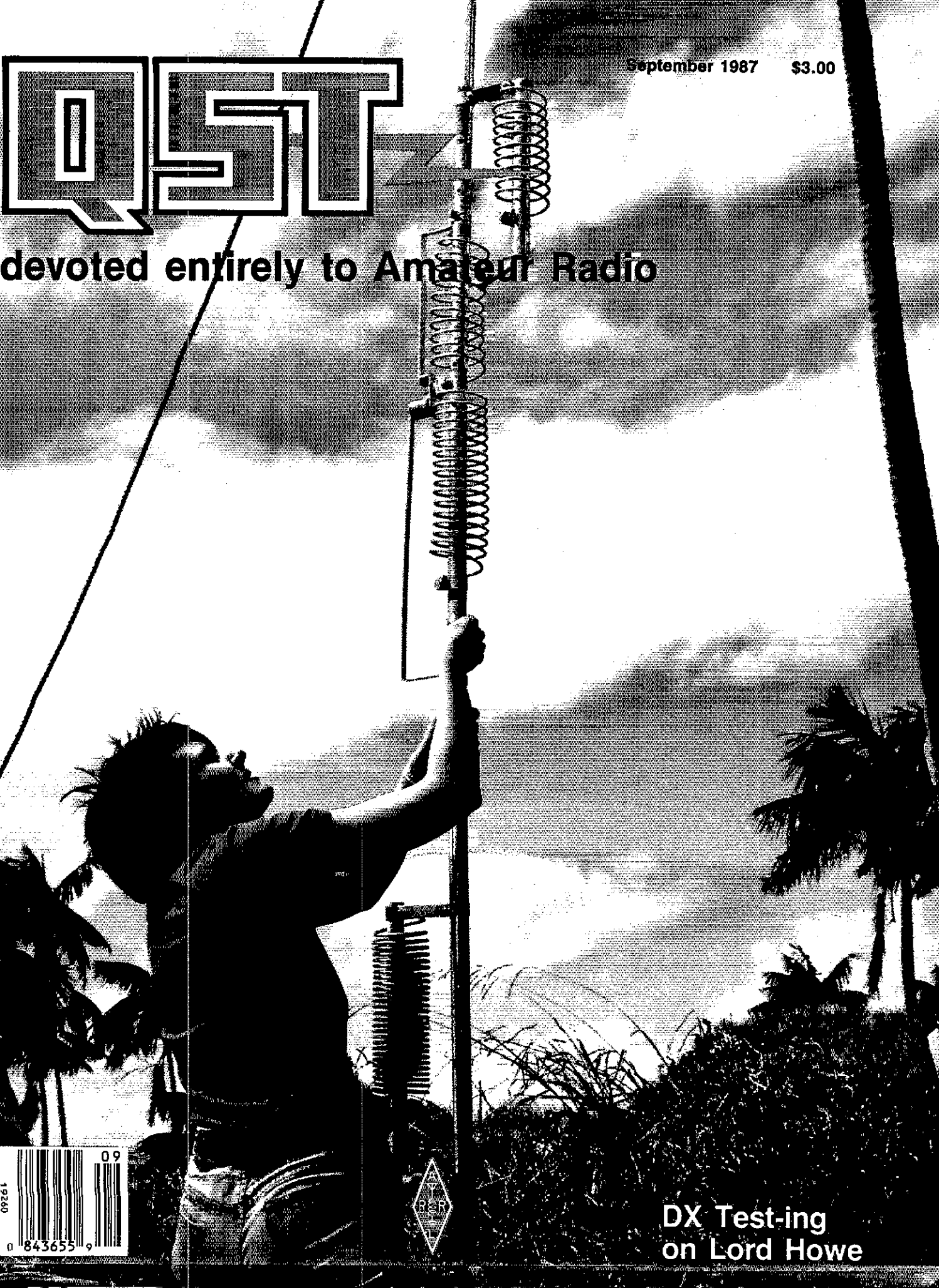
QST

devoted entirely to Amateur Radio

September 1987 $3.00



DX Test-ing on Lord Howe

09
19260
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We have a wonderful world of RF at Henry Radio

Many Amateurs are professional electronics engineers. This message is for them.

In the beginning Henry Amplifiers were for communications. Many still are. Amateur, commercial, MARS, military, short wave broadcast, FM broadcast, VHF link, domestic, foreign. . . Henry amplifiers go everywhere for diverse services. HF point-to-point, VHF, UHF, SSB, AM, FM, RTTY, packet, meteor burst, digital, marine shore station. . .are you beginning to get the idea? If you need a special purpose vacuum tube amplifier for a specific frequency from 2 MHz to 500 MHz at power levels up to 10,000 watts, we invite your inquiry.

But communications is only the beginning. Think about plasma generation, sputtering and etching, thin film deposition, laser excitation, nuclear magnetic resonance (NMR), photo-emissions and mass spectrometry, scientific research, industrial production. . . Henry equipment is used in all of these applications. We have always been customer driven and still are.

Recent projects include:

10,000 watt 41 MHz Meteor Burst
U.S. Air Force

10,000 watts 60 Mhz
U.S. Air Force

2,000 watts 45 MHz
numerous customers including SHAPE Headquarters, U.S. Dept. of Interior, The Mitre Company, M-A Com, Etc.

2,000 watts 13.5 MHz
Plasma generator for vacuum etching, many customers

1,000 watts 13.5 MHz
Same application as previous listing

5,000 watts 13.5 MHz
Same application as previous listing

5,000 watts various Marine HF frequencies
Shore stations

10,000 watts 90 MHz
Laser Excitation, Alumax Co.

2,000 watts 110 to 150 MHz
United Technology

3,000 watts 450 MHz
Western Research

4,000 watts 145 MHz VHF
Point-to-Point — Indonesia

3,000 watts 320 MHz
Pulse for Satellite Test station, Hughes Aircraft.

5,000 watts 400 MHz
Pulse for Laser Excitation, University of California

2,500 watts 27.12 MHz
to Ignite Argon Torch Photo-Emissions Spectrometry — Switzerland

1,500 watts 40 MHz
same application as above — The Baird Corporation

3,000 watts 27.12 MHz
Mass Spectrometry, VG Isotopes, England

2,000 watts 13.56 MHz
Sputtering — Munich, Germany

3,000 watts 6 MHz
Shortwave AM — Broadcast, Iraq

3,000 watts 70 MHz
Airborne Radar Research, England

5K Classic Amplifiers
Export

If you have a requirement for high power RF, please call Ted Shannon, Mary Silva or Ted Henry (Los Angeles office). And don't forget, Henry Radio still produces the world's broadest line of fine Amateur amplifiers!

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...pacesetter in Amateur Radio

New 220 MHz

220: FM for All!

Kenwood brings you a wide range of 220 MHz gear designed for every need. Choose from two types of mobile and two types of HT. The TH-315A is a full-featured HT covering 220–225 MHz. Ten memory channels and 2.5 watts of power. (5 W with PB-1 or 12 V DC.) Uses the same accessories as the TH-215A for 2 meters or TH-415A 440 MHz. For truly "pocket portability," choose the TH-31BT, a thumb-wheel programmable, 1 watt unit. For mobile use, select the TM-321A or TM-3530A.

The TM-321A is the 25 W, 220 MHz, 14-channel version of the super popular, super compact TM-221A. The 25-watt TM-3530A has 23 channels, a 15 telephone number memory and auto dialer. Direct keyboard frequency entry and front panel DTMF pad enhances operating convenience. Novice to Amateur Extra, these transceivers will put everyone on the air "Kenwood Style"!

TH-315A
Full-featured HT

TM-321A
Compact mobile transceiver

TH-31BT/31A
Pocket-held HT

New

New

TM-3530A
Full-featured mobile transceiver

A complete line of accessories is available for all models.

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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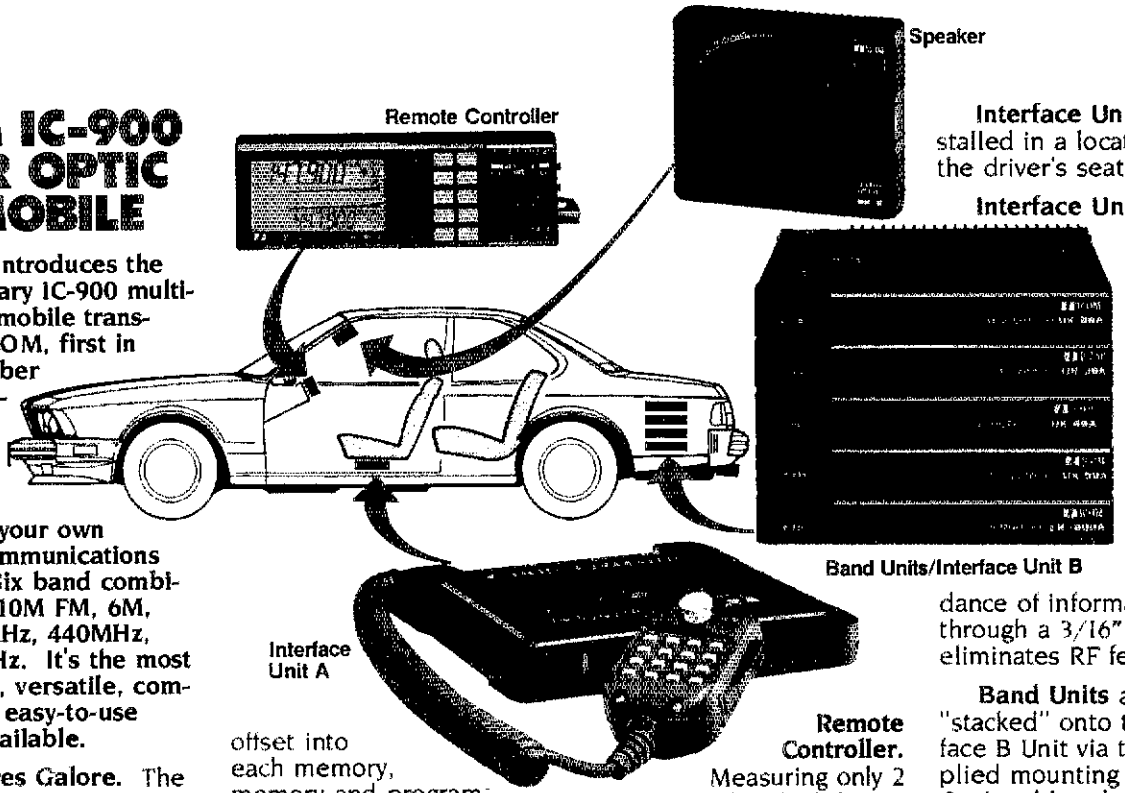
NEW

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 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.

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.

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

ICOM

First in Communications

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3150 Premier Drive, Suite 126, Irving, TX 75063 · 1777 Phoenix Parkway, Suite 201, Atlanta
ICOM CANADA, A Division of ICOM America, Inc., 3071 - #5 Road, Unit 9, Richmond, B.C. V6X 2T

September 1987 *Volume LXXI Number 9*

QST (ISSN: 0033-4812) is published monthly as its official journal by the American Radio Relay League, Newington, CT USA. Official organ of the Canadian Radio Relay League.

Offices
225 Main St, Newington, CT 06111 USA
Telephone: 203-666-1541
Telex: 650215-5052 MCI

Subscription rate: $25 per year postpaid in the US and Possessions and $33 elsewhere. All payments must be in US funds. Foreign remittances should be by international postal or express money order or bank draft negotiable in the US and for an equivalent amount in US funds. Individuals may apply for membership at the rates shown. Canadians apply to CRRL Headquarters, address on page 9. Licensed Amateur Radio operators over 65—$20 US, $26 elsewhere, plus proof of age. Persons age 17 or under may qualify for special rates. Write for application. Membership and *QST* cannot be separated. Fifty percent of dues is allocated to *QST*, the balance for membership. Single copies $3.00.

Second-class postage paid at Hartford, CT and at additional mailing offices. Postmaster: Form 3579 requested.

QST is available to blind and physically handicapped individuals on flexible discs from the Library of Congress, National Library Service for the Blind & Physically Handicapped, Washington, DC 20542.

Indexed by Applied Science and Technology Index, Library of Congress Catalog Card No: 21-9421.

OUR COVER

Toni Zimmer, KN3T/VK9NT, sets up for the CW portion of the ARRL International DX Contest. She and K3NA operated VK9LT on paradisaical Lord Howe Island in the Tasman Sea off New South Wales, Australia. No matter where *you* operated from, you'll want to see how you did in this premiere operating event. Find out in next month's *QST*. *(photo courtesy Eric Scace, K3NA)*

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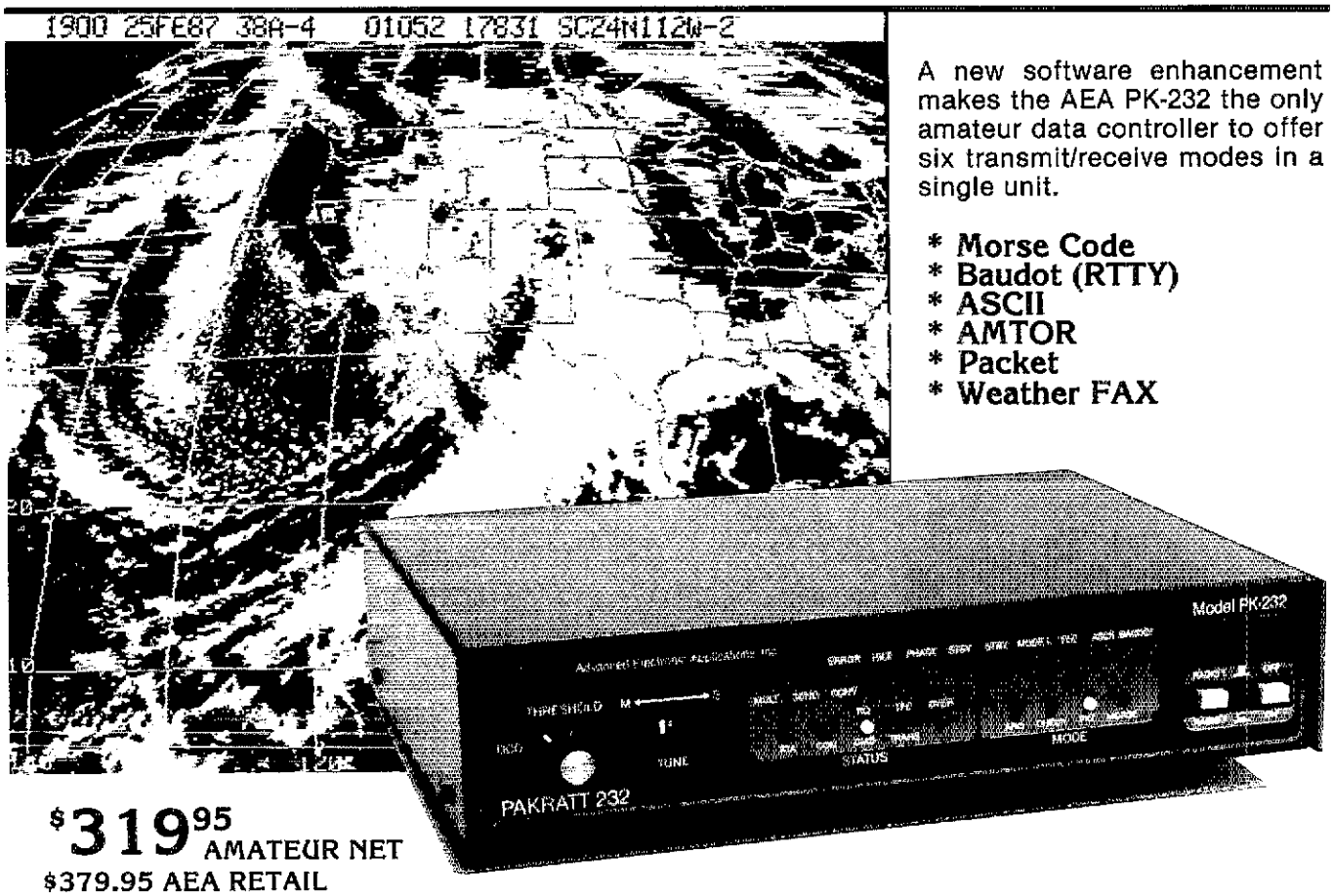
New PK-232 Breakthrough

Six Digital Modes - Including Weather FAX



A new software enhancement makes the AEA PK-232 the only amateur data controller to offer six transmit/receive modes in a single unit.

* **Morse Code**
* **Baudot (RTTY)**
* **ASCII**
* **AMTOR**
* **Packet**
* **Weather FAX**

$319.95 AMATEUR NET
$379.95 AEA RETAIL

Your home computer (or even a simple terminal) can be used for radio data communication in six different modes. Any RS-232 compatible computer or terminal can be connected directly to the PK-232, which interfaces with your transceiver. The only program needed is a simple terminal program, like those used with telephone modems, allowing the computer to be used as a data terminal. All signal processing, protocol, and decoding software is in ROM in the PK-232.

The PK-232 also includes a no compromise VHF/HF/CW modem with an eight pole bandpass filter, four pole discriminator, and 5 pole post detection low pass filter. Experienced HF Packeteers are reporting the PK-232 to have the best Packet modem available.

Operation of the PK-232 is a breeze, with twenty-one front panel indicators for constant status and mode indication. The 240 page manual includes a "quick start" section for easy connection and complete documentation including schematics. Two identical back panel radio ports mean either your VHF or HF radio can be selected with a front panel switch. Other back panel connections include external modem disconnect, FSK and Scope Outputs, CW keying jacks, and RS-232 terminal interface.

The RS-232 connector is also used for attaching any Epson graphics compatible parallel printer for printing Weather Fax. Weather maps and satellite photos, like the one in this ad, can be printed in your shack.

Contact your local AEA dealer today for more information about the one unit that gives you six modes for one low price, the PK-232.

Brings you the Breakthrough

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DX THAT STANDS OUT FROM THE CROWD

A3

10, 15, 20, *40 meters

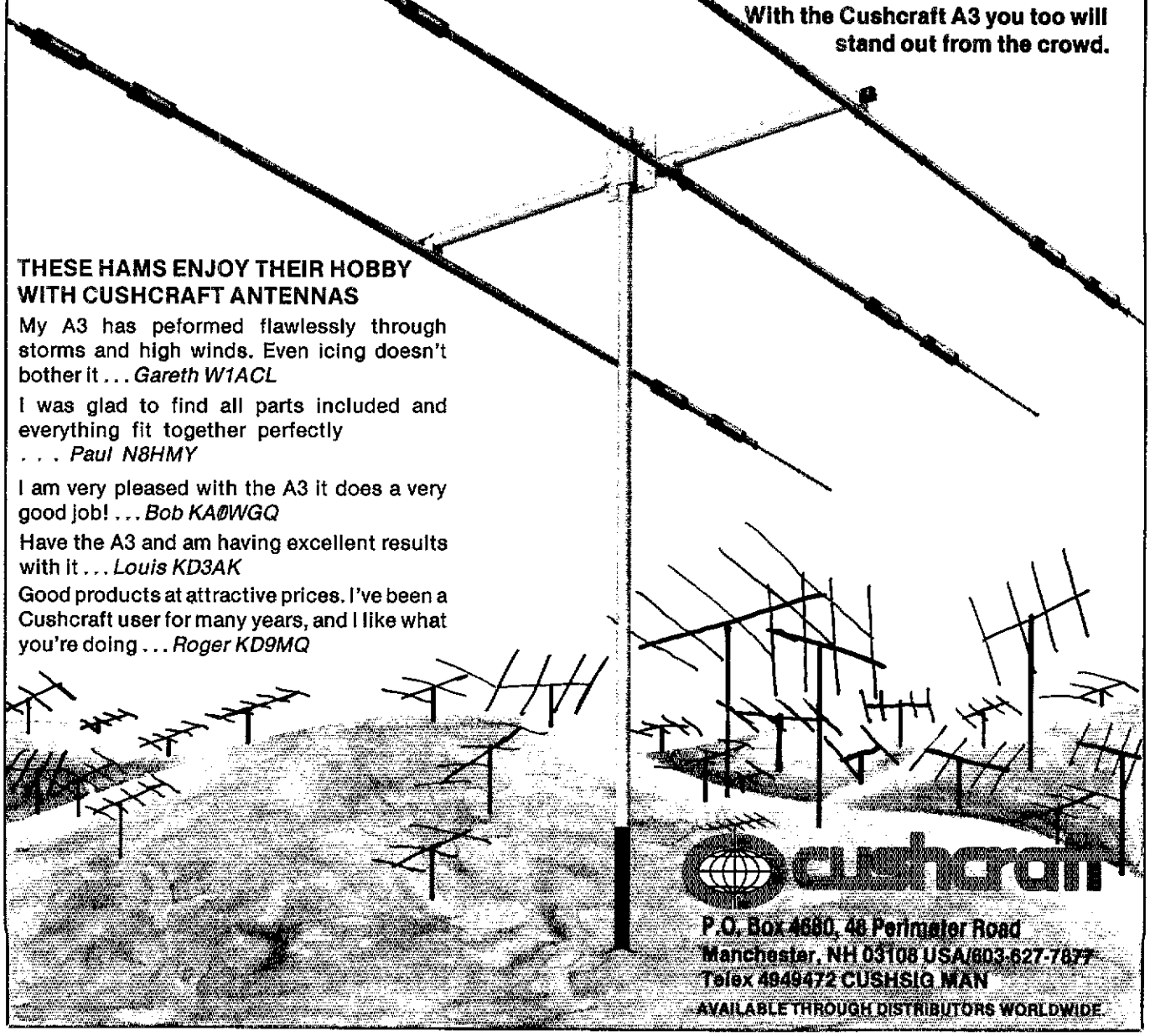
Whether busting pileups, rag chewing or hunting rare DX, the A3 stands out from the crowd with the perfect combination of easy assembly, the right size, rugged durability and great performance.

***40 METERS WITH THE A743 ADD ON KIT, STAINLESS STEEL HARDWARE KIT AVAILABLE**

OUTSTANDING A3 FEATURES

- Typical SWR 1.2:1
- Average Band width 500 KHz
- Power Rating 2,000 Watt PEP
- Boom Length 14ft, Weight 27 lbs
- Longest Element 27ft
- Wind Surface Area 4.36ft
- Turning Radius 15.5ft

With the Cushcraft A3 you too will stand out from the crowd.



THESE HAMS ENJOY THEIR HOBBY WITH CUSHCRAFT ANTENNAS

My A3 has peformed flawlessly through storms and high winds. Even icing doesn't bother it . . . *Gareth W1ACL*

I was glad to find all parts included and everything fit together perfectly . . . *Paul N8HMY*

I am very pleased with the A3 it does a very good job! . . . *Bob KA0WGQ*

Have the A3 and am having excellent results with it . . . *Louis KD3AK*

Good products at attractive prices. I've been a Cushcraft user for many years, and I like what you're doing . . . *Roger KD9MQ*

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AVAILABLE THROUGH DISTRIBUTORS WORLDWIDE.

KENWOOD

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220 MHz TM-321A Coming Soon!

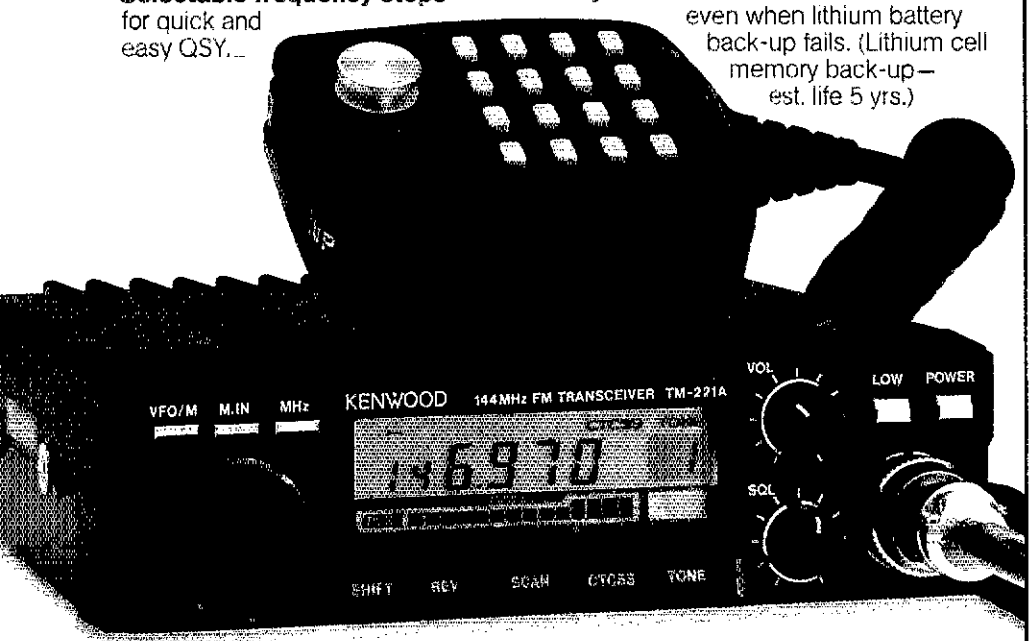
Here's One for You!

TM-221A/321A/421A

2 m and 70 cm FM compact mobile transceivers

The all-new TM-221A, TM-321A and TM-421A FM transceivers represent the "New Generation" in Amateur radio equipment. The superior Kenwood GaAs FET front end receiver; reliable and clean RF amplifier circuits, and new features all add up to an outstanding value for mobile FM stations! The optional RC-10 handset/control unit is an exciting new accessory that will increase your mobile operating enjoyment!

- **TM-221A provides 45 W, TM-321A, 25 W. The TM-421A is the first 35 W 70 cm mobile!** All three models have adjustable 5 W low power.
- **Selectable frequency steps** for quick and easy QSY.
- **TM-221A receives from 138-173.995 MHz. This includes the weather channels!** Transmit range is 144-148 MHz. Modifiable for MARS and CAP operation. (MARS or CAP permit required.) *(Specifications guaranteed for Amateur band use only.)*
- **TM-321A covers 220-224.995 MHz. The TM-421A covers 438-449.995 MHz.**
- **Built-in front panel selection of 38 CTCSS tones.** TSU-5 programmable decoder optional.
- **Simplified front panel controls**—makes operating a snap!
- **16 key DTMF hand mic., mic. hook, mounting bracket, and DC power cable included.**
- **Kenwood non-volatile operating system.** All functions remain intact even when lithium battery back-up fails. (Lithium cell memory back-up—est. life 5 yrs.)
- **Packet radio compatible!**
- **14 full-function memory** channels store frequency, repeater offset, sub-tone frequencies, and repeater reverse information. **Repeater offset on 2 m is automatically selected.** There are **two channels** for "odd split" operation.
- **Programmable band scanning.**
- **Memory scan with memory channel lock-out.**
- **Super compact:** approx. 1-1/2"Hx5-1/2"Wx7"D.
- **New amber LCD display.**
- **Microphone test function on low power.**
- **High quality, top-mounted speaker.**
- **Rugged die-cast chassis and heat sink.**



RC-10 Remote Controller

For TM-221A/321A/421A. 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 two transceivers with the optional PG-4G cable. When both 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, allows TM-221A/TM-421A full duplex operation
- **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)
- **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** Dual band antenna with duplexer (mount not supplied)
- **MB-201** Extra mobile mount

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

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KENWOOD

...a decade ahead in Amateur Radio

#1 Rated HF

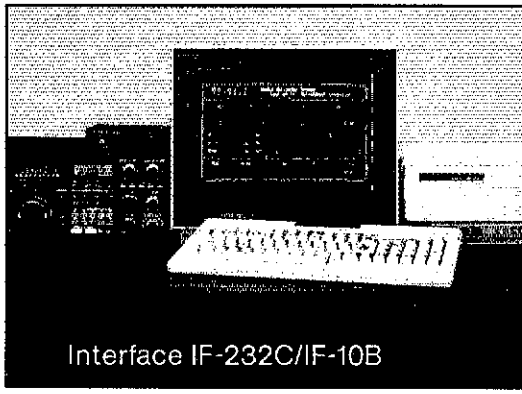
"DX-cellence!"

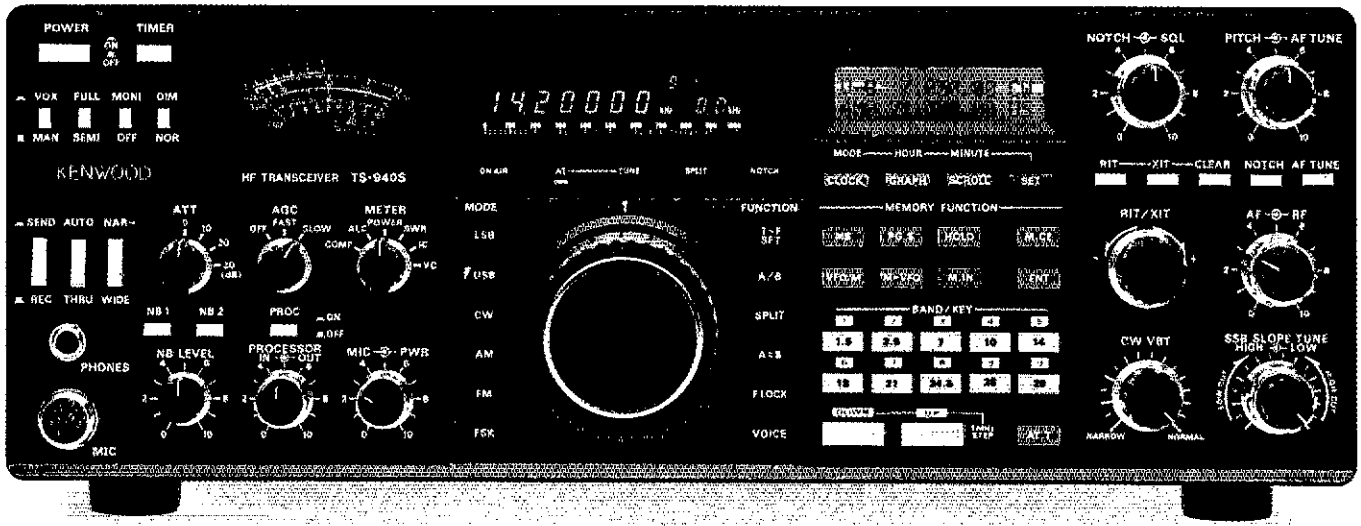
TS-940S

The new TS-940S is a serious radio for the serious operator. Superb interference reduction circuits and high dynamic range receiver combine with superior transmitter design to give you no-nonsense, no compromise performance that gets your signals through! The exclusive multi-function LCD sub display graphically illustrates VBT, SSB slope, and other features.

