank has explained his trip in the Oct. Antelope Valley Short Circuit. STM News: After the storm in the Gulf of Mexico and the Jamaican storm, traffic has slowed down for the last two weeks. Keep up the good work and don't forget Thanksgiving, and following the holidays, we will need all the help we can get. Sorry to announce that one of the area's old-timers is a Silent Key. W6BWG was one of the early birds in our area. Traffic: K6UY 456, W6INH 230, W6TH 125, N7CZF 48, W6NKC 27.

ORANGE: SM, Joe H. Brown, W6UBC—ASM: Riv. Co. W6LKN, Bob (714-886-3823) ASM: Org. Co. Ralph, W6BJU (714-776-9272) ASM: San Ber. Co. Ken, W6ZEF (714-983-1272). Ken has been appointed to replace Tony, W6BQH, who was appointed DEC for San Berdo Co. Tony was elected to chair the county ARES/RACES Council. This group got off to a somewhat rocky start, but with common sense and cool heads, effectiveness will prevail. Talks with David, W6BJU, Co. RACES Officer, John, W6A9YQ, Asst. Chief Telcom Div. State OES, ASM Ken, W6ZEF, DEC, Tony, W6BQH, indicate that working together for the good of Amateur Radio and public service is the name of the game. The Orange Section SET from what could be heard was a great success. Thanks to Ron, AK6Y, SEC Los Angeles Section, a multi section exercise came about. Listen up, now let's follow it up with the SET and annual report. ACC: Sandy, W6WZM, most clubs qualify for Special Service Club status. Just think, your very own awards manager! Call 714-549-8516 for info. Shirley, N6LFA, I am proud of my twelve years association with VVAFRC and extremely humble by the Life Membership award. Happy Birthday to the Victor Valley ARC. May the next 32 years be easier. None of the accomplishments have been shabby, but a club requires a lot of work, many hours of dedication. The hard part is lighting a fire under the members, nurturing new ideas and promoting traditional events that have worked. Fullerton RC T-Hunt report, for the first time in 8 years, it happened. N6MJN and K6BKN snookered the hunters. First in were Walt and Vince. They drove 31 miles. The Western Amateur RA has been officially designated as a Special Service Club. Determination to serve Amateur Radio and the community preceded this recognition. CONGRATULATIONS to officers and membership of WARA. PACKET RADIO: The SODCC works with local groups, packet committees and individual operators to help provide guidelines, tech concepts and promote packet within So Cal. Pres Mike N6KZB (ASM) VP Don W6BUCK, Sec. Treas Jim, K6LYV. Welcome back to NTS/BBS system, K6BJOB, K6BQV, W67QKP, all with new versions of BBS software. For info, call Mike 714-682-6212. Messages forwarded from N6MVS 350. NTS: K6BSQ-2 (435), N6KZB (65), N6RP-1 (21). NTS News STM Dan, W6FO, AJ6F-1 now moving lots of cts on 30 meters. SCN1 CW 3598 kHz, 6:30 PM. 31 Sec, QNI 222, QTC 21, SCN1V FM 147.645, 9:00 PM 31 Sec, QNI 289, QTC 201. NTS Traffic Report. BPL W6FO 586. PSHR K6HJK 150, K6BQZ 93, W6BQA 48, K6BTD 33. Reporting AD9A 119, K6DD 95, K6CE 83, N6GOT 82, K6AGND 57, W6CPB 42, W6SX 29, N6OKS 14, W6NTN 14, K6BVP1 10, W6TZR 6. SM comments: VIDEO LOG. ATV is being used more and more at Public Service and special events in the Orange Section. I wonder if we should set up a system for distribution of information of this mode to clubs and operators for the good of the Amateur community. For input, please call Joe, W6UBQ 714-887-8394. Let us list the ATV activities in this report.

SAN DIEGO: SM, Arthur R. Smith, W6INI—PIO: N6PKY, TC: N6JZE, SEC: W6INI, STM: N6GW, Phil Leonelli, W6FL (767-7008) has been apptd EC for the Tri-City district. The district includes North coastal SD County and inland to I-15. ATTN REPEATER OWNERS! It is vital that planning for disaster comm include the use of repeaters. If you would like to be included in ARES plans, please contact W6INI (273-1120). These plans will be tested in Apr 1989 which is Earthquake Preparedness Month. How does your repeater stack up? Is building fireproof (incl roof)? Are racks & bays secured to prevent toppling/sliding? Do you have automatic backup power? Do you have plans to provide a generator with gas supply before batteries rundown? Do you have emergency crew to restore repeater if operation is interrupted? Do you have replacement antennas for repeater and control system? Vitaly needed are portable repeaters. New exam sched for SANDARC VEC starting Jan 89: 1st Sat El Cajon, 2nd N County, 3rd Normal Hts, 4th Chula Vista & Escondido. W6KSI is proud owner of new T5440. WD5C8Y runs RTTY net Tuesdays, 1900, on 145.71. Traffic: K6I2H 82.  
SANTA BARBARA: SM, Thomas I. Geiger, W2KVA — ASMs: N6MAM/W6AKF/W6B8BYU. CO: K6SAH, BM: K6IXG, STM: N6WP. COCs: W6AKF, PIO: N6FOU, TC: W6KPV, SEC: W6BIIY. DECs: W6B6VA/K6AGF/K6IXG/W6BIIY. October is the month of the traditional Simulated Emergency Test. All areas of the Section responded in fine form, planning



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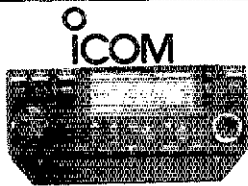
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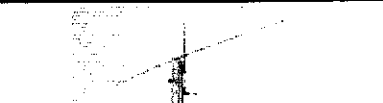
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individual community exercises or county wide drills as appropriate for this time. Ventura County ARES again wins the honors for the biggest, most wide-ranging, scenario. WBBVA planned a joint drill for ARES and RACES involving all the cities' EOCs, County and City public safety personnel. Participating cities were: Simi Valley, Moorpark, Thousand Oaks, Camarillo, Oxnard, Point Hueneme, Ventura, Santa Paula, Fillmore, and Ojai. Also participating was the Ventura County Red Cross. To the north, Santa Ynez Valley ARES ran a "table top exercise" with their respective Santa Barbara County OES counterparts, and then rush to participate in County Fire Department training. Several SYV ARES members, including EC Glen Todd, KF6OY, are training for certification as firefighters. Santa Maria Valley ARES participated in a City sponsored emergency exercise, receiving much support and praise from SM Fire Chief Crakes, while Lompoc ARES also worked with City emergency personnel in a local training exercise. Reports not yet in from San Luis Obispo County and Santa Barbara South County. If all this training weren't enough, Ventura County Red Cross held their annual Incident Command System (ICS) training, with materials and information provided by the County Fire Department. More than 110 people participated, including 81 amateurs. On the repeater front, NBJMI is undergoing modification for a more intelligent controller and emergency power/earthquake tolerance. Packet news is that WA6VOP, Jim Hendershot, has filled the large hole left when W6IXU took his bulletin board off the air. WA6VOP, and MORBAY node WD6Z are now both operating on 145.09. The change in frequency also seems to have helped reduce collisions and has improved packet access. Thanks to Mike, W6IXU, for providing his valuable service as long as he was able to, and to Jim for picking up the slack. Thanks also to Max, WD6Z, and all the other node and gateway stations. Without your support packet radio just wouldn't work! A final note: some of you have expressed concern that your area isn't receiving equal representation in Section News. The problem is that you aren't sending me TIMELY REPORTS! By the time I read about something in a club newsletter, write about it in this column, and wait for publication, the news item is 4 to 6 months old! If YOU or YOUR CLUB has something of interest to report LET ME KNOW! My address and phone are on page 8 of every QST. My packet "home BBS" is WA6VOP-1 in Arroyo Grande, 73 for now. Traffic: W8AKF 913, N6NLW 201, W6NOR 60. (Sept.) W8AKF 730.

### WEST GULF DIVISION

**NORTHERN TEXAS:** SM, Phil Clements, K5PC—Asst. SM: K5MXQ. SEC: W5GPO. STM: W5VMP. PIO: K5HGL. OOC: W5JBP. SGL: N1CWP. BM: W5QXK. TC: W5LNL. Congrats to K5UPN and KF5BL for making Brass Founders League by having traffic counts for October of over 500 points. Our mette was again tested this past hurricane season with a couple of close calls. The Temple ARC was deeply involved in the Gilbert operation and received cudors from Temple public safety officials for a super job in handling refugee traffic in the area. Congrats and best wishes to the new officers of the Lake County ARC out Graham way. SKYWARN classes will be starting in a few weeks in our area. Let's get caught up on all the latest technology and communications requirements of the National Weather Service for the upcoming tornado season. A special thanks to KF5BL for his great effort and perseverance in the implementation of packet radio into the National Trc System here in the D/FW metropole. Public Service Honor Roll for October: KF5BL K5UPN N5KCL W5YQZ and K5MXQ. Traffic: K5UPN 557, KF5BL 508, W5TNT 259, K5SRC 182, W5YQZ 172, W5VMP 171, K5MXQ 138, W5ZSN 106, N5KCL 99, W9OYL 91, K5AZK 46, W5EZZT 21, W5XQ 21, W55CPY 15.

**OKLAHOMA:** SM, Joe Lynch, N6CL—ASM: Carol King, K5CPZ. ACC: Ernie Buck, W5CDW. SEC: Bennett Bares, W5ZTN. SGL: Larry Hazelwood, W5NZS. STM: Sam Sifton, KV5X. TC: Ken Isbell, W5CMJ. OOC: Bill Goswick, K5VIG. Edmond ARS participated in Myriad Gardens run on Oct. 1 as well as other clubs. Ears also ran the communications for the Edmond Crop Walk. Your SM was a guest of the Broken Arrow ARC. Their guest speaker was a rep from the Broken Arrow Fire Dept. who spoke of the relationship between the city and Amateur Radio. Tulsa area and Northeast Oklahoma Amateurs had an excellent SET exercise involving a simulated earthquake (yes the area can have earthquakes) on Oct. 15. Oklahoma liaison net is looking for a few good checkins. The meet daily at 8 PM local on 3982.5 and will QRS for new or slow ops. The big news of the state was the well attended Texoma Hamarama (this year the Oklahoma State Convention). While rain dampened the spirits of the flea market, the attendance was up to nearly 1,000 registrants. W3AZD represented Headquarters while W5JBP and N5TC represented the division. The banquet and QCCWA breakfast were well attended. Special congratulations to Dave Cox, NB5H, outgoing President of the association for the excellent job. It is not too early to get involved with the planning of next year's West Gulf Convention. Contact your SM for further info or to volunteer to help. Traffic: W5OHK 270, W5OUV 244, KF5PD 154, N5IKN 116, K5CXP 99, W5RB 63, K5GBN 62, KV5X 45, W5QGC 27, W5ZOO 21, W5VOR 20, W5VLV 16, K5CAY 8, K5CPZ 6.

**SOUTH TEXAS:** SM, Arthur R. Ross, W5KR— SEC: K5DG. STM: W5SO. PIO: W5U2B. TC: N25U. ACC: W5BYDD. OOC: K5SBU. BM: K5CVD. SGL: K5KJN. AARCOVER, Austin ARC, reports KE5AL received nice TV coverage during Hurricane Gilbert's Jamaica passage; he was NCS on the 14,275 kHz Hurricane Net at the time of their visit; K5VU received plaque #5 for 5-Band WAS via packet; CONGRATULATIONS all around. DRN5 NM W5BYDD reports 530 messages in 62 October sessions; South Texas represented 98% by K5SKQ, W5KLV, W5VX, N5GKM, N25U, K5C5BW, W5SHZQ, KE5ZV, W55EPA, W5BFQU, N5BHQ, W5BYDD. BARN, bulletin of Beaumont ARC, reports club will be operating W200RIN during Texas anniversary week December 24 thru 30. Proud papa WAZVJL reports son KB5FTU, 13 year old 8th grader, received a letter of commendation from San Benito City Council for his Amateur Radio service to the city during the Hurricane Gilbert emergency; great going, Miguel! PIA N5ZSJ, Seguin, reports regrets on being unable to visit ARRL HQ as he passed thru Newington; had good visit with West Massachusetts SM W1UD; reports Hays County ECV NOSE has organized an emergency net on 147.10/70 Wimberly repeater; meets 6:30 PM local time 2nd Wednesday each month. PIA NSFIF, Northwest ARS, Houston, reports N5LSP is new NARS public Service Coordinator; also reports all Houston HAMS joined in preparation for Hurricane Gilbert;





they held "mock" drills, practiced message handling and "worst case scenarios" in order to be ready for a great deal of message handling if the need arose; it could come in handy later. GAND NM K5UPN reports 577 messages in 31 October sessions; RNS represented 100%; South Texas stations helping were WB5EPA, WB5FQU, KD5KQ, W5KLV, NX5V, WB5YDD, KE5ZV. Traffic: WB5J 323, WB5YDD 238, W5CTZ 143, WR5O 136, WD5GKH 112, NV5L 51, K5CVD 47, AC5Z 47, K5RG 33, W5BGE 17, NZ5J 10, W5KLV 9, WA5UZB 6, N5IAL 4.

**WEST TEXAS:** SM, Milly Wise, W5OVH—Wish to thank all clubs and individuals who send me news to enter into the SM column in QST. El Paso ARC members participated in the 1988 Scout Jamboree of the air. Cubmaster McLean (waiting for license) and several den masters with 20 cub scouts visited W5ES with Jack, KB5VQ, and Clay, K5TRW, operating the station enabling the scouts to talk to other scouts in various parts of US. Wish to welcome back as an affiliated club of ARRL in the West Texas Section the Sun City ARC, K5WPH. The Kilo-What, newsletter of San Angelo, W5QX, advises the luggage rack/antenna for the club van was constructed and installed with the help of W5QWX, K5ROV, NS5P, and other members. Lubbock ARC news sends congrats to James Chandler to Extra Class. Bill N5NFX to Adv. and Rex, KB5HNC, to Tech. New calls in Lubbock: Betty, N5NQQ, and Donna, N5NER. ASM Glenn, KA5PTG, reported the comm for the Easter Seal bike tour was supplied by the local ARES/RACES group: N5DWN, KB5AZA, KB5CTM, N5AE, WB5QLI, KA5RBR, WD5BWR, WB5PUM, KB5EKY, N6LTX and KA5PTG. SEC Sandy, W5MVJ, reports as of Oct 30 there are 325 ARES members. Shorted circuit of top of Panhandle ARC said hams demonstrated ham radio to Boy Scouts 18 troops for merit badges. Congrats to Scott, WA1ZVC, upgraded to General. The Keyer Newsletter of Key City ARC of Abilene for October was a very informative and enjoyable newsletter. Next month will list section appointees again. 73, Milly, W5OVH. Traffic: AE5I 132, K5KKO 35, N5KUC 20, W5ERT 16, K5UYH 12.

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## MURPHY WORKS THE CARIBBEAN

The freight forwarder mis-delivered all our ALPHA amps, ICOM transceivers, and towers to Curacao. Eight missing Cushcraft beams were discovered in a Miami warehouse just three days before zero hour. And we were getting pretty edgy when late Thursday afternoon arrived before our P40 operator licenses.

## FIFTY MILLION POINTS!

But things finally came together. All bands were on the air by 2359Z Friday and 48 hours later a new all-time record was in the log — 50,000,000-plus points! 20,000+ QSO's . . . multiplier over 900 . . . and only three 80M countries short of a 48 hour 5BDXCC!



"Not a single equipment failure in the whole contest! says Carl, AI6V/P40V. "AMAZING!"

Would you buy "GRATIFYING." Carl? We don't expect failures.

73.



*Dick Ehrhorn*

Dick Ehrhorn,  
W4ETO



# Helpful Hints For Newcomers

**I**COM is always sincerely interested in newly licensed amateurs and veteran operators returning to the shortwave bands after several years of inactivity. We understand your first contacts may be awkward, but they are also thrilling experiences... and the excitement only gets better with each day's operation! ICOM congratulates you on obtaining your new amateur radio license. A fascinating world of lifelong enjoyment is now open to you, and ICOM is dedicated to assuring all of your endeavors are a total success.

ICOM's "helping Elmer" assistance is available to you at friendly ICOM DAY promotions and amateur conventions nationwide. If you have a question that needs answering, from how to use ALC metering for setting mic gain to how long is a Morse dot or dash, step up and ask us! A series of ICOM's **RADIO NEWS** newsletters are also being published and distributed throughout the U.S. They guide you step-by-step through antenna selection and installation, station assembly, operating procedures, DX'ing, mobiling, packeting, and much more. If you have not received ICOM's newsletters, tell us. We are on your side and anxious to help you!

Many new licensees begin their on-the-air activities with FM operations on the popular 222MHz band. These voice communications are perfect for emergency use, keeping in touch with other ham family members and joining repeater conversations in almost every city. The line-of-sight range of VHF bands like 222MHz is several miles, and extends according to your area and its repeaters.

ICOM manufactures two models of handheld 222MHz FM transceivers to meet each amateur's needs. The simple-to-

operate IC-3AT is a 1.5 watt unit with convenient top-mounted thumbwheels for easy frequency selection. It includes a front keypad for autopatching, and it is an ideal first rig for portable use. ICOM's deluxe 5-watt IC-03AT sports a dual purpose front keypad that is used for both operating and autopatching. You can enter frequencies, repeater offsets, memory and scanning selections, and enjoy full base station operations right from your hand.

When VHF mobiling is your choice, ICOM's 25-watt IC-38A transceiver is the perfect selection. This "two-in-one special" can be used as easily as an auto's AM/FM radio or operated as a fully deluxe unit with band and memory scanning, any repeater offset selection, and much more. Alternately you can choose all mode operating luxury both at home and in your auto with ICOM's all-in-one cabinet IC-375A transceiver. It includes a built-in AC supply, DC power socket, 99 memories, 25 watts and a data switch for convenient packet operating. Today's VHF activities are indeed exciting, yet they are only a tip of the iceberg.

Ten meters is a Novice operator's delight for working the world with a barefoot transceiver and basic antenna system. This band is typically open for action from mid-morning until one or two hours around sunset, with Spring and Fall equinox usually enhancing conditions, and you can enjoy voice operations using SSB between 28.300 and 28.500MHz.

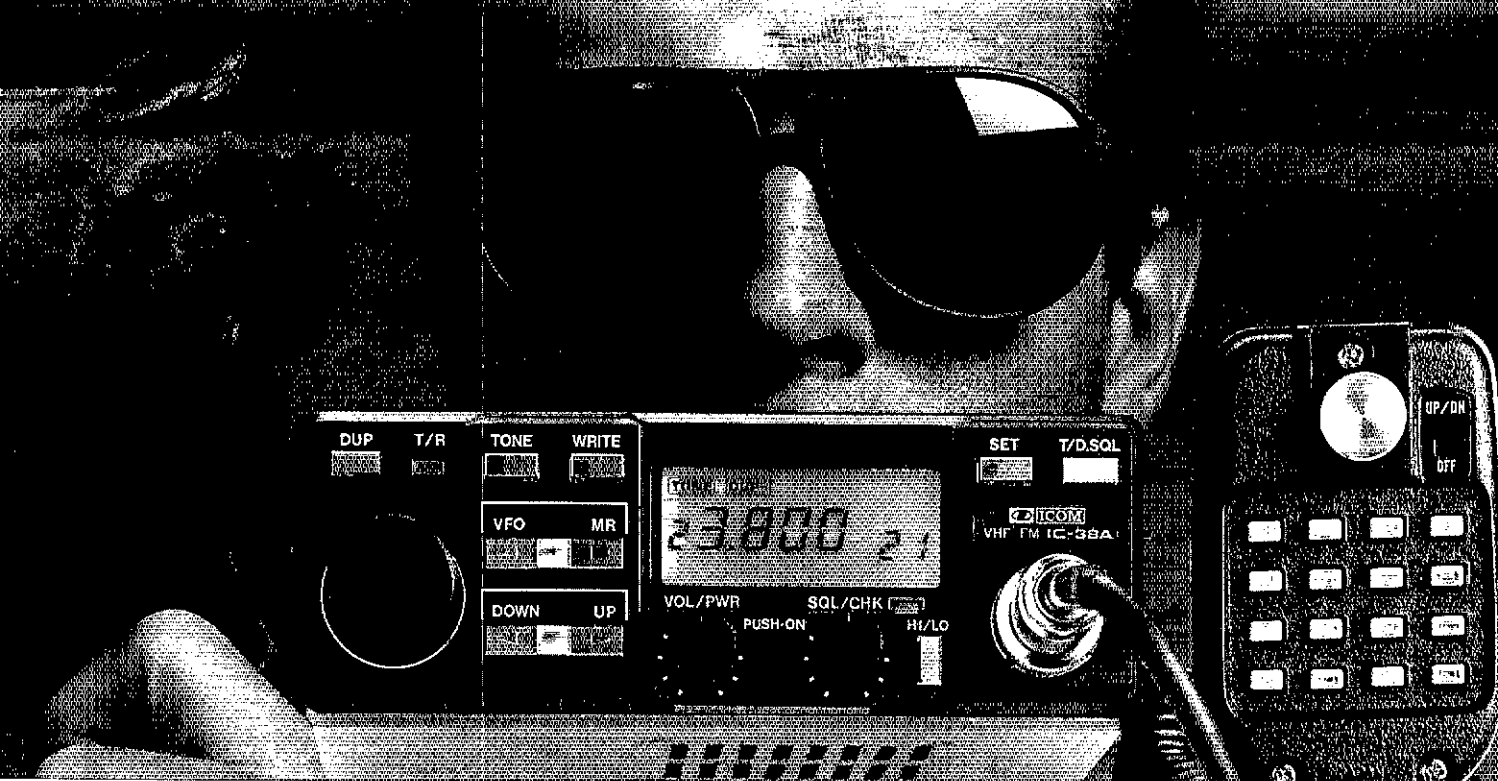
There's more! You can use Morse Code for operating on the big DX band of 15 meters and the "stateside favoring" bands of 40 and 80 meters. Morse Code also bridges many language barriers for super exciting DX'ing. Studying to upgrade your

license? You can increase your code speed by copying W1AW's evening code practice on 40 and 80 meters.