- **100% duty cycle transmitter.** Super efficient cooling system using special air ducting works with the internal heavy-duty power supply to allow continuous transmission at full power output for periods exceeding one hour.
- **High stability, dual digital VFOs.** An optical encoder and the flywheel VFO knob give the TS-940S a positive tuning "feel."
- **Graphic display of operating features.** Exclusive multi-function LCD sub-display panel shows CW VBT, SSB slope tuning, as well as frequency, time, and AT- 940 antenna tuner status.
- **Low distortion transmitter.** Kenwood's unique transmitter design delivers top "quality Kenwood" sound.
- **Keyboard entry frequency selection.** Operating frequencies may be directly entered into the TS-940S without using the VFO knob.
- **QRM-fighting features.** Remove "rotten QRM" with the SSB slope tuning, CW VBT, notch filter, AF tune, and CW pitch controls.
- **Built-in FM, plus SSB, CW, AM, FSK.**
- **Semi or full break-in (QSK) CW.**
- **40 memory channels.** Mode and frequency may be stored in 4 groups of 10 channels each.
- **Programmable scanning.**
- **General coverage receiver.** Tunes from 150 kHz to 30 MHz.
- **1 yr. limited warranty.** Another Kenwood First!

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 hand 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.





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More TS-940S information is available from authorized Kenwood dealers.

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Ontario — L. P. Thivierge, VE3GT, 34 Bruce St W, Renfrew K7V 3W1 (613-432-5967)
Quebec — Harold Moreau, VE2BP, 80 Principale, St Simon Co, Bagot J0H 1Y0 (514-798-2173)
Saskatchewan — Gordon Kosmenko, VE5GF, 59 Kowalchuk Cres, Regina, S4R 6W7 (306-543-7923)

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Eastern Pennsylvania — Kay C. Craigie, KC3LM, 128 Berkeley Rd, Devon 19333 (215-688-5045)
Maryland-DC — John A. Barolet, KJ3E, PO Box 247, California, MD 20619
Southern New Jersey — Richard Baier, WA2HEB, 1226 Audubon Dr, Toms River 08753 (201-270-9292)
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Indiana — Ronald J. Koczor, K9TUS, 2512 Glenwood Ave, Fort Wayne 46805 (219-483-1365)
Wisconsin — Richard R. Regent, K9GDF, 5003 South 26th St, Milwaukee 53221 (414-282-0312)

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South Dakota — Roland Cory, WØYMB, 1010 7th St, W, Mobridge 57601 (605-845-2400)

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West Texas — Amelia "Milly" Wise, W5OVH, 8516 Mt Scott, El Paso 79904 (915-751-4160)

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 1954. 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 and Canada.

Membership inquiries and general correspondence should be addressed to the administrative headquarters at 225 Main Street, Newington, CT 06111 USA
Telephone: 203-666-1541 Telex: 650215-5052 MCI.
MCI MAIL (electronic mail system) ID: 215-5052

Canadian membership inquiries and correspondence should be directed to CRRL Headquarters, Box 7009, Station E, London, ON N5Y 4J9, tel 519-225-2188.

"It Seems to Us . . ."

Call Signs

If ever there was a subject whose significance was more apparent to radio amateurs than to nonhams, it is call signs. There's an emotional dimension to that set of letters and numerals by which we're identified that is fully understood by very few of our unlicensed brethren.

As it comes out of the FCC computer, even the worst call sign possesses an important trait: It is unique. There are lots of Dave Sumners in the world, but when the FCC tagged KN1ZND on one of them a few years ago, that improbable combination of characters assumed an identity of its own. In those days, when you upgraded from Novice the "N" in the prefix simply dropped out, thus preserving that identity; when the FCC in 1976 opened a window of opportunity for Extras to select a specific one-by-two call, I (and many others) did a lot of soul-searching before taking them up on the offer.

A year later, the FCC closed that window and went to the present system of computer-assigned call signs, where you become eligible (at your option) for progressively more desirable (ie, shorter) call signs as you progress up the licensing ladder. The elimination of any human element from the selection process was quite deliberate on the Commission's part; unfortunately, back in the '70s one of its Gettysburg staffers was convicted for dispensing, in exchange for cash, call signs and licenses to people who weren't eligible for them. Understandably, that stain on an otherwise proud record of service compiled by the Gettysburg office colors the Commission's thinking to this day.

At about the same time, as an economy measure, FCC also proposed to eliminate the licensing of club stations. Mind you, they didn't simply want to stop issuing new club licenses, but renewals as well! This set off a storm of protest from clubs, many of whom had held the same call sign since long before the FCC itself was created. The idea of not renewing existing licenses was dropped, but no new club licenses have since been issued. Military recreation stations, RACES stations and short-term special-events stations fell victim to the same budget-cutting ax. Present club, military recreation and RACES station records aren't even in the Commission's computer data base, but instead are maintained manually on file cards.

The demand for special call signs didn't dissipate just because the Commission stopped issuing them. Recognizing the importance of club and special-events station licenses in particular, in early 1985 the ARRL Board directed that ways be explored of providing assistance to the Commission in the area of call sign issuance. The response we received was that the Commission would indeed be receptive to such assistance, provided that it resulted in a significant reduction in the Commission's workload. One source of that workload was a steady stream of individual requests for specific call signs, many of them submitted via Congressional representatives, which could not and would not be granted by FCC; thus, any special call sign program had to address and reasonably satisfy that demand.

Between then and now, an enormous amount of thought and effort has gone into the subject of how special call sign issuance could be performed in the private (ie, nongovernment) sector. At first blush it may seem to be a simple matter, but in fact it's fraught with complications. Since one and only one person may be assigned a particular call sign, it's not enough that the system be fair; it must also be universally perceived to be fair. There must be an absolute minimum of opportunities for error, and no opportunity at all for favoring members, supporters or friends over others. FCC must retain full responsibility for the licensing of amateur stations and operators, and for the maintenance of data bases used in enforcement. The special call sign system must be self-supporting, through reasonable application fees, but no one should be forced to obtain a call sign other than one granted free of charge by the Commission.

Clearly, from the amateurs' standpoint it would be best if the FCC itself granted special call sign requests, in accordance with policies and procedures developed through rule making and upon payment of a reasonable application fee. For a variety of reasons, that's not going to happen. But a legitimate demand for the service still exists, and there's no reason that demand should not be satisfied if it can be done equitably.

Who, if not the FCC, can do this? ARRL could, as a broad-based, representative, democratic organization with a long record of serving Amateur Radio without regard to profit. And if the FCC authorizes the League to do so, based on our submission in its PRB-3 pleading cycle, we will.

As you read Minute 70 in this month's "Moved and Seconded" you may get the feeling that the Board was very reluctant for the League to get involved. This reluctance stems largely from two factors. First, call sign issuance is a government function, and the League has no aspirations to become a quasi-governmental agency. Second, the more we've studied the issue, the more potential pitfalls we've identified. But as we've come to appreciate the scope of the problem it's also become increasingly clear that if it's to be done in the private sector, the League should do it, for the simple reason that there's no other entity that is accountable to the broad spectrum of amateur licensees.

Whether or not you're a League member, your best guarantee that the responsibility of Special Call Sign Coordinator will be discharged with the sensitivity and impartiality that you have a right to expect will come from the League performing that function.—*David Sumner, K1ZZ*

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UP FRONT in QST

Barry Goldwater
P. O. BOX 1601
SCOTTSDALE, ARIZONA 85252

June 27, 1987

Mr. David Sumner, Executive Vice President
The American Radio Relay League,Inc.
Newington, Connecticut 06111

Dear Dave:

As much as I would love to personally write a letter to every contributor for the Goldwater Scholarship, it's just an impossibility. When one retires from politics, one does not carry with him the benefits of secretaries, writers, and etc. It would be wonderful if there was some way for me, through the pages of QST, to thank those people who have been so generous in contributing to this fund.

I've taken great pride in the awarding of the initial scholarships to some of the finest young people in our Country. Now that I have a little more time on my hands, I'm getting my Rig back on the air, I hope to have a QSO with all of those people, and personally thank them.

73,

Barry

Barry Goldwater

A thank you note from K7UGA. In recognition of former Senator Goldwater's long history of supporting Amateur Radio, it is fitting that the ARRL Foundation-administered Goldwater Scholarship is awarded to applicants studying full-time in a communications-related field. The program is popular with members, too—the endowment fundraising goal of $50,000 has been exceeded by 25%!

This year, more than 30 hopeful hams have applied for the $5000 scholarship. The recipient for the 1987-1988 academic year award will be announced shortly.

Want a Place Up Front in *QST*?

Have a news item, human-interest story or photo you think other amateurs would be interested in? It may be just the ticket for use in Up Front in QST or perhaps as a Stray. Here are some hints to improve your chances of getting that item in print.

1) Be sure the information is timely and of interest to most readers.

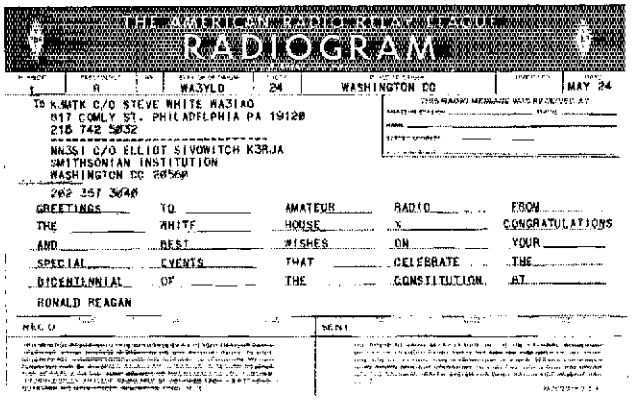
2) Photographs may be color or black and white, but good-quality action photos have the best chance of being used.

3) Send all material to ARRL, Up Front in *QST*, 225 Main St, Newington, CT 06111.

Decisions, Decisions

In July, your elected ARRL officials and many of you rubbed elbows in Atlanta—site of the second 1987 meeting of the ARRL Board of Directors *and* the 1987 ARRL National Convention. Here's an "open book quiz" (with answers in parentheses) that provides an overview of the issues the Board tackled. For the answers, see Moved and Seconded, and the accompanying article, elsewhere in this issue. The Happenings column includes a look at the Convention.

- When will CRRL become autonomous? (Minute 68)
- What action did the Board take regarding PRB-3, Special Call Signs? (Minute 70)
- What's the status of W1AW West? (Minute 77)
- What changes does Novice Enhancement bring to the ARRL Field Organization? (Minute 24)
- Where will the ARRL Diamond Jubilee 75th Anniversary Convention be held? (Minute 65)
- Who were the 1986 winners of the ARRL International Humanitarian Award, the Technical Excellence Award and the Hiram Percy Maxim Memorial Award? (Minutes 25, 26 and 28)
- What or who is ANERCOM? (Minute 36)
- What's the status of the ARRL Visitors' Center? (Minute 72)
- What will the first 10 qualifiers for 6-meter and 2-meter DXCC receive? (Minute 89)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GREETINGS	TO	AMATEUR	RADIO	FROM
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BICENTENNIAL	OF	THE	CONSTITUTION	AT

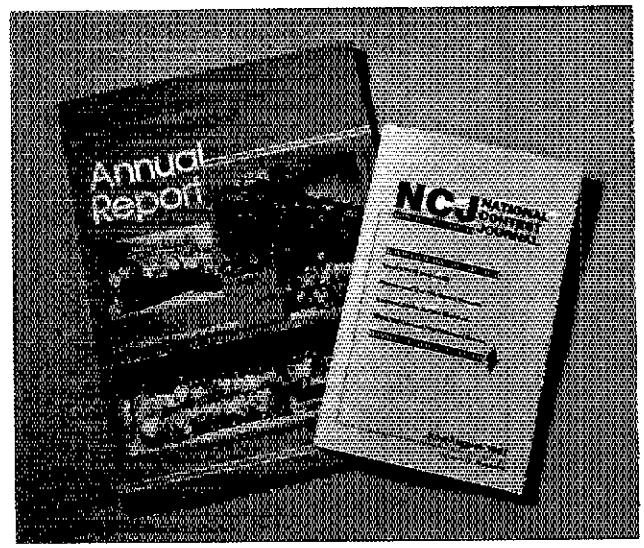
RONALD REAGAN

Thank you, Mr President: Amateur Radio's celebration of the Constitution Bicentennial received presidential best wishes for its official kickoff on May 25. This month's lead article on page 14 details on how *you* can participate in the upcoming special events.

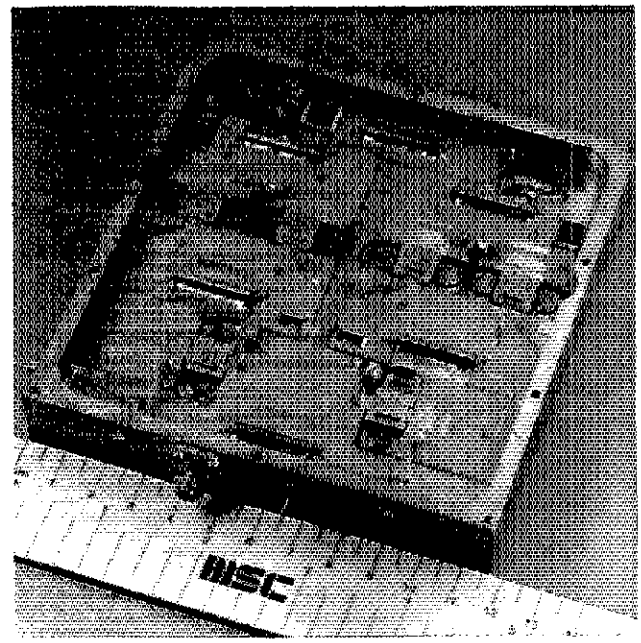
IARU Meeting Covers Upcoming WARC, Other Issues

Although we're in a different region, many agenda items from the recent IARU Region 1 Conference in The Netherlands—including preparations for the next World Administrative Radio Conference—are of interest to hams in North America as well. Details begin on page 47.

Is your emergency-preparedness group SET in its way?: In the 1986 Simulated Emergency Test, the Orange County (Florida) ARES/RACES provided emergency communications for the county Civil Emergency Department, the Fire and Rescue Divison and the American Red Cross during the controlled burning of an old hotel. How does *your* group measure up when the heat is on? Make a special note on your calendar for the weekend of October 17-18, the official weekend of the 1987 SET. Challenge your group's strengths and shortcomings in emergency organization and traffic-handling skills. For more information on SET, check this month's Public Service column. *(WD4FAB photo)*



One-stop information sources: Interested in how your membership dues were spent last year? Can't get enough of contesting? Read all about it in these new publications. You can get a copy of the 1986 *ARRL Annual Report* from HQ for $1 to cover postage and handling. In it you'll find reports from ARRL Officers, the Board of Directors and the HQ staff, as well as detailed financial statements. The *National Contest Journal* provides a surfeit of scores, tips, opinions, profiles and rules. *NCJ's* circulation is handled by ARRL HQ, 6 bimonthly issues for $10 in the US, $11 in Canada and Mexico, $12 elsewhere. Editorial correspondence, articles or club newsletters go to editor Randy Thompson, K5ZD, PO Box 11439, Pittsburgh, PA 15238.



Jersey Bounce: A group of New Jersey amateurs recently used this unusual solid-state power amplifier to make a half dozen moonbounce contacts on 2304 MHz. Built by Andy Furlong, WA2FGK, and Garth Conover, N2BMP, it runs all of 100 watts output for 100 milliwatts drive! See The New Frontier, this issue.

(continued on page 16)

League Lines

Get your satellite receiver and VCR ready for the world premiere of a new Amateur Radio videotape: *The New World of Amateur Radio.* The one-hour program will be uplinked at 6 PM EDT September 20 on GTE Spacenet 1, Transponder 12H. On most home satellite receivers the show will be on Channel 23. Audio will be stereo/compatible monaural with subcarriers listed on-screen just prior to the start of the show, so tune in early.

The complete program includes a 10-minute introduction, the 28½-minute main presentation entitled *The New World of Amateur Radio,* followed by some related material. Presented in a fast-paced TV magazine format, the show portrays the excitement and person-to-person contact that only ham radio can provide. The ARRL, which helped produce the show, expects it to be an outstanding recruitment tool.

The League produced the videotape with additional financial support from Kenwood, ICOM and Yaesu. It was put together under the guiding hand of Roy Neal, K6DUE, the former NBC News Science Editor who is best known for his coverage of the space program. Frosty Oden, N6ENV, served as Producer and Editor, while Bill Pasternak, WA6ITF, was Associate Producer and Technical Supervisor. Principal cameraman was George Barker, NA1F.

ARRL is encouraging extensive use of the video to introduce ham radio to groups of all ages and backgrounds. It is available on the September 20 satellite feed and on a free-loan basis to all ARRL-affiliated clubs and other interested organizations. Copies of the 28½-minute video may be ordered by individuals and organizations for their own use for $20 prepaid from ARRL, Box NW, 225 Main St, Newington, CT 06111.

The ARRL Board of Directors met in Atlanta just prior to the National Convention July 9-10 and voted to undertake the issuance of special call signs under certain conditions if the FCC decides to delegate this function as proposed in PRB-3. The Board also voted to raise funds for the complete refurbishing of W1AW and for a possible new ARRL bulletin/code practice station to serve the West Coast, Alaska and the Pacific areas. The ARRL Humanitarian award was conferred on Father Moran, 9N1MM, and Scott Young, N9FZS, was selected to receive the 1986 Hiram Percy Maxim Award. Complete minutes of the Board meeting begin on page 52.

A special enrollment period is currently in progress until November 1 for the ARRL "All Risk" Ham Radio Equipment Insurance Program. All members may enroll with guaranteed acceptance. For further information on this program, see this month's Happenings column.

The FCC has approved special numerals for preregistered club stations in state capitals and, possibly, other locations to be approved by the FCC, to honor the Bicentennial of the US Constitution. ***The FCC also granted the ARRL's request for special temporary authority*** (STA), which permits approximately 50 amateur packet stations to conduct unattended automatic operation while transmitting third-party traffic below 50 MHz. See the article beginning on page 14 and Happenings, this issue.

Effective July 29, Canadian amateurs are allowed to operate on the 18.068 to 18.168 MHz and 24.89 to 24.99 MHz bands. US amateurs are reminded that the 18-MHz band has not yet been authorized to them. US amateurs were authorized operation on 24 MHz in 1985.

The 1987 BSA Jamboree-On-The-Air, sponsored by the World Scout Bureau, will take place on October 17-18. This lively yearly event gives you the opportunity to bring local Boy Scouts into your shack for the experience of working fellow Scouts and amateurs, worldwide. Plan to join the fun! Full details on the JOTA will appear in next month's *QST.*

The ***Amateur Satellite Communications column*** will resume its normal schedule next month.

Are you a bright, hard-working ham with a writing/editing background and supervisory skills? The Production/Editorial Department at HQ is looking for a person with these attributes for the position of **Editorial Supervisor.** Starting salary $18,954-22,750. ***Contact the Assistant Managing Editor at HQ*** for more information on this challenging position.

HQ has an opening for the position of ***Deputy Advertising Manager.*** This full-time employee will be responsible for assisting the Advertising Manager in making telephone and written contacts with advertisers and prospects on a daily basis. The Deputy Advertising Manager edits classified advertising and supervises the preparation of advertising layouts for *QST* and other ARRL publications. The successful candidate will have an undergraduate degree or equivalent experience in advertising, marketing or related fields. An amateur license, Technician class or above, is needed. A basic understanding of advertising techniques and production methods is desirable. A demonstrated ability to organize own work and schedules with limited supervision is necessary. This exciting position reports directly to the Advertising Manager. Starting salary range: $18,954-22,750. For more information, contact Bruce O. Williams, WA6IVC, at HQ.

An opening exists in the Technical Department at HQ for an ***Assistant Technical Editor.*** We are looking for a licensed (and experienced) amateur with a Bachelor's degree in science or engineering, or equivalent experience. The successful candidate for this job must have a good grasp of electronic fundamentals, be able to do library research and be able to write effectively. The ideal candidate would have experience in preparing material for publication, in operating personal computers and in speaking before groups of people. Starting salary range is $22,334 to 26,806. Contact Chuck Hutchinson, K8CH, at HQ.

Amateur Radio Celebrates the Bicentennial of the United States Constitution ☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆

Club "200" call signs, "We the People" WAS and radiograms to the Bicentennial Commission all make up Amateur Radio's commemoration of the US Constitution's Bicentennial.

By John F. Lindholm, W1XX
Manager, ARRL Membership
Communications Services

Two centuries ago, in May 1787, representatives from the American states convened in Philadelphia to bring unity and order to their newly created nation. Four months later, on September 17, a new national Constitution was approved by the delegates. The convention adjourned.

Two-hundred years later, the United States celebrates the oldest written instrument of national government in the world, the cornerstone of American democracy. The celebration will continue into 1988, in remembrance of the tortuous ratification process by each of the individual states.

Amateur Radio Participates

In accordance with a resolution adopted by its Board of Directors, ARRL filed Amateur Radio's proposal for participation with the Commission on the Bicentennial of the United States Constitution. This official body is chartered under Public Law 98-101 and chaired by the Honorable Warren E. Burger, Chief Justice of the United States, 1969-1986. The comprehensive "People to People" Amateur Radio program has now been officially recognized by the Commission. Thus, the official "We the People" logo can be used in conjunction with Amateur Radio activities.

Bicentennial celebration festivities are presently underway throughout the land—by states, local communities, private corporations and civic and fraternal organizations. Amateur Radio has a unique reason to join in the celebration. As taken from the now-approved application for official recognition: "Amateurs realize that the Constitution's 'Commerce Clause' makes it possible to have one unified set of rules and standards for radio amateurs throughout the nation. Its First Amendment makes possible the free use of Amateur Radio's unique characteristic, the ability of the common man to communicate with another human anywhere on the globe without Governmental permission or commercial tribute."

Amateur Radio's Bicentennial participation actually began on May 25 with special-event stations in Philadelphia (K3MTK) and Washington DC (NN3SI/W3DOS). This commemorated the start of the Constitutional Convention in 1787. This operation was highlighted by transmitting via Amateur Radio a message from President Ronald Reagan to the Amateur Radio community. These special-event stations were again active on Independence Day and are slated for further duty on September 17, marking the acceptance of the Constitution by the assembled delegates.

Also already in effect is the transmission of the Constitution text for code practice by ARRL Maxim Memorial Station, W1AW—an on-the-air civics lesson.

Bicentennial Club Call Signs

Two centuries after the Constitutional Convention adjourned in unanimous agreement, Amateur Radio participation in the Bicentennial celebration begins.

Acting on a request from ARRL, the FCC has authorized use of special Bicentennial call signs for use by preregistered club stations in state capitals, along with other places if approved by the FCC. Each state is assigned a one-week period for special-event participation, using the number "200" in the call sign in place of the usual number. The special FCC authorization requires preregistration of clubs to facilitate identification of stations by FCC monitoring stations. ARRL has volunteered (and the FCC has accepted) to conduct the registration and make the data base of participants available to FCC monitoring stations.

For example, during Connecticut's designated week of January 9-15, 1988, club station W1AW once it has registered with ARRL, may sign W2ØØAW. Only "in-district" call signs may participate, ie, a W6 living in Maine may not use the 200 club call sign during the designated week from the state of Maine. Of course, any club member may authorize use of his call by his club. More than one club may participate within each state, but all must be within the state capital, or in one of the other FCC-approved locations. Check with ARRL HQ for the complete list of approved cities and towns.

The designated week (see Fig 1) has been chosen to coincide as closely as possible with that state's entry date into the Union (or in the case of the 13 original states, the date of ratification of the Constitution). (Actually, for 34 states the designated week embraces the date of entry into the Union; because of duplication, other dates correspond as closely as possible.) Each state's celebration week starts at 0001 UTC Saturday and ends at 2359 UTC Friday of the designated week. Where more than one state is listed, they are in the same call district, thus preventing any mixup in proper call sign identification. Thus, the "normal" call sign can always be deciphered from the Bicentennial call sign. (Alaska coincides with Georgia, but its distinctive prefix makes it distinguishable.)

Clubs, especially those located in state capitals, are encouraged to make these stations high-visibility media events. To maximize Amateur Radio exposure to the public, coordination with local and state Bicentennial Commissions is urged. Gaining good public relations for Amateur Radio is the goal. Clubs should be in close contact

1987		Entry #
DECEMBER		
5-11	DE	01
12-18	PA	02
19-25	NJ	03
26-Jan 1	UT	45
1988		
JANUARY		
2-8	GA	04
	AK	49
9-15	CT	05
16-22	NM	47
23-29	MI	26
30-Feb 5	KS	34
FEBRUARY		
6-12	MA	06
13-19	AZ	48
	OR	33
20-26	NE	37
27-Mar 4	OH	17
MARCH		
5-11	FL	27
12-18	VT	14
	ME	23
26-Apr 1	DC	

		Entry #
APRIL		
23-29	MD	07
30-May 6	LA	18
MAY		
7-13	MN	32
14-20	WI	30
21-27	RI	13
28-Jun 3	SC	08
	KY	15
	TN	16
JUNE		
4-10	NH	09
11-17	AR	25
18-24	WV	35
25-Jul 1	VA	10
JULY		
2-8	ID	43
9-15	WY	44
23-29	NY	11
30-Aug 5	CO	38
AUGUST		
6-12	MO	24
20-26	HI	50

		Entry #
SEPTEMBER		
3-9	CA	31
OCTOBER		
22-28	NV	36
29-Nov 4	ND	39
	SD	40
NOVEMBER		
5-11	MT	41
	WA	42
12-18	OK	46
19-25	NC	12
DECEMBER		
3-9	IN	19
	IL	21
10-16	AL	22
17-23	IA	29
24-30	MS	20
	TX	28

Fig 1—In-district call signs only may replace the numeral in the call sign with the numeral "200." Available to registered clubs only. Each state has one week starting at 0001 UTC Saturday and ending at 2359 UTC Friday of the designated week. Where there is more than one state scheduled for the same week, they are in the same call district. Thus, the normal call sign can always be deciphered from the Bicentennial call sign. Alaska coincides with Georgia, but its distinctive prefix makes it identifiable. "200" call signs (as well as standard call signs) may be used for credit for the Bicentennial "We the People" WAS; however, a special endorsement is available for working all 50 states with "200" call signs (see Rules). The designated week embraces the date of entry into the Union where possible. Write ARRL HQ for a club registration package.

THE AMERICAN RADIO RELAY LEAGUE

RADIOGRAM

VIA AMATEUR RADIO

NUMBER	PRECEDENCE	HX	STATION OF ORIGIN	CHECK	PLACE OF ORIGIN	TIME FILED	DATE
1	R		W8AL	ARLB	CANTON OH		MAR 1 88

TO

WARREN E BURGER
CHAIRMAN OF THE COMMISSION ON THE
BICENTENNIAL OF THE US CONSTITUTION
WASHINGTON DC

THIS RADIO MESSAGE WAS RECEIVED AT
AMATEUR STATION _____ PHONE _____
NAME _____
STREET ADDRESS _____
CITY AND STATE _____

TELEPHONE NUMBER

ARL	TWO	HUNDRED	210	CANTON
AMATEUR	RADIO	CLUB		

MYRON KOYLE, N8OHT, PRESIDENT CARC

REC'D FROM _____ DATE _____ TIME _____

SENT TO _____ DATE _____ TIME _____

THIS MESSAGE WAS HANDLED FREE OF CHARGE BY A LICENSED AMATEUR RADIO OPERATOR WHOSE ADDRESS IS SHOWN IN THE BOX AT RIGHT ABOVE. AS SUCH MESSAGES ARE HANDLED SOLELY FOR THE PLEASURE OF OPERATING, NO COMPENSATION CAN BE ACCEPTED BY A "HAM" OPERATOR. A RETURN MESSAGE MAY BE FILED WITH THE "HAM" DELIVERING THIS MESSAGE TO YOU. FURTHER INFORMATION ON AMATEUR RADIO MAY BE OBTAINED FROM A.R.R.L. HEADQUARTERS 225 MAIN STREET, NEWINGTON CONN 06111

THE AMERICAN RADIO RELAY LEAGUE INC. IS THE NATIONAL MEMBERSHIP SOCIETY OF LICENSED RADIO AMATEURS AND THE PUBLISHER OF QST MAGAZINE. ONE OF ITS FUNCTIONS IS PROMOTION OF PUBLIC SERVICE COMMUNICATIONS AMONG AMATEUR OPERATORS TO THAT END THE LEAGUE HAS ORGANIZED THE NATIONAL TRAFFIC SYSTEM FOR DAILY NATIONWIDE MESSAGE HANDLING

PRINTED IN U.S.A.

Fig 2—Each club is encouraged to send a "ratification" radiogram to the Bicentennial Commission as per this sample. ARL 200 means: "The___ members of the_____ have read and 'ratified' the US Constitution as a part of Amateur Radio's participation in the Bicentennial Celebration. Best wishes." The blanks should be filled in with the number of club members and the name of the club.

with their ARRL Affiliated Club Coordinator and State Government Liaison (through their Section Manager, p 8 of *QST*) to coordinate activities with other clubs.

"We the People" WAS

One-time awards such as the ARRL Golden Jubilee of DXCC have proven to be very popular. This is the Bicentennial equivalent—"We the People" WAS with its simplicity of rules modeled after the highly successful Golden Jubilee.

"We the People" is the theme of the entire Bicentennial celebration, so it headlines the special Bicentennial WAS offered for working all states during the celebration period. Here are the specific rules.

Rules

1) The Bicentennial period to qualify for the "We the People" Worked All States is from 0001 UTC September 17, 1987 through 2359 UTC December 31, 1988. All contacts must be made during this period.

2) The "We the People" WAS is awarded for working all 50 of the United States. Certificates are dated, but not numbered.

3) Contacts may consist of any combination of bands /modes (no 10 MHz).

4) No endorsements are offered, with two exceptions: (1) a special "Heard All States" endorsement is offered to nonlicensed shortwave listeners (SWLs); (2) a "200" endorsement will be provided after December 31, 1988 to those who have additionally succeeded in working special Bicentennial club "200" call signs from all states. This endorsement will be provided after the original certificate has been issued. Details on how to apply will be provided at a later date.

5) The applicant certifies on the official application the authenticity of log extract information for contact with all 50 states. *No QSL cards are required.*

6) The "We the People" WAS is separate and distinct from the traditional WAS Awards program. Qualifying for the "We the People" WAS certificate does not provide any credit for the traditional WAS award.

7) The "We the People" WAS certificate is available to ARRL members and nonmembers alike.

8) Applicable rules of the WAS program, such as fair play and good sportsmanship, apply to the "We the People" WAS award.

9) The official application form must be used to facilitate processing. Application forms are available for a self-addressed envelope with one unit of First Class postage (for US), or self-addressed envelope from overseas. Send requests to:

"We the People" WAS Application
American Radio Relay League
225 Main Street
Newington, CT 06111 USA

10) Send completed applications (within one year of the close of the Amateur Radio Bicentennial period) to ARRL HQ with $5

US, to cover cost of printing, postage and handling. In the case of non-US amateurs, 12 IRCs may be sent.

Club Ratification

To foster greater citizen awareness of the Constitution, clubs are encouraged to make pocket-sized editions of this historic document available to club members. Clubs may wish to build a program around a reading of the Constitution, followed by a radiogram message signifying that club members have read and "ratified" the Constitution.

Up to 50 pocket-sized editions of the Constitution are available free to clubs by mailing your orders to:

Commission on the Bicentennial
of the US Constitution
736 Jackson Place, NW
Washington, DC 20503
telephone 202-USA-1787

The club may use special ARL message number 200 in sending their radiogram. See Fig 2. Messages should be routed via the National Traffic System to the Bicentennial Commission in Washington, DC anytime up to December 31, 1988. Clubs may wish to correlate this with their designated week for signing "200" call signs. Stations in the Washington, DC area have been alerted for delivery of these Bicentennial Commission-bound messages. A suitable ceremony will be organized to recognize delivery of these messages.

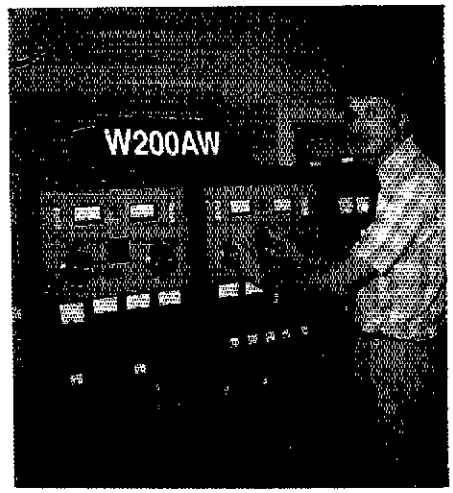


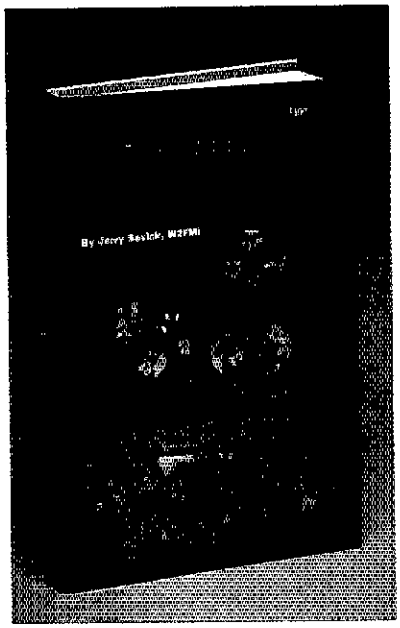
Fig 3—W1AW station operator Jeff Bauer, WA1MBK, is already looking ahead to January 1988 when the registered Headquarters Operator's Club will sign W200AW on the air for a one-week period—if Newington gains FCC approval.

Though participation is not limited to ARRL affiliated clubs, ARRL clubs have already been mailed a package of details on how to participate. Any club wishing to register should send a large SASE with 3 units of First Class postage to ARRL Bicentennial Club Program, 225 Main St, Newington, CT 06111.

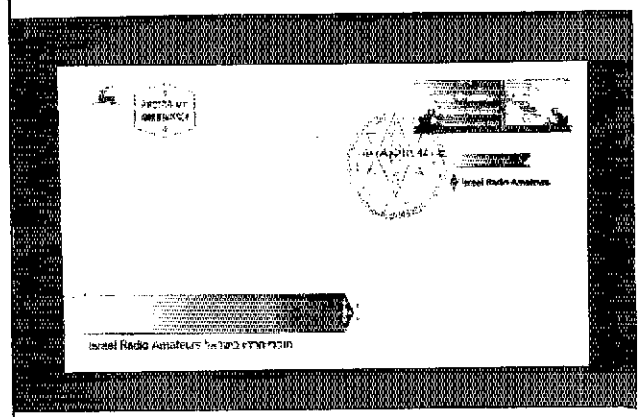
All of these fun activities offer a visible on-the-air display of affection that amateurs in the United States hold for their Constitution. It provides a beacon worldwide to the personal freedoms we enjoy, an opportunity for us to "secure the Blessings of Liberty to ourselves and our Posterity."

UP FRONT in QST

(continued from page 12)



We're all wound-up about this book: At last, a book crackling with electric tension, taking readers through the highs and lows of frequency characterization and impedance applications. For practical design information, the first edition of *Transmission Line Transformers* by Dr Jerry Sevick, W2FMI, contains 128 pages of in-depth information for the theorist and equipment builder. It's available now at your local dealer or via the ARRL Bookshelf order form on page 168.

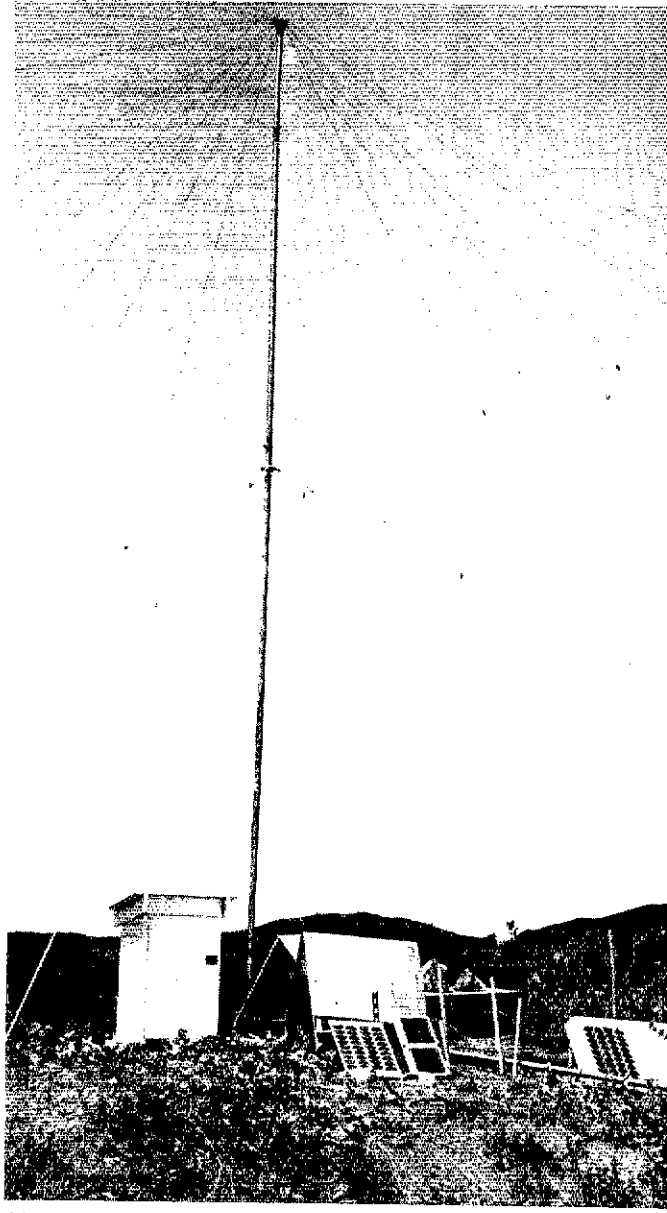


Attention, philatelists: Another ham radio stamp is available. On June 14, Israel issued a special postage stamp in honor of the radio amateurs of 4X-land. Supplies are limited. For more information, contact Israel Amateur Radio Club, PO Box 4099, Tel-Aviv 61040, Israel.

Alternative Energy—An Overview of Options and Requirements

Part 1: Planning on operating far from the power grid? You *can* have the electrical energy you need when you need it, but it takes a systems approach. Here's a look at how to pull energy from sun, water and wind.

By Michael Mideke, WB6EER
Box 123
San Simeon, CA 93452



Miles from commercial electric energy, Mike Mideke's experimental 1750-meter beacon has chugged along on solar power since 1984. The antenna is an 18-foot vertical. *(photos by WB6EER)*

Radio amateurs have always found many reasons to operate beyond the power lines. Field Day, DXpeditions, mountaintopping for the sheer fun of it, emergency work from disaster sites where power is out, and from wildfires in places where power lines have never run —all of these situations call for portable and more or less independent energy resources. Some amateurs find themselves spending long periods in locations far beyond the reach of commercial energy distribution. Others need to operate repeaters or remote equipment in places where commercial energy is either unavailable or unreliable. Still others find themselves caught up in the challenge of developing their own energy resources although they have perfectly good ac available in their wall sockets.

I suspect that the term "alternative energy" evokes quite a variety of responses and definitions in the minds of *QST* readers, so before moving into the subject proper, I'll discuss my personal definition of the term and where I stand in relation to this exciting field.

In my opinion, energy alternatives are those that provide electrical or other energy in some fashion not directly connected to commercial generation and distribution networks. If you buy a gasoline-powered generator and fuel to operate a Field Day rig, I think it is stretching things a bit to say that you're using alternative energy. If, however, you modify the generator to operate on methane, alcohol or wood, and then proceed to produce the fuel before going on the air, *then* you're on alternative power!

A combination of random circumstances moved me beyond the reach of power and telephone lines in 1969. Somehow, I have never gotten back to "civilization," except as a visitor. An addiction to personal comfort, late night reading and a variety of technical hobbies all combined to motivate my alternative energy efforts, so I now find myself operating on a mixture of solar, hydroelectric and internal-combustion-derived electricity. My commercial energy source is a 2.5-kW Onan power plant attached to a 250-gallon propane tank. The tank is topped off once a year. This generator sees limited duty, operating a washing machine once a week, a 16-mm movie projector on rare occasions, and power tools once in a while, as needed.

The combined solar and hydroelectric operations provide power for lights, amateur and experimental radio stations, soldering irons, an electric typewriter and other apparatus. The economics of our situation dictate a piecemeal approach, with maximum emphasis on scrounging, salvage and modification of available devices. My family and I know we'll find plenty of uses for all the energy we can afford to produce or store. At the same time, however, we organize our activities around whatever energy happens to be available at any given moment. Present solar capacity at the homesite is 90 W peak. Maximum hydroelectric capacity is around 300 W. Full hydroelectric potential is generally available from December through

May, while solar input is best from May through August. Some conservation measures are generally required from September through mid-November.

Are we self-sufficient? By no means! Full energy self-sufficiency is not a realistic concept as applied to alternative energy users. No matter how we generate and store electricity, we are *ultimately* dependent upon energy-intensive technologies to provide our essential hardware. Nor does alternative energy mean free energy. In most cases, cost per watt-hour (Wh) is substantially higher than commercial power. The exceptions are efficient systems that can operate for a long time (decades) at minimal cost above the initial installation expenses.

The effort necessary to achieve any degree of energy self-sufficiency almost inevitably leads to some realization of how much power a person or family really *needs* in order to live comfortably: generally, quite a bit less than the average user of "cheap" commercial power consumes. Thus, even in the short term, a small quantity of expensive power may be just as satisfactory as a lot of cheap power: Wise use of a scarce resource can be as effective as luxurious use of an abundant resource.

Achieving energy self-sufficiency engenders an awareness of the degree to which the global population is becoming ever more dependent upon the electrical power network. This potent but fragile network is, to a distressing degree, taken for granted by its users. When we build our own power systems, we come to better appreciate both our needs for electrical energy and the awesome scope and complexity of the commercial systems that are a cornerstone of modern civilization.

Short- or Long-Term Energy Needs?

If alternative energy signifies independence from the mains, *how long* must that independence be maintained? Will an alternative energy system serve only during emergencies and self-initiated portable/mobile stints, or will it be part of your way of life—perhaps permanently?

With NiCd battery packs and chargers available almost everywhere, much portable Amateur Radio operation can almost be considered an extension of the power lines. Potentially, if not always in fact, portable work goes well beyond this simple view. Portable operation, no matter how casual, requires energy storage and management. Such techniques are basic to nearly all alternative energy systems. Secondly, there are many alternatives as to how we charge those batteries. When there is no electricity in the power line or when there is no power line, how do you keep that hand-held transceiver running? Answer: with energy from an alternative source.

The most rigorous applications of alternative energy techniques involve permanent or semipermanent installations that must, for whatever reason, be energy self-sufficient to some degree. Such installations, be they repeaters or small households, must be dependably supplied with energy despite the fact that there can be no expectation of regular reconnection to the mains. For the remainder of this article, we'll be exploring alternative energy systems that can meet these needs. Energy for the short-term needs of portable, mobile and emergency Amateur Radio operation has received ongoing coverage in *QST* and *The ARRL Handbook*. Portable and mobile ham operation *do* have something in common with long-term alternative energy production, however. See the sidebar, "Milking a Herd of Cars."

Milking a Herd of Cars

Many of us have participated in mobile Amateur Radio operation, mainly from vehicles using 12-V electrical systems. Most vehicular electrical systems have sufficient capacity to operate a wide range of solid-state equipment with little or no modification to the power source. Does this mean that the nearest car or truck is an alternative energy source just waiting to be tapped?

Whether we consider vehicles to be a valuable source of alternative energy depends somewhat upon how we look at them. Viewed *as a resource*, motor vehicles are ubiquitous. They have on-board energy production, storage and regulation systems. Viewed purely as an electrical energy source, they are dreadfully *inefficient*. Even so, in certain types of emergencies, motor vehicles may provide the best (or only) short-term source of electricity. Further, the family car can be milked for a fair amount of battery charging, though at some reduction in gas mileage—not a particularly efficient source of energy, but a source nonetheless.

Automotive electrical systems are valuable in alternative energy production for another reason: Their components may be used in *long-term* energy production. Automotive storage batteries (and their relatives) may be the first such components that come to mind, but the list doesn't stop there. In my small hydroelectric installation, I get thousands of hours of service from used alternators purchased cheaply in scrapyards. They don't last forever, but with a typical life of three to four years, the annual cost of one alternator is under $5.

Energy Production

Most small-scale alternative energy schemes likely to be undertaken by radio amateurs involve two distinct processes: production and storage. It's easier to talk about storage if we have something to store, so let's look first at means of producing electricity.

Wherever there is an energy gradient, be it mechanical, chemical or thermal, there is the possibility of producing electricity.

Wherever there is an energy gradient, be it mechanical, chemical or thermal, there is the possibility of producing electricity. Wherever there is motion, kinetic energy may be intercepted and put to work, either directly to drive machinery or indirectly to generate electricity. The classic and most readily exploited energy sources are water and wind. Where electricity is the desired product, the linear movement of water or wind is transformed into a rotary movement suitable for driving generators. This transformation of linear to rotary motion is usually accomplished with a fan-like propeller in the case of wind, and any of a variety of turbines and wheels in the case of water.

Wind and waterpower systems offer an interesting analog to electrical theory. We may extract equal amounts of energy from large volumes moving at low velocity or smaller volumes moving at high velocity —very much as 1 W can be developed with 1 V at 1 A or with 1 kV at 1 mA. In practice, water is more easily manipulated in this way, while wind must be taken as it comes. Still, in areas where winds are light, larger wind turbines may be used to generate the same output produced by smaller generators in windier areas.

Waterpower Systems

Available water pressure—usually the result of water running downhill—is the heart of every hydroelectric energy system. Pressure increases in direct proportion to the height of the water column contained in the supply pipe or *penstock*. The height of the water column is defined as the *head*. Pressure at the bottom of the penstock in lb/in^2 will be approximately half the measure of the head in feet. Friction must be considered as well, because some of the energy in moving water is spent in friction between water and piping. This factor depends on pipe length and diameter, as well as the pipe material and its condition.

Hydroelectric systems can be divided into high- and low-head categories. In high-head systems, energy is extracted from a relatively small volume of water moving at high velocity, while large volumes of slow-moving water are employed in low-head operations. Either approach may be used to produce a few watts or many kilowatts

of power, and the appropriate choice will depend largely on the nature of the available water supply.

Low-head systems entail construction techniques suitable to routing and controlling large volumes of water. If a head of 15 to 20 feet is available, with flow enough to fill an 8-inch (or larger) pipe, turbines and complete generating systems are available that will produce ample electricity to maintain a household, assuming that energy *needs* versus wants have been carefully assessed. Despite the considerable volume of water they entail, low-head systems can be relatively compact because the water source usually need not be far from the generator. Low-head systems based on wooden waterwheels, such as those found at water-powered mills, can be built from basic materials with a minimum of precision work. Although such wheels can deliver substantial power, they do not turn fast enough to drive generators directly, so their speed must be stepped up mechanically. Because the required step-up is usually too extreme to be accomplished efficiently with belt-and-pulley drives, the usual solution is gearing. Automotive gear trains—even whole transmissions—are a common choice for this gearing.

High-head systems require less water for a given output, so they can be applied in areas where water volume is insufficient for low-head generation. A complete high-head installation may require a lot of territory. Much pipe may be needed. Safe and reliable containment of high-pressure water may dictate the use of expensive construction materials. A variety of small turbines, mostly of the Pelton type, are available for high-head systems. Turbine diameter may be as small as four inches for very small systems, with diameters of eight to twelve inches common in 1- to 2-kW applications.

For optimum efficiency, a turbine must be matched to both the volume and velocity of available water. Nonetheless, turbines can deliver useful power over a wide range of pressure and flow, so if you come into possession of an old unit that isn't exactly right for the available situation, it may still be worth using.

Hydroelectric systems may be designed to deliver either low-voltage dc or 117 V (and higher) ac, depending upon the power available and your requirements. Even a tiny hydroelectric potential of 2 or 3 A at low voltage can be useful in battery charging service. Because such a charger can work 24 hours a day, its performance can approach that of a photovoltaic (solar-powered) unit having four times the output capacity.

The construction of any hydroelectric system represents a long-term investment. Careful planning is a must. Attention must be given to the development of an adequate water source, disposal of water discharged from the system and a multitude of mechanical and environmental concerns related to the routing of water. Potential impact on erosion and vegetation patterns should be considered carefully. A good hydroelectric installation should deliver its design capacity for many decades while requiring only a relatively low level of maintenance and post-construction expense. Of the available small-scale alternative energy techniques, only hydroelectric systems offer a continuous supply of electricity with no battery storage requirements.

Fig 1—Hydroelectric power, anyone? Here, the author's 9-inch Pelton turbine (bottom), manufactured circa 1890, drives a modified automotive alternator (upper left) to produce 117 V ac. Pressing the button at the upper right of the meter panel provides dc field current for the alternator at system startup.

In my own system, I use a nine-inch Pelton wheel (manufactured circa 1890) with a 180-foot head delivered via ¼ mile of 2¼-inch pipe. The pipe is installed in six-foot sections, and I'm sure that friction losses are high in this piping because of turbulence at its many joints. Why the short pipe sections? They were brought to the generating site in the 1930s—packed on mules! In the original installation, the nine-inch turbine was used to operate circular and crosscut saws for cutting firewood. At the same time, a considerably smaller turbine charged batteries. Somewhere along the line, the smaller unit vanished. Since we can now take chain saws to the trees instead of dragging whole trees to the saw, the larger turbine is free for use in electricity production. The Pelton wheel drives a modified automotive alternator through a belt and pulleys (see Fig 1). In my

case, the alternator modification is a simple matter of installing wires to bypass the connection of one of its three poles to rectifier diodes so that low-voltage ac is available. This ac is applied to the primary of a 12-to-117-V step-up transformer, providing up to 300 W of ac power for lighting, soldering and small electronic applications. Operating frequency and output voltage in this system depend somewhat on loading—the resulting electricity is definitely *not* a 60-Hz sine wave!—but the energy generated is highly useful nonetheless.

Such a simple system is feasible only because of the limited power available from the turbine. Higher power would call for closer regulation and full utilization of the alternator's three-phase capacity.

At times, I use the waterwheel to charge batteries. To do this, it is necessary only to switch the transformer out of the alternator circuit and connect a battery to the alternator's dc output. In this mode, the alternator functions just as it does in a car except that output is somewhat reduced because of the limited driving power. If I want a trickle charge, I just close the turbine water supply valve until I get the charging current I want!

Wind Power Systems

As with waterpower, the kinetic energy of wind may be tapped by converting its action to a rotary motion suitable for operating generators. Like water, wind can provide large or small amounts of power, depending on need and subject to prevailing conditions. But unlike water supplies, which can be closely regulated for continuous operation, the wind is always somewhat intermittent and highly variable in intensity.

Small-scale wind power generators are generally employed as battery chargers, the stored energy being used directly or after conversion to ac for the operation of 117-V appliances and tools. I have heard that on the coast of Chile, where evening wind is common and fairly constant, extensive use has been made of propeller-driven automotive generators connected directly to low-voltage lamps.

The variable nature of wind and the extremes that will occasionally be encountered at any generation site necessitate mechanical means to prevent self-destruction of generating apparatus during high wind conditions. Such velocity compensation may be accomplished with variable pitch propellers that reduce efficiency as speed rises. Alternatively, tail-vane action may be used to turn the wind turbine off-axis to high winds. Various centrifugally actuated braking devices may be used; these operate aerodynamically or mechanically.

Provision must be made to maintain generation no matter what the wind direction. A tail vane will take care of this. Of course, if the generator is free to rotate as the wind turbine aligns itself with changing wind direction, a slip-ring coupling arrangement must be employed to get electricity out to the load. Voltage regulation is essential in wind systems to prevent overcharging of batteries and damage to low-voltage apparatus.

The preceding comments apply mostly to propeller-driven upright wind turbines common to most windmills. If a wind turbine is built similar to a vertical squirrel-cage fan, only the turbine itself need rotate, because such a turbine responds to winds from any direction. Thus, the generator may be fixed, and no slip rings are required to transmit its output to the load. An added advantage claimed for some squirrel-cage wind turbine designs is that they are self-regulating with respect to speed: Increasing wind velocity increases turbulence around the rotor, effectively limiting its maximum speed.

In the days before rural electrification, many homes on the Great Plains were wind powered. A number of companies produced wind generators and complete power systems. As power lines spread through the countryside, wind power installations were shut down and largely left to deteriorate. During the 1970s, increasing interest in alternative power sources led to the salvage and reconditioning of many such units. Some usable salvage may still be gleaned from such systems, but unless wind equipment has been regularly maintained or carefully stored, extensive restoration is required. Any towers and tower-mounted units that have been neglected for decades are potentially dangerous. Undertake salvage efforts only with the help of properly equipped people experienced in wind-power machinery.

Recently, we've seen significant advances in wind power design; high-efficiency units with long lifetimes are available at a variety of power levels. For the dedicated home builder, much has been published covering wind power at all levels, from the most basic on up. These are too numerous to list here; your library is the best place to begin research. If you possess good workshop skills, study of a cross section of this material should enable you to set about designing and building your own wind power system.

Photovoltaic (Solar) Power Systems

Until recently, practical electrical generation has been either electrochemical (primary cells) or electromechanical (generators). With the development of photovoltaic (PV) technology, we are presented with a third and highly elegant option: the direct conversion of light energy to electricity. Modern PV devices can do this efficiently enough to power a wide range of electrical and electronic devices.

The production of PV materials is an energy-intensive process, but the practical application of PV products is the most straightforward of any alternative energy technique. Aside from switches and relays, PV systems entail no moving parts bigger than electrons and photons. Thus, maintenance requirements are minimal: PV generating panels should be kept reasonably clean because sunlight must be able to reach them, electrical connections must be sound, and batteries must be maintained in good condition.

Electromechanical systems have definite ranges of optimum efficiency. A system designed to serve a maximum load demand may not be "happy" with an average or minimum load. With PV technology, power is available in direct proportion to collector surface area, so system capacity may be easily tailored to specific load requirements by adding or subtracting collectors.

PV collectors are a long-term energy source. Most good-quality solar panels are guaranteed for five to ten years, but the usable lifetime of a panel will ordinarily extend for a considerably longer period, offsetting high initial costs with low maintenance expense and high life expectancy.

At the moment, PV efficiency per unit area appears to be rising faster than cost per unit area. Various long-awaited breakthroughs in manufacturing processes, especially the continuous roll-to-roll production of amorphous silicon alloys, are on the point of bringing the PV industry to a new and highly competitive level. *QST* recently carried a New Product announcement about amorphous silicon panels.[1] Although photovoltaics are an expensive energy source, they are indispensable and cost-effective tools when it comes to powering permanent and semipermanent remote installations such as repeaters, remote bases, beacons and sensors.

For powering isolated households, PV will likely be less cost effective than hydroelectric or wind systems, assuming that those resources are readily available for development. But this is really a complex question. Its answer depends on how much energy you choose to define as "enough," how peak requirements relate to average demand, and so forth.

Modern photovoltaic devices can convert light energy to electricity efficiently enough to power a wide range of electrical and electronic devices.

Often, no single energy source will readily satisfy the full range of load demands, so system combinations become very attractive. For instance, photovoltaic battery-charging capability can work in conjunction with an internal-combustion-engine-powered generator. During peak-

[1]Bruce O. Williams, "Sovonics Amorphous Solar Electric Panels," New Products, *QST*, May 1987, p 20.

Used Solar Cells Deserve a Place in the Sun

Several years ago, I constructed a small (12 V at 30 mA) energy panel from small semicircular solar cell scraps. The panel worked, but it was never really weather tight. Moisture entered during every rain and heavy fog. This condensed on the glass surface of the panel, reducing its output until evaporation cleared the problem. One day, the panel took a fall and its glass cover broke. It lay abandoned and exposed to the weather for about two years until my curiosity led me to bring it home and check its cells. To my surprise, most of them performed quite well. Because a few cells were broken, and some soldered joints were in bad shape, I dismantled the panel, thinking that I might be able to salvage enough cells to charge small 6-V batteries. Before I could begin work on this charger, the PV cells, lying in disarray on a table, were accidentally exposed to the discharge of a Tesla coil. Sparks jumped freely between all of them! This looked like the end of my mini-project—but the cells checked out fine under test. Using them, I built the 6-V panel shown in the photo. For more than a year, it has been delivering 30 mA to my 6-V batteries whenever the sun shines.

I don't recommend trying any of these tortures on your solar cells, but my experiences do show that unlike many semiconductor devices, solar cells *can* survive abuse. Because of this, used solar cells should not be overlooked as a source of cheap energy.

This 6- × 8-inch solar panel delivers 30 mA to a 6-V battery under full sun conditions. The cover is acrylic plastic sheet, the back is plywood and the sealant is silicone rubber. These cells still work even after a rather shocking experience.

sun periods, the PV system maintains battery charge to operate lighting and low-voltage dc devices. At such times, the engine-driven system sees occasional use in running high-powered tools and appliances. When PV output falls because of short daylight hours in winter or extended periods of overcast, the engine system automatically tops off the battery charge. If PV capacity is later increased, the engine generator runs less, extending its life and reducing the fuel bill.

In many respects, photovoltaics are a nearly perfect power source, but there are drawbacks. System cost is extremely high if any attempt is made to satisfy the energy requirements of a typical American household with a PV system. Individual solar panels are light and fragile, although fragility stands to be greatly reduced with amorphous silicon PV collectors. They must be exposed in plain sight, creating a risk of theft and vandalism so great as to make PV installations totally impractical in many situations.

Battery storage is an essential adjunct to PV power systems. Many installations will also require the conversion of stored dc to 117 V ac, usually by means of high-efficiency solid-state inverters. Outlays for energy storage and conversion hardware must also include the cost of suitable housing for the components. This calls for careful planning, which should begin with a realistic assessment of system requirements.

Many people look at the high cost of the solar panels and decide to build their own, either from kits or by using "bargain" cells available from many sources. With care, anyone can solder cells together and house them well enough to provide protection from the immediate effects of the weather—but by the time the materials have been obtained and the hours have been invested in construction, the "bargain" may not seem like such a bargain. The real question is how long such collectors will continue to deliver their initial output—or work at all, for that matter. The answer depends to a large degree upon the materials used and the care exercised in building the panels. Users looking for more than a few watts should be prepared to tackle a large, demanding (and expensive) construction job. Otherwise, purchasing guaranteed, ready-made units is more satisfactory. On the other hand, construction of a small PV panel can provide a good introduction to photovoltaic technology while adding a useful energy source to the shack.