Remember, too, a **license is not required to listen on any frequency**. Make hamming a family affair by tuning in hurricane nets or rare DX on 20 meters, ships on marine frequencies or direct-from-the-source foreign news broadcasts on international shortwave bands. In fact, that's how many of today's upper class operators were first inspired to become radio amateurs!

The long term benefits of owning a full coverage HF transceiver are endless, and the most popular units among new amateurs are ICOM's IC-735 and IC-751A. Both 100 watt output units include full shortwave reception, all mode operation, memories, scanning, and a wealth of special features you can use or overlook as your desires dictate. The compact IC-735 fits into most small spaces. You can enjoy it at home, in your auto, or portable on vacations. Its simple front panel layout makes operation a breeze. Add its optional PS-55 AC supply and SP-7 speaker, and you have a setup that is as beautiful to view as it is to operate. ICOM's midsize IC-751A has the same outstanding features, plus it includes more memories and more CW operating attractions. Install ICOM's optional PS-35 AC supply inside the IC-751A and it becomes a complete station.

ICOM HF transceivers are recognized leaders in performance and reliability around the world. Their outstanding reputation of dependable operation under the most demanding conditions is surpassed only by their full coverage one year warranty and ICOM's incomparable customer support program. When you use ICOM equipment, you enjoy amateur radio with full confidence... a special benefit of owning the best!



# HIGH PERFORMANCE

ICOM has a commitment to high performance 220MHz gear. That's why we're the only manufacturer who can offer you a full line of 220MHz equipment...whether it's a mobile, handheld, base station transceiver, or fiber optic multi-bander.

**Handhelds.** Choose the full-featured five-watt **IC-03AT** with 10 full function memories capable of storing odd offsets and subaudible tones, scanning and

DTMF direct keyboard entry. Or select the **IC-3AT** easy-to-operate handheld featuring thumbwheel switch frequency selection.

**Mobiles.** ICOM offers the **IC-38A**, which sports a large LCD readout, 21 memories, scanning, and memory lock-out. The slim-line **IC-37A** features an LED readout, nine memories capable of storing offset and subaudible tones and both memory and band scan.

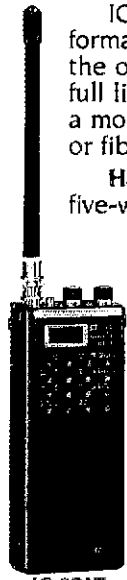
**Base Station.** The **IC-375A** is a 220MHz all mode operator's dream...25 watts output, an internal power supply, 99 memories, scanning, and all subaudible tones built-in.

**Multi-Bander.** The newest addition to ICOM's 220MHz family...the **IC-900** fiber optic controlled six-band mobile, which has a 220MHz optional band unit.

Quality. High Performance. That's ICOM 220MHz.



IC-3AT Handheld

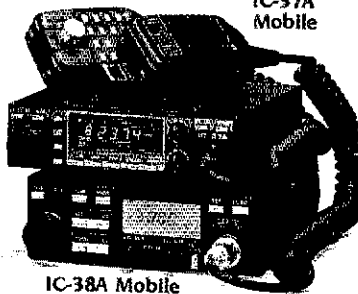


IC-03AT Handheld

NEW! IC-375A Transceiver



IC-37A Mobile



IC-38A Mobile

## ICOM 220MHz

**ICOM**  
First in Communications

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3150 Premier Drive, Suite, 126, Irving, TX 75063 / 1777 Phoenix Parkway, Suite 201, Atlanta, GA-30349

ICOM CANADA, A Division of ICOM America, Inc., 3071 - #5 Road, Unit 9, Richmond, B.C. V6X 2T4 Canada

All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions. 220MHz-2587

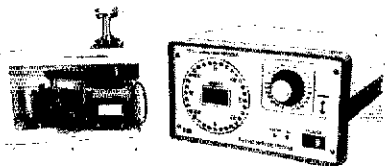


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- Vertical load: 2,000 lbs
- Mast size: 2 - 3.5 inch O.D.
- Motor: 1/3 HP 120/220V 50/60Hz
- Rotation speed: 1 RPM
- Weight: 230 lbs.
- Size: 15 x 25 x 15 inch

List \$4395.  
Call for Quote

## CRIS 6000 COMPUTER/RADIO INTERFACE SYSTEM.

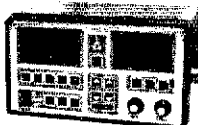
IBM PC OR COMPATIBLE.

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- Auto Log/Sort 800 memories
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- AMP only 14 x 22 x 13 inch 86 lbs

## SDU 8000

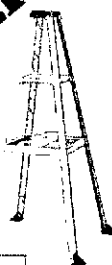
SPECTRAL DISPLAY UNITS (SDU) Allow user to "SEE" up and down the band for activity or lack of. You won't miss anything.



- Sweep width 50 KHz - 10 MHz
- Input 10.7 MHz
- Direct plug-in to R7000 no mods
- Variable sweep rate
- 3 inch CRT
- 120V 50/60 Hz

Introductory Price \$595.

# ROOF TOWERS



\$14000

MODEL	ETS-180
Base For Bearing (top)	5"
Max. Opening Width (leg)	2 7/8"
Actual Height	5' 7"
Angle	80°
Legs	Adjustable Step
Weight	22 lb

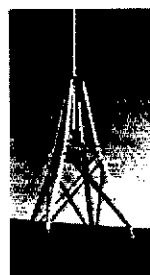
RDHN 20G	10' sect	48.95
20AG	top sect 9'	61.95
25G	10' sect	61.95
25AG2	top sect 9'	72.95
45G	10' sect.	144.95
45AG2	top sect 9'	150.95
AS25G	access shelf	24.95
AS45G	access shelf	62.95
1B-3	thrust bearing	57.95
M200	10' mast	19.95
SR25G	short base	28.95
SB45G	short base	61.95
EP245G	gin pole	149.95
	AND MORE!	

HUSTLER 68TV	5 band trap vert	147.95
58TV	5 band trap vert	125.95
48TV	4 band trap vert	95.95
G7-144	Fix stal 2ml coilinear	125.95
M0-1/M0-2	mobile masts	22.95
RM10/RM15	10m-15m resonator	12.95
RM10S/RM15S	super resonator	17.95
RM20/RM20S	std & super resonator	16.95/22.95
RM30	30mt std resonator	17.95
RM40/RM40S	std. and super	18.95/26.95
RM75/RM80	75 or 80 std	19.95
RM75S/RM80S	75 or 80 super	37.95
BM-1	bumper mt	16.95
SSM-2	stainless ball mt	18.95
SSM-3	spring	16.95
QD-1	quick disconnect	15.95
SGM-2	2mt 5/8 mag. mt.	28.95
HOT	trunk mt w/swivel ball	17.95
	AND MORE!	

VAN GORDEN PD8010	80-10 dipole kit	35.95
PD8040	80-40 dipole kit	33.95
PD4010	40-10 dipole kit	31.95
SD80	80 shortened dipole	29.95
SD40	40 shortened dipole	26.95
ALL BANDER GR5V	160-10mt	28.95
	AND MORE!	49.95

KLM KT34A	triband 4 el	
KT34XA	triband 5 el	
2M-14C	2mt satellite	
2M-22C	2mt satellite	
435-18C	70cm satellite	
435-40CX	70cm satellite	
432-30L BX	70cm satellite	
2M-13L BA	2 meter	
2M-16L BX	2 meter	

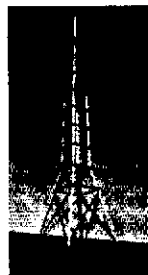
CABLE & CONNECTORS	per/ft	
Belden 9913	Low Loss	.54
RG213 50 OHM	30 cts	
RG8U	Foam	30 cts
RG BX	Mini	22 cts
RG59/U	72 OHM	14 cts
PL259/Silver		99-1.49
ft Male for 8/U		1.50
RNOM/PHH		5.50
Low Loss		58 cts



CR-18



CR-30



CR-45

CREATE ROOF TOWERS CONSTRUCTED OF HIGH GRADE ALUMINUM WITH GALVANIZED STEEL BRACING FOR ADDED STABILITY AND STRENGTH WILL EASILY ACCOMMODATE YOUR ANTENNA REQUIREMENTS. THREE SIZES OF ROOF TOWERS WILL SUPPORT VHF ANTENNAS, HF TRI-BANDERS AND OSCAR SYSTEMS. ROTATORS EASILY MOUNT INSIDE THE TOWER. AN OPTIONAL THRUST BEARING (#303) IS RECOMMENDED. SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE OR OBLIGATION.

MODEL	HEIGHT	MAXIMUM ANTENNA WIND LOAD IN FT 2	BASE WIDTH	MAX. VERT. LOAD LBS.	TOWER WEIGHT LBS.	PRICE
CR-18	5' 10"	21 @ 90 MPH	31-1/3"	440	28	129.00
CR-30	9' 10"	27 @ 90 MPH	39"	1,322	39	224.00
CR-45	14' 9"	23 @ 90 MPH	39"	881	55	328.00
CR45	Thrust Bearing For CR-18, CR-30 and CR-45. Maximum Acceptable Mast Diameter 2 1/4"					52.00

\*BUYING IS REQUIRED ON ALL ROOF TOWERS. UPS SHIPPABLE

WE CARRY THE FOLLOWING BRANDS AS WELL  
AEA, ALINCO, ALPHA DELTA, ARISTA, ASTRON, B&K, B&W, BECKMAN, BENCHER, BIRD, DATONG, FLUKE, HAL, HEIL, ICOM, IWATSU, JTL, KENWOOD, LEADER, MARANTZ, MAXON, MFJ, NOVEX, NYE, VIKING, SANGHAN, SONY, TEN-TEC, TOKYO-HY-POWER, TOSHIBA, TRIPPLITE, WELZ, YAESU.

### CUSHCRAFT

44	4 el triband	353.95
A3	3 el triband	259.95
AV5	5 band trap vert	117.95
32-19	19 el. 2mt. boomer	107.95
215WB	15 el wide band	
	2 mt	85.95
4248	24 el 70cm boomer	85.95
416TB	16 el OSCAR 435 MHz.	
	10 el OSCAR 145.9 MHz.	67.95
A144-10T	OSCAR pack 2mt & 70cm	167.95
AOP-1	2mt vert ringo	27.95
AR-2	2mt vert ringo	
ARX-2	2mt vert ringo	34.95
ARX-2B	2mt vert ringo	
	2mt ringo	41.95
	AND MORE!	
R4	4 band vert	214.95
	AND MORE!	
BUTTERNUT HFVX	80-10 vertical	188.00
HF2V	80-40 vertical	131.00
2M CVS	2MT vertical	80.00
RMKII	roof mfg kit	52.00
TBR160S	160m add on	53.00
MPS	mtg post sleeve	7.90
HF5B	HF mini beam	229.00

### MISC ITEMS

160, 80, 40 dipole	49.95	
AP151-3G	2m on glass	37.95
UGM	1/4 lambda mag	21.95
HB1448N	2 band trap	16.95
MONR51	scanner mag.	39.95
BL1500	9 ft balun	46.95
Coaxseal		2.95
GR6	6 gnd rod	6.00
5RG58N	5 jumper	4.99
M5	5' mast	5.95
CS3G	3-way switch	33.95
LAC2	Blitz Bug	8.95
4JU	4 jumper	8.95
TRT60	5 tripod	21.95
AR300XL	TV rotor	59.95
258XUU	25 cable	9.95
508XUU	50 cable	15.95
758XUU	75 cable	20.95
1008XUU	100 cable	25.95
CS201	coax switch	25.75
CS401	coax switch	109.95
	AND MORE!	

### AEA ISOPOLARS ARE BACK

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2 Meter	44.95
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CR2AM	PERM MT - CALL	41.00
CR2A	2M Mag MT	41.00
CR3A	220MHz Mag MT	37.00
CR4A	140MHz Mag MT	34.00
CR2RD	Radome Cover - CALL	12.00

CABLE IS NOT INCLUDED

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HAM IV	15 sq ft	299.95
CD45II	8.5 sq ft	213.95

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MR750E	16 sq. ft	319.95
MR750PE	w/preset	419.95
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### LARSEN

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NM0M	mag mt	19.95
NM0150	2m coil & whip	27.95
NM2/70	coil & whip	38.50
KD4270	dual band duck	26.95
LM220	250 coil & whip	25.95
	AND MORE!	



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NO C.O.D.'s - SORRY

ICOM

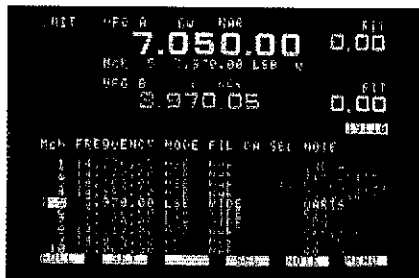
IC-781 HF Transceiver



# THE FUTURE OF AMATEUR COMMUNICATIONS

Once in a lifetime, a transceiver is introduced that's so extraordinary and innovative that it opens a totally new era in HF communications. ICOM's pacesetter IC-781 proudly exhibits that hallmark achievement with futuristic designs and features of true legendary proportions. Whether DX'ing, contesting, pioneering new interests or enjoying unquestionable top-of-the-line performance, the IC-781 is indeed today's standard of excellence!

**Multi-Function Five Inch CRT.** Displays frequencies, modes, memory contents, operating notes, RIT, two menu screens, plus a panoramic view of all signals in a selected range. A portion of the screen also serves as a display for data modes like RTTY, AMTOR, and PACKET.



**Unique Spectrum Scope.** Continuously indicates all signal activities and DX pileups with your operating frequency in the center. Selectable horizontal frequency spans of 50,

100, and 200KHz for each side of the frequency you're listening to. Vertical range indicates relative signal strengths. A contesteer's dream!



**Dual Width Noise Blanker** includes MCF filter plus level and width controls to eliminate pulse and woodpecker noise with minimum adjacent-signal interference.

**Incomparable Filter Flexibility.** Independent selection of wide and narrow SSB filters plus CW filters. Second and third CW IF filters are independently selectable!

**Dual Watch.** Simultaneously receives two frequencies in the same band! Balance control adjusts VFO A/B receive strength levels. You can check additional band activity, even tune in your next contact, while in QSO without missing a single word!

**DX Rated!** 150 watts of exceptionally clean RF output. Easily drives big amplifiers to maximum power.

**Twin Passband Tuning with separate controls for second and third IF stages!** Increases selectivity and narrows bandwidth, independently varies low and high frequency response, or functions as IF shift. It's DX'ing Dynamite!

**A Total Communications System!** Includes built-in 100% duty AC supply, high speed automatic antenna tuner, lmbic keyer, semi-automatic or full QSK CW break-in to 60 wpm, Audio Peaking Filter (APF), RF speech processor, multiscanning, 105dB dynamic range, all-band/all-mode receiver with general coverage, and much more!

**ICOM Dependability.** The phenomenal IC-781 is built for action and backed with the most extensive warranty in the industry.

See the IC-781 at your local ICOM dealer.

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All ICOM radios significantly exceed FCC regulations limiting spurious emissions. 781188.

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## Power Supplies

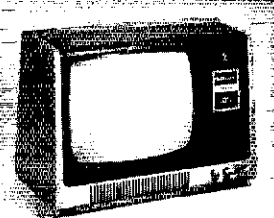


ASTEC AC9355-01. 65 watts. Outputs: +5VDC/6A, +12VDC/1.5A, +12VDC/2.1A, and -12VDC/250 mA. 115/230VAC input. NP-0001 ..... 79.95



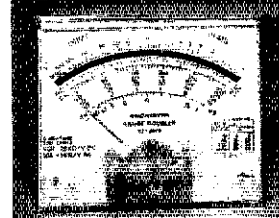
Aspen 20-Amp Regulated 13.8VDC Power Supply. NP-0003 ..... 89.95  
Aspen 10-Amp Regulated 13.8VDC Supply. NP-0002 ..... 59.95

## Video Monitor



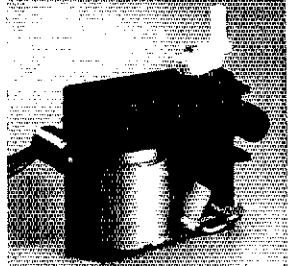
Here's the 12" monochrome monitor from the original TRS-80 Model I computer. NP-0010 ..... 24.95

## Meter Assembly



15  $\mu$ A movement has a 4 1/4", 3-color mirrored scale. NP-0004 ..... 8.95

## Steering Servo



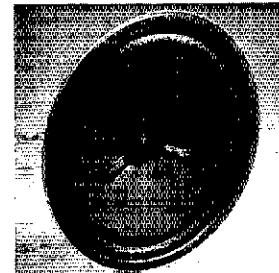
From radio-controlled toy vehicles. NP-0005 ..... 4.95

## Piezo Buzzer



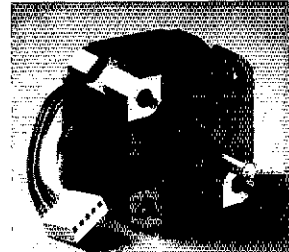
90 dB output. Operates from 3-10VDC. NP-0008 ..... 1.19

## 3" Speaker



8-ohm speaker, rated 2 watts. NP-0009 ..... 1.99

## Stepper Motor



3.6-degree step. Operates on 12VDC. NP-0011 ..... 10.95

## Ear Pads



Black foam, 35 mm round. NP-0007 ... Pkg. of 2/49¢

## Trimmers and More

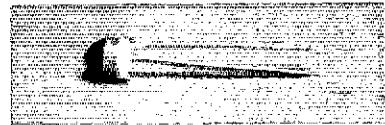


Horiz. PCB-Mount Trimmer Pots.

Type	Stock No.	Each
5K Semi-Fixed	NP-0014	.25
50K Semi-Fixed	NP-0012	.25
100K Trimmer	NP-0013	.25



KLR321 LED Display. Dual seven-segment red display. Com. cathode. NP-0015 ..... 1.99



Red LED. 0.3mm size. NP-0016 ..... 29¢

## Diodes

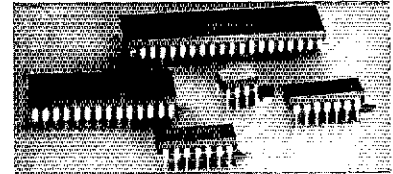


DBB10B Rectifier. Standard recovery bridge. NP-0017 ..... 99¢  
1N4732A. 6.8V, 1-watt zener. NP-0018 ..... 29¢

S1WB2 Rectifier. Standard recovery bridge. NP-0019 ..... 99¢  
216NR Varistor. NP-0020 ..... 79¢  
TCR1099 (Equiv.). Constant current source. NP-0021 ..... 99¢  
SCR106B11. NP-0022 ..... 69¢  
5.6V, 1W Zener. NP-0023 ..... 29¢  
1SS53. NP-0024 ..... 19¢  
1S1588. NP-0025 ..... 19¢  
1S188. NP-0026 ..... 19¢  
HV-80. NP-0027 ..... 19¢

Bridging Clips. For telephone station blocks. NP-0006 ..... Pkg. of 25/1.29

## ICs



Device	Package	Stock No.	Each
IA7303 Linear IF	9-pin SIP	NP-0028	1.49
MC6822P MUX	40-pin DIP	NP-0029	2.49
HA17812P 12V Reg.	---	NP-0030	1.99
MC1458CPI Op Amp.	8-pin DIP	NP-0031	.69
D19436 R-C Transmitter	20-pin DIP Surface-Mt.	NP-0032	1.99
TC4053BP Analog Switch	16-pin DIP	NP-0033	2.79
78L12 12V Reg.	---	NP-0034	1.79
14146B PLL	16-pin DIP	NP-0035	2.49
TR1602 UART	40-pin DIP	NP-0036	4.99
TA722AD Power Amp	10-pin SIP	NP-0037	2.69
CD4368BGN Quad Bilateral Switch	14-pin DIP	NP-0038	.89
MK5098IN Dialer	16-pin DIP	NP-0039	2.49
MC14049 Hex Buffer	16-pin DIP	NP-0040	.69
MB3730A Power Amp	7-pin SIP	NP-0041	3.99
LM8361 Alarm Clock	40-pin DIP	NP-0042	3.99
SCM95987 Character Generator	24-pin DIP	NP-0043	2.49
MCM6256AP15 256K DRAM (150 ns)	---	NP-0044	16.99

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NEW

# ICOM IC-900

## Six Bands in One Mobile!

### ICOM IC-900 FIBER OPTIC FM MOBILE

ICOM introduces the revolutionary IC-900 multi-band FM mobile transceiver. ICOM, first in utilizing fiber optic technology in amateur radio, enables you to create your own mobile communications system. Six band combinations... 10M FM, 6M, 2M, 220MHz, 440MHz, and 1.2GHz. It's the most advanced, versatile, compact, and easy-to-use mobile available.