The present generation of solar cells (of crystalline structure, as opposed to amorphous cells) is fragile. The cells are subject to outright breakage and to microscopic cracking, which interrupts conductive paths, reducing and eventually destroying cell capacity. Even so, solar cells can survive long use and even *abuse*, so used PV devices may be worth investigating. (See the sidebar, "Used Solar Cells Deserve a Place in the Sun.") As existing solar panels age and deteriorate, they are replaced by newer PV technology. This means that more and more surplus, defective and broken early-generation solar panels are sure to become available. These may well provide a useful source of materials for persons desiring to build their own panels on a low budget. While construction of a large panel means a major construction effort, small units are relatively quick and easy to build—and if the price is right, it isn't necessary that they last forever. Small PV panels may not be as impressive as a huge solar array on a roof, but their modest milliampere outputs add up to milliampere-hours. A few days of sunshine on such a panel will recharge a battery pack for your hand-held transceiver—allowing you to talk with the energy of recycled photons!

Mike Mideke was first licensed as KN7OGJ in Bellingham, Washington, and upgraded to K7OGJ shortly before graduating from high school. He graduated in 1966 from Antioch College, Yellow Springs, Ohio, with a BA in Art. Mike held W8BWZ in Ohio, but was inactive on the ham bands, devoting all of his time to the study of film-making. He did not renew 'BWZ when it expired.

In 1971, Mike and his wife, Elea, became resident caretakers of 2800 acres of privately owned wilderness surrounded by Los Padres National Forest in California. Because radio communication was essential in such a remote location, Mike and Elea studied hard and received their amateur licenses. (She's WD6DVJ.) Today, they also have two sons, aged 11 and 14.

Mike's early contacts as WB6EER included QSOs with other people dependent on alternative energy. Two of these hams sparked Mike's interest in experimental work at 160-190 kHz. Then, as Mike puts it, "I soon began noticing variations and anomalies in LF propagation, and my fate was sealed."

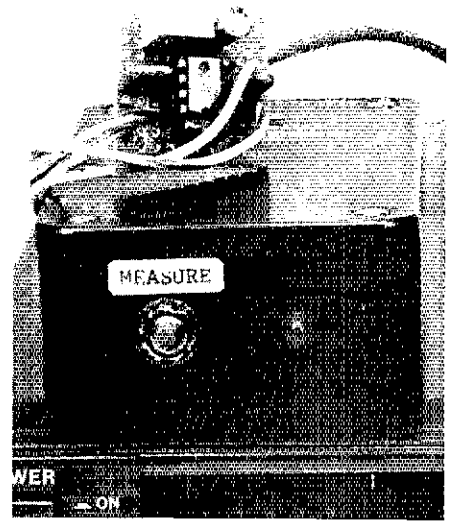
These days, Mike sits at the center of a web of receiving wires totalling over 15,000 feet in length. He has published longwave articles in Popular Communications *and his own 1750-meter newsletter, and is the Propagation Editor for* The Lowdown, *monthly journal of the Longwave Club of America. His ham activity is largely limited to handling occasional wilderness emergencies and coordinating longwave work.*

Mike prefers QRP and CW, and likes to build "all sorts of radio equipment." To him, the best route to understanding technology is through practical experience and experimentation.

A Precise Tuning Indicator for General-Coverage Receivers

Now you can measure CW, RTTY and carrier frequencies down to the 100-Hz resolution of your frequency display.

By Rich Erhardt, KF6CU
2200 Agnew Rd 309
Santa Clara, CA 95054-1052



Even though the digital display on my Kenwood R-2000 general-coverage receiver resolves frequencies to 100 Hz, I wanted an indicator that could show me when I had tuned to the *exact* frequency of an incoming carrier, RTTY or CW signal. I had not installed a CW (270- or 500-Hz) filter in my receiver. The R-2000's SSB filter, my only choice during CW reception, was 2.7 kHz wide. This meant that the pitch of received signals fell anywhere within a 2.7-kHz range, and that the R-2000's S meter peaked just as broadly. It looked like I wouldn't be able to get the most out of my R-2000's 100-Hz-resolution display! What received pitch would make the display read *correctly?* And how could I tune incoming signals at that pitch *every time?*

My solution to this problem is a simple tone decoder. The completed circuit is small enough to mount inside the R-2000, or you can build it as an outboard unit. You can use the circuit to enhance the tuning accuracy of *your* general-coverage receiver, even if it's not an R-2000.[1]

The Circuit

The tuning indicator consists of a 567 phase-locked-loop (PLL) tone decoder (U1 in Fig 1). Components C4, R1 and R2 set the free-running frequency of the 567's voltage-controlled oscillator. U1's output (pin 8) goes low when an incoming audio signal appears at this frequency. The 100-mA sinking capability at pin 8 is used to turn off the R-2000's CW mode-indicator LED (inboard version); you can wire the outboard indicator for LED-normally-on or LED-normally-off operation. (Normally-off operation lengthens battery life.)

The tuning range provided by R2 is roughly 540-1300 Hz. With R2 set for response at 1 kHz, circuit bandwidth is ±2.5% (975-1025 Hz) when used with the R-2000.[2] My R-2000 provides a 1-kHz beat note when WWV is tuned on the nose. Several receivers (ICOM IC-R70 and IC-R71, and Kenwood R-5000, among others) are normally aligned to provide a 700- to 800-Hz pitch for properly tuned CW signals. R2 allows adjustment of the tuning indicator to these pitches.

Audio input amplitude to the 567 should be between 20 and 200 mV. The tuning indicator works well with the signal at the R-2000's RECORD jack (level not measured). [An input voltage divider is necessary to avoid overdriving the indicator with the R-5000—Ed.] The 567 requires between 4.75-9.00 V dc at 6-8 mA. I stole this power from the regulated 5-V line in the R-2000's PLL unit for the inboard indicator; four AAA carbon-zinc cells in series (6 V) provide power in the outboard version. Maximum current drain for the outboard version is just over 22 mA.

Inboard or Outboard?

The 567's input connection also furnishes low-level audio *output* at the VCO free-running frequency—continuously in the inboard tuning indicator, and as long as the MEASURE switch is pressed in the outboard version. This is normal, but because this signal appears at the R-2000 RECORD jack with the inboard indicator installed, it will appear in tape recordings made via this jack. (The record-buffer amplifiers in the R-2000 and the receivers mentioned in Note 1 prevent injection of this signal into the receiver audio chain.) This problem is minimized in the outboard circuit because the 567 operates only while the MEASURE switch is pressed. If you intend to use your R-2000's RECORD jack for taping, or if you own a receiver other than the R-2000, build the *outboard* version of the indicator.

Construction and Hookup

I built my version of the tuning indicator on a 1- × 1-inch piece of perfboard and mounted it inside the R-2000 near the front-panel RECORD audio-output jack. Small-gauge insulated hookup wire connects the indicator to the R-2000 circuitry. Fig 1 shows these interconnections. Use the block diagrams and schematics in your R-2000 instruction manual to find the necessary connection points in the receiver circuitry.

Fig 2 details construction of the outboard indicator, and Fig 3 shows the circuit changes for this version. J2 in Fig 3 duplicates your receiver's RECORD jack, allowing simultaneous connection of a tape recorder and the tuning indicator to the receiver through audio patch cords.

Making It Go

These instructions refer to the inboard version of the tuning indicator, but adjustment of the outboard circuit is the same. (You must press MEASURE for the outboard version to function.) Test the tuning indicator as follows: Put the receiver in the CW mode at its slowest tuning speed, and at its wide CW (SSB) IF bandwidth. Set R2 to midrange. Find a steady carrier and tune slowly through it. At a received pitch of approximately 720 Hz, the R-2000's CW LED should go out. If it does, you've confirmed that the PLL decoder is functioning.

You can use any standard-frequency signal as a tuning reference; we'll use the 10-MHz WWV signal in this discussion.

[1]Notes appear on page 24.

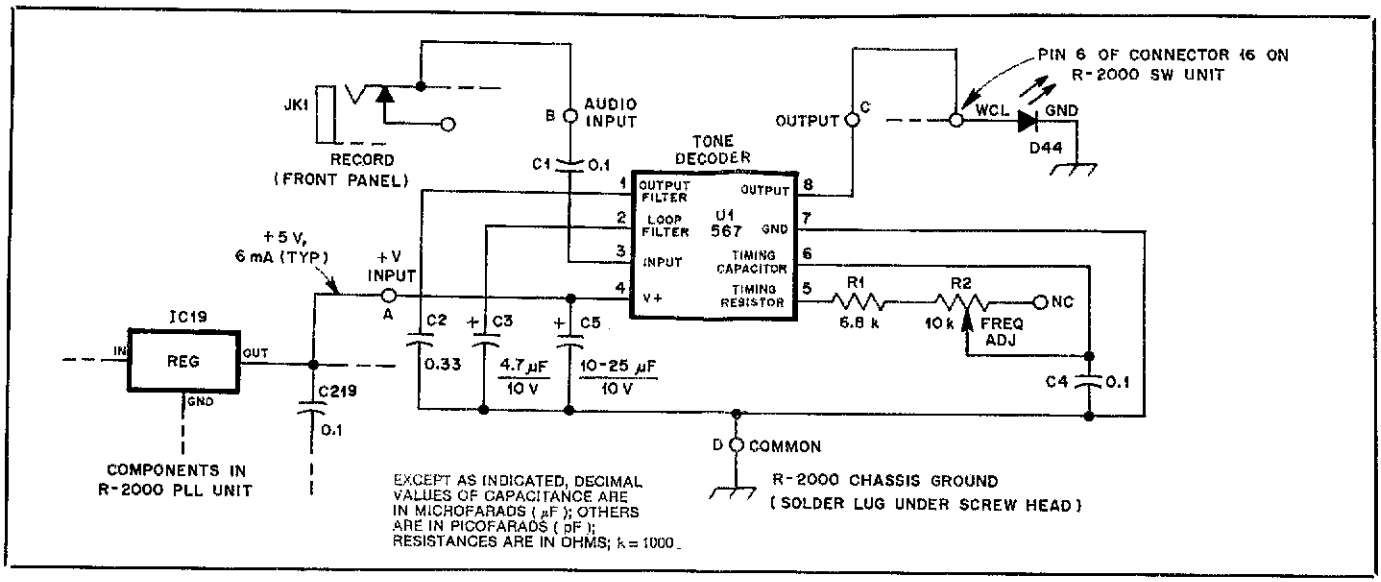


Fig 1—Schematic of the tuning indicator, showing interconnections with the R-2000 circuitry. Component designators IC19, C219, JK1 and D44 are Kenwood designations for R-2000 parts; WCL and GND are wires associated with D44. The tuning indicator may also be built as a self-contained unit; see text and Figs 2 and 3.

C1, C4—0.1-µF, 15-V, 10% tolerance ceramic or plastic film.
C2—0.33-µF, 15-V 10% tolerance ceramic or plastic film.
C4—4.7-µF, 10-V tantalum or aluminum electrolytic.
C5—10- to 25-µF, 10-V tantalum or aluminum electrolytic.
R1—6.8-kΩ, ¼-W, 5% tolerance carbon film.
R2—10-kΩ trimmer potentiometer wired as a variable resistor.
U1—567 PLL tone-decoder IC. LM567, NE567, XR-567 suitable; the LM567 is available as Radio Shack 276-1721.

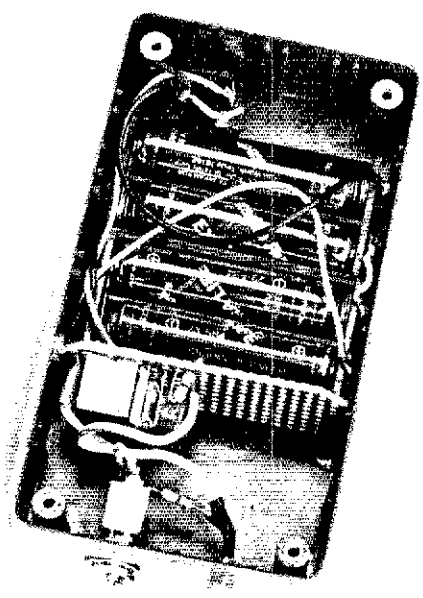


Fig 2—The outboard version of the tuning indicator. Four AAA cells power the circuit, and an audio patch cord connects the indicator to the receiver. The plastic box is a Radio Shack 270-221; the battery holders are RS 270-398.

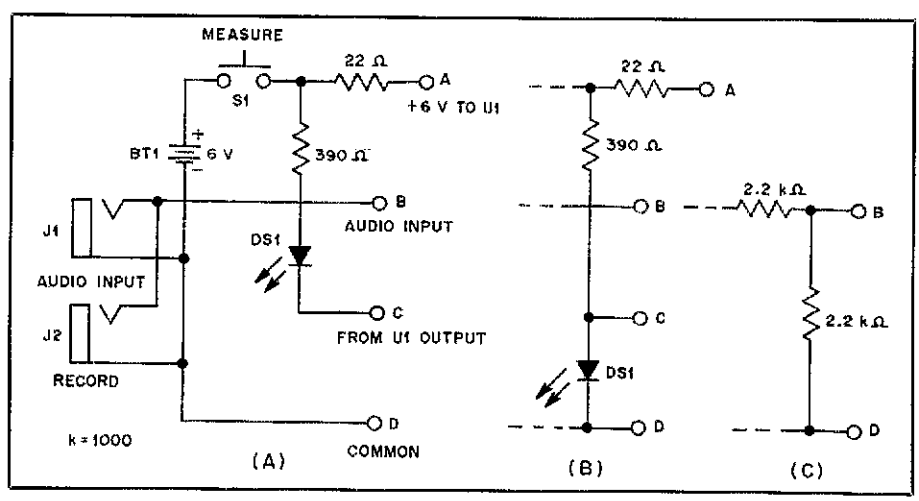


Fig 3—Schematic showing the additional components necessary for the self-contained tuning indicator. These replace the R-2000 circuitry connected to points A, B, C and D in Fig 1. The circuit at (A) allows normally-off indicator operation, meaning that the LED comes *on* when signals are properly tuned. Inset (B) shows the slight modification needed for a normally-*on* indicator; with this hookup, the LED goes *off* when signals are properly tuned. Use the optional 2.2-kΩ resistors shown at (C) to reduce the audio input level if the indicator will be used with a Kenwood R-5000. All resistors are ¼-W carbon-film units.

BT1—6 V; four AAA cells in series.
DS1—LED.
J1, J2—1/8-in. phone jack.
S1—Momentary SPDT toggle, Radio Shack 275-619 suitable. Momentary SPST or SPDT push-button switch also suitable.

Starting at a frequency just *below* 10 MHz, slowly tune in WWV until the display reads exactly 10.000.0. Do your tuning when WWV is *not* transmitting an audio tone so you won't be confused by these sidebands. You should hear the WWV carrier as a single audio tone. Be sure you haven't tuned one tuning step higher. If your receiver has a tuning lock control (F LOCK on the R-2000), engage it. Now, adjust R2 until the CW LED goes out. You may notice that the LED stays out over a few degrees of R2's rotation; if so, set R2 to the center of this range. This completes adjustment.

Performance Notes

It's normal for the LED to blink as the received pitch approaches the tuning-indicator center frequency. The LED will turn *fully* on or off (depending on whether your tuning indicator is wired for normally-off or normally-on operation) only when a signal is tuned properly. Tuning is especially critical for on-off-keyed signals

such as RTTY or CW, because the PLL requires time to lock onto an incoming signal. You can find the proper tuning point under such conditions by tuning for maximum or minimum LED brightness, depending on whether your indicator LED is normally off or on. The indicator can distinguish between the mark and space frequencies of RTTY signals; mark, usually the higher in frequency of the two states, is considered to be the nominal transmitter frequency during RTTY emission.

The smallest tuning step on the R-2000 is 50 Hz, or two steps per 100-Hz increment on the frequency display. Because the bandwidth of the tuning indicator is about 50 Hz at a 1-kHz center frequency, I can use the indicator to measure the frequencies of carrier, RTTY and CW signals to within 50 Hz! To do this, I tune slowly across a received signal and listen for the 50-Hz step (shift) in the signal pitch *between* display increments of 100 Hz. If, for example, the CW LED blanks at the tuning step between 11.311.0 and 11.311.1 MHz, the frequency of the received signal is close to 11.311.05 MHz.

Conclusion

Thanks to the narrowband response and excellent sensitivity of the 567 PLL tone decoder, this simple and inexpensive circuit has helped me to identify the operating frequencies of hundreds of DX stations, amateur and nonamateur, across the shortwave spectrum. You can use it to get the most out of the digital frequency display on *your* general-coverage receiver, too.

Notes

[1]The tuning indicator has been tested in the ARRL Lab, and functions as described, with Kenwood R-5000, and ICOM IC-R70 and IC-R71A receivers.—Ed.

[2]The bandwidth of the PLL-decoder filter varies somewhat with incoming signal level, narrower bandwidths corresponding to lower input levels. For a center frequency of 1 kHz, and with the C2 value shown in Fig 1, the tuning-indicator bandwidth will vary from about 2.2 to 7% (22 to 70 Hz for a 1-kHz center frequency) over an input signal range of 20 to 200 mV. The receiver's automatic gain control should minimize this bandwidth variation.—Ed.

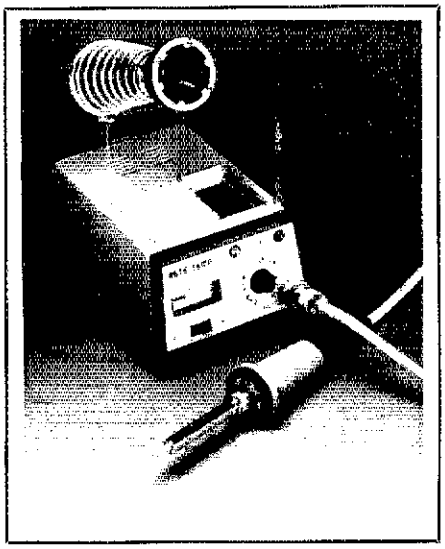
New Products

START MANUFACTURING TEMPERATURE-CONTROLLED SOLDERING STATION

☐ Start Manufacturing provides a versatile soldering station that permits interchanging of 30- and 60-W irons, thus providing two stations in one. The station features a unique control to keep temperature to within ±8°F of the setting. The station temperature is adjustable over the full temperature range of 200° to 900°F without having to change the tip or heating element.

The Model 1693A comes with a 60-W iron and a test tip. It features direct temperature readout, easy and fast calibration, and a means of permitting the station to be set and locked at a specific temperature.

Manufacturer: Start Manufacturing, Inc, 15775 N Hillcrest, Suite 508, Dallas, TX 75248, tel 214-960-1986. Catalog is available. Recommended list prices: Model 1693A, $79.50; 30-W iron, $15.

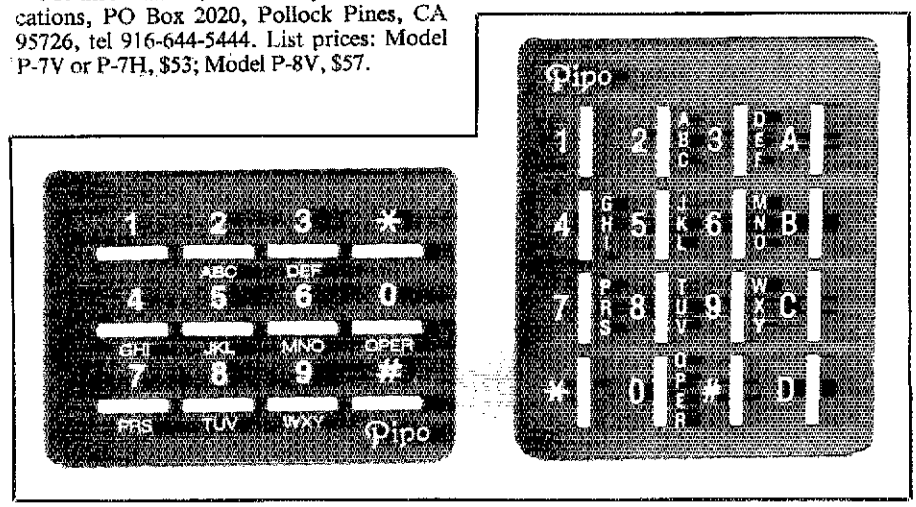


PIPO COMMUNICATIONS MINIATURIZED DTMF ENCODERS

☐ Pipo Communications' series of miniaturized dual-tone multi-frequency (DTMF) encoders includes a 12-key model in vertical or horizontal format (P-7V or P-7H), and a 16-key model (P-8V) in a vertical format. These encoders are specially designed with positive-action steel keys and sealed gold-dome contacts for maximum reliability and long life.

The miniature keyboards and electronics are designed to fit most radios. Dimensions of the encoders are: P-7V or P-7H, 2.16 × 1.5 × 0.20 inches; P-8V, 2.16 × 1.9 × 0.20 inches. The series is available in black or dark brown. All units are available from stock.

For information, contact Pipo Communications, PO Box 2020, Pollock Pines, CA 95726, tel 916-644-5444. List prices: Model P-7V or P-7H, $53; Model P-8V, $57.



KANTRONICS KANTERM TERMINAL PROGRAM FOR COMMODORE™ C64/128 COMPUTERS

☐ Kanterm is a comprehensive terminal program written for use with the Commodore C64 and 128 computers. The program offers many of the features amateurs have been asking for, such as split-screen display, message buffers, disk storage, type-ahead buffer and more. The C128 program runs in 128 mode and provides for 80-character lines.

Kanterm can be used with almost all Kantronics "smart" modems: KPC-1, KPC-2, KPC-4, KPC-2400, KAM and UTU-XT/(P). Kanterm 64 and 128 are provided together on one disk.

Kanterm is available from Kantronics, 1202 E 23rd St, Lawrence, KS 66046, tel 913-842-7745. Suggested retail price, $29.95.

Tuning-Diode Applications and a VVC-Tuned 40-m VFO

Inexpensive voltage-variable capacitance diodes are compact and easy to use in your Amateur Radio circuits. They can replace expensive, hard-to-get air-variable tuning capacitors.

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

Have you looked lately for small air-variable capacitors? Does the high cost and scarcity of tuning capacitors bother you? If you answer "yes" to these questions, I can sympathize with you!

Gone are the days when small air-variables lined the shelves of electronics surplus stores. Gone, too, are the attractive price tags of $1 or less. New capacitors are presently in the $10-$15 class, if you can find them. The once-popular Hammarlund and E. F. Johnson capacitor lines are produced by another firm, and single-lot purchases are a thing of the past. The surplus market has literally dried up for small air-variable capacitors with tuning shafts. There is, however, a bright spot in this seemingly grim situation.

We can look toward voltage-variable capacitance (VVC) diodes as a solution to the mechanical-capacitor shortages, at least for use with low-power oscillators and low-level tuned RF circuits. Tuning diodes are not only inexpensive, they are small. There is a greater opportunity for circuit miniaturization using VVC diodes. The major performance trade-off relates to use of diodes in VFO circuits: The frequency stability may be worse than with air variables, and the minimum capacitance of VVC diodes is substantially greater than is typical of an air-variable capacitor. For most amateur applications, however, these shortcomings are not serious.

VVC Diode Characterization

You have probably heard people refer to tuning diodes as Epicap® or Varicap® diodes. These are trade names that the manufacturers have given to these diodes. A varactor (variable reactor) diode is similar in effect to a tuning diode, but it is earmarked for use as a frequency multiplier (harmonic generator). Ordinary tuning diodes work quite well as varactors, as do many small-signal, high-speed switching diodes, such as the popular 1N914. The base-collector junctions of many transistors may also be used as tuning diodes or varactors.

In simple terms, the junction capacitance of a VVC diode changes when a reverse voltage is applied to the device (positive voltage applied to the diode cathode), and the capacitance varies with the voltage. The diode is placed in parallel with the components of a tuned circuit, and tuning is accomplished by varying the voltage, and thus the capacitance, by means of a potentiometer.

Fig 1 shows the equivalent electrical circuit of a VVC diode. Note that there are components of capacitance, resistance and inductance present. C_c is the stray case capacitance. C_j is the junction capacitance (voltage variable). L_s is the diode series inductance, and R_j is the junction resistance (also voltage variable, but negligible above 100 kHz). Finally, R_s is the series resistance of the diode and its leads. Our practical concern is mainly for the C_j component, at least with regard to HF operation. At VHF, and higher, we must be concerned about parasitic capacitance C_c, and R_s, both of which affect the Q and the upper-frequency limit or cutoff frequency of the diode, F_{co}. The diode cutoff frequency is also affected by L_s.

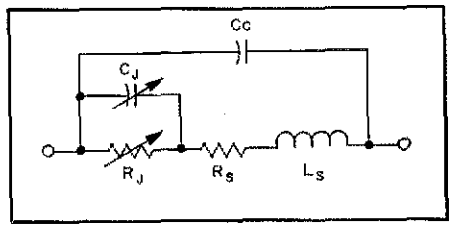


Fig 1—Electrical equivalent of a VVC diode, showing components of C, L and R (see text).

Types of VVC Diodes

There are three styles of tuning diodes. See Fig 2. The diode at A is the basic single-junction type, with a cathode and an anode. Fig 2B shows a unit that is designed to tune three circuits in an AM broadcast receiver. Three separate VVC diodes are contained in a single case. The tuning diode of Fig 2C features a back-to-back pair of junctions. Single VVC diodes can be connected together as in Fig 2C, if desired.

Diode Q Factor

An important consideration for any resonant circuit is the Q (quality factor). The higher the Q_L (loaded Q), the better the circuit selectivity (sharpness of response). High Q is important to an oscillator because if the Q is too low, the oscillator may not work or it may generate wideband noise. Q is dependent upon,

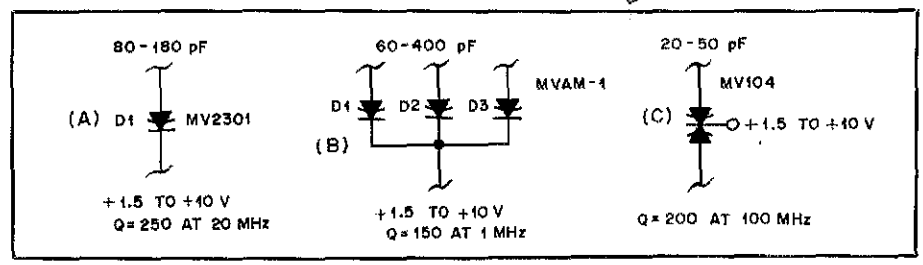


Fig 2—Three types of VVC diodes. A single diode is shown at A. The triple-diode version at B is for tuning three circuits at the same time, such as an RF amplifier, mixer and oscillator. Back-to-back diodes in one package are shown at C.

among other things, the ac resistance of the circuit: the higher the resistance, the lower the Q.

Tuning diodes are rated for Q. This factor varies with the operating voltage and the operating frequency. The Q for a given VVC diode changes considerably as the reverse voltage is varied. The manufacturers' specification sheets include curves showing Q compared with operating voltage and frequency. Check them before selecting a diode for your application.

Performance Trade-offs

Tuning diodes are not perfect! They have some shortcomings that we must take into account as we design circuits using them. They can worsen the frequency drift of a VFO when they are used in place of an air-variable capacitor. This is because all semiconductor junctions change capacitance with changes in junction temperature. Transistor junctions undergo the same changes with respect to temperature. The addition of a VVC diode adds to the short- and long-term drift problems.

Another annoyance with VVC diodes is the fairly high minimum capacitance value. An air-variable capacitor with a range of 50 pF might have a minimum capacitance of, say, 8 pF, whereas a VVC with a 50-pF range can have a minimum capacitance of 25 pF. We must design the tuned circuit to accommodate the high minimum capacitance of the diode. In some cases, this calls for a high C, low L tuned circuit.

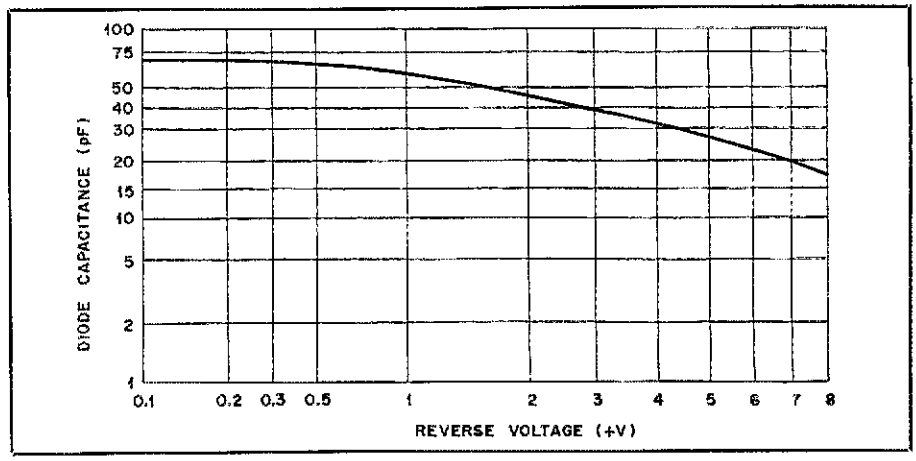


Fig 3—Abbreviated capacitance/reverse voltage curve for an MV2109 tuning diode. Note the flat portion of the curve to the left (see text for precautions about reverse voltages from 0.1 to 1.5).