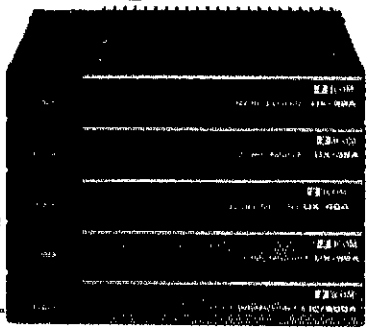
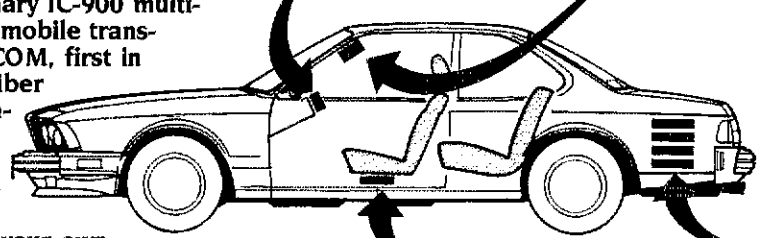
**Features Galore.** The IC-900 is an operator's dream... Listen on two bands simultaneously or transmit on one band and receive on a different band when using a second speaker (**true full duplex crossband operation**), 10 memories per band, independent PL tones and



Remote Controller



Speaker



Band Units/Interface Unit B

Interface Unit A is installed in a location near the driver's seat.

Interface Unit B controls the six band units and can be installed in your car's trunk. A fiber optic cable runs from Interface A to Interface B, which transports an abundance of information through a 3/16" cable and eliminates RF feedback.

Interface Unit A



offset into each memory, memory and programmable band scan, and all subaudible tones in actual Hz readout.

The IC-900 includes an ultra compact remote controller, an Interface A unit, Interface B unit, SP-8 speaker, HM-14 up/down DTMF mic, fiber optic and controller cables.

#### Remote Controller.

Measuring only 2 inches high by 5.7 inches wide by 1 inch deep, the remote controller can be installed on your car's dash or sun visor with the supplied velcro. And, if you want, take the controller with you when you leave your car. The controller features a super large, highly visible LCD.

**Band Units** are "stacked" onto the Interface B Unit via the supplied mounting bracket. Optional band units available are:

Band Unit	Power Output	Frequency
UX-19A	10W/1W	28-30MHz
UX-29A	25W/5W	138-174MHz Rx; 140.1-150MHz Tx
UX-29H	45W/5W	138-174MHz Rx; 140.1-150MHz Tx
UX-39A	25W/5W	216-236MHz Rx; 220-225MHz Tx
UX-49A	25W/5W	440-450MHz
UX-59A	10W/1W	50-54MHz
UX-129A	10W/1W	1240-1300MHz

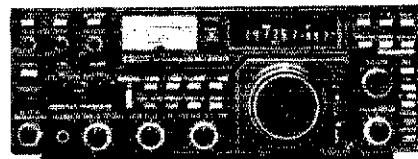


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3150 Premier Drive, Suite 126, Irving, TX 75063 / 1777 Phoenix Parkway, Suite 201, Atlanta, GA 30329  
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All ICOM specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions.

HF Equipment Regular SALE  
IC-781 Xcvr/Rcvr/ps/tuner/scope ... 5995.00 Call



IC-761 Xcvr/Rcvr/ps/tuner ..... 2699.00 2369  
HM-36 Scanning hand microphone 47.00  
SP-20 Ext. speaker w/audio filter ... 149.00 139<sup>95</sup>  
FL-101 250 Hz 1st IF CW filter .... 73.50  
FL-53A 250 Hz 2nd IF CW filter ..... 115.00 109<sup>95</sup>  
FL-102 6 kHz AM filter ..... 59.00  
EX-310 Voice synthesizer ..... 59.00



IC-751A 9-band xcvr/1.30 MHz rcvr 1699.00 1469  
PS-35 Internal power supply ..... 219.00 199<sup>95</sup>  
FL-32A 500 Hz CW filter (1st IF) .... 69.00  
FL-63A 250 Hz CW filter (1st IF) .... 59.00  
FL-52A 500 Hz CW filter (2nd IF) ... 115.00 109<sup>95</sup>  
FL-53A 250 Hz CW filter (2nd IF) ... 115.00 109<sup>95</sup>  
FL-33 AM filter ..... 49.00  
FL-70 2.8 kHz wide SSB filter ..... 59.00  
RC-10 External frequency controller 49.00



IC-735 HF transceiver/SW rcvr/mic 1099.00 949<sup>95</sup>  
PS-55 External power supply ..... 219.00 199<sup>95</sup>  
AT-150 Automatic antenna tuner ... 445.00 369<sup>95</sup>  
FL-32A 500 Hz CW filter ..... 69.00  
EX-243 Electronic keyer unit ..... 64.50  
UT-30 Tone encoder ..... 18.50

Other Accessories Regular SALE  
IC-2KL 160-15m solid state amp w/ps 1999.00 1699  
PS-15 20A external power supply ..... 175.00 159<sup>95</sup>  
PS-30 Systems p/s w/cord, 6-pin plug 349.00 319<sup>95</sup>  
MB Mobile mount, 735/751A/761A... 25.99  
SP-3 External speaker ..... 65.00  
SP-7 Small external speaker ..... 51.99  
CR-64 High stab. ref. xtal for 751A... 79.00  
PP-1 Speaker/patch ..... 179.00 164<sup>95</sup>  
SM-6 Desk microphone ..... 47.95  
SM-8 Desk mic - two cables, Scan... 89.00  
SM-10 Compressor/graph EQ, 8 pin mic 149.00 139<sup>95</sup>  
AT-100 100W 8-band auto. antenna tuner 445.00 389<sup>95</sup>  
AT-500 500W 9-band auto. antenna tuner 589.00 519<sup>95</sup>  
AH-2 8-band tuner w/mount & whip 659.00 589<sup>95</sup>  
AH-2A Antenna tuner system, only ... 519.00 449<sup>95</sup>  
GC-5 World clock ..... 91.95 79<sup>95</sup>

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★ Large Stocks  
★ Fast Service  
★ Top Trades  
at AES<sup>®</sup>

VHF/UHF base multi-modes Regular SALE  
IC-275A 25W 2m FM/SSB/CW w/ps 1299.00 1069  
IC-275H 100W 2m FM/SSB/CW ..... 1399.00 1129  
IC-375A 25W 220 FM/SSB/CW (c/o) 1399.00 899<sup>95</sup>  
IC-475A 25W 440 FM/SSB/CW w/ps 1399.00 1099  
IC-475H 75W 440 FM/SSB/CW ..... 1599.00 1289  
IC-575A 25W 6/10m xcvr w/ps ..... 1399.00 1129  
IC-575H 100W 6/10m xcvr ..... 1699.00 1499

IC-471H 75W 430-450MHz base (c/o) 1399.00 989<sup>95</sup>  
PS-35 Internal power supply ..... 219.00 199<sup>95</sup>  
AG-35 Mast mounted preamp ..... 99.95  
AG-35 (Purchased with IC-471H) 99.95 9<sup>95</sup>  
SM-6 Desk microphone ..... 47.95  
EX-310 Voice synthesizer ..... 59.00  
TS-32 CommSpec encode/decoder ... 59.95  
UT-15 Encoder/decoder interface ... 34.00  
UT-15S UT-15S w/TS-32 installed ... 96.00

VHF/UHF/1.2 GHz Mobiles Regular SALE  
IC-37A 25w 220 FM/TTP mic ... (c/o) 499.00 349<sup>95</sup>  
IC-47A 25w 440 FM/TTP mic ... (c/o) 549.00 399<sup>95</sup>  
PS-45 Compact 8A power supply ... 145.00 134<sup>95</sup>  
UT-16/EX-388 Voice synthesizer ... 34.99  
SP-10 Slim-line external speaker ... 35.99  
IC-28A 25W 2m FM, TTP mic ..... 469.00 409<sup>95</sup>  
IC-28H 45W 2m FM, TTP mic ..... 499.00 439<sup>95</sup>  
IC-38A 25W 220 FM, TTP mic ..... 489.00 349<sup>95</sup>  
IC-48A 25W 440-450 FM, regular mic 459.00 369<sup>95</sup>  
IC-48A 25W 440-450 FM, TTP mic ... 509.00 449<sup>95</sup>  
HM-14 Extra TTP microphone ..... 59.00  
UT-28 Digital code squelch ..... 39.50  
UT-29 Tone squelch decoder ..... 46.00  
HM-16 Speaker/microphone ..... 34.00  
IC-228A 25W 2m FM/TTP scan mic... 509.00 449<sup>95</sup>  
IC-228H 45W 2m FM/TTP scan mic... 539.00 479<sup>95</sup>  
UT-40 Pocket beep function ..... 45.00  
IC-900A Transceiver controller ..... 639.00 569<sup>95</sup>

★ Package Special . . .

IC-900A Transceiver controller with UX-29H  
2m/45W and UX-39A 220/25W band units.  
**\$969<sup>95</sup>**

UX-19A 10m 10W band unit ..... 299.00 269<sup>95</sup>  
UX-29A 2m 25W band unit ..... 299.00 269<sup>95</sup>  
UX-29H 2m 45W band unit ..... 349.00 319<sup>95</sup>  
UX-39A 220MHz 25W band unit ... 349.00 289<sup>95</sup>  
UX-49A 440MHz 25W band unit ... 349.00 319<sup>95</sup>  
UX-59A 6m 10W unit ..... 349.00 319<sup>95</sup>  
UX-129A 1.2GHz 10W band unit ... 549.00 499<sup>95</sup>  
IC-1200A 10W 1.2GHz FM Mobile ... 699.00 549<sup>95</sup>  
IC-3200A 25W 2m/440 FM/TTP (c/o) 695.00 499<sup>95</sup>  
UT-23 Voice synthesizer ..... 34.99  
IC-3210A 25W 2m/440 FM/TTP ..... 739.00 649<sup>95</sup>  
AH-32 2m/440 Dual Band antenna ... 39.00  
AHB-32 Trunk-lip mount ..... 35.00  
Larsen PO-K Roof mount ..... 20.00  
Larsen PO-TLM Trunk-lip mount ... 22.00  
Larsen PO-MM Magnetic mount ... 22.00  
RP-1210 1.2GHz 10W 99 ch FM xcvr 1529.00 1349  
RP-2210 220MHz 25W repeater ..... 1649.00 1469  
RP-3010 440MHz 10W FM repeater... 1299.00 1149

Due to the size of the ICOM product line, some accessory items are not listed. If you have a question, please call. All prices shown are subject to change without notice.



Hand-helds Regular SALE  
IC-2A 2-meters ..... 289.00 259<sup>95</sup>  
IC-2AT with TTP ..... 319.00 279<sup>95</sup>  
IC-3AT 220/TTP (c/o) 349.00 269<sup>95</sup>  
IC-4AT 440 MHz, TTP 349.00 299<sup>95</sup>  
IC-02AT/High Power 409.00 349<sup>95</sup>  
IC-03AT for 220 MHz 449.00 289<sup>95</sup>  
IC-04AT for 440 MHz 449.00 389<sup>95</sup>  
IC-u2AT for 2m w/TTP 329.00 289<sup>95</sup>  
IC-u4AT 440 MHz, TTP 369.00 299<sup>95</sup>  
IC-2GAT for 2m, TTP 449.00 379<sup>95</sup>  
IC-4GAT 440MHz, TTP 429.00 399<sup>95</sup>  
IC-32AT 2m/440MHz 629.00 559<sup>95</sup>

IC-u2A for 2m w/o TTP  
Reg. \$299 - Closeout \$249<sup>95</sup>

IC-12AT 1W 1.2GHz FM HT/batt/cgr/TTP 473.00 369<sup>95</sup>  
IC-12GAT Dlx 1/7W 1.2GHz FM HT/TTP 529.00 469<sup>95</sup>  
Aircraft band hand-helds Regular SALE  
A-2 5W PEP synth. aircraft HT ..... 525.00 479<sup>95</sup>  
A-20 Synth. aircraft HT w/VOR ..... 625.00 569<sup>95</sup>

Accessories for all except micros Regular  
BP-7 425mah/13.2V Nicad Pak - use BC-35 79.00  
BP-8 800mah/8.4V Nicad Pak - use BC-35 ... 79.00  
BC-35 Drop in desk charger for all batteries 79.00  
BC-16U Wall charger for BP7/BP8 ..... 21.25  
LC-11 Vinyl case for Dlx using BP-3 ..... 20.50  
LC-14 Vinyl case for Dlx using BP-7/8 ..... 20.50  
LC-02AT Leather case for Dlx models w/BP-7/8 54.50

Accessories for IC and IC-O series Regular  
BP-2 425mah/7.2V Nicad Pak - use BC35 ..... 49.00  
BP-3 Extra Std. 250 mah/8.4V Nicad Pak ... 39.50  
BP-4 Alkaline battery case ..... 16.00  
BP-5 425mah/10.8V Nicad Pak - use BC35 65.00  
CA-5 5/8-wave telescoping 2m antenna ..... 19.95  
CP-1 Cig. lighter plug/cord for BP3 or Dlx ..... 13.65  
CP-10 Battery separation cable w/clip ..... 22.50  
DC-1 DC operation pak for standard models 24.50  
MB-16D Mobile mtg. bkt for all HTs ..... 25.99  
LC-2AT Leather case for standard models ... 54.50  
RB-1 Vinyl waterproof radio bag ..... 35.95  
HM-9 Speaker microphone ..... 47.00  
HS-10 Boom microphone/headset ..... 24.50  
HS-10SA Vox unit for HS-10 & Deluxe only 24.50  
HS-10SB PTT unit for HS-10 ..... 24.50  
SS-32SMP CommSpec 32-tone encoder ..... 27.95

For other HT Accessories not listed please CALL

Receivers Regular SALE  
R-71A 100kHz to 30MHz receiver ..... \$999.00 869<sup>95</sup>  
RC-11 Infrared remote controller ... 70.99  
FL-32A 500 Hz CW filter ..... 69.00  
FL-63A 250 Hz CW filter (1st IF) .... 59.00  
FL-44A SSB filter (2nd IF) ..... 178.00 159<sup>95</sup>  
EX-257 FM unit ..... 49.00  
EX-310 Voice synthesizer ..... 59.00  
CR-64 High stability oscillator xtal 79.00  
SP-3 External speaker ..... 65.00  
CK-70 (EX-299) 12V DC option ..... 12.99  
MB-12 Mobile mount ..... 25.99  
R-7000 25MHz to 2GHz scan rcvr ... 1199.00 1049  
RC-12 Infrared remote controller ... 70.99  
EX-310 Voice synthesizer ..... 59.00  
TV-R7000 ATV unit ..... 139.00 129<sup>95</sup>  
AH-7000 Radiating antenna ..... 99.00 (16)

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 ICOM Handhelds

# HOW DO YOU PACK 7 WATTS, 20 MEMORIES AND SCANNING INTO A HANDHELD?

**IC-2GAT:** 7 Watts Rx 138-174MHz, Tx 140-150MHz

**IC-4GAT:** 6 Watts 440-450MHz

**IC-32AT:** 5 Watts Rx 138-174MHz/440-450MHz;  
Tx 140-150MHz/440-450MHz

## A New Generation of Powerful, Versatile Handhelds.

Select a new "G Series" or dual band ICOM transceiver and enjoy full base station luxury in a portable unit designed especially for you!

- **Maximum Frequency Coverage.** The IC-2GAT receives 138-174MHz, including NOAA, and transmits 140-150MHz to include CAP and MARS frequencies. The IC-4GAT operates 440-450MHz, and the IC-32AT receives 138-174MHz and operates 140-150MHz/440-450MHz.
- **Most Powerful Handheld!** The IC-2GAT delivers seven watts! The IC-4GAT is six watts and the IC-32AT is five watts! One watt level selectable for local QSO's.
- **20 Memories.** Store any frequency, Tx offset and subaudible tone in any memory. Total flexibility!
- **Programmable Scanning** of band and memories plus easy lockout and instant memory recall.
- **Additional Features.** Battery saver, call channel, all subaudible tones, multi-function LCD readout and DTMF pad.
- **Compatible Accessories.** All ICOM IC-2AT/02AT series battery packs, headsets and speaker mics are interchangeable.
- **Optional UT-40 Beeper** silently monitors a busy channel for your calls. When the pre-programmed subaudible tone is received, the unit beeps and the LCD flashes.



**IC-32AT**  
2 Meters and  
440MHz

**IC-2GAT**  
2 Meters

**IC-4GAT**  
440MHz

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First in Communications

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**SATURDAY**  
**January 14, 1989**  
**9am til 3pm**



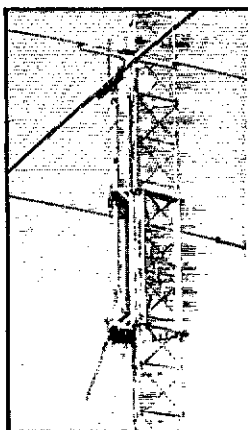
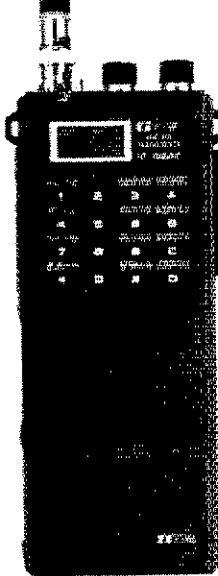
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**Prize Drawings each hour.**  
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- Special pricing
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**Bring things down for  
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Never climb your tower again with this elevator system. Antennas and rotator mount on HAZER, complete system travels tower in vertical upright position. Safety lock system operates while raising or lowering. Never can fall.

Complete kit includes winch, 100 ft. of cable, hardware and instructions. For Rohm 20 and 25 G Towers.

Hazer 2-Heavy duty alum. 12 sq. ft. load **\$311.95 ppd.**  
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Hazer 8-Heavy duty galv. steel 18 sq. ft. load **CALL**  
Ball Thrust Bearing TB-25 for any of above **\$64.50 ppd.**

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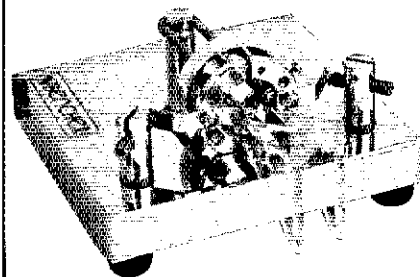
SuperSCAF incorporates a switched-capacitor bandpass filter, an economical implementation of digital filter technology. Extreme sharpness, stability, accuracy and complete freedom from ringing characterize this design approach. Bandwidth is adjustable from a minimum of 30 Hz to a maximum of 3700 Hz, allowing optimum passband tailoring under widely varying conditions. Skirt slope is 150 dB per octave (about twice as steep as a good crystal filter), and stopband attenuation is at least 51 dB. SuperSCAF is connected via the receiver's speaker or headphone output and provides 1.5 Watts to drive a 3 1/2 to 8 Ohm speaker. SuperSCAF operates from 105 to 130 VAC.

SuperSCAF is available in kit form for \$119.95 or assembled for \$179.95. Please include \$7.00 for shipping and handling. Order from AFtronics, Inc., PO Box 785, Longwood, FL 32752-0785. Florida residents should include state sales tax.

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ICOM

THE INTERNATIONAL DX CONTEST IC-735

HF Transceiver



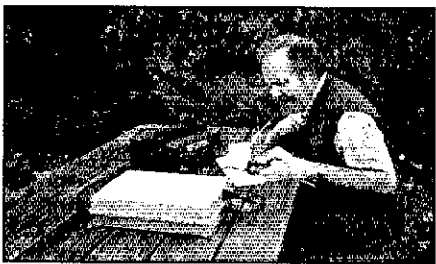
# 'MOST RELIABLE HF'

"Of all the possible radios, I chose the ICOM IC-735 for my CQWW QRP world record attempt."

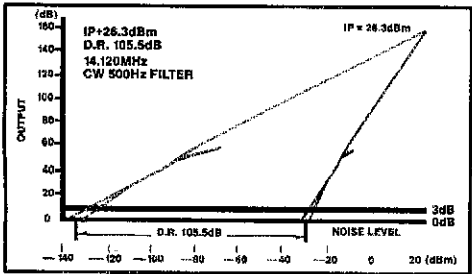
Danny Eskenazi, K7SS, World High QRP Score  
-1987 CQWW SSB (PJ2FR)  
-1986 CQWPX SSB (K7SS/WH6)  
-1986 ARRL DX PHONE & CW (K7SS/KH6)

ICOM's IC-735 is the world's most popular HF transceiver. With the highest performance, smallest size, and best customer satisfaction of any HF transceiver, the IC-735 is the winner's choice for fixed, portable, or mobile operations.

- **Field Proven 100W Transmitter** with 100% duty cycle. Proudly backed with ICOM's full one-year warranty.
- **105dB Dynamic Range Receiver** includes passband tuning, IF notch, adjustable noise blanker, and semi or full CW QSK.
- **Conveniently Designed.** Measures only 3.7"H by 9.5"W by 9"D.



- **Optional AH-2 Automatic Tuning Mobile Antenna System** covers 3.5MHz-30MHz and tracks with the IC-735's tuned frequencies.
- **All HF Amateur Bands and Modes** plus general coverage reception from 100KHz-30MHz.



- **12 Tunable Memories** operate and reprogram like 12 separate VFO's. Supreme flexibility!
  - **Additional Options:** SM-10 graphic equalized mic, PS-55 AC power supply, AT-150 automatic antenna tuner for base operation.
- ICOM's IC-735...** a proven winner for reliable worldwide HF communications. See it today at your local ICOM dealer.

# ICOM

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—1989—

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**Commercial Exhibit Areas**

**Watch this space for more details next month!**

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Hamcation Information • P.O. Box 547811, Orlando, FL 32854

**ORLANDO HAMCATION & COMPUTER SHOW**

Sponsored by: Orlando Amateur Radio Club, Inc.

To transform your shack into a DX powerhouse, combine the intelligence of Yaesu's FT-767GX HF/VHF/UHF base station and the muscle of our powerful FL-7000 HF amplifier.

You'll be amazed at how you can cut through pile-ups. Be heard anywhere in the world. And wake up otherwise inactive bands.

**The brains of the operation: The FT-767GX.** This intelligent HF/VHF/UHF base station includes four micro-processors for unparalleled flexibility and ease of operation.

Features include 160 to 10 meter transmit, including WARC bands. Optional plug-in modules for 6-meter, 2-meter and 70-cm operation. Receiver coverage from 100 kHz to 30 MHz. AM, FM, SSB, CW, AFSK modes built in. Ten memories that store frequency, mode, and CTCSS information (optional CTCSS unit for controlled-access repeaters). Memory check feature for checking memory status without affecting operating frequency. Dual VFOs with one-touch split frequency capability. VFO tracking for slaved VFO-A/VFO-B operation at a constant offset. Digital display in

10 Hz steps. Slow/fast main dial tuning. Synthesizer step programming at up to 99.99 kHz per step. Digital SWR meter. Digital RF power meter. Built-in RF preamplifier. Adjustable drive level from 0 to 100 watts. Blue fluorescent display. Built-in AC power supply.

Up to 30 minutes continuous transmit (100% duty cycle). Full CW break-in. Built-in CW electronic keyer. Audio peak filter for CW (Yaesu patent). CW and AM wide/narrow filters. Woodpecker noise blanker.

RF clipping speech processor. IF shift for both receive and transmit (TX side allows you to adjust voice frequency response pattern). IF monitor. IF notch filter. Audio low-pass filter.

Built-in antenna tuner with memory of settings on each band. Separate antenna connectors for each VHF or UHF optional unit. Separate beverage antenna receive input on rear panel. Quick turnaround time from TX to RX for AMTOR, Packet, and QSK CW. AGC slow/medium/fast/off selection. Push-pull MRF422 transistors

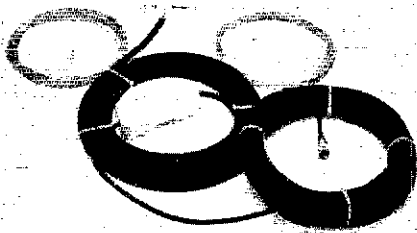


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## Highest Quality • Fast Service

### G5RV ..... \$44.95



#### FEATURES...

• 102' heavy duty copper antenna wire with insulators • KW 300 OHM transmission line • 70' highest quality RG8X complete with PL-259 and reducer • Center insulator with eyelet for center support • Transformer coupler

Completely assembled ready to install, handles 2KW PEP, works all bands 3.5-30MHZ. may be installed in either horizontal or vertical configuration, work 160 by using the antenna in a marconi configuration

#### High Performance Sloper Antennas

Dual Element 160/80/40, 2KW PEP .....	41.95
Single Element 80/40, 2KW PEP .....	33.95
SWL .....	33.95

#### WIRE & CABLE

RG-213 97% Braid, Mil Spec .....	31¢/ft.
RG-214 Silver Dbl Shield, Mil Spec .....	1.50/ft.
Equiv. Belden 9913 .....	37¢/ft.
RG-8X Foam, 95% Braid .....	14¢/ft.
RG-11 96% Braid, Mil Spec .....	31¢/ft.
8 Cond. Rotor Cable, Std (2-18 6-22) .....	16¢/ft.
8 Cond. Rotor Cable, Hvy (2-16 6-18) .....	32¢/ft.
6 Cond. Rotor Cable .....	14¢/ft.
300 OHM KW Twin Lead .....	11¢/ft.
450 OHM Ladder Line, Poly Ins .....	10¢/ft.
450 OHM Ladder Line, Bare, 100ft. Rol .....	16.00
14GA HD Stranded Copper .....	08¢/ft

#### ANTENNA SPECIALISTS (AVANTI)

APR151 3G 2M on Glass .....	32.99
AP220 3G 220MHZ on Glass .....	32.99
AP450 3G UHF on Glass .....	33.99
APR450 5G UHF on Glass .....	36.99
1/2 Wave Mag Mount, Complete, 2M .....	17.95
All Scanner Antennas in Stock .....	CALL

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LM450, UHF Coil and Whip .....	22.95
NM0MM, Mag Mount .....	17.95
NM02/70 Dual Band Coil and Whip .....	32.95

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STR, Stub Tuned Radial Kit .....	29.95
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HF5B Mini Beam .....	199.95

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160 Meter Half-Sized Dipole Kit .....	42.00
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80, 40M Loaded Dipole, Complete .....	50.95
160 Thru 10M Trap Dipole, Complete .....	99.95
160, 80M Trap Dipole, Complete .....	56.95
80 Thru 10M Trap Dipole, Complete .....	47.95
40, 20, 15, 10M Trap Dipole, Complete .....	44.95
20, 15, 10M Trap Dipole, Complete .....	39.95
PD80-10 80-10M Dipole Kit, Complete .....	33.95
PD40-10 40-10M Dipole Kit, Complete .....	30.95
PD80-40 80-40M Dipole Kit, Complete .....	31.95
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Shorty All Bander, Only 70' Complete .....	28.95
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MB-V-A Super Tuner .....	555.95
RFM-003 Power Monitor System .....	213.95
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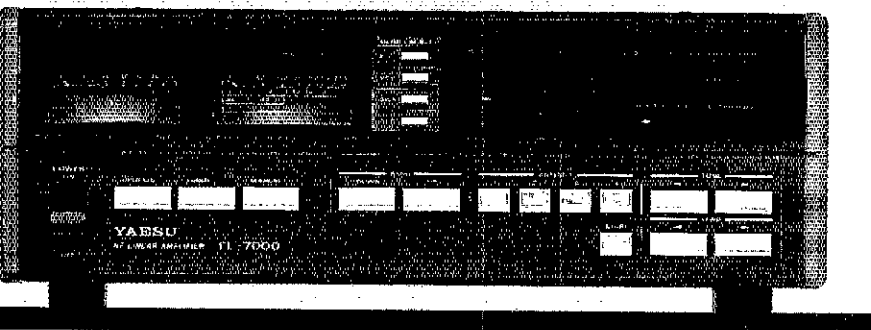
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# AND THE BRAWN.

(rated dissipation 290 watts each) operated at 24 volts for excellent inter-modulation rejection in transmitter.

Enhanced C.A.T. system for external control of transceiver from personal computer. (Software for Apple IIe/MAC, Commodore C-64, and IBM-PC is available through your Yaesu dealer.) There's also data communication with the FL-7000 linear amplifier for hands-free amplifier operation.

**The muscle to get you out: The FL-7000.** This solid-state amplifier covers 160 to 15 meters, and includes

a built-in power supply, automatic tuner and lots of powerful operating features.

There's fast turnaround time for break-in (QSK) CW, HF packet radio, and AMTOR. Only 70 watts excitation for full output, and 1200 watts PEP input power. Fully protected push-pull parallel wideband "no-tune" amplifier circuit powered by 47V, 25A DC power supply. Yaesu's exclusive "DVC" (Direct Vertical Cooling Heatsink System) with bottom-mounted fan. Automatic antenna matching sensor

turns off amplifier and rematches tuner circuitry if SWR rises above 2:1. Hands-free automatic band change when used with FT-767GX, FT-757GX or FT-980. Lithium battery backup remembers antenna selection and tuner settings. Dual 2-speed fans with independent thermal sensors. Connection to up to four antennas, including automatic selection via optional unit. Eight front panel LED status indicators. And more.

**Get the DX advantage.** Just combine the FT-767GX's brains, the FL-7000's brawn, and your special operating knowledge. What an impact you'll make on the world!

# YAESU

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Repair Service: (213) 404-4884

Parts: (213) 404-4847

Prices and specifications subject to change without notice.



The Paragon

## The PARAGON, Performance Plus...

All mode versatility and a transmitted signal you will be proud of. A receiver that has set new standards for sensitivity and quietness. Receives from 100 kHz to 29.999.99 MHz. Transmits on all bands from 1.8 MHz to 29.999.99 MHz with 100 watts output. SSB, CW, real FSK and optional FM. Standard equipment includes speech processor, noise blanker, dual VFOs. TX split, RX split and QSK with a changeover time of 30 ms or less. Five I-F filter positions with the 6 kHz AM filter and 2.4 kHz SSB filter, standard. Optional 1.8 kHz, 500 Hz and 250 Hz filters are selectable independent of mode. Two selectable tuning rates. Passband tuning, notch filter, audio bandpass filter, tone control, squelch and more!

Sixty-two programmable memories that store

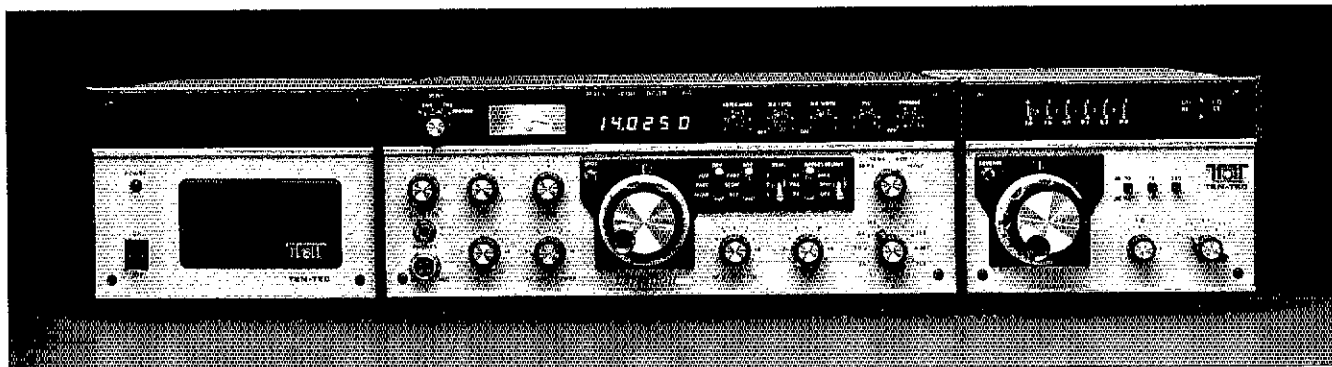
frequency, mode, filter selected, channel number and a 7 character alpha-numeric "tag" for entering channel I.D. Scan rate is selectable and as each memory is scanned all of the stored information is displayed (what a light show!). Alternately, the memories can be tuned with the main tuning knob.

Frequency selection is with the main tuning knob, direct keypad entry or up/down buttons that will shift in 100 kHz or one MHz increments or to the next ham band. DISPlay button selects 24 hour clock or date or tag. VOICE button causes a voice frequency announcement with optional synthesized voice board installed.

Rear panel controls are provided to adjust the VOX, cw monitor level and tone, and SSB

sidetone monitor level. Switching is provided to control conventional linear amplifiers and of course, high speed switching for QSK linears, such as the Titan or the Hercules II. Other rear panel inputs and outputs for transverters, FSK (170 Hz shift), fixed level audio out, audio in, external speaker, aux dc jack and provision for the optional HS-232 control interface. An absolute delight for the all mode operator.

The Paragon is the result of a three year engineering effort. We are proud of the Paragon and we think it has set new standards of excellence in synthesized rigs. Check it out yourself. We think that you will share our pride in the Paragon.



## The Classic CORSAIR II...

Unique in all the world, the CORSAIR II is the only ham transceiver available that uses a crystal mixed, permeability tuned oscillator. The ability of this scheme to reject strong adjacent signals and to dig out weak signals under the most adverse conditions is legendary. The 95 dB of dynamic range is all useable!

Frequency tuning is also unique. The main tuning is 18 kHz per turn. Dual range offset tuning

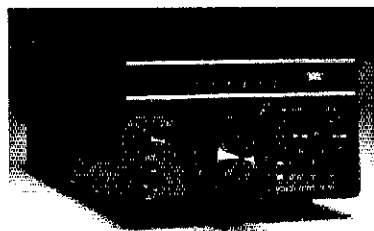
can control transmit, receive or transceive. Selectivity is enhanced with a 16 pole crystal ladder filter and pass band tuning. The 50+ dB notch filter virtually eliminates carrier type interference. An eight pole audio filter is standard and the I-F filters are selectable independent of mode for superior operation on the digital modes.

The transmitter is well known for outstanding audio quality on SSB and QSK CW performance is

simply beyond comparison. All ham bands are covered. 160 through 10 meters with WWV at 10 MHz. The front panel is a thoughtful and spacious arrangement with only the controls that you need.

If your number one priority is outstanding performance on the ham bands, and simplicity is still a virtue, you may be the kind of purist who deserves the classic CORSAIR II.

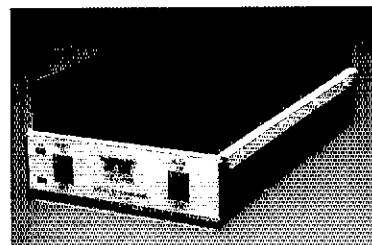
### Add Satellite Communications To Your HF Station



Model 2510B

The Model 2510B, mode B, satellite station is a 70 cm, 10 watt SSB and CW transmitter with a super-sensitive, low noise, 2 meter to 29 MHz receive converter. The receive conversion idea takes advantage of the excellent selectivity and sensitivity that you already have in your HF station. Frequency tuning is with the PTO in the 2510B and the transmitter automatically tracks the receive frequency for "transceive" operation. "Split" operation is also provided. Two bands are included for full coverage of Oscar 10 and Oscar 13.

The Model 2410 is an all mode, broadband, 100 watt, 70 cm amplifier that adds 10 dB of gain to your up-link signal. Tx/Stby control can be hard-wired or automatic when the drive signal is present. Primary power is 12 to 14 Vdc at 20 amps.



Model 2410





# TITAN: A Gallon And A Half Out! (5.68 Liters)

Titan

The TITAN has it all! 1500 watts output with ease, all legal bands 160 through 15 meters including MARS frequencies (10 meters after owner mod), lightning fast QSK for full break-in CW or the digital modes and a two speed blower for quiet operation on SSB. This awesome performance from a 17 lb desk top amplifier is made possible by a pair of Eimac® 3CX800A7 ceramic triodes and an external 45 lb power supply that is an absolute "horse."

The heart of the power supply is our own tape wound, four core Hypersil® transformer that weighs in at an impressive 41 lbs. The

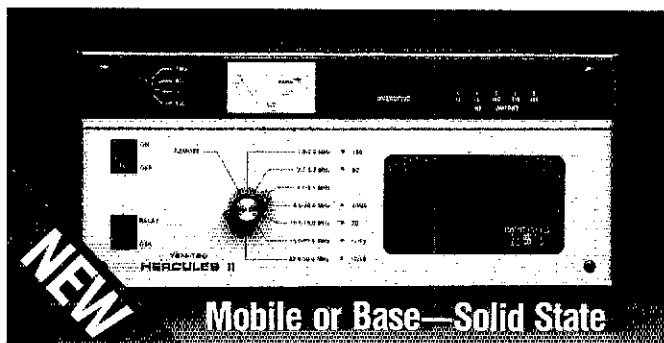
transformer is conservatively rated at 2.5 kva CCS. (9.5 kva IVS.) The power supply is housed in a separate utility enclosure and is nearly noiseless even at full power.

Front panel features include a ten element LED bargraph that displays peak power, a multi-meter selectable to read plate voltage, forward or reverse power and grid current. A matching meter is dedicated to display plate current. The TUNE and LOAD controls use 3:1 vernier drives which, in combination with a great RF deck design, make the TITAN a real "pussy cat" to operate.

The low drive requirement of the TITAN (65 watts for 1500 watts output, typical) makes life much nicer for your exciter too. This is especially comforting when operating keydown modes such as RTTY. Two product review articles have been published, see QST April 1986, CQ February 1986.

If you are ready to choose your dream amplifier the TITAN has everything but the highest price. Check it out!

**THE TITAN IS BACKED BY A THREE YEAR LIMITED WARRANTY.**

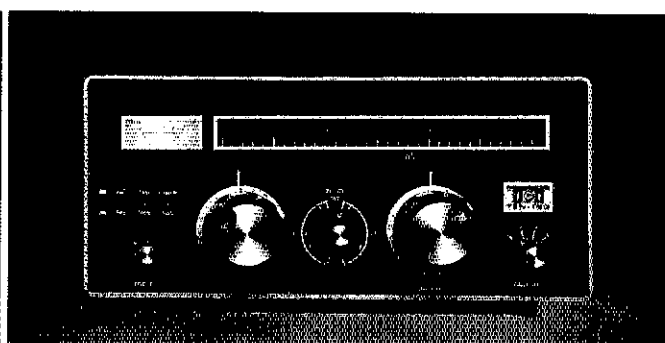


## Hercules II No Tune HF Amplifier

The HERCULES II, Model 420, is an amplifier design that offers a combination of unique features that can only be achieved using modern solid state technology. Instant on, 12 - 14 Vdc operation, no-tune broadband final and compact size. General coverage operation from 1.8 to 22 MHz to 29.999 MHz with authorized modification). Add to that lightning fast QSK cw, remote control, superb linearity and a low drive requirement. Outstanding!

The HERCULES II will interface nicely with virtually all transceivers. The front panel includes an analog multi-meter for collector current, voltage, forward power and SWR. A 10 element LED bar-graph display indicates peak output power. Band selection is made from the front panel switch or remotely controlled through a rear panel connector. Accessories are available for mobile remote control and automatic band tracking when using a Paragon. A front panel speaker is built-in.

The Model 9420 115/220 Vac power supply is in a separate utility enclosure and connects to the RF deck using a 6 foot power cable. It provides 80 amps to the amplifier plus 20 amps at 13.8 Vdc to power a 100 watt output exciter.



## KW Antenna Tuner

The Model 229B adds a lot of versatility to your HF station antenna system. With this tuner you can load virtually any unbalanced (coax or single wire) antenna. With the accessory balun, antennas with balanced feeders can be used. Maximum legal power may be used from 1.6 to 30 MHz. The modified "L" network will tame an SWR of at least 10:1, any phase angle, without "false load" problems. Lighted multi-meter shows power in two ranges plus reflected power. A great way to operate all bands with something less than a world-class antenna farm.

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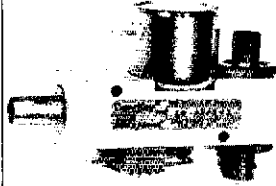
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UM9137	400watt RF Switch	5Ω	dc-0.8 GHz 5/\$12
UM7104	800watt RF Switch	5Ω	dc-5.0 GHz 310 ea.

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HP2693	HOT CARRIER DIODE	10/\$5

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- Crystals: All frequencies in stock 730ch, 5 or more crystals only \$8 ea.
- KWM2A plug-in relays 970-2439-01(X98) or 970-2439-02(X97) \$49.95
- KWM2C plug-in relays 970-2439-03(X98) or 970-2439-04(X97) \$159
- 500 cycle CW filter (brand new) for 755-3 (528-9494-00 • F455FA-05) \$258
- Microphone connectors: 3/16" phone plug \$5ea(\$0 w/cord), panel jack \$3
- 30L-1 caps, 100pf, 450v, Sprague TVA1718 (slightly larger than original) \$710/\$55
- 30L-1 blowerfan motor \$45
- Oak on/off "AC" end switch for rotary switch repair on Collins gear \$15
- Trim Ring for 516/312 (small cabinet) plastic (609-1254-001) \$19
- KWM380 Matched Pair Transistors: Finals \$110 pair Drivers \$18 pair
- KWM380 Oscillator/Oven Complete and Calibrated 638-6918-001 \$278
- KWM380 A3 Lowpass Filter Complete and Calibrated \$275
- KWM380 Power Transformer 662-0650-020 SPECIAL PRICE \$95
- KWM380 Power Supply Cap: 72,000µF @ 25v \$18; 12,000µF @ 25v \$9
- KWM380 1.7 KHz RIT filter 263-1337-020 new from Piezo \$249
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- KWM380 Main Tuning SPINNER KNOB 281-0659-020 \$49
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- KWM380 Display board, all components except digital displays \$18.95
- KWM380 Noise Blanker board, 638-6800-001, 90% complete \$49.95
- KWM380 Power Amplifier board, 80% complete, missing finals, etc. \$34.95
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# Ham-Ads

(1) Advertising must pertain to products and services which are related to Amateur Radio.

(2) The Ham-Ad rate is 85 cents per word. This includes firms or individuals offering products or services for sale. A special rate of 25 cents per word applies to individuals seeking to dispose of or acquire personal station equipment, and to hamfest and convention announcements.

(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" x 11" sheet of paper.

(4) Closing date for Ham-Ads is the 13th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received January 14 through February 13 will appear in April QST. If the 13th 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 firms or individuals offering products or services for sale must submit a production sample (which will be returned) for our examination. Dealers are exempted, unless the product is unknown to us. Check with us if you are in doubt. You must furnish a statement in writing that you will stand by and support all claims and specifications mentioned in your advertising before your ad can appear.