The change in diode capacitance is quite nonlinear as the reverse voltage is decreased below approximately 2 V. This means that we should design for operation in a reasonably linear portion of the curve. Fig 3 shows a typical VVC diode voltage/capacitance curve. You can see that there is very little capacitance change from 0.1 to 1 V. If we use this portion of the curve, we will find that our tuning control has minor effect until we reach the 1.5-V region. The range from 2 to 8 V provides a more linear capacitance change, and this is the desired part of the curve. If we allow the voltage to drop below 1.5, a large part of the tuning dial range will be wasted on a 1- or 2-kHz frequency change at, for example, 7 MHz, while the overall frequency change may be 100 kHz in the 2-

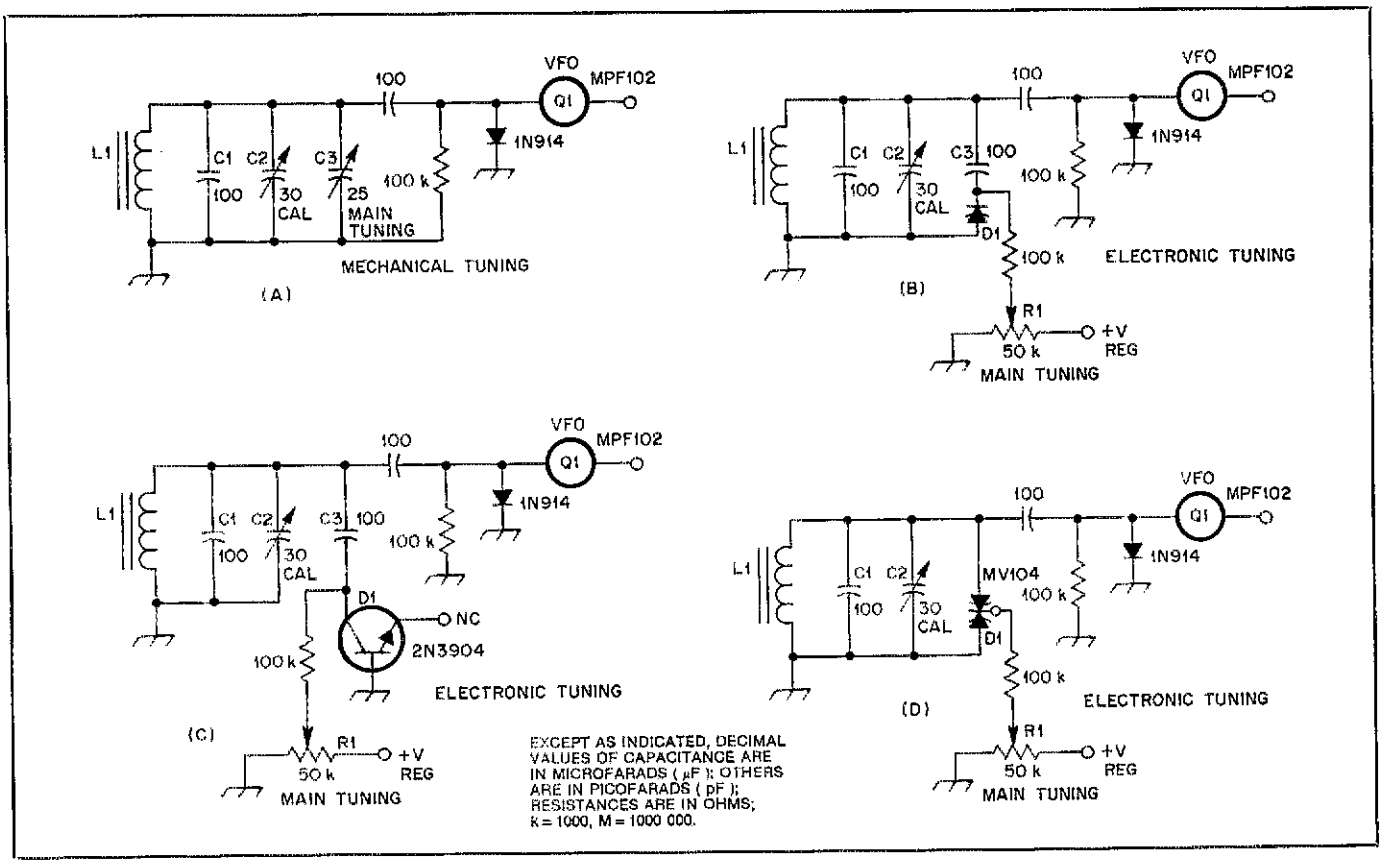


Fig 4—Simplified examples of electronically tuned oscillators. The circuit at A is tuned by a conventional air-variable capacitor. The circuit at B uses a single VVC diode. The example at C shows how to use a bipolar transistor junction as a tuning diode. The circuit at D is preferred, with respect to obtaining a linear oscillator waveform.

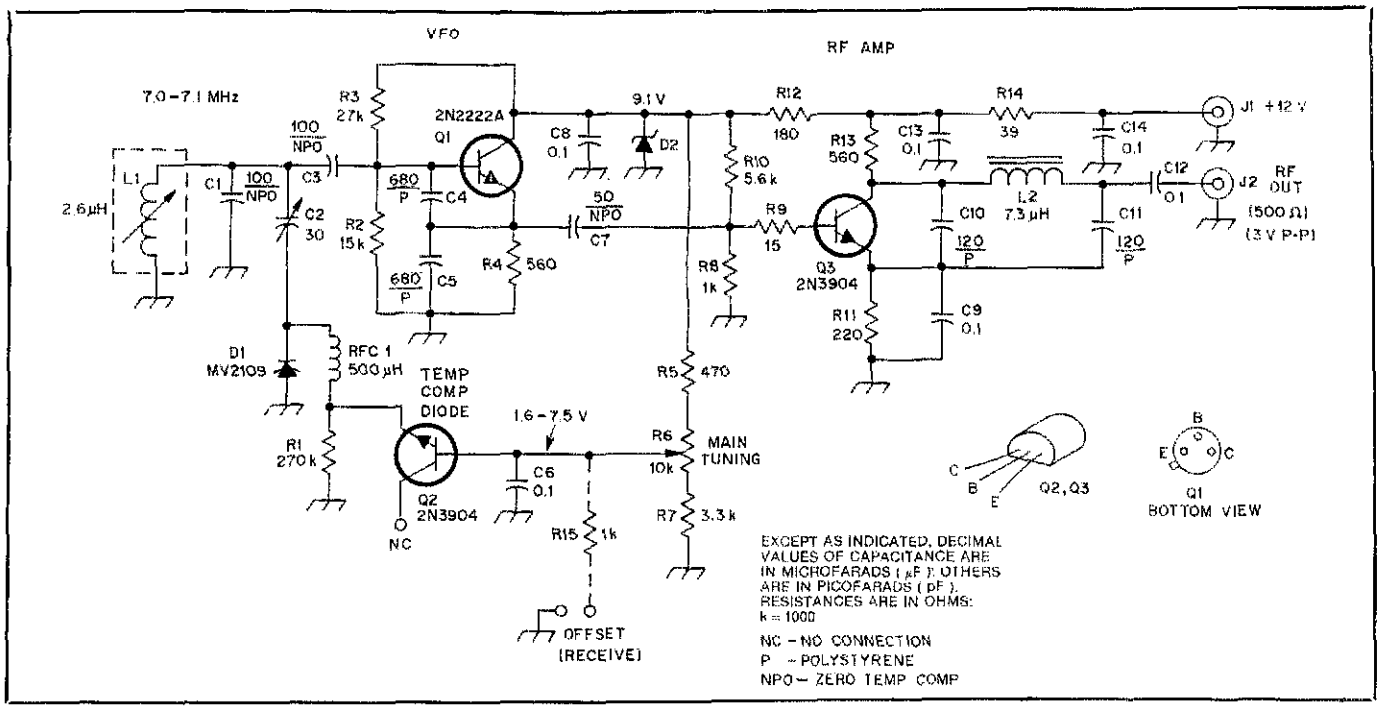


Fig 5—Schematic diagram of a practical VVC-tuned VFO for 40 meters. Unless noted otherwise, fixed-value capacitors are disc ceramic or mylar. Fixed-value resistors are ¼- or ½-W carbon composition, 10% tolerance. Numbered components not listed below are identified for PC-board layout purposes.

C2—30-pF trimmer or ceramic NP0 trimmer (preferred).
D1—Motorola MV2109 VVC diode (see notes 1 and 3).
D2—9.1 V, 400 mW Zener diode.
J1, J2—Single hole mount phono jack.
L1—Slug-tuned inductor, 2.6 µH. Use 16 turns of no. 26 enam wire on the bobbin of an Amidon Assoc L-57-6 transformer assembly.
L2—Toroidal inductor, 7.3 µH. Use 38 turns of no. 28 enam wire on an Amidon T-50-2 core.
R6—Linear taper 10-turn carbon composition potentiometer (see text).
RFC1—Miniature 500-µH RF choke.

to 8-V reverse-voltage range as we adjust the tuning potentiometer.

Most Motorola tuning diodes are rated for +30 V, maximum. I did not extend the curve in Fig 3 beyond 8 volts because the example is used mainly for illustrative purposes. The higher the reverse voltage, the lower the capacitance; but most amateur equipment is designed for 12-V operation. Therefore, we are interested primarily with the portion of the diode curve from 1.0 to 10 V. Regulated reverse voltage is necessary when VVC devices are used for the frequency control of oscillators; this aids frequency stability.

Some Circuit Examples

Fig 4 shows four VFO tuning approaches. Fig 4A illustrates, in abbreviated form, a tuned circuit for a VFO. C3 is an air-variable capacitor used for frequency adjustment. C2 is a trimmer capacitor used for oscillator calibration. The same circuit is seen at Fig 4B, but D1 and its related circuitry replaces C3 of Fig 4A. The values of C1 and L1 may need slight alteration to provide the same frequency coverage that is obtained from the oscillator of Fig 4A. This is because the minimum capacitance of D1 is greater than that of C3 of Fig 4A. R1 is a panel-mounted control used to vary the reverse voltage applied to D1. A resistor may be added between the low end of R1 and ground to prevent the diode voltage from dropping below 1 or 2 V. We can thereby avoid the flat part of the curve of Fig 3.

A transistor junction can be used as a VVC diode as shown in Fig 4C. The capacitance change will differ with the particular transistor used. Some experimentation may be useful.

Fig 4D shows a circuit using a Motorola MV104 VVC diode. Notice that the MV104 features two back-to-back diodes in one case. This arrangement is preferred for better oscillator-waveform linearity. Two separate VVCs may be connected together, back-to-back, when we desire to use the method seen at Fig 4D. Similarly, two bipolar transistors (Fig 4C) may be connected back-to-back to permit the arrangement of Fig 4D.

A Practical VVC-Tuned VFO

I chose the circuit of Fig 5 as the local oscillator for a direct-conversion (D-C) receiver I am developing. I want the unit to be small, so I opted for a VVC tuning scheme instead of using a large, expensive air-variable capacitor. I had on hand some surplus Motorola MV2109 Epicap diodes that I purchased from BCD Electro.[1] A capacitance swing of approximately 20 pF is possible in the linear portion of the diode curve. This provides sufficient capacitance change for the circuit of Fig 5, because I am interested in covering only 7.0 to 7.1 MHz. A tuning voltage of 1.6 to 7.5 provides the desired tuning range.

Q2 of Fig 5 is a temperature-compensating device that is connected as a diode. As the ambient temperature changes, so does the resistance of the Q2 diode junction. The small resultant resistance change causes the reverse voltage at D1 to change slightly, thus compensating for changes in the diode junction capacitance that are caused by heat.

R5 and R7 are included to provide the required 1.6 to 7.5 V reverse potential for D1 across R6. You may require different values if the regulated voltage for your oscillator is greater or less than the 9.1 V indicated in Fig 5.

L1 is an adjustable inductor that is wound on the bobbin of an Amidon L-57-6 shielded transformer assembly.[2] The no. 6 (yellow) iron-core material offers good stability in the presence of changing temperatures. No. 2 material (red) has greater permeability (fewer turns needed), but it is less stable than is the no. 6 material. The coil turns are glued in place on the bobbin with a high-quality coil cement, such as General Cement Q-Dope.* After L1 is tested and adjusted for the desired frequency range, the coil slug should be locked in place by melting a small piece of beeswax or canning wax onto the end of the coil

[1]Notes appear on page 29.

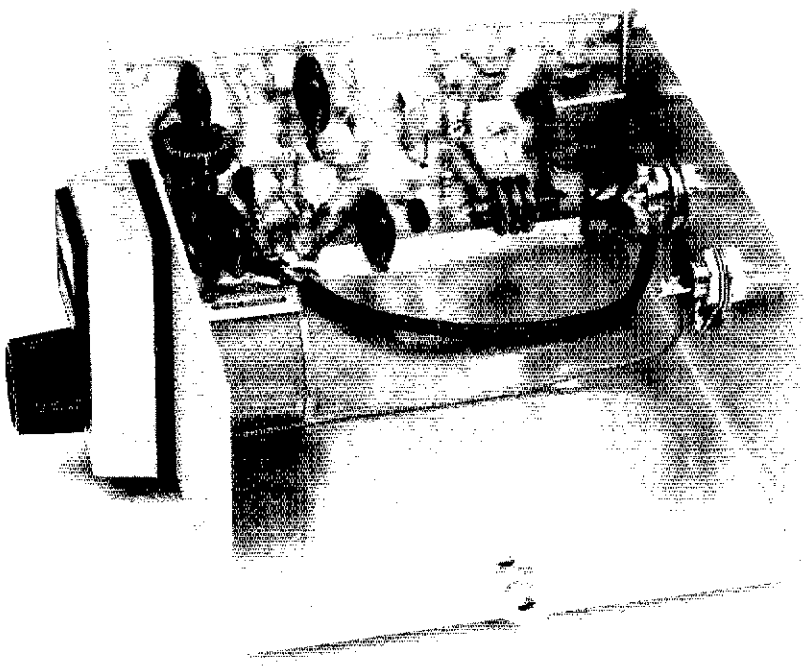


Fig 6—Photographic view of the 40-m VFO in its cabinet with cover removed.

slug. This prevents vibration from moving the slug and changing the oscillator frequency.

C2 is used to set the tuning range of D1. The capacitance of C2 is in series with the capacitance of D1. Therefore, the lower the capacitance of C2, the smaller the frequency spread provided by D1 as R6 is adjusted through its range. In other words, the lower the capacitance at C2, the smaller the effective capacitance change for D1.

NP0 (zero temperature coefficient) ceramic capacitors are used at C1, C3 and C7.[3] Polystyrene capacitors are indicated at C4 and C5, but NP0 units can be used instead. I used polystyrene capacitors because they are quite stable with temperature changes. Also, I did not have a pair of 680-pF NP0 units on hand when I built this VFO. Silver-mica capacitors can be used at C1, C3, C4, C5 and C7 if necessary. You may find that silver-mica units exhibit positive *or* negative drift characteristics, however. Best VFO stability will result if you experiment with these capacitors by trying various units of the same value at each critical circuit point. That is, like-value capacitors of the same brand will often exhibit different drift characteristics with respect to internal heating. For this reason, most homemade highly stable VFOs are practically tailor-made with respect to the final choice of fixed-value capacitors in the oscillator circuit.

D2 of Fig 5 regulates the oscillator operating voltage, and ensures a regulated voltage for the D1 tuning circuit. The regulated voltage also stabilizes the forward bias for amplifier Q3, and helps prevent load changes at the oscillator output that would otherwise be reflected by Q3 if the forward bias were allowed to vary.

Q3 is lightly coupled to the emitter of Q1. This also reduces the loading effect of the amplifier. R9 is included as a parasitic suppressor for Q3. If unwanted VHF oscillations are allowed to develop, they will appear at the output of Q3. VHF parasitic oscillations can cause spurious responses in a receiver or transmitter, or cause TVI.

A broadband pi network is used at the output of Q3. It is designed for a Q_L of 3 to ensure a constant output across the VFO tuning range. The network is designed for a 1:1 transformation ratio. R13 sets the collector impedance of Q3. The VFO output impedance (approx 500 ohms) is suitable for interfacing with a class-A bipolar RF amplifier or the 500-ohm input terminal of a mixer IC, such as a CA3028A.

Peak-to-peak output from the circuit of Fig 5 is 3 V across a 470-ohm resistor. This equates to 1.06 V RMS and an output power of 2.4 mW. Greater output power may be obtained by changing R11 to 100 ohms. This provides 5 V P-P or 1.76 V RMS for an output power of 6.6 mW. If greater output power is needed, you may add an RF power amplifier after Q3. A 2N2222A is a good transistor for this purpose. Suitable RF amplifier circuits are presented in *Solid State Design for the Radio Amateur*.[4]

VFO Offset Circuit

Because of the heating of the D1 junction when operating voltage is first applied, you will notice a short-term frequency change of approximately 300 Hz. The VFO settles down and commences its long-term drift after about 30 seconds. Because of this, the VFO should remain operating at all times when it is used with a transmitter. R15 of Fig 5 is shown as part of a frequency-offset circuit. During the receive period you may shift the VFO frequency away from the frequency you are listening to by grounding R15. A mechanical or solid-state switch in your TR circuit may be used for this purpose. The amount of frequency offset is determined by the value of R15. If the VFO is used in a D-C transceiver, you may ignore the offset provision—the VFO will be operating at all times.

Drift and Output Waveform

I measured the VFO drift at room temperature (72 °F) with the cover in place on the VFO cabinet. The initial drift took place in a 30-second spurt. Thereafter, the drift was gradual, and stabilization (±2 Hz) was noted after 10 minutes. The long-term drift was measured as 80 Hz. Do not measure your VFO drift for at least an hour after all soldering on the PC board is completed. The VFO module should be mounted in place and enclosed in a cabinet before measurements commence. Even slight stress on the VFO board will cause frequency changes. Solder a 470- or 560-ohm resistor across J2 before doing your drift checks. Set R6 at midrange before starting the tests.

I examined the output waveform of Q3 with a 50-MHz Tektronix 453A scope. A clean sine wave was observed and the output amplitude remained constant over the 100-kHz tuning range of the VFO. The filtering action of the Q3 pi network aids in laundering the output waveform.

Practical Considerations

Some type of reduction-gear mechanism is desirable for the VFO of Figs 5 and 6. I used a 10-turn potentiometer and counter dial that I bought at a flea market for $3. Various 10-turn controls and dials are currently manufactured, but the cost may be prohibitive. Check the surplus electronics dealers' catalogs for these mechanisms. You may also use an imported reduction gear drive to control the VVC diode tuning control (R6). If you are adept at making plastic or metal pulley wheels, try coupling the R6 tuning shaft to the dial-drive shaft with a rubber O ring and two pulleys. A small wheel driving a large pulley wheel will provide a slow tuning rate for the VFO. Some of the small gear drives with readout dials from WW II surplus transmitters, receivers or tuning units can be adapted easily for use as reduction drives for R6.

A good-quality potentiometer is recommended for use at R6. Select a unit that turns smoothly. Industrial-grade controls of the Allen Bradley type (linear taper) operate smoothly, and they will last a long time.

Fig 6 shows the assembled VFO with the cover removed. The unused space in the

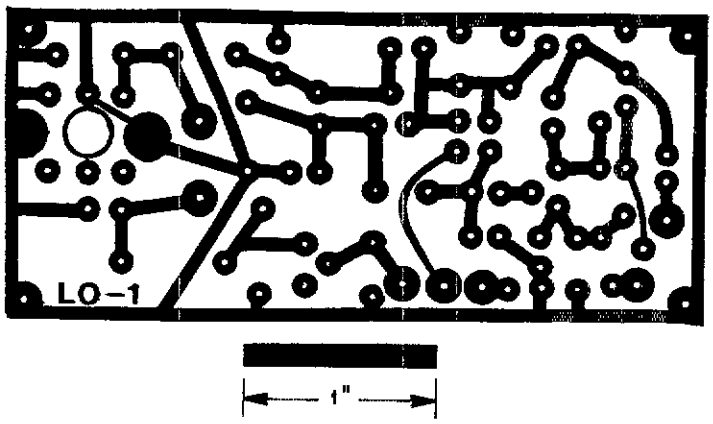


Fig 7—Circuit-board etching pattern for the VVC-tuned 40-m VFO. The pattern is shown full-size from the foil side of the board. Black areas represent unetched copper foil.

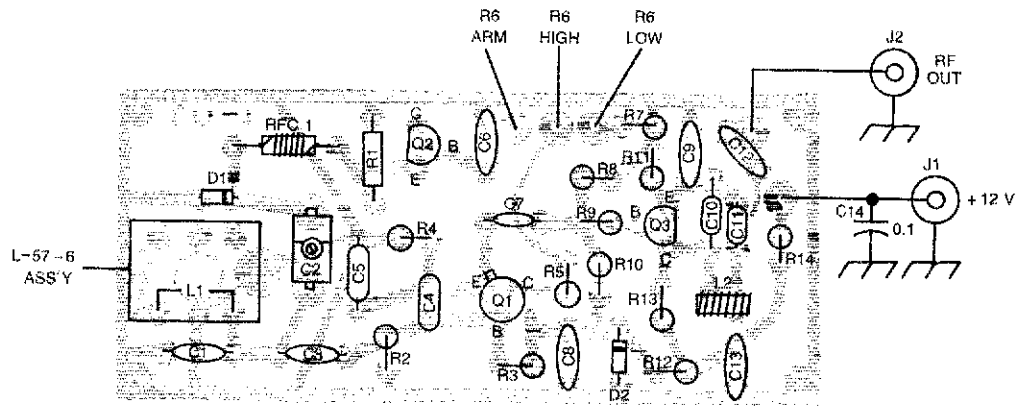


Fig 8—Parts-placement guide for the VVC-tuned 40-m VFO. Parts are placed on the nonfoil side of the board; the shaded area represents an X-ray view of the copper pattern.

cabinet will contain the product detector, active filter and audio amplifier for my 40-meter D-C receiver project. I used a Ten-Tec TP-19 cabinet. It measures (HWD) 2 × 4¾ × 4 inches. As supplied, it is a plain-finish aluminum box. I painted the front and rear panels with gray automotive primer. The cover was also painted with primer, followed by a coat of marine blue gloss enamel. Adhesive-backed plastic feet are affixed to the bottom.

Motorola, Inc, manufactures a variety of VVC tuning diodes.[5] Check with them regarding the availability of data sheets for these diodes. My information came from the *Motorola Semiconductor Library*, Vol 3, series A, 1974 edition.

Fig 7 shows a full-size etching template for the VFO. Fig 8 is a parts-placement guide.

In Summary

I have addressed the subject of VVC tuning diodes in simple terms. The nature of these diodes is considerably more complex than this article indicates. However, you should now have sufficient knowledge to permit plenty of experimentation and practical satisfaction. Application notes from the companies that manufacture VVC tuning diodes will give you greater insight into the performance characteristics of these devices. If nothing more, you can save money by using tuning diodes, and your equipment will be much smaller than when using mechanical tuning capacitors.

Notes

[1]BCD Electro, PO Box 830119, Richardson, TX 75083, tel 214-690-1131. Catalog available.
[2]Amidon Assoc, Inc, 12033 Otsego St, N Hollywood, CA 91607. Catalog available.
[3]NP0 capacitors, silver-mica capacitors and MV2109 VVC diodes (also other VVC diodes) are available from Circuit Specialists, PO Box 3047, Scottsdale, AZ 85257, tel 602-966-0764. Catalog available.
[4]W. Hayward and D. DeMaw, *Solid State Design for the Radio Amateur*, 2nd printing (Newington: ARRL, 1986).
[5]Motorola Semiconductor Products, Inc, Technical Information Center, PO Box 20924, Phoenix, AZ 85036.

QEX: THE ARRL EXPERIMENTERS' EXCHANGE AND AMSAT SATELLITE JOURNAL

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- "Optimum Wire Size For RF Coils," by Charles J. Michaels, W7XC
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QEX is edited by Paul Rinaldo, W4RI, and Maureen Thompson, KA1DYZ, and is published monthly. The special subscription rate for ARRL/AMSAT members is $8 for 12 issues; for nonmembers, $16. There are additional postage surcharges for mailing outside the US; write to Headquarters for details.

Fiber Optics—It's Here Now

Your next rig may contain a fiber-optic link. But what is fiber optics? What's the advantage of using fiber-optic systems, and how do they work?

By Clarke Greene, K1JX, and Ellen E. Wilson
Pirelli Communications Systems, Inc
2 Tower Dr
Wallingford, CT 06492

Fiber-optic systems—you may have already used them today if you've spent any time on the telephone, and they're already being used in Amateur Radio. Telephone companies tell us that we have fiber optics to thank for improved telephone sound fidelity, and that we'll soon be enjoying integrated voice/data services through state-of-the-art fiber-optic networks. We hear about the immunity of fiber-optic cable to signal pickup and leakage, and plans for fiber-optic transoceanic cables. Behind all the hype, though, what is fiber optics?

Fiber-optic communication uses modulated light. You modulate a light source, launch that modulated light into a fiber-optic cable, and demodulate the beam at the other end. Here's an overview of what fiber-optic systems do for us, and how they work.

The Fiber-Optic Advantage

Fiber-optic telecommunication is already far beyond the "gotta iron the bugs out first" stage—so far, in fact, that fiber-optic techniques are supplanting wire and radio wherever possible. What's the big deal? Low loss, for starters: Fiber-optic systems afford very low signal loss compared to wire systems. Another advantage of fiber-optic links is increasingly important in our busy electromagnetic environment: Because optical fibers are nonmetallic and nonconductive, they cannot radiate or pick up electromagnetic signals. This is important in long- *and* short-haul fiber-optic applications.

Does radiation from the cabling between your computer and its peripherals interfere with radio reception? Replacement of those wires with optical fibers could reduce the noise to inaudibility. Need to connect digital circuitry to sensitive analog circuitry without mutual interference? Optocouplers can help, but fiber-optic signal transmission can make the isolation complete. Need to run a data communication line through an electrically noisy area? A fiber-optic link won't pick up the noise—and your data stream is more secure against electronic eavesdropping. Have you ever tried to place a telephone call via transoceanic wire during a severe geomagnetic storm? Large currents can be induced in long cables under such conditions, causing disruption of many wire-dependent communications services. Optical fibers eliminate this: They're immune to induction.

Moving Light from Point to Point

In wire communication systems, messages move from point to point along *metallic* fibers (wires). Fiber-optic systems don't use metal to conduct energy. Instead, they use plastic or glass. But optical fibers don't conduct light in the same sense that a wire conducts electricity. An optical fiber is a *waveguide.* Waveguides *confine* waves instead of conducting them electrically.

Waveguides exhibit low signal attenuation. At radio frequencies above 2 GHz or so—frequencies at which most coaxial cables are too lossy to use for long runs—waveguides afford an efficient means of connecting antennas to receivers and transmitters. Waveguides are the *only* practical means of long-haul signal transmission at light wavelengths. Radio waveguides look like plumbing. Optical waveguides are much smaller in diameter—so small that

Fiber Optics: In a Radio Near You

In this article, authors Greene and Wilson declare that fiber-optic transmission is already an important part of TV transmission and distribution in some areas of the country, and that you've probably already spoken via fiber-optic link if you've used the telephone today. This is no exaggeration—and there may be a fiber-optic link in a *radio* near you.

Last May, friend John Ramsey, N1AKB, chief engineer at WGAB (1550 kHz) gave me a tour of the WGAB transmitter site in Bloomfield, Connecticut. WGAB's 5-kW-output main transmitter, a Continental Electronics 315R-1, is solid-state with the exception of two 3CX3000F7 tubes: one is the final amplifier and the other is the switching modulator in a pulse-width modulation (PWM) system. The anode of the final amplifier is grounded for dc; the 315R-1's high-voltage power supply, in conjunction with the second 3CX3000F7, provides modulated *–13.7 kV* dc to the *cathode* of the 3CX3000F7 final. The switching modulator tube and its solid-state driver are above chassis by –13.7 kV. The preceding stage—the pulse-width modulator—is no more than a few tens of dc volts above chassis. Here, I thought, is an interconnection problem of epic proportion: The 315R-1's PWM system requires *dc coupling* across that 13.7-kV potential difference. John pointed out Continental's elegant solution: a fiber-optic link! Nonconductive optical fiber easily withstands the 13.7-kV potential difference between stages as it transmits the pulse-width modulator's 70-kHz output signal to the switching modulator driver. The modulated output of the optical-link transmitter (an ultraviolet LED) contains a dc component, preserving the dc response of the link. Continental is one of several transmitter manufacturers using fiber-optic techniques to solve control and interconnection problems.

Off-the-shelf fiber optics have come to Amateur Radio with the introduction of ICOM's IC-900 multiband HF/VHF/UHF transceiver. The IC-900 uses fiber optics to move audio and control signals between system modules without the RF feedback problems often encountered with conductive interconnections.

Who'll be next in the Amateur Radio marketplace with fiber optics? For that matter, who'll be first—if someone's not doing it already—to use fiber optics in a home-built ham installation? Section 97.7 of the FCC rules, **Frequency Privileges**, authorizes use of *all* frequencies above 300 GHz by Amateur Radio licensees of Technician and higher classes. This enormous chunk of spectrum includes light frequencies, so light wavelengths are part of ham turf, too. If you're using fiber optics to solve engineering problems at your Amateur Radio station, *QST* would like to hear about it.—*David Newkirk, AK7M, Assistant Technical Editor,* QST

their thinness has been likened to human hair. Some fiber-optic waveguides are made of plastic, but the best (long-haul) optical waveguides are made from high-purity *glass.*

The light wavelengths used in most fiber-optic systems lie between 600 and 1600 nanometers (nm). (A nanometer is 0.000000001, or 1×10^{-9}, meter.) Although we'll continue to refer to light wavelengths in this article, we should mention the light *frequencies* used for fiber-optic communication: Wavelengths between 1600 and 600 nm correspond to frequencies from 187.5 to 500 THz (T = tera [10^{12}])!