The publisher of QST will vouch for the integrity of advertisers who are obviously commercial in character, and for the grade or character of their products and services. Individual advertisers are not subject to scrutiny.

The League reserves the right to decline or discontinue advertising for any reason.

### CLUBS/HAMFESTS/NETS

PROFESSIONAL CW operators, retired or active, commercial, military, gov't, police etc. invited to join Society of Wireless Pioneers—W7GAQ/6, 146 Coleen Street, Livermore, CA 94550.

IMRA—International Mission Radio Association helps missionaries by supplying equipment and running a net for them daily except Sunday, 14,280 Mhz, 1:00-3:00 PM Eastern Time. Rev. Thomas Sable, S.J., University of Scranton, Scranton, PA 18510.

THE Veteran Wireless Operators Association, a non-profit organization of communications people founded in 1925, invites your inquiries and application for membership. Write VWQA, Ed F. Pleuler, Jr., Secretary, 46 Murdock Street, Fords, NJ 08863.

FCC EXAMS. Novice-Extra Class, Walk-in's only. Sunnyvale VEC ARC, POB 80142, Sunnyvale, CA 94088-0142, 408-256-9000, 24/hr. Gordon, W6NLG, President. Flea Market, March-Sept, Foothill College, Los Altos Hills, CA.

MARCO: Medical Amateur Radio Council, operates daily and Sunday nets. Medically-oriented amateurs (physicians, dentists, veterinarians, nurses, therapists, etc.) invited to join. For information, write MARCO, Box 73's, Acme, PA 15610.

JOIN The Old 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., 20933 Brant Avenue, Long Beach, CA 90810.

INDIANA: South Bend Swap & Shop, Saturday, January 7 at the Century Center downtown, on US 33, one-way north between Trustcorp Bank Building and the river. Four lane highways to door from all directions. Tables: \$5/5 ft. round; \$15/8x2.5 rectangular; \$20/8 ft. wall locations. Talk-in 52-52 & area repeaters. Sponsored by Repeater Valley Hamfest Committee. Contact: Wayne Werts, K9IXU, 1889 Riverside Drive, South Bend, IN 46616, telephone 219-233-5307.

RAIN FOUNDATION needs your financial help to continue amateur program broadcasting: Westlink, IARF, BLS, CSRA-1, etc. Donations to: Box 2565, Des Plaines, IL 60017.

LIMARC ARRL Hamfest Sunday, February 5, 1989. Indoors at the Electricians Hall, 41 Pinelawn Road, Melville, Long Island. Doors open 9 to 3. Admission \$4 to all regardless of age. \$3 after 11:30 AM. Sellers 4' x 6' tables are \$12 or bring your own at \$1.50 a foot, 6 foot minimum, helpers pay admission. Tables in advance only, check payable to LIMARC, L.I.E. Route 495 to Exit 49 North 1/4 mile right turn onto Pinelawn Road. Talkin 146.85. Tables/info Mark Nadel, NK2T, 516-796-2366, 22 Springtime Lane East, Levittown, NY 11756 or Hank Wener, WB2ALW, 201-694-1811.

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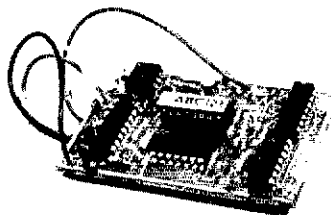
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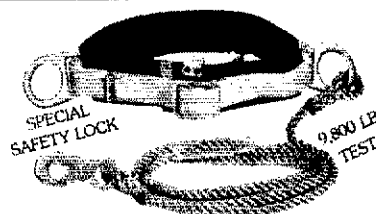


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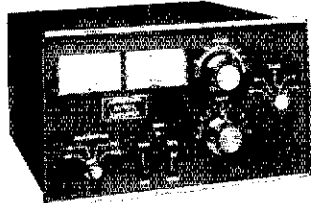
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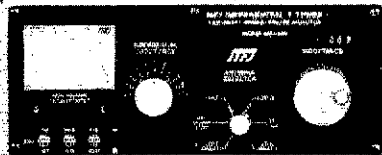
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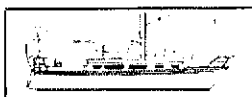
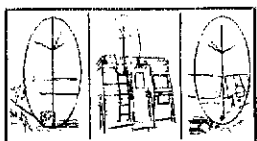
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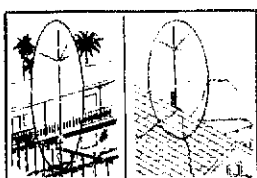


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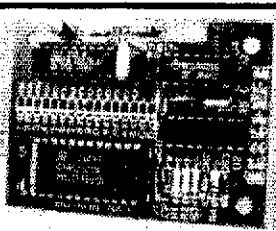


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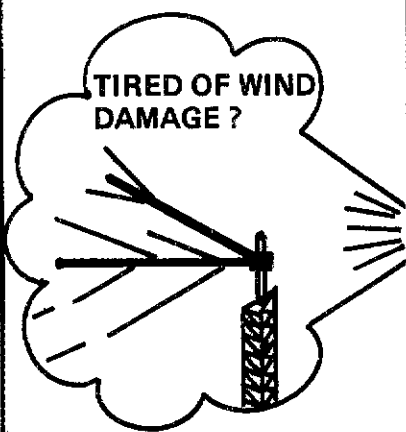
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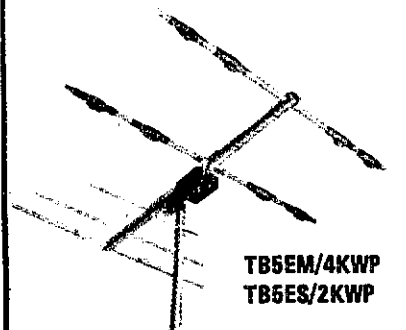
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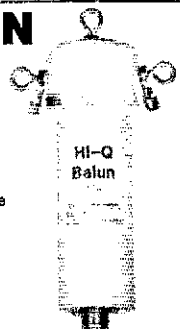
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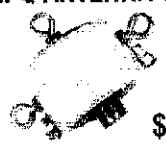
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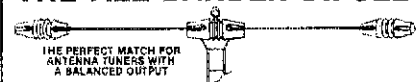
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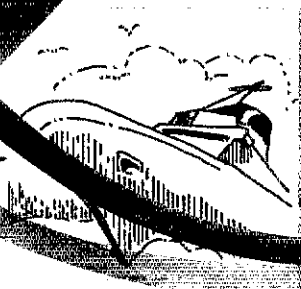
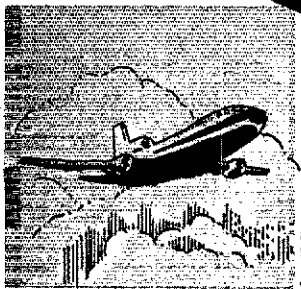
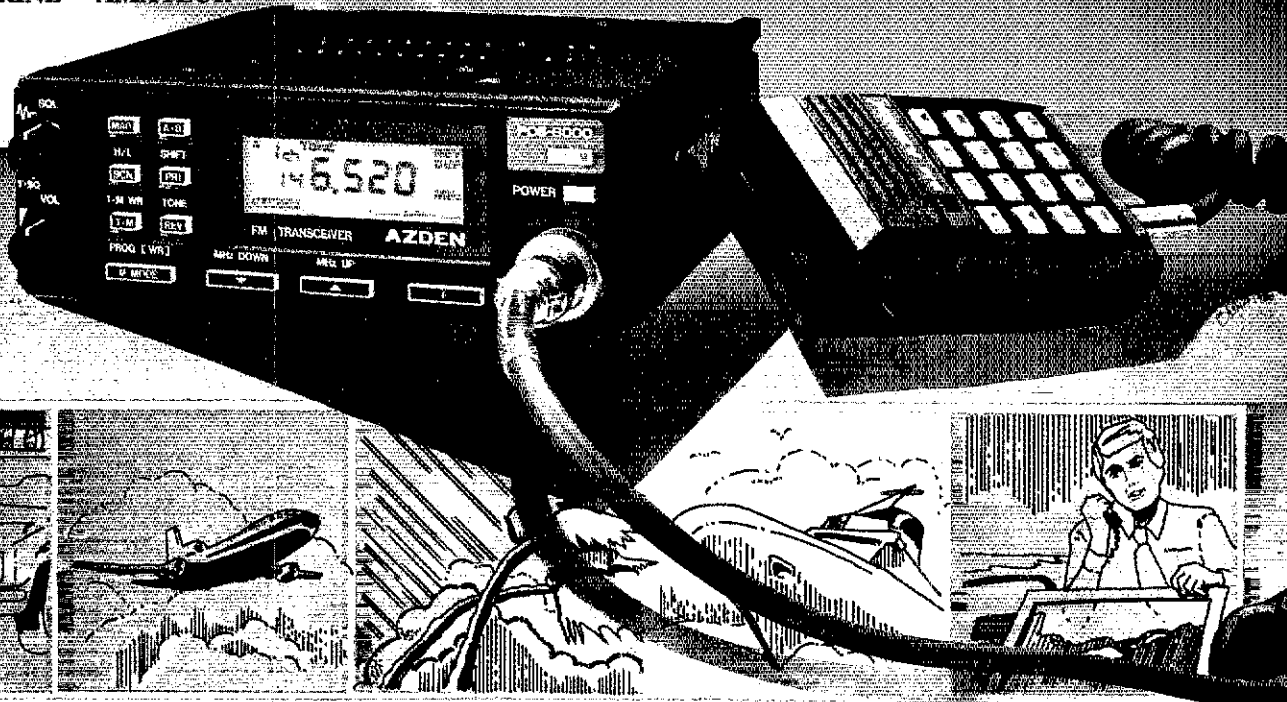
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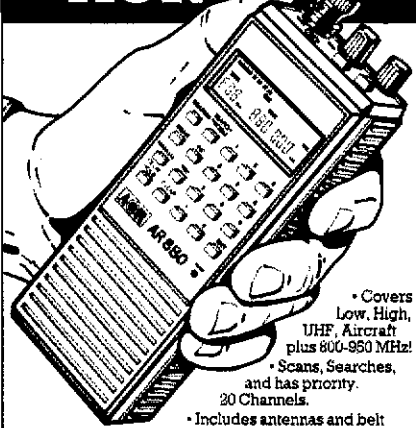
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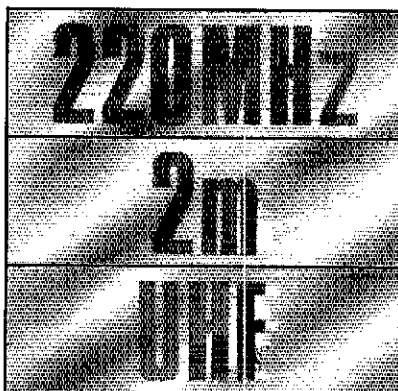
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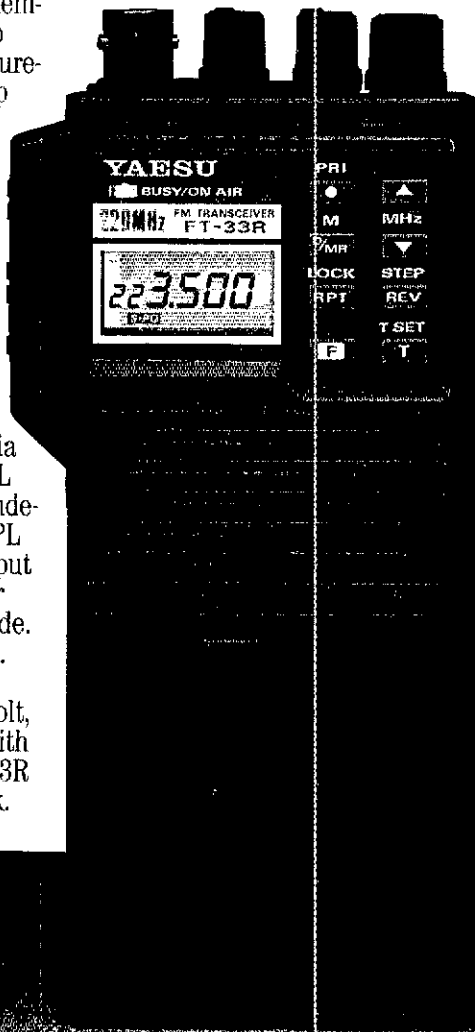
Ten memories that store frequency, offset and PL tone. Memory scan at 2 frequencies per second. Tx offset storage. Priority channel scan. Channel selection via tuning knob or up/down buttons. PL tone board (optional). PL display. Independent PL memory per channel. PL encode and decode. LCD power output and "S" meter display. Battery-saver circuit. Push-button squelch override. Eight-key control pad. Keypad lock. High/low power switch.

The FT-23R comes with a 7.2-volt, 2.5-watt battery pack. The FT-73R with a 7.2-volt, 2-watt pack. And the FT-33R with a powerful 12-volt, 5-watt pack.

You can choose the miniature 7.2-volt, 2-watt pack shown in the photo below. And all battery packs are interchangeable, too.

And consider these options: Dry cell battery case for 6 AAA-size cells. Dry cell battery case for 6 AA-size cells. DC car adapter/charger. Programmable CTCSS (PL tone) encoder/decoder. DTMF keypad encoder. Mobile hanger bracket. External speaker/microphone. And more.

Check out the FT-23R Series at your Yaesu dealer today. Because although we can tell you about their incredible performance, toughness and small size, seeing is really believing.



## YAESU

Yaesu USA 17210 Edwards Road, Cerritos, CA 90701. (213) 404-8700. Repair Service: (213) 404-4884. Parts: (213) 404-4842.

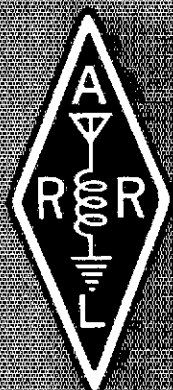
Prices and specifications subject to change without notice. PL is a registered trademark of Motorola, Inc. FT-33R shown with optional FNB-9 battery pack.

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**DOZENS OF PUBLICATIONS FOR EVERYONE WHO LOVES AMATEUR RADIO!**





# OPERATING EXCELLENCE

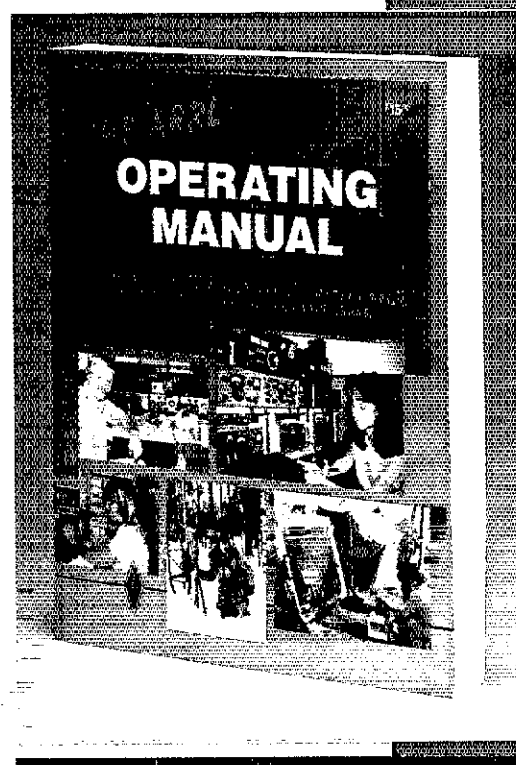
No one has ever called Amateur Radio boring. There's so much to do in this multi-faceted hobby and it is all described in the big 688-page *ARRL Operating Manual*! The book proved so popular that we had to go back on press for a second printing in less than a year.

Why is this League publication a smash hit? We gathered together the efforts of talented writers who are experts in each of their Amateur Radio specialties:

Basic Operating by Bill Jennings, K1WJ and Carol Smith, AJ2I; FM and Repeaters plus the chapter on Packet Radio by QST columnist Stan Horzepa, WA1LOU; DXing by Bob Locher, W9KNI, Overseas DXing/DXpeditions by Carl Henson, WB4ZNH; Traffic Handling by Maria Evans, KT5Y; Emergency Communications by Richard Regent, K9GDF; Image Communications by Bruce Brown, WA9GVK; VHF/UHF Operating by Michael Owen, W9IP; Satellites by Dick Jansson, WD4FAB and Contests by Clarke Greene, K1JX.

The chapters on Shortwave Listening, The Amateur Radio Spectrum, Antenna Orientation, and RTTY Communications were written by HQ staffers: AK7M, W4RI, K1TD and WA3VIL. Bob Halprin, K1XA was the editor of the *Operating Manual* and was responsible for the popular Operating Awards chapter where more than seven dozen awards are described and illustrated in full color.

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# MFJ multi-mode data controller

You can transmit and receive 8.5, 12, 17, 24, and 36 second black and white format SSTV pictures using two levels.

## Contest Memory Keyer

*Nothing beats the quick response of a memory keyer during a heated contest.*

You'll score valuable contest points by completing QSOs so fast you'll leave your competition behind. And you can snag rare DX by slipping in so quickly you'll catch everyone by surprise.

Message memories let you store contest call, name, QTH, rig info -- everything you used to repeat over and over.

You get lmbic operation, automatic incrementing serial numbering, weight control to penetrate QRM and more.

## More Features

Turn on your MFJ-1278 and it sets itself to match your computer baud rate. Select your operating mode and the correct modem is automatically selected.

Plus... printing in all modes, threshold control for varying band conditions, tune-up command, lithium battery backup, RS-232 and TTL level serial ports, watch dog timer, FSK and AFSK outputs, output level control, speaker jack, key paddle jack, test and calibration software, Z-80 at 4.9 MHz, 32K EPROM, and socketed ICs. FCC approved. 9x1 1/2 x 9 1/2 in. 12 VDC or 110 VAC.

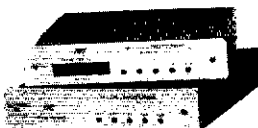
Get yours today and join the fun crowd!

## New Firmware Update

A new KISS/AMTOR/Navtex Firmware update is available to MFJ-1278 owners.

MFJ's powerful update is the most reasonably priced multi-mode upgrade by any manufacturer. Contact your dealer or MFJ for yours today!

## MFJ Packet Radio



MFJ-1274  
\$139.95  
MFJ-1270B  
\$119.95

MFJ-1270B super clone of TAPR's TNC-2 give you more features than any other packet controller -- for \$119.95.

You can double your fun by operating both VHF and HF packet because you get high performance switchable VHF/HF modems.

You get MFJ's new Easy Mail™ with soft-partitioned memory so you and your friends can leave messages for each other 24 hours a day.

In MFJ's new WeFAX mode you can print full fledged weather maps to screen or printer and save to disk using an IBM compatible or Macintosh computer with an MFJ Starter Pack.

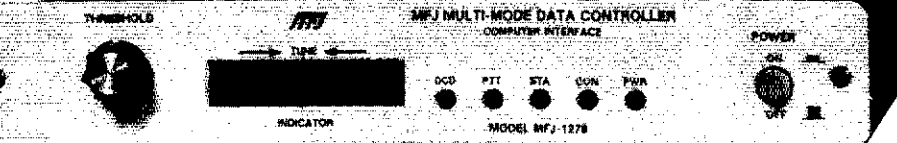
A new KISS interface lets you run TCP/IP. They also come NET ROM compatible -- no modification needed!

You also get 32K RAM, a full one-year unconditional guarantee and you can use 12 VDC or the included 110 VAC power supply.

For dependable HF packet tuning, the MFJ-1274 gives you a high resolution tuning indicator that's accurate to within 10 Hz -- and it's only \$20.00 more.

FOR YOUR NEAREST DEALER  
or to order call toll free  
**800-647-1800**

One Year Unconditional Guarantee



## 9 modes for only . . . \$249.95

Amateur radio's most versatile multi-mode data controller -- the MFJ-1278 -- lets you join the fun on Packet, AMTOR, RTTY, ASCII, CW, Weather FAX, SSTV, Navtex and gives you a full featured Contest Memory Keyer mode . . . you get 9 modes . . . for an affordable \$249.95.

Plus you get MFJ's new Easy Mail™ so you and your ham buddies can leave messages for each other 24 hours a day.

You'll find it the most user friendly of all multi-modes. It's menu driven for ease of use and command driven for speed.

A high resolution 20 LED tuning indicator lets you tune in signals fast in any mode. All you have to do is to center a single LED and you're precisely tuned in to within 10 Hz -- and it shows you which way to tune!

Plus you get 32K RAM, KISS for TCP/IP, high performance HF/VHF/CW modems, software selectable dual radio ports, AC power supply and more.

All you need to join the fun is an MFJ-1278, your rig and any computer with a serial port and terminal program.

You can use the MFJ Starter Pack to get on the air instantly. It includes computer interfacing cable, terminal software and friendly instructions . . . everything you need to get on the air fast. Order MFJ-1282 (disk)/MFJ-1283 (tape) for the C-64/128 and VIC-20; MFJ-1287 for Macintosh; MFJ-1284 for the IBM or compatible, \$19.95 each.

### Packet

MFJ's new generation packet mode gives you genuine TAPR software and hardware plus many MFJ enhancements like Easy Mail™.

A new Kiss interface makes the MFJ-1278 TCP/IP compatible.

Extensive tests published in *Packet Radio Magazine* ("HF Modem Performance Comparisons") prove the TAPR designed modem in the MFJ-1278 gives better copy with proper DCD operation under all tested conditions than the other modems tested.

### New AMTOR mode!

Now the MFJ-1278 has a new AMTOR and Navtex mode, making it the only controller to feature nine digital modes.

MFJ-1278 transmits and receives AMTOR and includes all AMTOR modes: ARQ (Mode A), FEC and MODE S (Mode B).

### Baudot RTTY

You can copy all shifts and all standard speeds including 170, 425 and 800 Hz shifts and speeds from 45 to 300 baud. You can copy not only amateur RTTY but also press, weather and other exciting traffic.

You can transmit both narrow and wide

shifts. The wide shift is a standard 850 Hz shift with mark/space tones of 2125/2975 Hz. This lets you operate MARS and standard VHF FM RTTY.

### ASCII

You can transmit and receive 7 bit ASCII using the same shifts and speeds as in the RTTY mode.

### CW

You get a Super Morse Keyboard mode that lets you send and receive CW effortlessly, including all prosigns -- it's tailor-made for traffic handlers.

A huge type ahead buffer lets you send smooth CW even if you "hunt and peck".

You could store entire QSOs in the message memories, if you wanted to! You can link and repeat any messages for automatic CQs and beaconing. Memories also work in RTTY and ASCII modes.

A tone Modulated CW mode turns your VHF FM rig into a CW transceiver for a new fun mode. It's perfect for transmitting code practice over VHF FM.

An AFSK CW mode lets you ID in CW.

You also get a random code generator that'll help you copy CW faster.

### Weather FAX

You'll be fascinated as you watch WEFAX signals blossom into full fledged weather maps on your Epson or IBM graphics compatible printer.

Automatic sync and stop lets you set it and leave it for no hassle printing.

You can save FAX pictures and WEFAX maps to disk if your terminal program lets you save ASCII files to disk.

Pictures and maps can be saved to disk or printed to screen in real time or from disk if you have an IBM or Macintosh with the MFJ Starter Pack.

You can transmit FAX pictures right off disk and have fun exchanging and collecting them.

### Slow Scan TV

The MFJ-1278 introduces you to the exciting world of slow scan TV.

You can print slow scan TV pictures on any IBM or Epson graphics compatible printer. If you have an IBM or Macintosh you can print to screen and save to disk with the MFJ Starter Pack.

You can transmit slow scan pictures right off disk. If your terminal program lets you save ASCII files you can save pictures from over-the-air QSOs.

# MFJ

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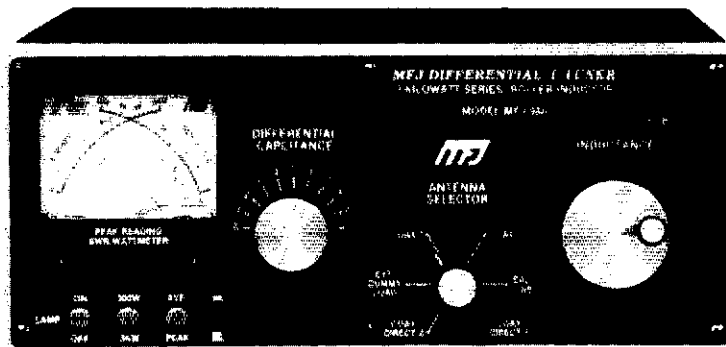
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MFJ . . . making quality affordable

# MFJ 3 KW Roller Inductor Tuner

... lets you get your SWR down to *absolute* minimum -- something a tapped inductor tuner just can't do ...

... plus you get a *peak reading* Cross-Needle SWR/Wattmeter, 6-position antenna switch, balun for balanced lines and 1.8-30 MHz coverage...\$239.95



MFJ-986  
**\$239<sup>95</sup>**

Made in U.S.A.

**MFJ's** innovative new Differential-T Tuner™ uses a differential capacitor that makes tuning foolproof and easier than ever. It ends constant re-tuning with broadband coverage and gives you minimum SWR at only *one* setting.

The new MFJ-986 is a rugged no-compromise 3 KW PEP Roller Inductor antenna tuner that covers 1.8-30 MHz continuously, including MARS and all the WARC bands. **The roller inductor lets you tune your SWR down to the absolute minimum** -- something a tapped inductor tuner just can't do.

A 3-digit turns counter plus a spinner knob gives you *precise* inductance control -- so you can quickly return to your favorite frequency.

You get a lighted Cross-Needle meter that not only gives you SWR, forward and reflected power at a glance -- but also gives you a **peak-reading** function! A new directional coupler gives you even more accurate readings over a wider frequency range.

You get a 6-position ceramic antenna switch that lets you select two coax lines and/or random wires (direct or through tuner), balanced line and external dummy load.

A new **current** balun for balanced lines minimizes feedline radiation that causes field pattern distortion, TVI and RF in your shack. Ceramic feedthru insulators for balanced lines withstand high voltages and temperatures.

### New Antenna Tuner Technology

MFJ brings you **three innovations** in antenna tuner technology: a new *Differential-T™* circuit simplifies tuning; a new *directional coupler* gives you more accurate SWR, forward and reflected power readings; and a new *current balun* reduces feedline radiation.

### Differential-T Tuner™:

#### A New Twist on a Proven Technology

By replacing the two variable capacitors with a single *differential capacitor* you get a **wide range T-network tuner with only two controls** -- the differential capacitor and a roller inductor.

**That's** how you get the new MFJ Differential-T Tuner™ that makes tuning easier than ever, gives you minimum SWR at only one setting and has a broadband response that ends constant re-tuning. You'll spend your time QSOing

instead of fooling with your tuner.

The compact 10 3/4 x 4 1/2 x 15 inch cabinet has plenty of room to mount the silver-plated roller inductor away from metal surfaces for maximum Q -- you get high efficiency and more power into your antenna.

The wide spaced air gap differential transmitting capacitor lets you run a full 3 KW PEP -- no worries about arcing.

### A New Directional Coupler: Accurate SWR and Power Reading

MFJ's Cross-Needle SWR/Wattmeter gives you more accurate SWR and power readings over a wider frequency range with no frequency sensitive adjustments.

**That's** because MFJ's new directional coupler gives you up to an order of magnitude higher directivity and coupling factor than conventional circuits ... *plus* it gives you a flat frequency response that requires **no** frequency compensation.

The cross-needle meter lets you read forward/reflected power in 2 ranges: 200/50 and 2000/500 watts. The meter lamp is front-panel switched and requires 12 volts.

A switch lets you select peak or average power readings.

### A New Current Balun: Reduces Feedline Radiation

Nearly all commercially built tuners use a "voltage" balun. The "voltage" balun forces the *voltages* to be equal on the two antenna halves. It minimizes unbalanced currents *only* if the antenna is perfectly balanced --not the case with practical antennas.

The MFJ-986 uses a true **current balun** to force equal *currents* into the two antenna halves -- *even* if your antenna is not perfectly balanced -- so you get minimum unbalanced currents.

The **current** balun gives superior balance over the "voltage" balun.

**Minimum** unbalanced current reduces field pattern distortion -- which concentrates your power for a stronger

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**MFJ ... making quality affordable**

signal -- *plus* it reduces TVI and RF in your shack caused by feedline radiation.

### The MFJ-986 Differential-T Tuner™: Get absolute minimum SWR

Get the tuner that incorporates the latest innovations by the world's leader in antenna tuner technology.

See your dealer today for the new MFJ-986 Differential-T™ 3 KW Roller Inductor Tuner. Include \$10 shipping/handling if ordering direct.

### WHY CHOOSE AN MFJ TUNER?

**Hard-earned Reputation:** There's just no shortcut. *MFJ is a name you can trust* -- more hams trust MFJ tuners throughout the world than all other tuners combined.

**Proven Reliability:** *MFJ has made more tuners for more years than anyone else* -- with MFJ tuners you get a highly-developed product with proven reliability.

**First-rate Performance:** MFJ tuners have earned their reputation for being able to match just about anything -- *anywhere*.

**One full year unconditional guarantee:** That means we will repair or replace your tuner (at our option) *no matter what* for a full year.

**Continuing Service:** MFJ Customer Service Technicians are available to help you keep your MFJ tuner performing flawlessly -- no matter how long you have it -- just call 601-323-5869.

**Your very best value:** MFJ tuners give you the most for your money. Not only do you get a *proven* tuner at the lowest cost -- you also get a one year *unconditional* guarantee and *continuing* service. That's how MFJ became the world's leading tuner manufacturer -- by giving you your very best *value*.

**Choose** your MFJ tuner with confidence! You're getting proven performance and reliability from the most trusted name in antenna tuners. Don't settle for less.

Call or write for a *free* full-line MFJ catalog with all 10 of our tuners and tons of ham radio accessories!

**FOR YOUR NEAREST DEALER**  
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*One Year Unconditional Guarantee*

# MFJ TUNERS

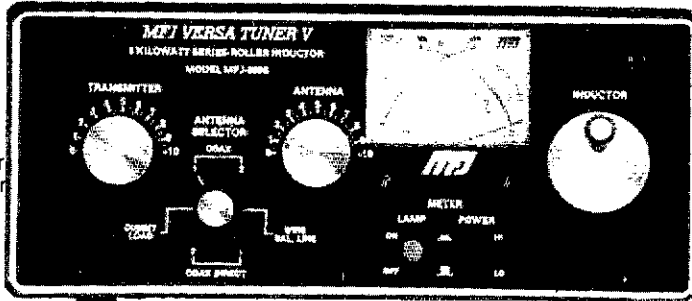
**Invest in the finest 3 KW roller inductor tuner money can buy with dummy load, new peak reading Meter and more...**

The MFJ-989C is a compact 3 KW roller inductor tuner with a new peak reading Cross-Needle SWR/Wattmeter. The roller inductor lets you get your SWR down to absolute minimum.

With three continuously variable components -- two massive 6 KV capacitors and a high inductance roller inductor -- you get precise control over SWR and the widest matching range possible from 1.8-30 MHz.

You get a new lighted peak and average reading Cross-Needle SWR/Wattmeter with a new more accurate directional coupler.

You get a giant two core balun wound with teflon wire for balanced



MFJ-989C \$349<sup>95</sup>

lines and a 6-position antenna switch with extra heavy switch contacts.

You get a 50 ohm 300 watt dummy load for tuning your exciter, a tilt stand for easy viewing and a 3-digit turns counter plus a spinner knob for exact inductance control.

Its compact 10 3/4 x 4 1/2 x 15 inch cabinet slides right into your station.

The MFJ-989C is not for everyone. However, if you do make the investment, you'll get the finest 3 KW tuner money can buy -- one that will give you a lifetime of use, one that takes the fear out of high power operation and one that lets you get your SWR down to absolute minimum.

## MFJ's Best VERSA TUNER II



The MFJ-949C gives you more precise matches than any tuner that uses two tapped inductors. Why? \$139<sup>95</sup>

Because you get two continuously variable capacitors that give you infinitely more positions than the limited number on switched coils.

This gives you the precise control you need to get your SWR down to a minimum. After all, isn't that why you need a tuner.

You also get a dual range lighted Cross-Needle SWR/Wattmeter, 6-position antenna switch, 50 ohm 300 watt dummy load, balun for balanced lines and continuous 1.8-30 MHz coverage -- all in a compact 10x3x7 inch cabinet that fits right into your station.

With MFJ's best 300 watt tuner you get an MFJ tuner that has earned a reputation for being able to match just about anything -- on that is highly perfected and has years of proven reliability.

## MFJ's smallest VERSA TUNER

MFJ-901B \$59<sup>95</sup>

The MFJ-901B is our smallest -- 5x2x6

inches -- and most affordable! 200 watt PEP Versa tuner -- when both your space and your budget is limited. Matches dipoles, vees, random wires, verticals, mobile whips, beams, balanced and coax lines continuously 1.8-30 MHz. Excellent for matching solid state rigs to linears. Efficient airwound inductor, 4:1 balun for balanced lines.

## 144/220 MHz VHF TUNERS

MFJ-920 \$49<sup>95</sup>

MFJ-921 \$69<sup>95</sup>

MFJ's newest VHF tuners cover both 2 Meters and the new Novice 220 MHz bands. They handle 300 watts PEP and match a wide range of impedances for coax fed antennas. MFJ-921 has SWR/Wattmeter.

## MFJ's Fastest Selling TUNER



The MFJ-941D is MFJ's fastest selling MFJ-941D 300 W PEP antenna tuner! Why? \$99<sup>95</sup>

Because it has more features than tuners costing much more and it matches everything continuously from 1.8-30 MHz.

It matches dipoles, vees, verticals, mobile whips, random wires, balanced and coax lines.

SWR/Wattmeter reads forward/reflected power in 30 and 300 watt ranges. Antenna switch selects 2 coax lines, direct or through tuner, random wire/balanced line or tuner bypass. Efficient airwound inductor gives lower losses and more watts out. Has 4:1 balun, 1000 V capacitors, 10x3x7 inches.

## MFJ's Mobile TUNER



MFJ-945C \$79<sup>95</sup>

Don't leave home without this mobile tuner! Have an uninterrupted trip as the MFJ-945C extends your antenna bandwidth and eliminates the need to stop, go outside and readjust your mobile whip.

You can operate anywhere in a band and get low SWR. You'll get maximum power out of your solid state or tube rig and it'll run cooler and last longer.

Small 8x2x6 inches uses little room. SWR/Wattmeter and convenient placement of controls make tuning fast and easy while in motion. 300 watts PEP output, efficient airwound inductor, 1000 volt capacitors. Mobile mount, MFJ-20, \$3.00.

## 2 KW COAX SWITCHES

MFJ-1702 \$19<sup>95</sup>

MFJ-1702, \$19.95. 2-positions. 60 dB isolation at 450 MHz.

Less than .2 dB loss. SWR below 1:1.2.

MFJ-1701, \$29.95.

6-positions. Unused positions grounded. For desk or wall mount.

## MFJ's 1.5 KW VERSA TUNER III



For a few extra dollars, the MFJ-962C lets you use your barefoot rig now and have the capacity to add a 1500 watt PEP linear amplifier later. \$199<sup>95</sup>

Two continuously variable 6 KV capacitors give you precise control for getting your SWR down to a minimum. And lots of inductance gives you the widest matching range possible.

You can read both peak and average power with the lighted 2-color Cross-Needle SWR/Wattmeter. A new directional coupler gives you more accurate readings over a wider frequency range.

Has 6-position ceramic antenna switch and a teflon wound two-core balun with ceramic feedthrough insulators for balanced lines. 10 3/4 x 4 1/2 x 14 7/8 in.

## MFJ's Random Wire TUNER

MFJ-1601D \$39<sup>95</sup>

You can operate all bands anywhere with any transceiver when you let the MFJ-1601D turn any random wire into a transmitting antenna. Great for apartment, motel, camping operation. Tunes 1.8-30 MHz. Handles 200 watts. Ultra compact 2x3x4 in.

MFJ artificial RF ground \$79<sup>95</sup> MFJ-931

## MFJ artificial RF ground

You can create an artificial RF ground and eliminate RF "bites", feedback, TVI and RFI when you let the MFJ-931 resonate a random length of wire and turn it into a tuned counterpoise. The MFJ-931 also lets you electrically place a far away RF ground directly at your rig -- no matter how far away it is -- by tuning out the reactance of your ground connection wire.



ORDER ANY PRODUCT FROM MFJ AND TRY IT -- NO OBLIGATION. IF NOT SATISFIED RETURN WITHIN 30 DAYS FOR A NO-HASSLE REFUND (less shipping).

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# 1989 CALLBOOKS



## THE QSL BOOK!

Continuing a 68 year tradition, we bring you three new Callbooks for 1989, bigger and better than ever!

The North American Callbook lists the calls, names, and address information for 495,000 licensed radio amateurs in all countries of North America, from Canada to Panama including Greenland, Bermuda, and the Caribbean islands plus Hawaii and the U.S. possessions.

The International Callbook lists 500,000 licensed radio amateurs in countries outside North America. Its coverage includes South America, Europe, Africa, Asia, and the Pacific area (exclusive of Hawaii and the U.S. possessions).

The 1989 Callbook Supplement is a new idea in Callbook updates, listing the activity in both the North American and International Callbooks. Published June 1, 1989, this combined Supplement will include thousands of new licenses, address changes, and call sign changes for the preceding 6 months.

Every active amateur needs the Callbook! The 1989 Callbooks will be published December 1, 1988. Order early to avoid disappointment (last year's Callbooks sold out). See your dealer now or order directly from the publisher.

- North American Callbook  
incl. shipping within USA \$29.00  
incl. shipping to foreign countries 35.00
- International Callbook  
incl. shipping within USA \$32.00  
incl. shipping to foreign countries 38.00
- Callbook Supplement, published June 1st  
incl. shipping within USA \$13.00  
incl. shipping to foreign countries 14.00

### SPECIAL OFFER

- Both N.A. & International Callbooks  
incl. shipping within USA \$58.00  
incl. shipping to foreign countries 68.00

Illinois residents please add 6 1/2% tax.  
All payments must be in U.S. funds.

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HAMLOG Computer Program, 17 Modules Full features. Auto-logs, 7 band WAS/DXCC, Apple \$19.95. IBM, CPM, Kaypro, Tandy, C-128 \$24.95. QST-KA1AWH, POB 2015, Peabody, MA 01960.

NICADS new AA 500 MAH Quick Charge. Ten for \$12 plus \$1.80 shipping. Twenty for \$23 plus \$2.45 shipping. Raymond Richard, 6113 Town Ridge, Middletown, CT 06457.

'N-TENNA Quad Kits, Boomless Tribanders, \$64.50. Box 6332, Hickory, NC 28603.

KWM-380/HF-380 Repairs. Kirby, K7WOC, 713-320-2324.

TUBES WANTED: I pay cash or trade for all types of transmitting or special purpose tubes. Mike Forman, 1472 McArthur Blvd., Oakland, CA 94602, 415-530-8840.

QRP CW Xmr Kits and Components. SASE brings catalog. W1FB, Box 250, Luther, MI 49656.

CHEAP PROGRAMS for Commodore, IBM-PC, Apple, TI99/4A. Send legal size SASE: EPO Software, 7805 NE 147th Avenue, Vancouver, WA 98682.

AREC & EMERGENCY Operators! Scanner & shortwave frequency directories! Public Safety, Federal Agencies, Aero, etc. Big free catalog. CRB, Box 56-QS, Commack, NY 11725.

REVIVING and revising best live DX show "30 Greatest DX-peditions Of All Time" for 1989 hamvention season. WA4WME, 202C Chapel Ridge, Hazelwood, MO 63042.

ELECTRON TUBES. All sizes and types. Transmitting, Receiving, Microwave—large inventory. Same day shipment. Ask about our 3-500Z special. Daily Electronics, P.O. Box 5029, Compton, CA 90224, 800-346-6667.

COMPUTER Code Course. Apple II +/c/e/GS, C-64/128, 37 modes, graphics, 1-100 WPM, menus, proportional spacing, variable frequency, more (\$29.95). With wordprocessor (\$39.95). Manual (\$10). Check/MO. Larecco, P.O.B. 2018-QS, Calumet City, IL 60409, 1-312-891-3279.

APARTMENT Dwellers/Portable Antenna System. For HF. SASE for information. Burk Electronics, 35 North Kensington, La Grange, IL 60525, 312-482-9310.

WANT: RS-6 Radio or Components of. W8MFL, 612-698-4851.

WANTED: Six Meter FM Equipment. Interested in Genave GTX-600, Regency HR-6, etc. Also GE, Motorola, RCA portables, mobiles or bases that are low band high split that could be converted for six meters. Reasonable. WA3RSP, 469 Jayson Avenue, Pittsburgh, PA 15228.

NY HAMS Dream House. A modern ranch house on 1.5 acres, 450' ft. above sea level, 40 ft. tower, good reception, 2M and 6M extends over 200' miles north of the Empire State Building in White Plains, NY. Easy commute to Manhattan, 360° view of horizon, no other buildings or structures at same level for miles, very private setting, borders 1000 acre natural preserve. For Sale by owner, \$750,000. Dick, 914-761-1966, 717-253-1278 evs.

MACKET: Macintosh packet program, \$42.45. Now supports RTTY and PK-232 host mode. Contact W8PUH, S. Fine Software, P.O.B. 6037, State College, PA 16801.

DIL AWARDS for that LID you know. Set of four different official awards. Worked All Neighbors, Radio's Biggest Ecogist. Nothing Ever Works and World's Biggest LID. \$7 ppd. Fred England, W2SVS, 3900 Canterbury Road, New Bern, NC 28562.

BIRDS on your antenna? Try our Decoy Owl, \$19.95. They really work! Ham Radio Outlet, 1-800-854-6046.

WANTED: Six Meter SSB Equipment. Interested in Drake, Swan, Heath, etc. Also interested in RF amplifiers. Reasonable. WA3RSP, 469 Jayson Avenue, Pittsburgh, PA 15228.

FOR SALE: ComTek ACB-4 Array Switch. For your 2 or 4 element phased vertical arrays on 160M, 80M, or 40M. Complete. Contains remote switchbox with hybrid power dividers and relays, and console control box. Handles 5 KW. Complete directions. Works with 1/4 wave verticals or 1/2 waves. Now you can get gain and directivity at the throw of a switch. Compete with the big boys. Only \$195 US + \$18 S & H. (Foreign, add 10%) ComTek, P.O. Box 202, Hopkinton, MA 01748.

SPY RADIOS Wanted! Any type or period! Military radios in civilian suitcases; radios beginning in "RS"; "SS"; (example "SSTR-11", "RR-6", etc); AN-PRC-1, 5, 10! Melton, days 318-747-9618, evenings 318-798-7319.