The choice of operating wavelength in a fiber-optic communication system is based largely upon the physical properties of the fiber. Pure silica (silicon dioxide, or SiO_2) glass is the basis for most optical fibers manufactured today. Silica is also the main constituent of sand, windowpanes and the drinking glass on your kitchen sink. No matter how clear silica window glass looks, however, it is *not* uniformly transparent across the entire optical spectrum. Because of this, fiber-optics engineers define a *window* as a band of wavelengths at which the transparency of a substance—in this case, silicon dioxide—affords very low signal propagation losses. The windows in a given substance are referred to by ordinal numbers (first, second, third and so on), in order of increasing wavelength. The best windows in SiO_2 glass lie at wavelengths to which our eyes don't respond at all. The first SiO_2 window (820 nm) allows efficient transmission at light wavelengths between 600 nm—visible red light—and 850 nm—invisible *infrared* light. At 820 nm, a typical communication-quality fiber has a loss of about 3.5 dB per kilometer of fiber length. SiO_2's second window—1300 nm—is better yet. The average loss for an optical fiber at 1300 nm is between 0.4 and 0.5 dB/km—*eight times better* than the same fiber operated at 820 nm! Because of this, almost all of today's medium and long-distance fiber-optic work is done at 1300 nm. The very latest commercially available systems are pushing a frontier at 1550 nm—the third SiO_2 window. At 1550 nm, loss in the best SiO_2 optical fiber averages between 0.20 and 0.25 dB/km. This is about half of the loss at 1300 nm, meaning that, for a given signal loss, a 1550-nm system can operate over *twice* the distance of a 1300-nm system—a significant improvement in range. The best 1550-nm optical fibers approach the theoretical lower limit of loss for SiO_2 glass. Researchers are working at making fibers from compounds based on fluorine. The theoretical loss for some of the preferred fluoride-glass windows is less than 0.02 dB/km! Aside from consideration of fiber material, there are choices to be made in optical-fiber *construction.* The sidebar, "Choosing an Optical Fiber," discusses three principal optical-fiber configurations: step-index multimode, graded-index multimode and monomode.

Multiplexing's the Thing in Fiber Optics

Multiplexing allows the simultaneous transmission of large numbers of video, voice or data signals over a single transmission path—and it's the most efficient way to use optical fiber. Multiplexing can be done in three ways:

- *Space division multiplexing* (SDM) uses a dedicated fiber for each signal. This is inefficient use of the large bandwidth available on a fiber link; depending on the job to be done, the cost of SDM may be too high to be practical.
- *Time division multiplexing* (TDM) allows a number of signals to share a common transmission path on a cyclical basis, with each signal using the path exclusively for a preassigned period of time. TDM is used with digital signals; these may represent pulse-code-modulated analog signals.
- *Frequency division multiplexing* (FDM) is the system most often used for fiber-optic transmission of analog signals, including the broadcast radio and TV we receive in our homes. In FDM, the signals to be transmitted are combined into a *composite* signal for optical transmission; each of these components is assigned a particular segment of the composite's spectrum. At the receiving end, the composite signal is split into its component parts by FM demodulators tuned to the proper frequencies.

The Light at the End of the Fiber

So much for the medium. What about a means of sending the message? LEDs and solid-state lasers are the answer. Both types of devices are available for operation at the three SiO_2 windows (820, 1300 and 1550 nm). The operational difference between LEDs and lasers hinges on light *coherence.* Laser light, said to be *coherent* because of the unvarying phase relationships between its components, is a highly directional, narrow-band light emission. Laser light may be finely focused—important in long-haul fiber-optic telecommunication systems, in which the fiber core may be as small as 6 *μm* in diameter. In contrast, LED light is *incoherent* because its components—light energy over a wide range of wavelengths—vary randomly in phase relative to each other.

The choice between LEDs and lasers depends on the type of fiber used. LED optical transmitters are inexpensive and reliable. They are usually used with multimode fiber because their incoherent light cannot easily be focused and coupled into single-mode fiber. (Graded-index fiber is the preferred choice for use in LED-driven systems where wide information bandwidths are required; this fiber significantly reduces intermodal delay distortion over that encountered with step-index fiber.) The limited optical output power and narrow information bandwidth of LED optical transmitters best suits them to short-haul, low-speed applications.

Long-haul, monomode-fiber links must be driven by lasers. (*Laser*, an acronym, stands for *l*ight *a*mplification by *s*timulated *e*mission of *r*adiation; the verb *lase* signifies the action.) In a solid-state injection laser, light generation begins with the injection of photons into the *amplifier medium*—actually an optical cavity—situated between two mirrors. (As in an LED, the source of these photons is a forward-biased PN semiconductor junction.) The photons excite, or pump, atoms in the amplifier medium to higher energy levels. Each collision between a photon and an excited atom stimulates the release of another photon, and light intensity builds in the cavity. This is *avalanche multiplication.* When a critical threshold is exceeded, lasing occurs. Laser light is coherent because the electromagnetic waves associated with the photons in the optical cavity exist in phase.

Close control of device temperature and drive current is necessary for long life of an injection-laser diode. The necessary control circuitry adds to system complexity and cost. All in all, laser optical transmitters are more expensive to fabricate and comparatively less reliable than their LED counterparts. But because lasers work well over wide information bandwidths, and can generate high output power, they're ideal for long-haul, high-speed fiber-optic links.

Injection-laser diodes are also used for disc scanning in audio compact disc (CD) players. These diodes are cheaper than diodes optimized for telecommunication use, but they *can* be made to work in relatively simple fiber-optic systems. This leads some small companies to purchase discount-priced CD players, remove the laser from each and throw the remains into the trash! The net cost of such lasers from cannibalized CD players is actually *less* than that of lasers marketed for communications use, particularly in small volumes. Consumer buying power hits the fiber-optic industry!

Putting Information on the Fiber

Modulation of light intensity, frequency, phase, or polarization are all possible means of impressing information on a fiber-optic link. At present, however, most practical fiber-optic applications rely on some form of intensity (amplitude) modulation of the optical transmitter. Intensity modulation can be used for optical transmission of analog and digital signals. Analog intensity modulation requires large signal-to-noise ratios and careful attention to reproduction accuracy; therefore, most optical telecommunication systems are digital.

Choosing an Optical Fiber: A Matter of Modes

Launching light into an optical fiber isn't as easy as pouring water into a pipe. Because light is electromagnetic in nature, it's subject to the same enhancement and cancellation by phasing as is radio. Multipath signals in a radio circuit can cause fading, distortion and data errors; optical multipath can result in similar problems in a fiber-optic communication link. At radio frequencies, we can make use of careful frequency selection, directional antennas and diversity reception techniques to minimize multipath. In a fiber-optic link, frequency selection is mandated by the characteristics of the fiber material, and the coherent light of a laser can do *part* of the job of a directional antenna. Further suppression of optical multipath depends on the characteristics of the fiber.

Reflection (return of a wave from the interface between two media) and *refraction* (bending of a wave as it passes across the interface between one medium and another) occur because electromagnetic waves travel at different speeds in media of differing densities. The angle at which a wave strikes a surface or interface is the *incident angle*. The concept of *critical angle* also comes into play where reflection and refraction occur: The critical angle is the highest *incident angle* at which a wave can strike a surface or interface and still be reflected.

Reflection keeps light inside an optical fiber (Fig A). The fiber is composed of an inner *core* surrounded by concentric *cladding*. The core is a strand of material—glass or plastic—that exhibits high refractivity (that is, it slows light propagation to a relatively large degree). The cladding, bonded to the core, is relatively less refractive. When the incident angle of the light is less than the critical angle of the mirror formed by the core/cladding interface, the light reflects back into the fiber instead of escaping into the cladding. As long as light strikes the core/cladding interface at less than the critical angle, it can propagate through the fiber. Light waves entering the fiber at different angles travel varying distances before reaching the end of the fiber. This means that light waves traveling along the fiber axis will arrive at the end of the fiber sooner than those entering the fiber at higher *angles of acceptance* (Fig B).

Each optical path supportable by a fiber is called a *mode*. The magnitude of the angle of acceptance for a given mode relates directly to the *order* of that mode: For instance, light entering the fiber at a high angle of acceptance is referred to as a *high-order* mode. Multimode light propagation in a fiber-optic link can cause fading, distortion and data errors similar to those caused by multipath signals in a radio link.

There are three types of optical waveguides, each with distinct propagation characteristics: step-index multimode, graded-index multimode, and monomode (also called single-mode) fibers. They differ primarily by the extent to which they suffer from, and their means of suppressing, multimode (multipath) light propagation.

Step-index multimode fiber (Fig B) exhibits uniform refractivity through its core and an abrupt change in refractivity at the core/cladding interface. Light can enter the core of this fiber at varying angles of acceptance. Because light at low-order modes travels less distance than higher-mode light, light rays launched simultaneously into the fiber

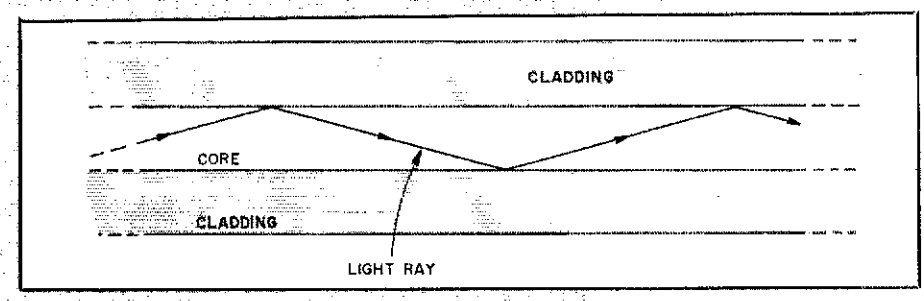

Fig A—Light wave propagation in an optical fiber depends on reflection at the core/cladding interface.

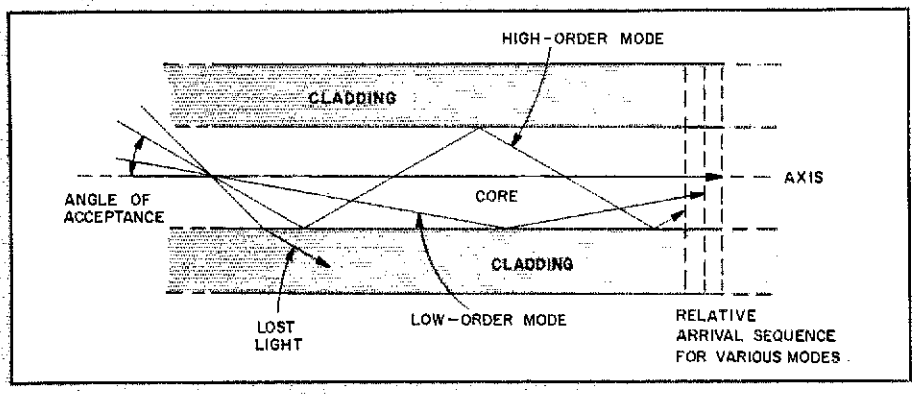

Fig B—Light launched into the fiber travels a distance that increases with the angle of acceptance. Light traveling at high-order modes arrives at subsequent points on the fiber later than lower-order light; the result of this is *intermodal delay distortion* at the receiving end of the link. (See text and Fig C.)

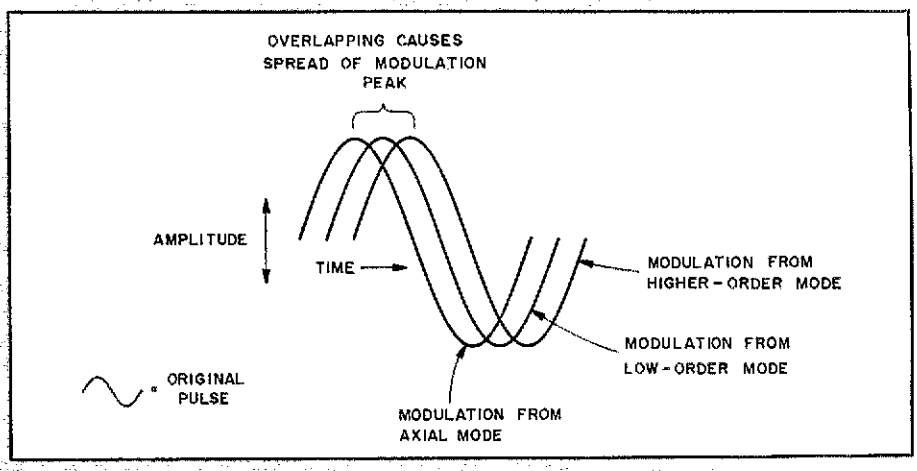

Fig C—Intermodal delay distortion. Even though light launch is simultaneous at the transmitter, the staggered arrival of multimodal light blurs modulation at the receiving end of a step-index multimode fiber. The data rate on such a link must be slow enough that pulse broadening does not cause demodulation errors.

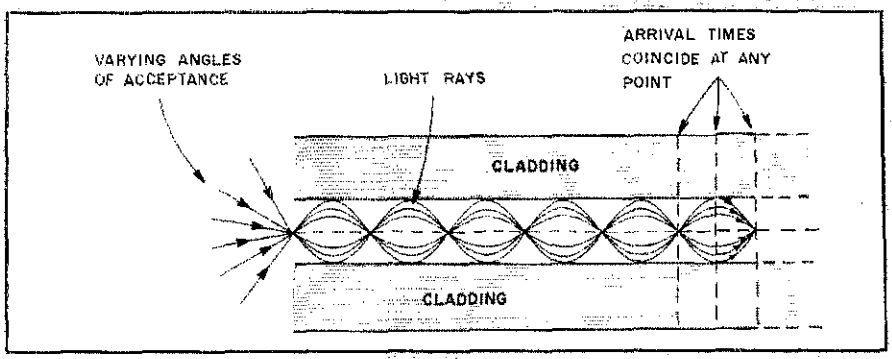

Fig D—Graded-index multimode fiber decreases in refractivity as distance from the core increases. This works to equalize the net propagation speed of the fiber, regardless of mode: Light traveling in higher-order modes propagates faster than lower-order light. In a perfect graded-index fiber, intermodal delay distortion would be zero.

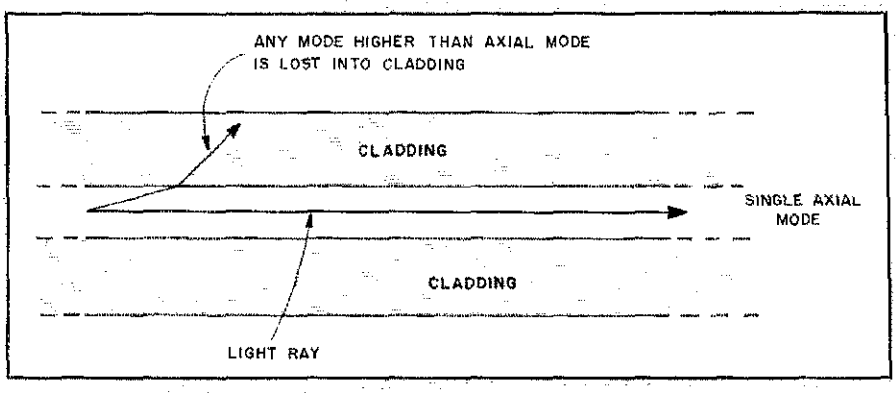

Fig E—Monomode fiber eliminates intermodal delay distortion simply: It supports only one mode of propagation! Although the tiny core diameter of monomode fiber requires the use of laser transmitters and complicates splicing and installation, monomode fiber is the mainstay of long-haul fiber-optic links today.

at different angles of acceptance arrive out of sync at the receive end. This results in *intermodal delay distortion*—broadening and overlap of modulation peaks, resulting in an increasingly distorted signal at the receiver (Fig C). This puts an upper limit on the data rate in the link: If the data rate is too high, intermodal delay distortion will cause demodulation errors.

Graded-index multimode fiber (Fig D) is a step toward solving this problem. This fiber is most refractive at the center of its core; its refractivity decreases gradually toward the core/cladding interface. Light rays entering the fiber off-axis travel in curved paths. Because the refractivity of graded-index multimode fiber decreases with distance from the core, light of higher-order modes generally travels *faster* than lower-order light in this fiber. This means that propagation speed varies inversely with path length. Ideally, all light rays launched simultaneously into such a fiber arrive simultaneously at their destination, regardless of path length. A perfect such fiber would exhibit no intermodal delay distortion—but perfect graded-index multimode fiber exists only in theory.

Monomode fiber (Fig E) solves the intermodal delay distortion problem altogether: It has an extremely restricted angle of acceptance. The core diameter of such fiber is only 6 to 12 μm in comparison with the 50- to 100-μm diameter typical of multimode cores. The fiber propagates only light that is launched near the center of the core at very low acceptance angles—parallel, or very nearly parallel, to the fiber axis. The bandwidth afforded by monomode waveguides is enormous because there is no possibility of interaction between light rays of differing modes; thus, monomode fiber affords the greatest communications potential of the three fibers figured here. It's also the most widely used optical fiber in the telecommunications industry. Monomode fiber isn't perfect: Its small core diameter complicates installation and splicing, and mandates the use of laser transmitters as light sources. These factors make the cost of a monomode system roughly *10 times* that of a link based on multimode fiber!

Despite the fact that analog information can be digitized, most digital optical links handle only computer data, which exists in digital form long before its application to the fiber-optic link. Transmission of digitized analog signals, such as voice or video, requires costly conversion to digital form, and reconversion to analog form after transmission. Presently, systems handling digitized analog information cost about seven times as much as purely analog systems. But lower-cost analog systems are on the horizon: One economically promising development is the fairly new use of analog 1300-nm laser-based transmission over monomode fiber.

On the Receiving End

Envelope detection—recovery of the signal modulation envelope by rectification—is the basis for all optical receivers in commercial use. The greater the intensity of the light striking such a photodetector, the higher the detector output current. The original information is recovered as a variation in detector current proportional to the modulation applied at the transmitter. PN, PIN and avalanche photodiodes are commonly used in this service; in some cases, phototransistors can be used. (See Chapter 4 of *The 1987 ARRL Handbook* for details on the construction of PN and PIN semiconductor diodes; we'll concentrate on their optical attributes here.)

PN diodes are familiar to us as power rectifiers and AM detectors. In such applications, they are forward biased. A *reverse*-biased PN junction possesses a characteristic very useful in optical telecommunication: It generates electric current when exposed to light. This property can be used to convert the modulated infrared light of a fiber-optic link into a variable electrical current suitable for demodulation.

PIN photodiodes, similar to their PN cousins, contain an intrinsically pure semiconductor layer—hence, the *I* in PIN—sandwiched between P and N semiconductor materials. This allows deeper penetration into the diode by light of longer wavelengths. PN and PIN detectors offer wideband operation, and good linearity and temperature stability; on the other hand, they exhibit relatively poor *responsivity* (the amount of current generated in relation to the strength of the received light signal).

Avalanche photodiodes (APDs) exhibit gain. APDs take advantage of a process called *impact ionization* to multiply the effect of each photon striking the diode junction. The resultant current avalanching allows large currents to flow in response to relatively small amounts of applied light. Avalanche photodiodes require high reverse bias—30 to 400 V—compared with the 3 to 15 V required by PN and PIN detectors. Like injection-laser diodes, APDs require temperature stabilization; this means more hardware, rendering

Why The Phone Companies—and Hams—are Going Digital

Telephone companies have recently been moving toward digital transmission techniques because digital voice transmission is more expandable and immune to noise than conventional analog schemes. *Switching* is the reason for this. Equipment control and call routing at telephone plants depend on switching—and switching analog signals without significant signal degradation is expensive. (If you're talking to someone on the phone, noise and crosstalk arising from analog switching can mean only that you have to speak up—but if you want to send computer data over the same circuit, you may run into problems with data errors.) Quality switching of *digital* signals is simpler and less expensive—so much so that the fundamental operation of switching is the driving force in the move to digital signal transmission within the telephone industry. Digital signal transmission has another great advantage: A digital system doesn't care about the nature of the transmitted information, as long as the data signals adhere to system protocol. Digitized voice, data, and images are all the same to a digital telecommunication network, and digital switching systems can handle them equally well. Radio amateurs are enthusiastic about packet radio for the same reason: In an amateur packet network, data is data, no matter what its final form.

Analog Signals Over Optical Fiber

Most of this article has been aimed at describing *digital* signal transmission through fiber-optic systems. Well over 95 percent of fiber-optic work done today is digital in nature, but more and more applications make use of analog transmission techniques. Analog signals *can* be transmitted through fiber-optic systems if the penalties of somewhat reduced distance performance and greater transmission and reception equipment sophistication are acceptable.

A few dozen cable TV systems in the United States are using analog fiber-optic systems to connect distribution hubs. Other cable TV companies are using fiber optics to connect satellite earth stations to local distribution systems. At the 1980 Winter Olympics in Lake Placid, and at the 1984 Summer Olympics held in Los Angeles, fiber-optic systems were used to connect the sites of various events together for eventual transmission by the TV networks.

A growing number of TV stations throughout the United States and Canada are using fiber-optic links for studio-to-transmitter links. If you live in the Baltimore, New York, Los Angeles or Hartford areas, just to mention a few, or if you watched the Olympic games of the 1980s, you've undoubtedly seen TV transmitted through fiber optics.

APDs more costly than PN and PIN photodetectors. Another disadvantage of the APD is that it amplifies noise in addition to the received signal. Despite this, the enhanced responsivity of APDs makes them a good choice for some applications.

Phototransistors are hybrid devices that resemble standard bipolar transistors in concept. The semiconductor material used in the manufacture of phototransistors is chosen specifically to enhance their sensitivity to light. Phototransistors offer high gain without the high-voltage bias needed by APDs, but their slower response time limits system bandwidth.

The Move to Fiber is On

The use of low loss SiO_2 optical fibers at the second or third window affords long-distance transmission with relatively few relay stations. The modest retransmission needs of fiber-optic systems mean that little in the way of service-intensive equipment is needed outside of the protection of a telephone office. The major telecommunication companies plan to replace most transcontinental and transoceanic satellite links, and much microwave service, with fiber-optic systems over the next 10 years. The first transatlantic fiber-optic telephone system is nearly complete. A transpacific system is in the works. Several domestic telephone companies are already depending on fiber-optic systems for their long-distance services. These firms have also switched to fiber optics for local traffic between central offices. By now, you've almost certainly had a telephone conversation over a fiber-optic system without even realizing it! Short-haul fiber-optic links are finding increasing use in equipment interconnection and control.

What of the future? Sometime before every garage houses a space ship, and before computerized robots cook and serve our evening meals, fiber optics will be so pervasive that virtually all communication—including Amateur Radio—will be carried over fiber optics for at least part of the way. Integrated systems are being planned to bring TV, data, telephone, shopping and financial services into the home via optical fiber. Experimental systems are already in place, and fiber-optic systems are finding their way into Amateur Radio stations. Before too long, *wireless* will refer not only to radio transmission, but also to transmission in which copper wires have been replaced by strands of glass.

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Ellen E. Wilson is a technical writer for Pirelli Communications Systems, Inc. A Penn State University graduate, Ellen has been writing about fiber optics for three years. Before that, she did free-lance writing for museums, electronic firms, medical facilities and general-interest magazines.

New Books

REFERENCE DATA FOR ENGINEERS: RADIO, ELECTRONICS, COMPUTER AND COMMUNICATIONS

Editor-in-Chief Edward C. Jordan. Published by Howard W. Sams & Co, Inc, a subsidiary of Macmillan, Inc, 4300 West 62nd St, Indianapolis, IN 46268. Seventh edition, 1985. Hard-bound volume, 9¾ × 7 inches, 1368 pages, $69.95.

Reference Data for Radio Engineers has long been considered the "engineer's bible" by design engineers. This publication first appeared in an ITT affiliate company as a 60-page brochure. In this seventh edition, our "old friend" has been expanded to 1368 pages. The new title also indicates an expansion to cover the latest in today's technology.

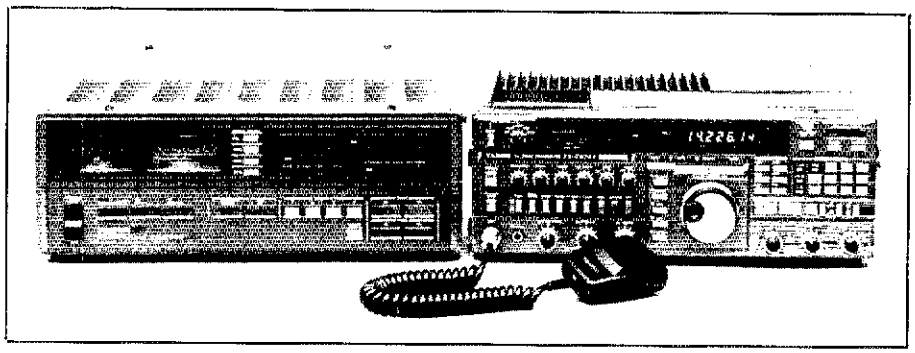
This edition contains 48 chapters—the same as the previous edition. Nevertheless, the changes in chapter titles and contents make it evident that much thought and effort has gone into bringing the reader the information that is needed today. New to the book this time are chapters on integrated circuits, lasers, computer networks, digital signal processing and a whole range of communication modes.

Looking for information on optical, analog or digital communications? How about networks, filters, waveguides, antennas, radar, lasers or mathematical constants and conversion factors? You'll find them all covered here.

A word of warning: This book is not for the casual electronic enthusiast. The text is supported by appropriate mathematical equations and data tables. If you are an engineer or an advanced amateur, you'll find this book a valuable reference resource. If you have been using an earlier edition, you may want to upgrade.—*Charles L. Hutchinson, K8CH*

Yaesu FT-767GX All-Mode HF Transceiver and FL-7000 Solid-State HF QSK Linear Amplifier

The current trend toward miniaturization and more features has created many amazing rigs. Yaesu's FT-767GX is one of the newest, and it may be the most versatile. The FT-767GX offers frequency coverage unobtainable before with a general-coverage receiver, transmitting capability on 160 m and all HF bands (including the WARC bands), and optional added coverage for 6 and 2 m, and 70 cm. When coupled with its mate, the FL-7000 HF linear amplifier, it provides efficient, easy operation with all amplifier control accomplished through the transceiver.



Transceiver Features

The FT-767GX is a solid-state, all-mode synthesized transceiver that incorporates an internal power supply, automatic antenna tuner and provisions for adding up to three internal transverter modules covering VHF and UHF bands. The rig provides 100 W output on 160 m and all HF bands in SSB, CW, FM and FSK modes. AM carrier output is 25 W, and the optional VHF/UHF modules provide outputs of 10 W.

Four microprocessors provide digital integration and control, together with features such as user-programmable independent tuning steps for each mode, an automatic calculating SWR meter, digital RF wattmeter, choice of VFO A/B and autospeed AGC (when tuning or scanning). Ten memories that store both frequency and mode, all-mode squelch, range/step programmable scanning, continuously variable noise-blanker threshold, IF shift and IF notch are also included.

For the CW operator, the FT-767GX operates full break-in (QSK) or semi break-in (VOX) and includes, as standard equipment, an iambic keyer with linear speed control, selectable sidetone and carrier offsets of 600, 700 and 800 Hz, three-speed AGC (plus OFF), a tunable audio peak filter and a 600-Hz crystal filter. All of these features are controlled from the front panel.

For VHF/UHF FM operation with the optional modules, an FM-discriminator center-tuning meter is provided. To facilitate repeater operation, a split-frequency and carrier-offset display function plus mode-dependent programmable tuning steps are very useful. An optional subaudible-tone squelch unit that is programmable from the front panel is also available.

The FT-767GX has a computer-aided tuning (CAT) system that allows external computer control of many of the transceiver's operations. With the FT-767GX operating under the CAT system, 21 commands can be used to control the VFOs and memories (data entry, selection and tuning) in addition to IF shift and CTCSS tone selection (if the optional tone squelch unit is installed). The FT-767GX also automatically controls its matching amplifier, the FL-7000.

Transceiver Controls and Indicators

The front panel of the FT-767GX looks complex—and it is! There are 67 (the way I count 'em) separate controls located on the front panel, and some of these have multiple functions. Space limitations prohibit a description of all of these functions. The rear panel contains 25 jacks and switches, three controls and mounting space for the three VHF/UHF modules. All controls are within easy reach of the operator. It is not necessary to open the cabinet to adjust anything.

Before firing up the transceiver the first time, the BACKUP push-button switch on the rear panel must be in the out position to activate the lithium-battery VFO and memory data backup system. Although the FT-767GX operating system is in nonvolatile read-only memory (ROM), the information in its 10 memories is retained in random-access memory (RAM), which requires battery backup. Before the transceiver leaves the factory, the BACKUP switch is turned off. The operating manual states that because the backup system requires very little current, the battery will last for up to five years. The memories may be cleared by setting BACKUP to OFF. The OFF position is also useful in preserving the life of the backup cell if the transceiver is to be stored for a long period of time.

When the FT-767GX is first turned on, the meter and the blue fluorescent digital display light up, with the display indicating the default frequency of 7.000 MHz. In subsequent on/off cycles, the radio remembers the frequency to which it was tuned when turned off.

There are several means of changing the FT-767GX's operating frequency. VFO A or B can be used to change frequency in 1-kHz or 10-Hz steps. To toggle between VFO A and B, press the VFO A/B button. The tuning knob controls the selected VFO. The UP/DOWN switches (immediately above the tuning knob) can also be used to change the operating frequency, as can the UP/DOWN buttons on the microphone. Normal and fast settings are possible for tuning steps/rates; the FAST button toggles between these choices. When FAST is used, the 10-Hz digit on the display is blanked. The FUNCTION keypad can also be used to enter frequencies.

The 15 FUNCTION keys have *dual* functions. Normally, the default functions labeled on the top of the key apply, but when the orange FUNC key is pressed, the alternate functions (reverse-lettered labels) are selected. For example, the H/G ENT switch toggles between HAM bands or GENERAL coverage in the default position. When GENERAL coverage is selected, a green LED, GEN, lights up beneath the frequency display. The alternate (ENT) function allows direct keypad frequency entry. After the last digit is entered, tuning shifts to the new frequency and the functions of all keys return to their default states.