CIPHERING Equipment (M-209, M-94, others) Wanted. Books, Manuals, anything related to secret writing. WB2EJK, 17 Alfred Road, Merrick, NY 11566, 516-378-0263.

WANTED: ICOM IC-30A, 440 MHz Xtal. Rig. \$100 if good condition. Dave, KSJOL, 6714 Gaston Avenue, Dallas, TX 75214-4028, 214-826-0535.

LIMITED Space Dipoles... Tri-Bander 160/80/40... \$75; Du-band 160/80, 160/40, 80/40... \$59.50; 80/20... \$49.50; 40/10... \$47.50. All coax fed, low VSWR, no tuning required, maximum power. G5FRV... \$35; G5RV junior... \$32. UPS prepaid. SASE. Tom Evans, W1JC, 113 Stratton Brook, Simsbury, CT 06070.

KENWOOD VFO 520 Wanted. W1LF, 617-899-2624.

VACATION—Ham high in Colorado Rockies. Furnished Mt. Chalet with 205B @ 85' and Collins station. By week. W4LSD, 719-395-6547 nights.

EXCELLENT HRO-60 with A, B, C, D, G. AC Coils. Speaker. \$200. K7LQI.

NOSTALGIC OM looking for Hammarlund HQ-140-XA or Hallicrafter SX-82. Also a WRL Globe King 800A, B or C Transmitter. Even if not working, unit should be cosmetically mint or near mint or else I get thrown out of the house along with "all that dirty junk". Will pay fair price. Contact WA1YIW, 3245 Heather Hill Lane, Tallahassee, FL 32308, 904-893-3936 after 9 PM.

AUSTIN, Texas QTH of N5CQ: 4 bedroom, 2 bath home, 2000 square feet, with 2 fireplaces on large, fenced, fully landscaped lot with oak trees and established rose, vegetable, and herb gardens. Feabody Rock school district, convenient to major employers. One bedroom is set up as a ham shack with dedicated 110, 220, and phone circuits. Good elevation with 80 foot professionally installed Robin 45G with A4, 2M beam, discone, dipoles. \$115,000. Call 512-250-9032.

SSB ELECTRONIC LT245 1269/144 10W \$449. UEK-13/P3C 2400/144 RX GaAsfet \$199. LT705 432/435/28 Trvr., 20W, GaAsfet, dbm, pwr. meter \$549. RF switched preamp MX-2, MX-70 \$79. UEK-13 + USM-13 2304/144 1W \$399. RF Power Meter PM1300A \$199. TFM-4 \$279. Microwave Modules MMT 144/28R \$250, MMC432/28S \$69, MMS-1 Morse Talker \$99, MMK1 296/144 conv. \$59. Mutek mounted Preamp GMFA 144E \$99. PA23/200 \$299. Catalogue \$1, 603-547-2213. Transverters Unlimited, Box 178, New Boston, NH 03070.

CHEAP PACKET for the C64/C128. DigiCom > 84 TNC emulator software with documentation and schematics for AM7910 based HF-VHF interface, \$8 ppd. Complete kit \$49.95. Assembled \$79.95. Both include free disk. Add \$2.50 shipping. See my 73 Magazine article (August 1988) for details. SASE for info. Barry Kutner, W2UP, 614-B Palmer Lane, Yardley, PA 19067.

QTH—20 acre mountain top in scenic Southeast Oklahoma. 2450 feet msl. 1900 feet above average terrain. One of the highest spots in Eastern Oklahoma. Ideal DX, contest, camping, cabin location. 360 degree unobstructed view. Write or call for information and photos. Stan Wigh, WB6UYG, 2133 14th, Kingsburg, CA 93631, 209-897-1124. Priced at \$11,000.

ADOPTION. I have listened in the night and have heard, low against the ground the cry of lonely, orphaned, and forgotten Telegraph Keys and Bugs. Times past, they were loved, and used, daily, nay hourly, but now languish, almost unknown in many a dusty box or drawer. If you happen to find any of these unfortunates, please give them our address or telephone number and we would be overjoyed to pay the adoption fee and give them regular attention, care and use. Thank you. Reno Telegraph Key Orphan Home, W7SK Headmaster, c/o Box 7415, Reno, NV 89510-7415, 702-356-0615 collect.

COMPUTERIZE with the "Amateur Radio Operating System". This MS/DOS based software features auto-logging, QSL management, award summaries, contesting, and Morse Base System \$39.95, demo disk \$10 (credited). SASE brings details. WA4PYF, Fundamental Services, 1546 Peaceful Lane, Clearwater, FL 34616.

FOR SALE: Heath HW-101, Heath Antenna Tuner, Keyer, other misc. Accessories. \$500 takes all-negotiable. Don White, W8DQX, 618-874-9456.

WANTED Ham Equipment for Boy Scouts. Troop 125 is starting a training program in communications, emergency communications, and international brotherhood through amateur radio. Your property donation or financial support will be acknowledged with a receipt for your tax deductible contribution. Contact Mike, W82FCP via callbook or 718-984-8177 evenings. Thank you.

"Q" PRODUCTS: 8877 QRO VHF amplifiers, 50 MHz, 144 MHz, 220 MHz. HV power supplies, coaxial antenna relays. Holiday special 10% off on 144 and 220 kits. Introductory price on 50 MHz kit. SASE for brochure. "Q" Products, Larry Price, N7BNJ 10412 35th Street E., Puyallup, WA 98372, 206-841-7465 evenings.

ATLAS RADIOS Wanted—working or not. RF Parts Co., 619-744-0720, 800-854-1927.

DXpedition to Montserrat for only \$300/week, radio included. Complete details for SASE or call: Box 50, Fulton, CA 95439, 707-523-1001.

WANTED: Heath 5010 Keyer. KA5FKC.

WANTED: SB220/1 or equiv., TH6, TH6 to TH7 Kit, TXR Rotator, Heath CW Keybd., Heath Iambic Keyer, Bencher Iambic Key. W2UGM, 66 Columbus Avenue, Closter, NJ 07624, 201-767-0123.

SWAN 750, nice, \$125. K4NBN, "No Bad News".

HAM HOLIDAY in VP5. Join cycle 22 fun from rare DX QTH, Turks & Caicos Islands. We supply transceiver, antenna, process license and offer accommodations as low as 7 nights \$380 each; double occupancy in private bungalow. Direct Pan Am service, 80 minutes Miami. Details VP5D, P.O. Box 100858, Ft. Lauderdale, FL 33310.

I NEED to Buy New or Serviceable Coils for HQ-1 Mini-Quad. W4ADX, 1162 S. Harbor Drive, Riviera Beach, FL 33404, phone 407-848-8580, FAX 407-842-4122.

NEW 572Bs limited quantity \$59.95 each. Cash, COD, MO, add \$3.50 per tube shipping and handling. Tubes for Collins, 811A \$16.95 each. Premium quality 6146B \$11.95 each, 813, \$24.95, 4CX1500B for 30S-1, \$269.95. Wanted for cash or trade, any types of transmitting or special purpose tubes. M & S Communications Engineering, 160 S. Auburn Street, Suite 200, Grass Valley, CA 95945, 916-272-5500.

TELETYPEWRITER Parts Bought, Sold. Want Tubes, MS Connectors, Air Trimmers. Typetronics, Box 8873, Ft. Lauderdale, FL 33310.

CALL SIGNS professionally made for auto window or desk. Only \$3 ppd. CBS, 2203 Park Avenue, Cheyenne, WY 82007.

1989 CALLBOOKS. North American \$26. International \$29. Both \$52. Personal check. Insured UPS paid. Immediate shipment. Avatar/W9JVF, 1408 W. Edgewood, Indianapolis, IN 46217.

BUSINESS Opportunity: Profitable Communications Business, CB/Ham Sales & Service, 24 years, high return, large and faithful following. Long Island, NY. Owner retiring. Pat, 516-423-3614.

WANT: R-1004 Receiver, part of AN/GRC-109. Miles Anderson, K2CBY, RFD 2, Cornell Road, Sag Harbor, NY 11963, 516-725-3431 evenings.

# DAYTON Hamvention®

April 28, 29, 30, 1989

## Early Reservation Information

• General Chairman, Bill McNabb, WD8SAY

• Asst. General Chairman, Ed Hillman, N8ALN

**Giant 3 day flea market • Exhibits  
License exams • Free bus service  
CW proficiency test • Door prizes**

Flea market tickets and grand banquet tickets are limited. Place your reservations early, please.

### Flea Market Tickets

Maximum of 3 spaces per person (non-transferable). Tickets (valid all 3 days) will be sold IN ADVANCE ONLY. No spaces sold at gate. Vendors MUST order registration ticket when ordering flea market spaces.

### Special Awards

Nominations are requested for 'Radio Amateur of the Year,' 'Special Achievement' and 'Technical Achievement' awards. Contact: Hamvention Awards Chairman, Box 964, Dayton, OH 45401.

### License Exams

Service thru Extra exams scheduled Saturday and Sunday by appointment only. Send FCC form 610 (Aug. 1985 or later) - with requested elements shown at top of form, copy of present license and check for prevailing ARRL rates (payable to ARRL/VEC) to: Exam Registration, 8830 Windbluff Court, Dayton, OH 45458

### 1989 Deadlines

*Award Nominations:* March 15

*Lodging:* April 7

*License Exams:* March 26

*Advance Registration and banquet:*

USA - April 4    Canada - March 31

### Flea Market Space:

Spaces will be allocated by the Hamvention committee from all orders received prior to February 1. Express Mail NOT be necessary! Notification of space assignment will be mailed by March 15, 1989.

### Information

General Information: (513) 433-7720

or, Box 2205, Dayton, OH 45401

Lodging Information: (513) 223-2612

(No Reservations By Phone)

### Lodging

Please write to **Lodging, Dayton Hamvention, Chamber Plaza, 5th & Main Streets, Dayton, OH 45402** or refer to our 1988 Hamvention program for lodging information which includes a listing of hotel/motels located in the surrounding areas of Dayton. Reservations for the surrounding area will then become the responsibility of the individual.

HAMVENTION is sponsored by the Dayton Amateur Radio Association Inc.

## Advance Registration Form

Dayton Hamvention 1989

Reservation Deadline - USA-April 4, Canada-March 31

Flea Market Reservation Deadline: February 1

Enclose check or money order for amount indicated and send a self addressed stamped envelope.

Please Type or Print your Name and Address clearly.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

### How Many

Admission _____ (valid all 3 days)	@ \$10.00*	\$ _____
Grand Banquet _____	@ \$20.00**	\$ _____
Women's Luncheon (Saturday) _____	@ \$7.00	\$ _____
(Sunday) _____	@ \$7.00	\$ _____
Flea Market _____ (Max. 3 spaces)	\$25/1 space \$50/2 adjacent	
Admission ticket must _____	\$150/3 adjacent	\$ _____
be ordered with flea market tickets	<b>Total</b>	\$ _____

\* \$12.00 at door

\*\* \$22.00 at door, if available

Make checks

payable to - **Dayton HAMVENTION**

Mail to - **Dayton Hamvention  
Box 2205  
Dayton, OH 45401**

# National Tower Company

P.O. Box 15417 Shawnee Mission, KS. 66215

Hours 8:30-5:00 M-F

Price Subject to Change Without Notice

913-888-8864

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25G	10' section	\$59.50
25AG2 & 3	model 2 or 3 top section	\$69.50
25AG4	model 4 top section	\$76.90
45G	10' section	\$140.00
45AG3 & 4	model 3 or 4 top section	\$142.90
55G	10' section	\$180.00
M200	10' mast, 2" dia	\$14.90
BX-40	40' self supporting 16 sq ft	\$215.50
BX-48	48' self supporting 16 sq ft	\$274.50
BX-56	56' self supporting 16 sq ft	\$368.50
BX-64	64' self supporting 16 sq ft	\$474.50
BX-40	40' self supporting 10 sq ft	\$249.50
BX-48	48' self supporting 10 sq ft	\$338.90
BX-56	56' self supporting 10 sq ft	\$432.00
BX-40	40' self supporting 18 sq ft	\$313.00
HDXB-48	48' self supporting 18 sq ft	\$423.50

3/16EHS 500' galvanized 7 strand \$40.00  
1/4EHS 500' galvanized 7 strand \$50.00

### HYGAIN/TELEX ANTENNAS

HF ANTENNAS		Tribands
TH3JRS	2 element Junior Thunderbird	\$221.00
TH5MK2S	5 element Thunderbird	\$510.00
TH2MK3S	2 element Thunderbird	\$202.00
TH7DXS	7 element Thunderbird	\$537.00
EXP 14	Explorer 14 triband beam	\$365.00
OK710	30/40 M conv. exp 14	\$91.00

Monoband		
103BAS	Long John 3 element 10 mtr	\$78.00
105BAS	Long John 5 element 10 mtr	\$174.00
155BAS	Long John 5 element 15 mtr	\$285.00
204BAS	4 element 20 meter	\$332.90
205BAS	Long John 5 element 20 mtr	\$408.00
7-15	Discoverer rotary dipole 30/40mtr	\$150.00
7-20	Discoverer 2 elem 40 meter beam	\$420.00
7-35	converts 7-25 to 3 elem. beam	\$264.00

Multiband Verticals		
18VTS	Hy-Tower 10 thru 80 meters	\$502.00
18VS	Case loaded 10 thru 80 meters	\$39.00
12AVUS	trap vertical 10 thru 20 meters	\$49.00
14AVU/WBS	trap vertical 10 thru 40 meters	\$84.00
18AVU/WBS	trap vertical 10 thru 80 meters	\$123.00

Multiband Doublets		
18TD	portable tape dipole 10-80 meters	\$139.00
28DD5	trap doublet 40 and 80 meters	\$59.00
58DD5	trap doublet 10 thru 80 meters	\$109.00

VHF ANTENNAS Beams & Verticals		
23BS	2 meter 3 element beam	\$29.00
25BS	2 meter 5 element beam	\$33.00
28BS	2 meter 8 element beam	\$39.00
214BS	2 meter 14 element beam	\$50.00
64BS	4 element 6 meter beam	\$84.00
V-25	collinear gain vertical 138-174 MHz	\$56.00
V-35	collinear gain vertical 220 MHz	\$49.00
V-45	collinear gain vertical 430-470 MHz	\$67.00
6PG2A	base 2 mtr. ground plane	\$24.00

VHF & UHF Mobiles		
HR144GR1	teleglass 2 mtr 3/8-24 mt	\$69.00
HR144GR1	HyBander 2mtr 3/8-24 mt	\$49.00
HR144MAG	HyBander 2 meter	\$74.00
BN86	terrace balun for 10-80 meters	\$23.00

OSCAR LINK ANTENNA		
216S	70cm 435 MHz	\$79.00
218S	Complete Oscar link system	\$256.00

CUSHCRAFT ANTENNAS		
A0P-1	complete Oscar Link system	\$189.00
APR	8band 1/2 wave vertical	\$152.00
A3	3 element triband beam	\$246.00
A743	7 & 10 MHz add on kit for A3	\$81.00
A744	7 & 10 MHz add on kit for A4	\$81.00
4218XL	18 element 2 mtr, 28' boomer	\$125.00
R4	10, 12, 15, 20 meter vertical	\$204.50
A4S	4 element triband beam	\$344.00
AV4	40-10 mtr vertical	\$94.50
AV5	80-10 mtr vertical	\$111.00
ARX2B	2 mtr Ringo Ranger	\$39.25
ARX450B	450 MHz Ringo Ranger	\$39.25
A144-11	144 MHz 11 ele VHF	\$50.50
A147-11	11 element 146-148 MHz beam	\$50.50
A147-22	22 element Power Packer	\$141.75
A144-101	10 element 2 mtr Oscar	\$54.00
A144-201	20 element 2 mtr Oscar	\$77.50
21WB	15 element 2 mtr Boomer	\$81.00
220B	17 element FM Boomer	\$101.25
230WB	144-148MHz, 30 element	\$216.00
32-19	19 element 2 mtr Boomer	\$101.25
424B	24 element Boomer	\$81.00
10-40CD	4 element 10 mtr Skywalker	\$124.75
15-40D	4 element 15 mtr Skywalker	\$145.40
20-40D	4 element 14 MHz Skywalker	\$310.50

HUSTLER ANTENNAS		
491V	40-10 mtr vertical	\$78.00
581V	30-10 mtr vertical	\$105.00
681V	6 band trap vertical	\$124.00

ROTORS		
Alliance	H073 (10 7 sq ft)	\$104.00
Alliance	U110	\$47.00
TELEX	AR40 TV 3 sq ft	CALL
TELEX	CD45-III (8 5 sq ft)	CALL
TELEX	HAM IV (15 sq ft)	CALL
TELEX	12X (20 sq ft)	CALL

CABLE		
12-18 & 6-22	4080 - per foot	\$0.18
12-15 & 6-20	4090 - per foot	\$0.35
110S	R88U Mini 8 low loss foam per foot	\$0.17
119R	R88U Columbia superflex 100'	\$31.00
1180	R88U Low loss 100% bonded foil shield 88% in copper braided shield - per foot	\$0.35

## Uniden

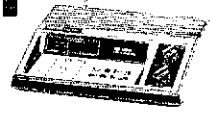
BC100XLT \$199.90

100 Ch 11 band, with aircraft 10 priority channels, lockout, scan delay, auto search, track tuning, direct Ch access, WAC adapter carry case & ear phone.



BC145XL \$92.90

16 Ch 10 band, built-in delay, review priority memory backup, Ch lockout, direct Ch access, weather search, AC/DC



BC55XLT	10 Ch 10 Band hand held	\$114.90
BC200XLT	200 Ch 12 band hand held 800 MHz	\$269.90
BC175XL	16 Ch 11 band aircraft AC/DC	\$149.90
BC210XLT	40 Ch 11 band aircraft & weather	\$179.90
BC800XLT	40 Ch 12 band aircraft & 800 MHz	\$239.90
BC560XLT	16 Ch 10 band mobile weather	\$99.90
BC580XLT	100 Ch 11 band mobile weather	\$189.90
BC760XLT	100 Ch 12 band aircraft & 800 MHz	\$279.90

## Regency



Z60 \$99.90

60 Channel 8 band aircraft, programmable 60 pre-programmed Channels, search or scan, alarm clock, priority, permanent backup, Ch lockout, scan delay, AC/DC with both cords.



INF5 \$89.90

AC powered Turbo Scan, pre-programmed by state to receive any type of police transmission plus fire & weather scans at 50 channels per second, digital display, instant weather.

RI70 \$79.90

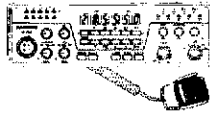
10 Ch 6 band, programmable permanent memory backup, dual level digital display, Ch lockout, step control, AC only

INF1 \$119.90

Pre-programmed mobile receives 60 states police plus instant weather, scans 40 channels per second, DC

## RANGER

10 meter transceiver, 25 watt, can be programmed to split transceive SSB CW AM FM programmable scanning, fully automatic noise blanker, 2 1/2" 734W, 110



AR3500 \$299.90

## Uniden

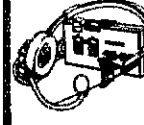
25 WA11 10 Meter Transceiver all mode operation, backlit multi function LCD meter, frequency lock, auto squelch, NB, RF gain, PA, external speaker jack, 7 1/2" WX9 1/4 DX2 1/2 H



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HPG-382A, Wanted, Variable Attenuator. Ham lab project. Need several pieces. Will consider any condition. K8GOX, P.O. Box 10, O'Neals, CA 93845, 209-868-3548 collect.

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WA2RZQ is looking for linear parts, transformer, 4-400As and sundry. Also mint 390-A. A. Bart, 51 South Oxford Street, Brooklyn, NY 11217.

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WANTED: Collins S-Line, KWM2, 30L1 and Drake TR4 CW. K5GIT, 713-331-1074.

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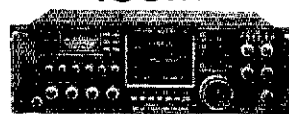
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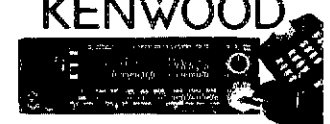


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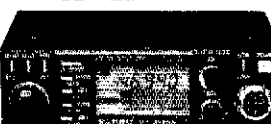


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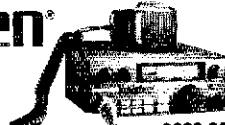
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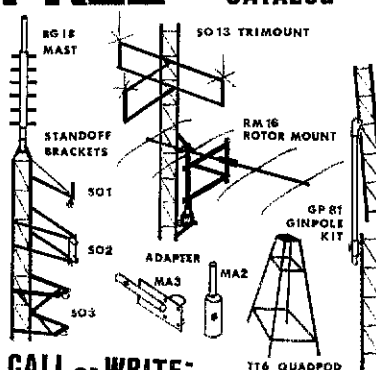
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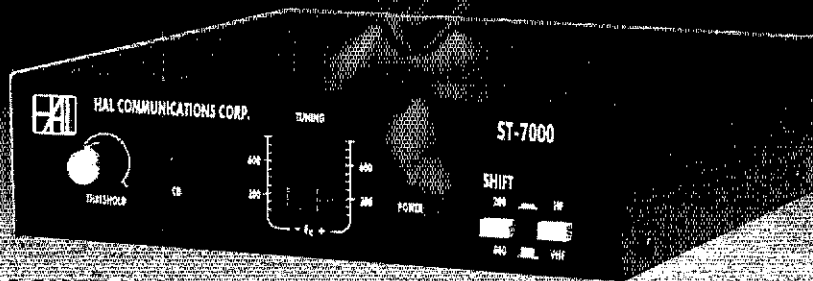
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WANTED: Hammerlund, HQ170AC VHF, and HQ180AC, prefer mint cond. Mike Matich, P.O. Box 515, Cedar Ridge, CA 95924, 916-477-0622.