The BAND/MCH keys, DOWN and UP, select the operating frequency band or memory channel according to the function selected by the keypad. In GENERAL coverage, BAND steps are 500 kHz; in HAM mode, steps are in 500-kHz band segments.

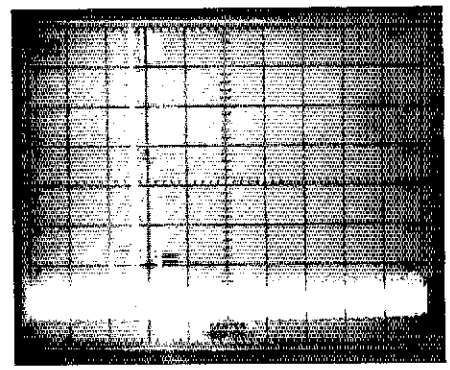
For split-frequency operation, press the SPLIT button; the active VFO frequency is displayed during receive and transmit. The display indicates SPLIT operation and which VFO is active.

The FT-767GX has 10 programmable memory channels (0 through 9) that store operating frequency and emission. Selection and manipulation of the memories and VFOs are accomplished through default keypad functions. First press the MCK key, then select the desired memory channel with the MCH UP or DOWN key. Press the VFO>M key to write the data to memory. Press the MCK key again to return the display to the VFO after you confirm that the desired data has been stored.

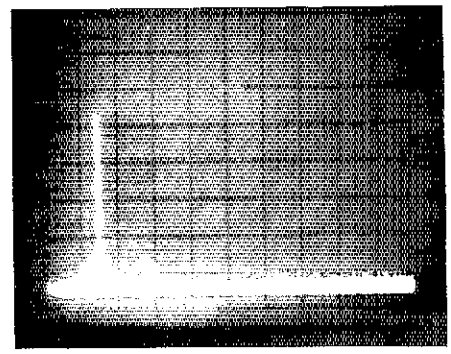
To recall a memorized frequency, press the MR key. The display shows the last channel accessed, along with its frequency. Press the MCH UP and DOWN keys to get to the desired memory channel. You may return to the last

Table 1
Yaesu FT-767GX HF Transceiver, Serial No. 6J030740

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency coverage: Receiver coverage—100 kHz to 29.99999 MHz; transmitter coverage—1.5-1.99999, 3.5-3.99999, 7.0-7.49999, 10.0-10.49999, 14.0-14.49999, 18.0-18.49999, 21.0-21.49999, 24.5-24.9999, 28.0-29.99999 MHz.	As specified.
Modes of operation: USB/LSB (J3E), CW (A1A), AFSK (J2B, F1B), AM (A3E), FM (F3E).	As specified.
Frequency display: 8-digit, blue fluorescent LEDs.	As specified.
Frequency stability: Better than ±3 ppm (−10 to +50°C) after 15-min warmup.	Not measured.
Transmitter	*Transmitter Dynamic Testing*
Power output: HF (all modes except AM), 100 W; HF (AM carrier), 25 W; VHF/UHF (all modes except AM),10 W; VHF/UHF (AM carrier), 2.5 W.	As specified.
Spurious signal and harmonic suppression: HF, better than 50 dB below peak output, VHF/UHF, better than 60 dB.	See Fig 1.
Third-order intermodulation distortion: Better than 35 dB below peak output.	See Fig 2.
CW keying waveform: Not specified.	See Figs 3 and 4.
Receiver	*Receiver Dynamic Testing*
Receiver sensitivity: See Table 2.	Minimum discernible signal (Noise floor), (dBm): Preamp on / Preamp off 20 m, −131 / 20 m, −116 80 m, −136 / 80 m, −116
Receiver dynamic range: Not specified.	*HF Measurements* Blocking dynamic range (dB): Noise limited, measured at 100 kHz. Preamp on / Preamp off 20 m, 117 / 20 m, 120 80 m, 115 / 80 m, 119 Two-tone, 3rd-order intermodulation distortion dynamic range (dB): Preamp on / Preamp off 20 m, 92 / 20 m, 86 80 m, 85 / 80 m, 86 Third-order input intercept (dB): Preamp off, 20 m +13 dBm *VHF Measurements (2-m module)* Minimum discernible signal (dBm) −139 Blocking dynamic range (dB) 112 Two-tone IMD dynamic range (dB) 71 Receiver quieting (μV for 12 dB signal + noise + distortion/ signal + distortion): 0.26
Receiver recovery time: Not specified	Rise time 2.4 ms, fall time 2.4 ms, on delay 22 ms, off delay, 14 ms.
Squelch sensitivity: See Table 2.	Not measured.
Receiver audio output into 4 Ω with 10% total harmonic distortion: 1.5 W	3.2 W.
Color: Brown	
Size (height, width, depth): 5 × 14-1/2 × 11-5/8 in.	
Weight: 35 lb (with options).	



(A)



(B)

Fig 1—Worst-case spectral display of the FT-767GX operating on the 20-m band (A). Vertical divisions are each 10 dB; horizontal divisions are each 10 MHz. Output power is approximately 104 W at a frequency of 14.011 MHz. All spurious emissions are at least 56 dB below peak fundamental output. The two taller pips on each side of the fundamental are mixing products, but are below the maximum level allowable under FCC regulations. At B, the FT-767GX is operating on the 2-m band with an output power of 14 W. The fundamental has been reduced approximately 26 dB by means of notch cavities to reduce spectrum analyzer overload. All spurious emissions are at least 65 dB below peak fundamental output. The FT-767GX complies with current FCC specifications for spectral purity on all bands.

selected VFO by pressing VFO A/B once.

Changing the data stored in a memory channel requires shifting the data to a VFO, altering it, and rememorizing it. Two means are available to accomplish this. First, select the target VFO (A or B). Press the MCK key and select the channel to be changed with the MCH UP or DOWN keys, and then press MCK again to return to the VFO. If you don't want to keep the VFO data, but want to save the memory data, press the M>VFO key to copy the stored data to the VFO. This leaves the data in memory intact. If you want to save the VFO data, but not that in memory, press the VFO/M key to swap the memory and VFO data.

For memory-channel scanning, set the SQUELCH control to the point where background noise is silenced, press the MR key, then press SCAN to start scanning. Scanning speed is controlled by the FAST key.

Another variation in the FT-767GX's frequency-control scheme is the CLARifier, another name for receiver incremental tuning (RIT). In the default mode, CLAR fixes the transmit frequency, allowing the tuning knob and buttons to control only the receive frequency. As a CLAR offset is set, it is stored in a memory unrelated to memory channels 0-9. This is not erased when the clarifier is

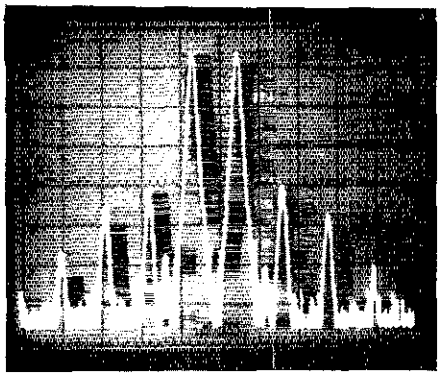


Fig 2—Spectral display of the FT-767GX output during transmitter two-tone intermodulation distortion (IMD) testing. The transmitter is being operated at 115-W output power on the 20-m band. Third-order products are 40 dB below PEP, and fifth-order products are 45 dB down. Vertical divisions are each 10 dB; horizontal divisions are each 1 kHz.

turned off; only the AC key can erase the clarifier memory.

Operating Features

Receiver

The FT-767GX is equipped with several operating aids. The IF shift and width controls, squelch and variable noise blanker allow you to eliminate interference of different types and durations.

The following functions are controlled by the group of five push buttons located to the left of the tuning dial: D LOCK (red LED indicator) disables the tuning knob to prevent inadvertent frequency changes; MUTE (yellow LED) disables the receiver audio, keeping the receiver in standby; NB (green LED) activates the noise blanker; APF (green LED) activates the audio filter for CW reception; and NOTCH (green LED) activates the IF notch filter.

An RF preamplifier (RF AMP) may be activated for increased sensitivity below 30 MHz, but this increases the chances of overload. In addition, a 20-dB attenuator may be switched in between the antenna and the receiver front end for extra immunity to overload on the HF bands. The ATT indicator LED below the display window lights when this feature is activated.

Transmitter

The FT-767GX transmitter has more standard operating features than most of the new rigs. In addition to VOX and a speech processor, it also includes an automatic antenna tuner and an iambic keyer.

The antenna tuner can match the antenna to the transmitter on all bands below 30 MHz, including 160 meters. Once a particular antenna has been matched on a band, the settings are stored in memory. If you select another band and then return to the previous band, the antenna tuner returns to the proper settings automatically. All antenna-tuner controls are in the upper-right corner of the front panel. The indicator window shows "READY" (in green) when the tuner has returned to previous settings or found an acceptable match. When the tuner is activated, a yellow "WAIT" appears. If the tuner fails to find an acceptable match (SWR below 3:1), a red "WARN" appears. The antenna tuner memories are set for a 50-ohm load on all bands. Once you have set the tuner for your particular antenna and operating frequencies, you will rarely have to reset it.

Meter

With the FT-767GX in receive, the meter displays either relative received signal strength, in S units, or discriminator tuning. In the FM mode, with the DISC button pressed, the meter shows discriminator center tuning instead of signal strength. The discriminator meter indication is at center scale when no signal is received or when an FM signal is precisely tuned in. When an FM signal is not properly tuned, the meter will deflect to the right or left of center depending on whether the signal is above or below the frequency tuned.

In transmit, the 5-position meter switch selects relative transmitter power output (PO), final transistor current (ICC), automatic level control (ALC) or speech processor compression level (COMP). The fifth position, VCC, can be used to read power supply voltage at the final transistors at any time.

Filters

In addition to the usual CW and SSB filters, the FT-767GX is equipped with an audio peaking filter, IF shift and IF notch. The audio filter provides a narrow audio bandwidth for CW reception. It is activated by pressing a front-panel switch (APF), and adjustments are made using a knob on the bottom-right side of the front panel. When APF is activated, the indicator light next to the APF switch glows green.

In SSB, CW, AM and FSK modes, the location of the IF passband relative to the received carrier frequency can be adjusted with the SHIFT control. If there is interference on the desired signal, SHIFT can move the passband window farther away from the interference. The tone characteristics of the received signal will also vary—this is useful in AM to supplement the TONE control.

The IF notch filter provides a means of suppressing interfering heterodynes in SSB, CW, AM and FSK modes. NOTCH should be activated only after the SHIFT control has been adjusted for minimum adjacent-channel interference.

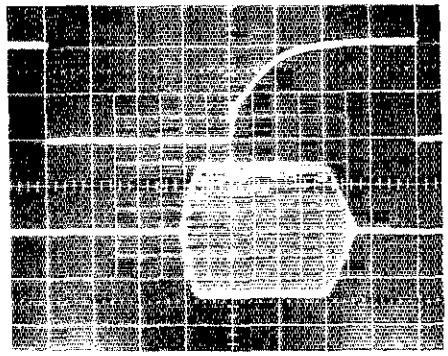
AGC

The FT-767's microprocessor automatically selects fast AGC when the tuning knob is rotated quickly. This feature helps in detecting weak signals while tuning. With the tuning parked on a desired frequency, you can select the AGC decay rate for most comfortable reception through the four-position AGC selector switch (OFF, Fast, Medium and Slow). The M (medium) position is a good option when you are trying to work weak signals in noisy band conditions.

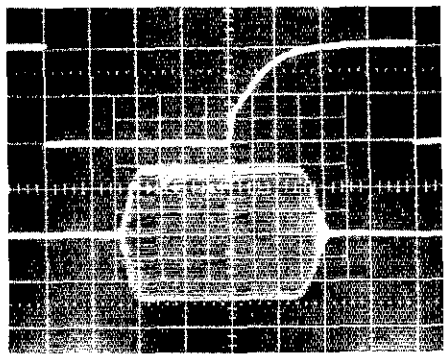
VHF and UHF Modules

There are four VHF/UHF band modules available for the FT-767GX: one for 6 m, one for 2 m, and two for 70 cm (430-440 MHz or 440-450 MHz). There are mounting locations for only three modules on the rear panel, and the modules must be installed in predetermined positions. Only the 70-cm modules are interchangeable. Thus, a fully loaded FT-767GX can cover 6 and 2 m, and only one of the 70-cm ranges.

Installation of the modules is simple and requires only a screwdriver. The review unit was equipped with the 2-m module. Installation is almost effortless: The entire process takes less than 10 minutes.



(A)



(B)

Fig 3—CW keying waveforms for the FT-767GX transceiver operating in the VOX and MOX modes. Horizontal divisions are each 5 ms. At A, the transceiver is operating in the VOX mode with QSK. At B, the transceiver is operating in the MOX mode. Although the waveforms are comparable, in the VOX mode with QSK the delay between initial key closure and RF output is approximately 7.5 ms longer.

The Manual

Lately, it seems that operating manuals, in general, satisfactorily describe a radio's features, but fall short in areas where detailed explanations are required. The FT-767GX manual is no exception. It lacks sufficient detailed instructions for the FT-767GX's frequency and memory schemes, and the complexity of these can be mind-boggling. The descriptions covering front- and rear-panel controls, jacks and switches are adequate, however. The 2-m module operating instructions covered installation, and included block diagrams and a schematic.

Observations

Operating a new rig should be a pleasant experience. For the most part, that's how it went with me and the FT-767GX. I qualified for my Golden Jubilee DXCC in about six weeks of casual weekend operation on both CW and SSB. The radio performs well, and I received many unsolicited compliments

Table 2
FT-767GX Sensitivity Chart

	100 to 200 kHz	200 to 500 kHz	0.5 to 1.5 MHz	1.5 to 29.9 MHz	2m
10-dB signal + noise/noise (μV)					
SSB/CW/FSK	2.5	1.0	4.0	0.25	0.25
AM	25.0	4.0	20.0	1.0	1.0
12-dB SINAD (μV)	—	—	—	0.5	0.32
Squelch sensitivity					
SSB/CW/FSK/AM	20.0	10.0	20.0	2.0	2.0
FM	—	—	—	0.32	0.32

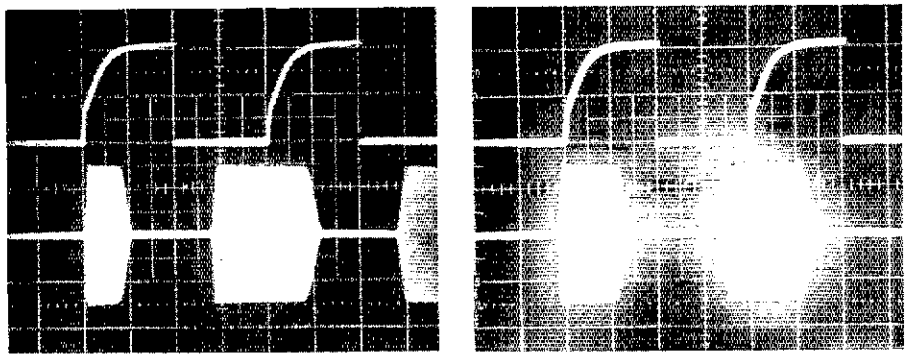
Table 3
Yaesu FL-7000 Solid-State HF QSK Linear Amplifier, Serial No. 6N050017

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency coverage (MHz): 1.8-2.0, 3.5-4.0, 7.0-7.5, 10.0-10.5, 14.0-14.5, 18.0-18.5, 21.0-21.5, 24.5-25.0 and 28.0-30.0 (28.0-30.0 not in US version).	As specified, except no coverage on 12 m.
Collector input power: (SSB) 1200 W PEP; (CW/FSK) 1200 W dc.	Power output: 500 W or more on all bands.
Spurious signal and harmonic suppression: Better than 50 dB.	See Figs 5 and 6.
Third-order intermodulation distortion (IMD): Less than 25 dB.	As specified.
Turnaround time: Not specified.	14 ms.
Antenna impedance matching range: 1.8-2.0 MHz, 25 to 100 ohms; other amateur bands, 16-150 ohms.	Not measured.
Color: Brown.	
Size: (height, width, depth) 5-1/8 × 15-1/2 × 15-3/4 in.	
Weight: 66 lb.	

about clean CW keying and SSB audio quality. I noticed one FT-767GX shortcoming: The receiver selectivity seems noticeably worse when the noise blanker is used, making operation on crowded bands somewhat more of a challenge.

Shortwave listening was a renewed and enjoyable experience with the FT-767GX. Most shortwave broadcast stations are spaced 5 kHz apart, and the PROGRAM and mic UP/DOWN keys are useful in finding these stations.

The FT-767GX is a good radio for the operator with limited room for equipment, and for operators who move between several equipment locations. This rig offers coverage of nearly all amateur bands in one compact package. With the features it packs, it will surely not be obsolete for a long time.



(A) (B)

Fig 4—Keying waveforms for the FT-767GX operating in VOX and QSK modes. At A, the transmitter is operating in the VOX (non-QSK) mode. Each horizontal division is 5 ms. The top trace is the input key closure; the bottom trace is the RF output. There is shortening of the first dot in this mode. At B, the transceiver is operating in the full-break-in (QSK) mode. In this mode, shortening of the first dot is less evident.

LINEAR AMPLIFIER FEATURES

The FL-7000 is a microprocessor-controlled solid-state linear amplifier with a built-in power supply and automatic antenna tuner. It provides at least 500-W RF output power on 160 m and all HF Amateur Radio bands (excluding 10- and 12-m bands in the US version). The FL-7000's TR turnaround time allows it to be used for QSK CW, HF packet radio and even AMTOR when driven by the proper exciter.

The '7000 requires 70 W drive for full power output. Four final transistors, each capable of 300-W collector dissipation, are combined into a fully SWR-protected push-pull, parallel "no tune" amplifier. These transistors are powered by a 47-V, 25-A supply that is cooled by a fan mounted in the bottom of the cabinet. Input ac power can be supplied at 100/110/117/200/220/234 V, 50 to 60 Hz, selectable through transformer taps. The review unit was wired for 117-V operation.

When the FL-7000 is used with Yaesu transceivers equipped with digital band data output (FT-767GX, FT-757GX and FT-980), band changing is completely automatic and controlled from the transceiver. As each band is selected, antenna choice and tuner settings are recalled from the transceiver memories.

The sensing circuitry in the FL-7000's antenna tuner turns off the amplifier and rematches the antenna whenever the SWR exceeds 2:1. During this process, the power amplifier shuts down until the antenna has been properly matched. If the SWR cannot be brought below 1.2:1, the protective circuitry causes the amplifier to be bypassed, and the red WARNING indicator lights. When the FL-7000 is used with the optional FAS-1-4R remote antenna relay unit, up to four different antennas can be connected to the

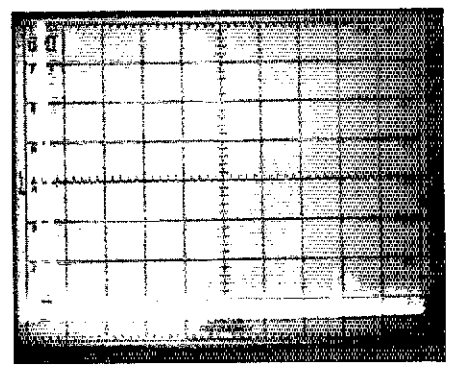
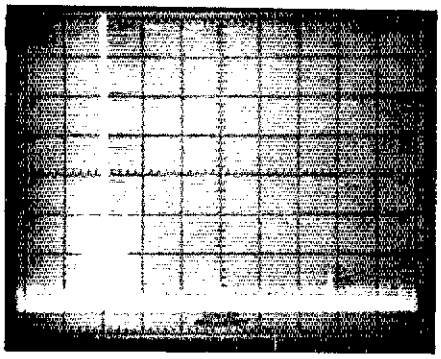
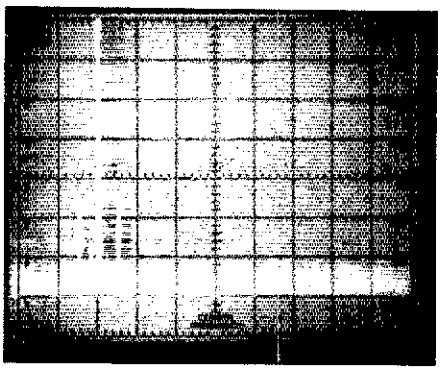


Fig 5—Best-case spectral display of the FL-7000 operating on the 40-m band. Vertical divisions are each 10 dB; horizontal divisions are each 10 MHz. Output power is approximately 525 W at a frequency of 7.020 MHz. All spurious emissions are at least 65 dB below peak fundamental output. The FL-7000 complies with current FCC specifications for spectral purity.



(A)



(B)

Fig 6—Spectral display of the FL-7000 operating on the 20-m band. At A, the input to the FL-7000 during testing. The exciter was a Kenwood TS-440S transceiver. Vertical divisions are each 10 dB; horizontal divisions are each 10 MHz. At B, the output of the FL-7000. Output power is approximately 580 W at a frequency of 14.2 MHz. All spurious emissions are at least 45 dB below peak fundamental output, and the FL-7000 output shows some attenuation of the upper close-in spurious response of the TS-440S transceiver.

amplifier and automatically selected by the FL-7000's microprocessor.

Front Panel

The front panel controls and indicators comprise 19 switches, 2 meters and 17 LED indicators. One of two large, illuminated meters provides continuous monitoring of amplifier collector current. The other meter provides selectable monitoring of relative power output, supply voltage, SWR or ALC through a four-position switch. Eight LEDs indicate amplifier, tuner and protective systems status, including fan activity and speed (high/low). (The FL-7000 has dual two-speed fans for cooling the amplifier and power supply; these are controlled by independent thermal sensors. If one of the monitored parameters exceeds safe limits, a PROTECT LED indicator lights while the microprocessor takes defensive action.)

The POWER ON/OFF switch controls input ac power to the amplifier. If the switch is turned OFF while the power supply and amplifier transistors are hot, the PS TEMP, FAN 1, FAN 2 indicators and fans will remain on until the components have cooled.

When the two-position OPERATE switch is pressed, the amplifier is operational, and the green indicator glows when the exciter activates the amplifier. When the OPERATE switch is set to OFF, the amplifier is bypassed. This switch function can be overridden by the microprocessor if it senses a problem. The two-position TUNER switch controls switching of the antenna tuner. With the TUNER set to ON, the antenna tuner is connected between the amplifier and the antenna. The tuner is bypassed when TUNER is set to OFF.

When pressed, the MANUAL switch allows manual control of band switching through the BAND DOWN/UP push buttons. This feature can be used if the exciter is not equipped with the Yaesu band-control feature. When this feature is not activated (MANUAL not pressed), the band is automatically selected by the transceiver (Yaesu FT-767GX, FT-757GX or FT-980, only). The active band is indicated by one of nine green LEDs.

The four ANTENNA selector switches are used to manually select one of up to four antennas if the optional FAS-1-4R antenna relay unit is used. If the optional unit is not used, these buttons and indicators have no function and the antenna selection will default to antenna 1.

The START switch is a momentary push-button that activates the antenna tuner system manually. Normally, as operating bands are changed, the tuner adjusts itself to the same antenna and matching impedances set at the last time the band was used. Press the START switch to retune if you're on a different part of the band, or if SWR is still a bit high after automatic tuning.

The TUNE and LOAD buttons allow manual adjustment of the matching network in the antenna tuner. These buttons are disabled when the tuning system is active or when the TUNER switch is off. In some cases, it is handy to be able to tweak the tuner settings.

Rear Panel Connectors and Controls

There are nine connectors and two switches located on the rear panel. These include a GROUND terminal post, SO-239 ANTENNA jack, remote terminal strip, SO-239 RF INPUT jack, a fuse holder, ALC jack and PTT jack. In addition, there are two accessory remote-control connections: ACC-1 is a 28-pin jack provided for use with the FT-980 transceiver; ACC-2 is an 8-pin Molex jack for the FT-757GX and FT-767GX transceivers. Rear-panel-mounted controls include an ATT/OFF slide switch to activate an input-power attenuator that is used if input power exceeds 100 W, and an ALC adjustment control.

Operation With The FT-767GX Transceiver

I've *got* to tell you about operating this amplifier with a matching transceiver! Ease of operating the system is almost unbelievable! Once you've completed all the proper interconnections between transceiver and amplifier, just turn on the power and you are truly set for "hands off" operation.

The first thing I noticed about the station was that at initial power-up, there was no fan noise. I thought for an instant that something was wrong with the amplifier, but such was not the case. Those fans are quiet!

The meters and status-indicating LEDs light up, and the amplifier is automatically set to the band you have selected on the transceiver. Simultaneously, the proper antenna is selected and the antenna tuner recalls its proper settings. Within seconds, you are ready to go on the air with a very respectable signal of about 600-W PEP output (as indicated by the PO meter). If you want to change bands, simply select the new band on the transceiver, and the process starts all over again. It's that simple!

My only problem (if you can call it a problem) was getting used to not having to perform operator functions such as retuning the finals, checking the amplifier drive, and so on. With the FT-767GX/FL-7000 combo, about all I have to do is occasionally monitor the function and status-indicating LEDs.

The FL-7000 performs as if it is part of the exciter—which, in use, it really is! True, it is the second piece of equipment at the operating position, but all you have to do is turn it on. Because of its size, features and outstanding performance, the FL-7000 is a fine complement to the FT-767GX transceiver.

Manufacturer: Yaesu USA, 17210 Edwards Rd, Cerritos, CA 90701, tel 213-404-2700. Recommended list prices: FT-767GX transceiver, $1895; FL-7000 linear amplifier, $1895; 2-m module $180. —*Don "Mac" McGrath, KZ1A*

New Books

ALL ABOUT VERTICAL ANTENNAS

By William I. Orr, W6SAI, and Stuart D. Cowan, W2LX. Published by Radio Publications, Inc, PO Box 247, Lake Bluff, IL 60044. First printing, 1986. Soft-cover edition, 8 × 5½ inches, 191 pages, $10.95.

As an inveterate antenna experimenter, I was attracted to this new booklet by Orr and Cowan. I knew from reading previous works by these prolific amateurs that the text of the new book would be to the point and presented in plain language. I was correct in my assumption. *All About Vertical Antennas* is not laced with unwieldy equations or phrases that could confuse the radio newcomer. The text has been prepared using a computer and printed in letter-quality Gothic type. This makes the narrative easy to read, even if you have weak or tired eyes!

The book has the flavor of the old Frank Jones publications. I can think of no more appropriate word to describe it than "earthy." It has a down home character that makes for enjoyable reading.

There are eight chapters and countless easy-to-follow line drawings that deal with how verticals work, practical Marconi antennas and radio ground systems. The authors also treat the subjects of matching devices, ground-plane antennas and phased vertical arrays. Multiband vertical antennas are also included in the wide-ranging coverage. The final chapter, Antenna Roundup, contains a collection of ideas that should make your antenna work better.

The urban dweller should be particularly interested in this book because it describes antennas that go up, rather than out. Full-sized and shortened antennas are discussed in sufficient depth to permit any beginner to build and adjust them easily. I found no evidence of theoretical designs in the book; the practical antennas described by Orr and Cowan appear to be based on proven, established designs. I recommend this book for any amateur library.—*Doug DeMaw, W1FB*

Hints and Kinks

Conducted By Bob Schetgen, KU7G
Assistant Technical Editor

TEST RF INSULATORS IN A MICROWAVE OVEN

☐ From time to time, situations arise where a piece of scrap plastic would make a convenient RF insulator. Some plastics, however, are very lossy at RF. Unless the application is critical, a simple test can provide reasonable assurance that the material is suitable for the job.

To perform the test, irradiate an ounce or two of the material in a microwave oven. (Protect the oven by including a cup of water with the sample as an RF load.) Operate the oven at high power for two to three minutes, then remove the sample. If the plastic has become warm, it is probably too lossy for use as an RF insulator. (The warmth is more apparent if you cool the sample in a freezer for about 15 minutes just before the test.) Insulators tested in this fashion have given me no problems at power levels up to 1000 W at 50-100 MHz.—*E. R. Berg, KZ9Y, Rockford, Illinois*

A TOWER THRUST-BEARING COVER

☐ Fig 1 is a drawing of a Volkswagen transaxle boot. The part is available at local Volkswagen dealers and it serves well to protect rotator thrust bearings from the weather. On a vehicle, the boot is installed by wrapping it around the transaxle and fastening it closed with screws. Thus, it can be easily installed on an existing tower assembly with a minimum effort.—*Robert Powell, KB6FNP, Lakewood, California*

Editor's Note: No doubt similar fittings are readily available at junk yards as well. Use your ingenuity when fitting the boot to the mast. If the mast is smaller than the boot opening, wrap the mast with sheet rubber to increase its diameter. If the mast is too large, use sheet rubber to pad between the mating boot surfaces. Sheet rubber can be salvaged from tire shops that service commercial trucks. Heavy trucks still use tires with inner tubes—the discarded tubes are a good source of rubber (about 3/32-inch thick).

Frugal readers may wish to fabricate a custom thrust-bearing boot by wrapping the mast/bearing with sheet rubber. Cut a section of rubber large enough to cover the bearing and wrap it around the mast. Secure the seam(s) with no. 6 or no. 8 hardware. Use a hose clamp to fasten the assembly in place on the mast and seal the assembly with RTV.