FV-700DM VFO \$125, PS-30 Kenwood \$159, FP-700 \$159, MC-60A \$99, VM-6200 Camcorder \$699. All mint! KA8UWR, 216-376-2402.

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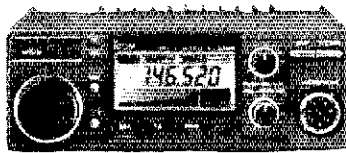
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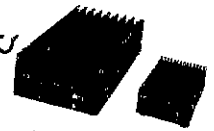


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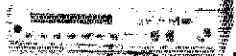
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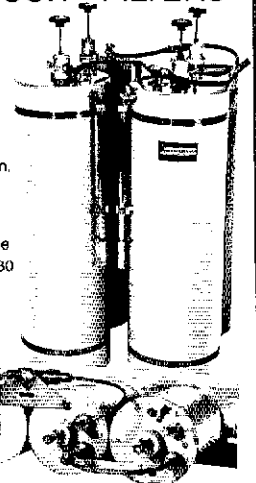
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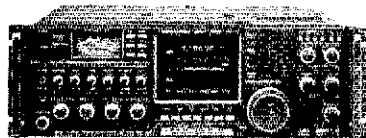


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TS-440S/AT Gen. Cvg Xcvr		1379.95	Call \$
TS-140S Compact, Gen. Cvg Xcvr		929.95	Call \$
TS-680S HF Plus 6m Xcvr		1099.95	Call \$
TL-922A HF Amp		1649.95	Call \$
<b>Receivers</b>			
R-5000 100 kHz-30 MHz		999.95	Call \$
R-2000 150 kHz-30 MHz		749.95	Call \$
RZ-1 Compact Scanning Rcvr.		599.95	Call \$
<b>VHF</b>			
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TH-315A Full Featured 2.5w HT		399.95	Call \$



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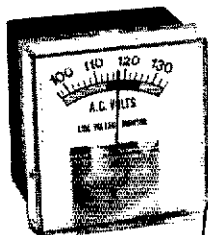
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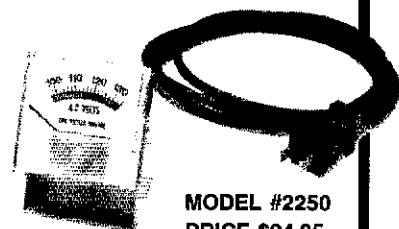
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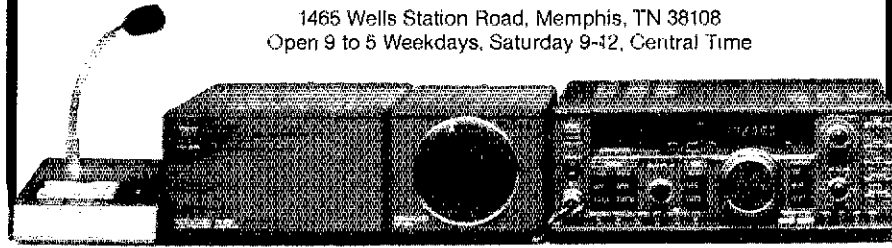
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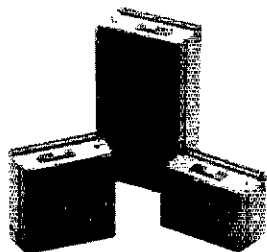


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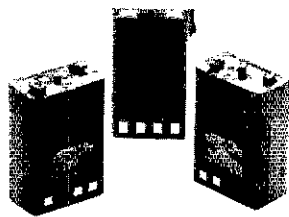
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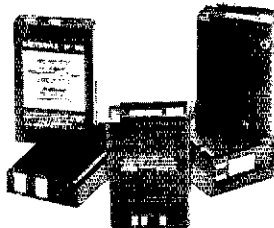
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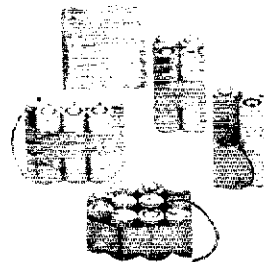
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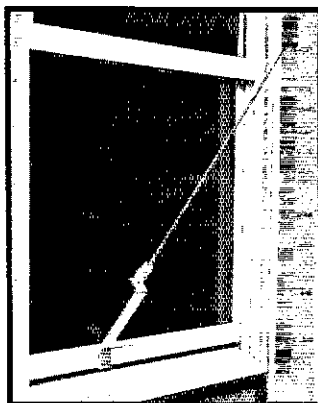
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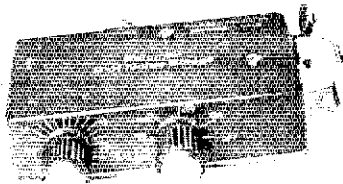
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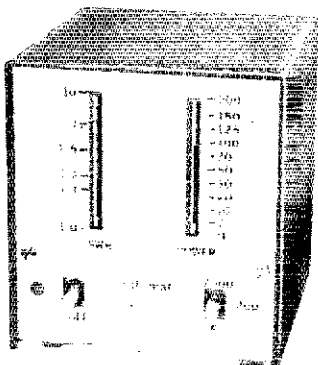


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Model	Height	Ant. Load*	Weight	Delivered Price*
HBX40	40 ft	10 sq ft	228	\$419
HBX48	48 ft	10 sq ft	303	\$539
HBX55	55 ft	10 sq ft	385	\$629
HDX40	40 ft	18 sq ft	281	\$519
HDX48	48 ft	18 sq ft	363	\$619

\*Your Total Delivered Price Anywhere in Continental 48 States. Antenna Load Based on 70 MPH Wind.

## ROHN Guyed Tower Packages

- World Famous Rohn Quality and Dependability
- Rugged high wind survival provides safe installation
- Multi purpose towers satisfy a wide range of needs
- Complete packages include: guy hardware, turnbuckles, guy assemblies, w/torq bars, concrete base, rotor plate and top section per manufacturers specs.

Packages shown below are rated for wind zone "B" (86 mph wind). Zone "C" (100 mph wind) design prices slightly higher. All tower packages shipped freight collect from our Plano, TX warehouse, in stock for prompt delivery.

Model	Model 250	Model 45G	Model 55G
50'	\$689	\$1369	\$1889
60'	849	1549	1899
70'	919	1699	2069
80'	1099	1899	2299
90'	1179	2199	2489
100'	1269	2399	2699
110'	1499	2569	3129
120'	1579	2749	3349

## US TOWER CORPORATION

These rugged crankup towers and masts now available from Texas Towers!

Check these features:

- ✓ All steel construction
- ✓ Hot dipped galvanized
- ✓ Totally self-supporting—No guys needed

Coax arms, Thrust bearings, Masts, Motor drives, Remote controls, Hinged bases, Rotor bases, & Raising fixtures also in stock.

**CALL FOR SALE PRICES!**

Model	Min.Ht.	Max.Ht.	Ant.load*	Sale price
MA40 mast	21'	40'	10 sq ft	\$629
MA50 mast	22'	50'	10 sq ft	\$699
TX438	22'	38'	18 sq ft	\$199
TX455	22'	55'	18 sq ft	1385
TX472	23'	72'	18 sq ft	2279
HDx555	22'	55'	30 sq ft	2070
HDx572	23'	72'	30 sq ft	3559

Note-Us Towers Shipped Freight Collect From Visalia, CA Factory

\*Note-towers rated at 50 mph to EIA specifications

## RG-213U

\$ .35/ft \$349/1000 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

\$ .22/ft \$209/1000 ft.

- RG8X—95% Bare Copper Shield • Low Loss
- Non-contaminating Vinyl Jacket Foam Dielectric

## 9086

\$ .42/ft \$409/1000 ft.

- Same Specs as Belden 9913
- Lower loss than RG8U
- 100% shielded-braid & foil

## HARDLINE/HELIX®

Lowest Loss for VHF/UHF!

Cable Type	Imped.	10MHz	30MHz	100MHz	400MHz
RG-213/U	50	6	9	2.3	5.2
RG8X	52	8	1.2	3.5	5.8
9086	50	4	5.4	1.7	3.1
1/4" Alum	50	3	5	1.2	2.2
1/2" Helix	50	2	4	9	1.6
3/4" Helix	50	1	2	5	9

## HARDLINE & HELIX® CONNECTORS

Cable Type	UHF FML	UHF MALE	FML N	FML MALE
1/4" Helix®	\$29	\$29	\$29	\$29
3/4" Helix®	\$55	\$55	\$55	\$55

## COAX CONNECTORS

Amphenol Silver PL259	\$1.50
UG21B N Male	\$3.50
9086/9913 N Male Connector	\$4.95

## ANTENNA WIRE & ACCESSORIES

Stranded Copper 14ga.	\$10/ft.
1/4 mile 18ga copper-clad steel wire	\$30
Dog bone end insulator	\$79 ea.

## Van Borden

1:1 Balun	\$15	Center Insulator	\$8
Dipole Kits	D80 \$31.95/D40 \$28.95		
Short Dipole Kits	SD80 \$35.95/SD40 \$33.95		
All-band Dipole w/ladder line	\$29.95		
GSRV all band antenna	\$49.95		

## ALPHA DELTA DX-A 160-80-40 Sloper

\$49

## CUSHCRAFT

A3 3-el Tribander	\$259
A4S 4-el Tribander Beam w/S.S. Hdwr.	\$349
A743 & A744, 30/40 mtr KIT for the A3 & A4.	\$ 89
R4 20-10 mtr Vertical	\$229
AP8 80-10 mtr Vertical	\$159
AV5 80-10 mtr Vertical	\$119
D40 40 mtr Dipole	\$159
40-20D 2-el 40 mtr Beam	\$339
A50-5 5-el 6 mtr Beam	\$ 98
215 WB NEW 15-el 2 mtr Beam	\$ 89
230 WB NEW 30-el 2 mtr Beam	\$229
4218 XL 18-el 2 mtr Beam	\$129
3219 19-el 2 mtr Beam	\$109
4248 24-el 432 MHz Beam	\$ 89
ARX2B 2 mtr Vertical	\$ 45

## hy-gain Discoverer 2-el 40-mtr Beam

## Discoverer 3-el Conversion Kit

## EXPLORER-14 SUPER-SPECIAL

OK710 30/40 mtr. Add-On-Kit

V2S 2-mtr Base Vertical

V4S 40MHz Base Vertical

TH5MK2S Broad Band 5-el Triband Beam

TH7DXS 7-el Triband Beam

TH3JRS 3-el Triband Beam

205BAS 5-el 20-mtr Beam

155BAS 5-el 15-mtr Beam

105BAS 5-el 10-mtr Beam

204BAS 4-el 20-mtr Beam

64BS 4-el 6-mtr Beam

12 AVQ 20-10 mtr vertical

14 AVQ 40-10 mtr vertical

18 AVT/WB 80-10mtr Vertical

18HTS 80-10 mtr Hy-Tower Vertical

23BS 3-el 2 mtr Beam

25BS 5-el 2 mtr Beam

28BS 8-el 2 mtr Beam

214BS 14-el 2-mtr Beam

28DD 80/40 mtr Trap Dipole

58DD 80-10 mtr Trap Dipole

BN86 80-10 mtr KW Balun W/Coax Seal

## HUSTLER

6BT 80-10 mtr Vert	\$149	5BT 80-10 mtr Vert	\$129
4BT 40-10 mtr Vert	\$99	G7-144 2-mtr Base	\$129
GG-144B 2-mtr Base	\$89		

## Mobile Resonators

10m	15m	20m	40m	75m
400W Standard	\$16	\$17	\$19	\$22
2KW Super	\$20	\$22	\$25	\$29

Bumper Mounts - Springs - Folding Masts in Stock!

## BUTTERNUT ELECTRONICS CO

HF6VX 80-10m Vertical \$149 Delivered

- Full Legal Power
- Highest Q Tuning Circuits

HF2V 80-40m Vertical \$139 Delivered


- Full Legal Power
- Automatic Band Switching

Accessories:

- RMK II Roof Mtg. Kit.....\$55
- STR II Stub-Tuned Radials.....\$35
- TBR160 160m Coil Kit.....\$55
- 30m Add-on Kit.....\$35
- 17/12m Add-on Kit.....\$35

FREE UPS on ACCESSORIES when purchased with antenna

## HF5B "Butterfly" 20-10m Compact Beam \$229.95



- Unique Design Reduces Size
- No Lossy Traps
- Turns w/TV Rotor
- Boom Length 6 Feet
- Element Length 12.5 Feet

FREE UPS Shipping in Continental USA

## MIRAGE/KLM

KT34A 4-el Broad Band Triband Beam	\$399.95
KT34XA 6-el Broad Band Triband Beam	\$569.95

## ROTORS

Alliance HD73 (10.7 sq ft rating)	\$119.95
Alliance U110 (3 sq ft rating)	\$49
Telex CD 4511 (8.5 sq ft rating)	\$CALL
Telex HAM 4 (15 sq ft rating)	\$CALL
Telex Tailwister (20 sq ft rating)	\$CALL
Telex HDR300 Heavy Duty (25 sq ft rating)	\$CALL

## ROTOR CABLE

Standard 8 cord cables \$.22/ft. (vinyl jacket 2-#18 & 6-#22 ga)

Heavy Duty 8 Cord cable \$.39/ft. (vinyl jacket 2-#16 & 6-#18 ga)

## ROHN GUYED TOWER SECTIONS

10 FT. STACKED SECTIONS

20G	\$49.50	45G	\$139.50
25G	\$59.50	55G	\$179.50

ALL ACCESSORIES IN STOCK—CALL

## ROHN FOLDOVER TOWERS

Model	Height	Ant. Load*	Price
FK2548	48 ft.	15.4 sq. ft.	\$1129
FK2558	58 ft.	13.3 sq. ft.	1199
FK2568	68 ft.	11.7 sq. ft.	1239
FK4544	44 ft.	34.8 sq. ft.	1489
FK4554	54 ft.	29.1 sq. ft.	1599
FK4564	64 ft.	28.4 sq. ft.	1699

25G Double Guy Kit.....\$279.  
45G Double Guy Kit.....\$299.

\*Above antenna loads for 70 mph winds w/guys at hinge and apex. All foldover towers shipped freight prepaid in 48 states. Prices 10% higher west of Rockies.

## TOWER/GUY HARDWARE

3/16 EHS Guywire (3990 lb rating)	\$ 15/ft
1/4 EHS Guywire (6650 lb rating)	\$ 18/ft
5/16 EHS Guywire (11,200 lb rating)	\$ 29/ft
5/32 7 x 7 Aircraft Cable (2700 lb rating)	\$ 15/ft
3/16 CCM Cable Clamp (3/16" or 5/32")	\$ 45
1/4 CCM Cable Clamp (1/4" Cable)	\$ 55
1/4 TH Thimble (fits all sizes)	\$ 45
3/8EE (3/8" Eye & Eye Turnbuckle)	\$6.95
3/8EJ (3/8" Eye & Jaw Turnbuckle)	\$7.95
1/2 x 9EE (1/2" x 9" Eye to Eye Turnbuckle)	\$9.95
1/2 x 9EJ (1/2" x 9" Eye & Jaw Turnbuckle)	\$10.95
1/2 x 12EE (1/2" x 12" Eye & Eye Turnbuckle)	\$12.95
1/2 x 12EJ (1/2" x 12" Eye & Jaw Turnbuckle)	\$13.95
5/8 x 12EJ (5/8" x 12" Eye & Jaw Turnbuckle)	\$16.95
3/16" Preformed Guy Grip	\$2.49
1/4" Preformed Guy Grip	\$2.99
6" Diam - 4 ft Long Earth Screw Anchor	\$17.95
500 D Guy Insulator (5/32" or 3/16" Cable)	\$1.69
502 Guy Insulator (1/4" Cable)	\$2.99
5/8" Diam - 8 ft Copper Clad Ground Rod	\$12.95

## PHILLYSTRAN GUY CABLE

HPTG2100 Guy Cable (2100 lb rating)	\$ .32/ft
HPTG4000 Guy Cable (4000 lb rating)	\$ .52/ft
HPTG6700 Guy Cable (6700 lb rating)	\$ .72/ft
9901LD Cable End (for 2100/4000 cable)	\$9.95
9902LD Cable End (for 6700 cable)	\$11.95
Socketfast Potting Compound (does 6-8 ends)	\$16.95

## GALVANIZED STEEL MASTS

Heavy Duty Steel Masts 2 in OD - Galvanized Finish

Length	5 FT	10 FT	15 FT	20 FT
12 in Wall	\$29	\$49	\$69	\$89
18 in Wall	\$49	\$89	\$129	\$149
25 in Wall	\$69	\$129	\$189	\$249

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**TS-940 "DX-CELLENCE"**

- All Band, All Mode Transceiver
- Direct Keyboard Entry
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- Built-in Power Supply and Automatic Antenna Tuner
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- QSK to 60 WPM

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- Mobile 10 Meter Transceiver
- SSB/AM/FM/CW
- 25 Watts PEP
- Computer Controlled Operation

**SALE PRICED**


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**TS-140S AFFORDABLE DX-ing!**

- HF Transceiver With General Coverage Receiver
- All HF Amateur Bands
- 100 W Output
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- SSB, CW, FM on 2 Meters and 70 cm
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- 10 Watts Output on 6 Meters and 1.2 GHz
- 100 Memories

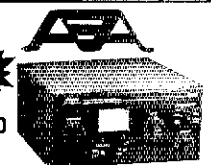
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**IC-781 NEWEST SUPER RIG**

- 5 Function Display Screen
- Built-in Spectrum Scope
- 150 Watts Output
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**NEW!**




**AT-300 and AT-3000**

Antenna Tuners

- AT-300 Rated for 300W
- AT-3000 Rated for 3 kw
- Dual Movement Cross Needle Power and SWR Meter
- AT-300, Amateur Net **\$159.95**
- AT-3000 Amateur Net **\$259.95**

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- Direct Keyboard Entry or VFO

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- 45W Output
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- FT-712 RH for 70cm

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2 Meter & 440 Handhelds


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- VS20M . . . \$129
- RS35A . . . \$139
- RS35M . . . \$155
- VS35M . . . \$175
- RS50A . . . \$199
- RS50M . . . \$225
- RM50M . . . \$245
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- Frequency Coverage: 141-163 MHz (Rx), 144-148 MHz (Tx)
- Front Panel DTMF Pad
- 5 Watts Output
- 14 Memories
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- 144-147-995 MHz
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- 10 Memories
- 6.5 Watts w/optional EBP-8NAZ Battery Pack

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**MFJ-986 ANTENNA TUNER**

- 3 kw Roller Inductor Tuner
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- 6 Position Antenna Switch

List Price \$239.95

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## YAESU



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### TS-140S

HF transceiver with general coverage receiver.

Compact, easy-to-use, full of operating enhancements, and feature packed. These words describe the new TS-140S HF transceiver. Setting the pace once again, Kenwood introduces new innovations in the world of "look-alike" transceivers!

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- **All modes built-in.** LSB, USB, CW, FM and AM.
- **Superior receiver dynamic range** Kenwood DynaMix™ high sensitivity direct mixing system ensures true 102 dB receiver dynamic range.



- **New Feature! Programmable band marker.** Useful for staying within the limits of your ham license. For contesters, program in the suggested frequencies to prevent QRM to non-participants.
- **Famous Kenwood interference reducing circuits.** IF shift, dual noise blankers, RIT, RF attenuator, selectable AGC, and FM squelch.

- **M. CH/VFO CH sub-dial.** 10 kHz step tuning for quick QSX at VFO mode, and UP/DOWN memory channel for easy operation.
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- **RF power output control.**
- **AMTOR/PACKET compatible!**
- **Built-in VOX circuit.**
- **MC-43S UP/DOWN mic. included.**

#### Optional Accessories:

- **AT-130** compact antenna tuner • **AT-250** automatic antenna tuner • **HS-5/HS-6/HS-7** headphones • **IF-232C/IF-10C** computer interface
- **MA-5/VP-1** HF mobile antenna (5 bands)
- **MB-430** mobile bracket • **MC-43S** extra UP/DOWN hand mic. • **MC-55** (8-pin) goose neck mobile mic. • **MC-60A/MC-80/MC-85** desk mics.
- **PG-2S** extra DC cable • **PS-430** power supply
- **SP-40/SP-50B** mobile speakers • **SP-430** external speaker • **SW-100A/SW-200A/SW-2000** SWR/power meters • **TL-922A** 2 kW PEP linear amplifier (not for CW QSK) • **TU-8** CTCSS tone unit
- **YG-455C-1** 500 Hz deluxe CW filter, **YK-455C-1** New 500 Hz CW filter.



### TS-680S

All-mode multi-bander

- 6m (50-54 MHz) 10 W output plus all HF Amateur bands (100 W output).
- Extended 6m receiver frequency range 45 MHz to 60 MHz. Specs. guaranteed from 50 to 54 MHz.
- Same functions of the TS-140S except optional VOX (VOX-4 required for VOX operation).
- Preamp for 6 and 10 meter band.



Complete service manuals are available for all Kenwood transceivers and most accessories. Specifications, features, and prices are subject to change without notice or obligation.

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