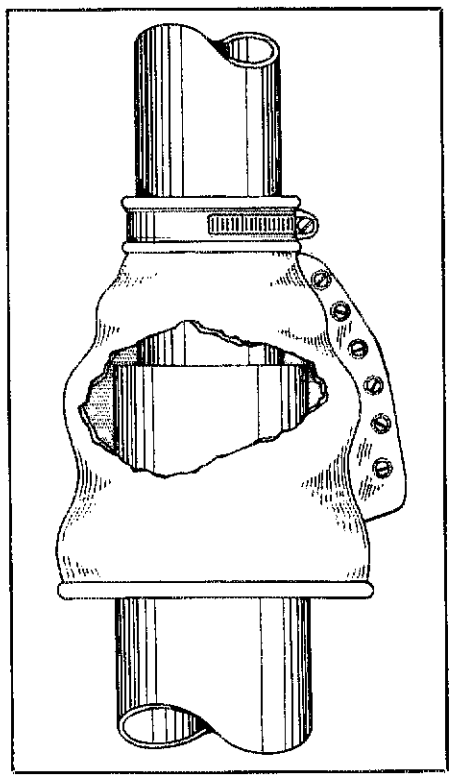


Fig 1—KB6FNP suggests a Volkswagen transaxle boot to cover and protect a rotator thrust bearing.

USES FOR EMPTY STICK-DEODORANT CONTAINERS

☐ For some time, I have been using empty stick-deodorant containers for coil forms and component modules. [Two to three minutes in the microwave oven gives a good idea how lossy the plastic is. See KZ9Y's hint.—Ed.] I mount two banana plugs (spaced ¾-inch apart) in the cap and install components inside it. The container body is screwed onto the cap to protect the circuitry. (Fine sandpaper quickly removes the product name from the outside of the container.)

The 1-7/8-inch-diameter English Leather™ container gets barely warm, but the 1¾-inch-diameter Old Spice Stick™ gets quite hot—the cool one is less lossy.

I also use the containers to store small nuts and bolts. The push-up feature makes it possible to push up the last remaining bolt and remove it easily from the container.

The cap and part of a container body covers the loading coil on my mobile antenna. It is nice to get something besides a vanishing aroma for your $2.—*Philip DeJarlais, WØJHS, Champlin, Minnesota*

HOW'S THE WEATHER BEACON FOR VHF DX?

☐ VHF DXers are in constant need of beacon stations on 2 m to help them spot band openings. For years, TV- and FM-broadcast stations have served this purpose, but many do not transmit continuously.

NOAA weather stations, however, are handy, free VHF beacons. The stations operate, around the clock, on three frequencies near 162 MHz, and they don't cost you a dime (except in taxes).

Over the years, I have found NOAA stations near me, in the Carolinas, a good indicator of tropospheric ducting. Since the NOAA frequencies are fixed, a weather radio, scanner or one of the new 2-m rigs may be simply switched among the channels for a reliable propagation check. This morning, for example, the NOAA station at Conway, South Carolina (it identifies as Myrtle Beach), 110 miles from my QTH, is completely overriding the QRP repeater at Sumter, which is in my line of sight.

I have noted "tropo" openings on the NOAA frequencies for the past six years, and they almost always correlate with 2-m conditions. In the winter, I have heard the NOAA stations in Raleigh-Durham, Wilmington and Cape Hatteras, North Carolina, and some in Virginia, during tropo openings.

Since these signals are heard here with nothing more than a small, monopole antenna on the back of the scanner, I can well imagine that an outside antenna, especially a beam, would let me hear even more distant NOAA "beacons."—*Drayton Cooper, N4LBJ, Bishopville, South Carolina*

AN EMERGENCY CHARGE ADAPTER FOR NiCd BATTERY PACKS

☐ Fig 2 shows a simple charge adapter I use to charge batteries for my hand-held transceivers. The adapter allows both fast and slow constant-voltage charging with a regulated 13.8-V dc power supply.[1]

Charge rates for several ICOM battery packs are shown in Table 1. The BP2 and BP5 have internal temperature sensors to protect them from excessive heat during charging. When the pack becomes warm, DS1 will go out. After a cool-down period of about a half hour, the DS1 will flash, indicating that the pack is ready for use.

Construction of the charge adapter is not critical. Mount the potentiometers on metal to help dissipate heat. I made a drop-in charger by cutting the metal lid of a Radio Shack® (RS 270-230) box to fit the battery packs. Use two machine screws as contacts.

[1]Generally, NiCd batteries last longest if charged with a constant current, which is limited to about one-tenth of the cell capacity. Charging should stop when a voltage of 1.3 V per cell is reached. Constant-voltage charging results in a quick charge (approximately one hour), but the voltage should be limited to about 1.5 V per cell (nominal battery voltage is 1.2 V per cell), and charging should continue for about three hours. Packs being quick charged should be switched to the low-current rate when the LED goes out and charged for a few more hours.

There are trade-offs for quick charging a NiCd cell. Some references claim a cell life of up to 1000 cycles for constant-current charging. My quick-charge experience is with Kenwood's PB-26 battery and ST-2 base charger (a 1-hour, 600-mA, quick charge). Kenwood claims a 300-cycle life for that equipment combination.

Operation of NiCd batteries is explained in "Those NiCad Batteries and How to Charge Them!" Oct 1981 *QST*, p 34. More sophisticated chargers appear in "Build the AA6PZ Power Charger," Dec 1982 *QST*, p 17, "Any-State Ni-Cad Charger," Dec 1979 *Ham Radio*, p 66, and *The ARRL Handbook*.—Ed.

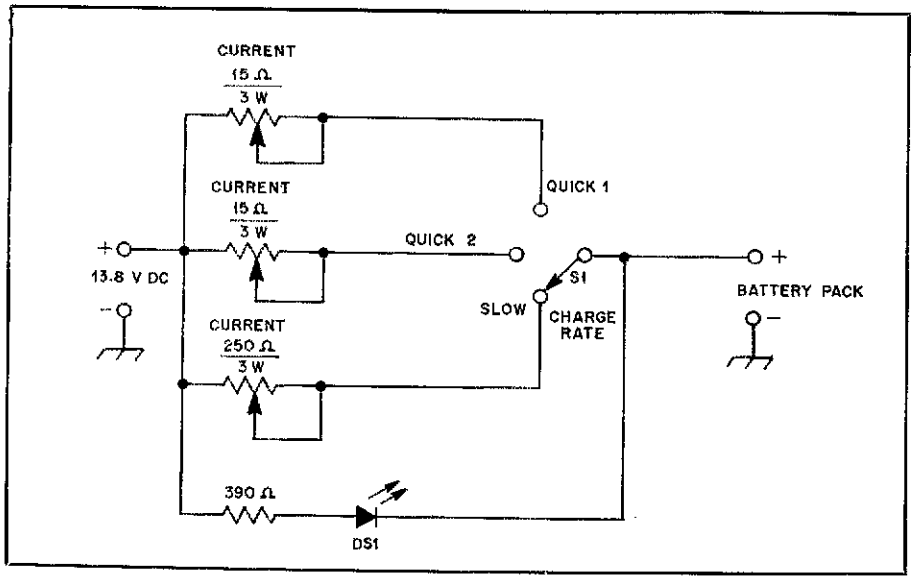


Fig 2—KB3WZ's emergency charge adapter for NiCd battery packs. S1 is a three-position, single-pole rotary switch. DS1 is any common LED.

Adjust the potentiometers so that the current is at the level indicated when the pack is near full charge.—*Joseph J. Janus, KB3WZ, New Castle, Pennsylvania*

Table 1
Charging Rates for Several ICOM Battery Packs

Pack	*Current (mA)*	*Duration (hrs)*
BP2††	600	1-1.5
BP3	25	15
BP4†	45	15
BP5†	500	1-1.5

†Recharge only NiCd batteries in the BP4.
††Do not quick charge batteries without internal thermal protection.

Fig 3 shows my switching arrangement. When the toggle is in the CW position, the modem AFSK/transmitter circuit is opened and the CW-keying circuit is completed. When the toggle is in the SSB position (for RTTY operation), the AFSK circuit is completed and the CW-keying circuit is grounded (to key the transmitter when it is placed in the CW mode).

This external switch allows easy changeover between AFSK and CW modes without the need for internal modem modifications. The project is very easy to build, and it makes computer CW/RTTY operation much more convenient.—*Russ Rennaker, W9CRC, Kokomo, Indiana*

A SOURCE OF RING MAGNETS

☐ Some of the ring magnets used in speakers are quite large and powerful. The magnets are discarded with faulty speakers, but they are useful around the shop, or for a home-built magnetic antenna mount.

But have you ever tried to salvage one of these magnets? The magnet material is often ceramic—very hard and brittle. Any attempt to separate the magnet and speaker usually results in a broken magnet. Careful application of heat from a propane torch, however, softens the cement that holds the magnet and allows it to be removed in one piece.

Slowly apply heat to the metal speaker case (heat can damage the magnet) until the cement starts to soften, then gently pry the magnet free. I have not found a speaker magnet that could not be removed with this method.—*J. M. Simms, N7BBC, Tucson, Arizona*

USE IC SOCKETS TO PRESERVE PLUG-IN BREADBOARDS

☐ Fig 4 shows an inexpensive DIP socket used to preserve the holes of a plug-in breadboard fixture. I have found that heavy use weakens the contact clips in such boards. (Some of my older boards no longer grip wire smaller than no. 16 AWG.) An inexpensive DIP socket protects the expensive plugboard from excessive wear. When the socket no longer provides good contact, simply replace it with a new one.—*David Polen, W8FRB, Canton, Ohio*

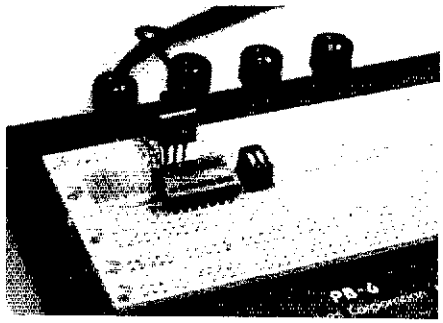


Fig 4—W8FRB uses a DIP socket to prolong the life of his plug-in breadboards.

AN AID TO COMPUTER CW

☐ The proliferation of computers in Amateur Radio stations has greatly simplified RTTY operation and enhanced high-speed CW operation. Unfortunately, some of the computer/radio interfaces (modems) have default conditions on the radio AFSK and CW-keying lines that are incompatible with some transceivers. Those modems leave the RTTY tone on when placed in the CW mode. This condition makes it impossible to use a VOX feature for CW operation because the AFSK tone keeps the transmitter keyed. Also, many modems leave the CW-keying circuit open when in the RTTY mode, so that the key line must be unplugged when you switch to the CW mode for transmitter adjustments. I use the Hal Communications CRI-200 modem, and it works fine on both RTTY and CW—except for the aforementioned problems.

Here is a cure for these problems. It consists of an external DPDT switch, a small aluminum box and four phono jacks.

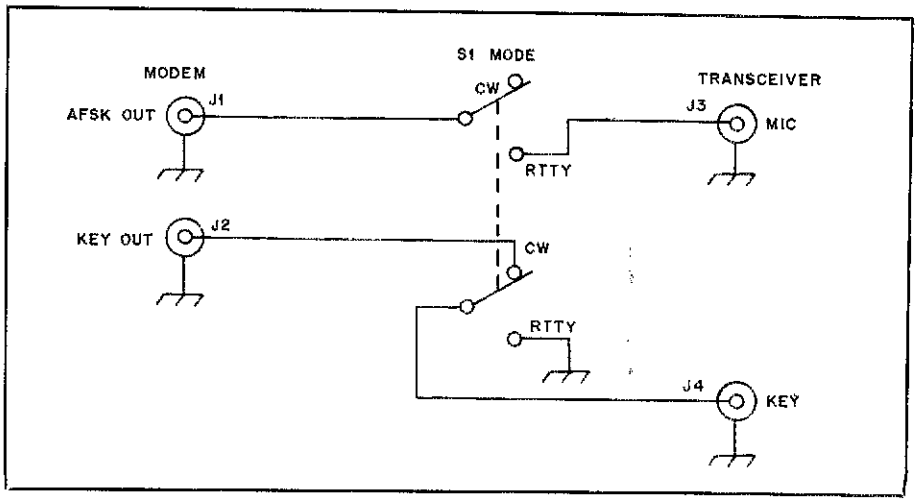


Fig 3—W9CRC's CW/AFSK switch circuit. S1 is a DPDT toggle switch. J1-J4 are phono jacks.

Technical Correspondence

Conducted By Paul K. Pagel, N1FB
Senior Assistant Technical Editor

WIRE GAUGE AND DIAMETER IN BASIC

☐ Many programs for designing antennas or winding coils require conversion of wire gauge to wire diameter. A standard method of performing such conversions using BASIC is to write several IF..THEN statements to cover the expected range of wire sizes. This method is awkward, wastes memory and results in a slow-running program.

A much simpler approach uses the fact that the wire diameter doubles when the wire gauge is reduced by a factor of 6. For example, no. 20 wire has a diameter of 0.032 inch; no. 14, 0.064 inch and no. 8, 0.128 inch. Knowing this, the conversion fits into one BASIC program line:

```
100 D = .324 * 2 ^ (G/-6)
```

when solving for wire diameter, or

```
100 G = -6 * LOG(D/.324)/LOG(2)
```

when solving for wire gauge, where D = wire diameter in inches, and G = wire gauge.

These two formulas will work for all wire gauges from 0 to at least 40. A small error in diameter calculation (about 10% for no. 30 wire and 2% for no. 10) will occur when using enameled wire. This can be corrected with an expanded version of the formula. —*John Young, WA8KNE, 14386 Demery Dr S, Jacksonville, FL 32250*

VCR TVI

☐ Recently I was informed that my 15-m signal was causing RFI to a neighbor's VCR located several hundred feet away. I verified the interference while a friend operated my station. I maintained contact with my friend by telephone, noting that the VCR motor would change speed, following the SSB modulation. Turning on my linear amplifier increased the severity of the interference.

To pinpoint the source of RF entry, I disconnected the coaxial cables from the TV receiver and operated the VCR by itself. The interference persisted. In an attempt to rule out signal entry via the ac line cord, I wrapped several turns of the cord through a 2½-inch ferrite toroid; that didn't help. Apparently the RF energy was entering through the plastic VCR enclosure.

The customer service department of the manufacturer of the VCR (a Mitsubishi 105 CH) admitted that the motor control circuit (which is synchronized to the video signal for proper picture display) is very susceptible to HF interference and would require good shielding to eliminate the interference.[1] There appears to be no simple solution to the problem. My neighbor's only recourse is to bring the VCR to a Mitsubishi dealer who may be able to coat the inside of the plastic case with conductive paint, a project that I am not willing to undertake.

I am an ARRL ATC (Assistant Technical Coordinator) and a VHF/UHF enthusiast with quite a bit of experience relating to RFI/EMI/TVI. I have copies of the ARRL publications, *Radio Frequency Interference* and *Amateur Radio Field Resources Directory*, but could find little on curing VCR problems in them. Can you imagine the plight of amateurs in populated areas as VCRs continue to proliferate? Recent VCR price reductions (and evident corner-cutting with regard to shielding) is sure to make VCR RFI a problem for more of us soon. Have any other *QST* readers experienced such RFI problems? Does anyone have any cures?—*Dale P. Clement, AF1T, Bela View Dr, Box 388, Concord, NH 03301*

[1]The MGA Mitsubishi customer service department telephone numbers are 800-421-1140 and 714-220-2500. In the manual I have, the number is incorrectly given as 800-421-1132.

VFO STABILITY

☐ Many years ago, I attempted to replace the tube-type oscillator of a BC-221 frequency meter with a transistorized oscillator; the results were disappointing. While the transistor contributed little heat to the tuned circuit and thermal drift was reduced greatly, the oscillator was quite sensitive to supply voltage changes. Since then, I have learned to cope with the shortcomings of transistor oscillators. I'll describe a method I have developed for compensating LC oscillators to reduce the effect of supply voltage changes. An additional benefit is the reduction of incidental phase and frequency jitter. Simply adding a regulated power supply will not provide these benefits.

Over the years, many authors have pointed out the desirability of loose coupling between the LC circuit and the active device, the need for a high loaded Q and so forth. These are necessary, but insufficient, steps toward oscillator stability. The answer lies, I believe, in a paper by F. B. Llewellyn.[2] His reactance-compensated oscillator can be realized by the simple expedient of adjusting the reactance of a strategically located bypass or coupling capacitor.[3] Even crystal-controlled oscillators can benefit from reactance stabilization when the utmost in stability is required.

Oscillator compensation can be done with simple equipment found in most amateur stations. Fig 1 is the schematic diagram of a VFO designed to cover a narrow band around 1300 kHz. T1 adds a perturbing 60-Hz signal to the supply voltage. Make C1 and R1 temporarily variable by any convenient means. Tune a communications receiver to the oscillator frequency. With the output of T1 set for minimum by means of R2, the oscillator should produce a T9 note, if all is well. As the output of T1 is slowly raised, the oscillator signal will take on the characteristic warble of incidental FM. Add only enough 60-Hz signal to produce a noticeable warble. Alternately adjust C1 and R1 to improve the tone. Once the adjustment for minimum FM of the oscillator signal is established, install fixed-value components for R1 and C1, and remove T1. The oscillator is now compensated for large variations in supply voltage.

In the circuit of Fig 1, C1 (510 pF) presents a relatively high reactance (230 ohms) at the operating frequency. R1 provides a degree of negative feedback, further improving stability.—*Walter S. Glazar, W3WI, Goddard Space Flight Center, Code 675, Greenbelt, MD 20771*

[2]F. Llewellyn, "Constant Frequency Oscillators," Proc IRE, Vol 19, p 2063, Dec 1931.

VLF AND THE HAM

☐ I was very interested in the Heath HD-1420 VLF converter review.[4] The reviewer correctly states that the antenna impedance must be carefully matched to the converter. At the low end of the spectrum, where wavelength approaches many kilometers, the impedance of the average ham antenna is that of a small

[3]F. Terman, *Electronic and Radio Engineering*, 4th ed (New York: McGraw-Hill, 1955), p 495.
[4]Bruce O. Williams, "Heath Model HD-1420 VLF Converter and Model HD-1422 Antenna Noise Bridge," *Product Review*, *QST*, Nov 1986, pp 40-41.

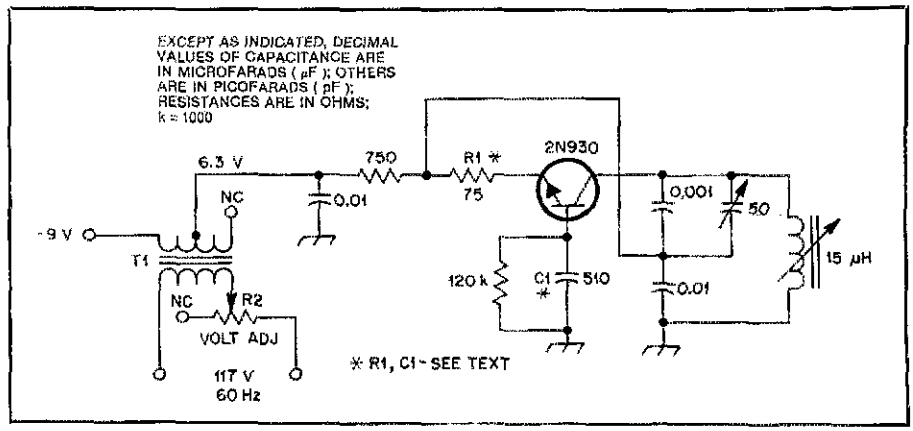


Fig 1—An experimental oscillator circuit used to demonstrate reactance compensation.

capacitor having a value of perhaps 100 pF. The signal collected by the antenna is quite small and requires amplification. A simple FET amplifier with a transformer input circuit can be used for impedance matching and signal amplification.

Most VLF stations transmit vertically polarized signals. Often, the best VLF antenna is a short (2-5 m) vertical. A good ground system is more important than antenna size.

There is no lack of signals below the AM broadcast band. Most hams can hear at least several beacons in the 190-415 kHz range. These stations identify themselves with modulated CW. The Loran-C network at 100 kHz covers most of the country. Communications stations in the 15-30 kHz range can be heard anywhere in the world. The OMEGA navigation stations at 10.2, 11.3 and 13.6 kHz are used throughout the world for navigational purposes. In each case, commercial users of these services employ little more than a short vertical antenna and preamplifier.

There are several uses the average ham can make of VLF signals:

1) Loran-C transmissions are an accurate source of 100-kHz signals.

2) Monitoring the waveshape of the Loran-C signal can provide reliable information on the state of the upper atmosphere, such as D-layer absorption, E- and F-layer heights, and so on. Because the shape of the Loran pulse follows the sine-square formula, skywave and ground signals are easily discerned using an oscilloscope.

3) Monitoring the amplitude and phase of the OMEGA network stations offers data about the propagation conditions to virtually any place on the globe. The OMEGA transmitters are located in Japan, Norway, Liberia, Hawaii, North Dakota, LaReunion (Reunion) Island, Argentina and Australia.

Information about these services is available from the US Coast Guard. The Naval Observatory in Washington also maintains a bulletin board service with status on these and other navigational services. That BBS number is 202-653-1079. I use 1200 baud, 7 bits, even parity and 1 stop bit. Users must identify themselves each time they access the BBS. No general menu is displayed, but operations information can be had by sending @EXP or @TCO for an explanation of codes and services. Terminate your call with @BYE.—*Bob Fisher, K2ND, 80 Iroquois Dr, Brightwaters, NY 11718*

[3]F. Terman, *Electronic and Radio Engineering*, 4th ed (New York: McGraw-Hill, 1955), p 495.

[4]Bruce O. Williams, "Heath Model HD-1420 VLF Converter and Model HD-1422 Antenna Noise Bridge," Product Review, *QST*, Nov 1986, pp 40-41.

DX-60B SWITCH REPLACEMENT

☐ I was off the air for four months because of a malfunctioning switch in my old Heath DX-60B transmitter. There are still a number of these old rigs on the air, and the FUNCTION switch is often the first part to fail. When I inquired about a replacement switch (part no. 63-246) for my transmitter, Heath said replacement switches were no longer available. But they are! I thought other DX-60B owners might like to know that a Centralab switch, PA 077-0018, works just fine as a *direct replacement*. [The DX-60 and DX-60B FUNCTION switches bear the same Heath part number.—Ed.]

To provide a slightly larger working area when replacing the switch, I removed the adjacent DRIVE LEVEL control mounting hardware and moved the control to one side. When wiring the replacement switch, solder the leads to the *front* wafer first.—*Gordon ("Gus") R. White, KA8BFY, 1944 Northfield NW, Warren, OH 44485.*

VIEW: DIGIVFO

☐ Sometimes, poor choices for electronics terminology lead to misunderstanding of circuit function and design. For example, take "dual digital VFOs"—please! Even though "dual digital VFOs" is a common phrase these days in discussions of synthesized-tuning transceivers and receivers, I suggest that its application to most current consumer step-tuned radio equipment is usually incorrect, in at least two senses, even when there's a switch or button marked VFO A/B somewhere on the front panel.

True enough, nearly every new amateur transceiver these days sports these VFO characteristics: (1) microprocessor frequency control; (2) phase-locked-loop (PLL) frequency synthesis; and (3) digital (that is, direct numeric) frequency readout. But this does not make such a VFO "digital"! Far from it, in fact: The nondigital nature of PLL VFOs is the main reason for the specter we're coming to know all too well as phase noise. High receiver dynamic range is more or less accepted as important by amateur equipment manufacturers. Now, we must increase their understanding of the fact that noisy oscillators can and do offset improvements in dynamic range. (If you've noticed in some receiver/transceiver reviews that a given dynamic-range measurement was said to be "noise limited," you've seen the result of phase-noisy PLL VFOs.)

What does this have to do with whether or not a VFO is PLL or digital? If it's commanded and displayed digitally, it's digital, right? Not necessarily. At the heart of almost all of our PLL VFO rigs are phase-locked LC (inductor/capacitor) or VXO (variable crystal oscillator) circuits. Phase locking is simply a method of forcing a VFO or VXO to a desired frequency and holding it there by negative feedback. (Oscillators tuned in this way are almost always controlled by varying the tuning voltage of one or more varactor diodes; such a VFO is thus called a VCO; a voltage-controlled crystal oscillator is a VCXO.) Because it's possible to use microprocessors to monitor and control PLL circuitry, and because microprocessors "speak digital," many of us feel safe in referring to such microprocessor-controlled PLL VCOs and VCXOs as "digital."

Trouble is, such PLL oscillators aren't digital—they're "analog" oscillators controlled through the use of digital techniques. When your transceiver "remembers" a frequency, its microprocessor isn't actually setting an internal oscillator to that frequency and leaving it there. Rather, the radio's microprocessor/RAM system stores the set of instructions necessary to force the VCO back to that frequency. (Information concerning front-end filters, operator choice of emission [CW, SSB, etc] and IF selectivity is just part of this set of instructions.)

Yes, there are truly digital VFOs—VFOs in which the output signal is fabricated piece by piece in digital circuitry.[5] Because such circuits do not use phase-locked loops to achieve good frequency stability, they can, in theory, provide output very low in phase noise. But the VFOs in most of our "digital VFO" rigs aren't digital at all.

What about the fallacy of the "dual" in "dual digital VFOs"? Well, remember that the designers of most "digital" transceivers have merely implemented digital means of commanding nondigital circuitry. Band/frequency/mode memories involve only the storage and re-execution of commands. Although there are usually several VCOs/VCXOs in a given "digital" transceiver, this is done for enhancement of oscillator function and not for redundancy. (Each oscillator operates over a relatively narrow frequency range; this allows for optimization of frequency control and output purity.) Any VFO "duality" in such a synthesized rig arises from multiple means of storing band/frequency/mode/filter commands. That's all. There is only one set of VCOs/VCXOs in the radio!

There are directly perceptible differences between the performances of true digital and digitally commanded PLL (that is, indirectly synthesized) oscillator circuitries. These circuitries are greatly different electrically. Words do exist that allow us usefully to signify these differences—and improper application of words to a circuit configuration can, as usual, lead to inadequate comprehension of circuit performance and quality on the part of buyers of equipment containing that circuitry.

So, "dual digital VFOs"? Usually not. Here's my vote for better terminology where microprocessor-controlled VFOs are neither dual nor digital: "Dual VFO command registers." It almost sounds like something new.—*David Newkirk, AK7M, Assistant Technical Editor, QST*

[5]Fred Williams, "A Digital Frequency Synthesizer," pp 24-30, Apr 1984 *QST* (Feedback, p 43, Jun 1984), and "A Microprocessor Controller for the Digital Frequency Synthesizer," pp 14-20, Feb 1985 *QST*. A distillation of both articles appears in the 1986 and 1987 editions of *The ARRL Handbook* (Newington: ARRL), M. Wilson, editor, p 29-23. The Apr 1984 *QST* article and *Handbook* writeups also explain the difference between direct, indirect and digital frequency synthesis. As far as I know, all of our present HF/MF "synthesized" receivers and transceivers employ indirect synthesis.—*AK7M*

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.

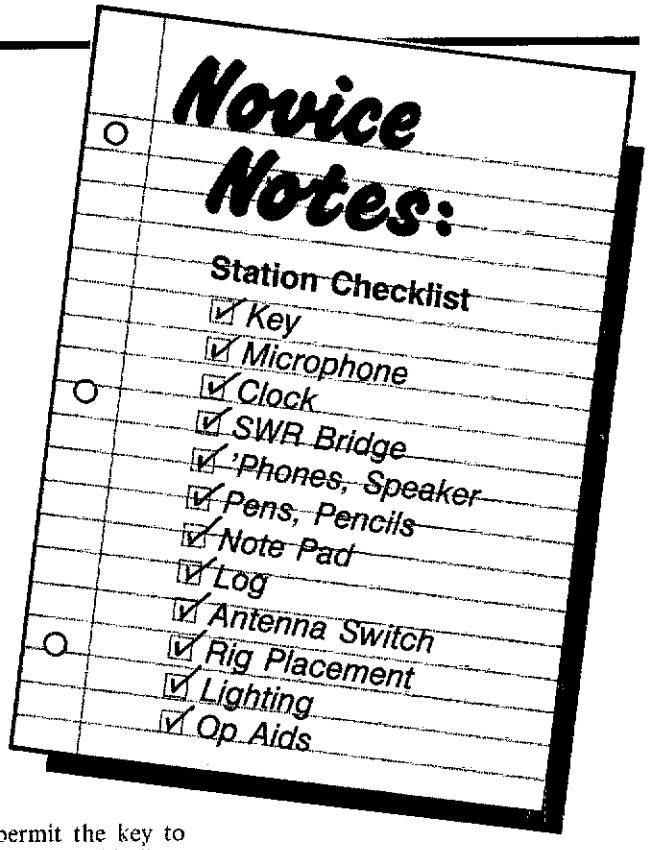
Feedback

☐ Footnote 2 of the article, "A New Chip For Charging Gelled-Electrolyte Batteries" (*QST* Jun 1987, p 26) should read: A complete kit (the PC board the Unitrode chip and other parts) is available from A & A Engineering for $49.95. Their address is 2521 W La Palma, Unit K, Anaheim, CA 92801, tel 714-952-2114. Add $2.50 to all orders for shipping and handling.

Cleaning up Your Act in the Ham Shack

Is your station's layout cramping your operating style? Here's one ham's tips on what to put where, and why.

By Lee Aurick, W1SE



You've waited for months to get on the air, and finally have everything connected. You've summoned all the courage at your command to make that first contact. Now, when that first station returns your call, you don't have a pencil, or even paper, to record the call sign. Don't feel bad—at least not for too long. In the excitement, such "minor" things tend to get overlooked by a great many beginners.

STATION ESSENTIALS

In addition to a rig and an antenna, there are several other important items you should consider when setting up your first ham shack. They include a key (or electronic keyer), a microphone (particularly in light of the recent passage of Novice Enhancement), a 24-hour clock, an SWR bridge (even if one is included in your rig), headphones, a speaker, a healthy supply of pens or pencils, a pad of paper, a log book and an antenna selection switch. Let's look at each of these items.

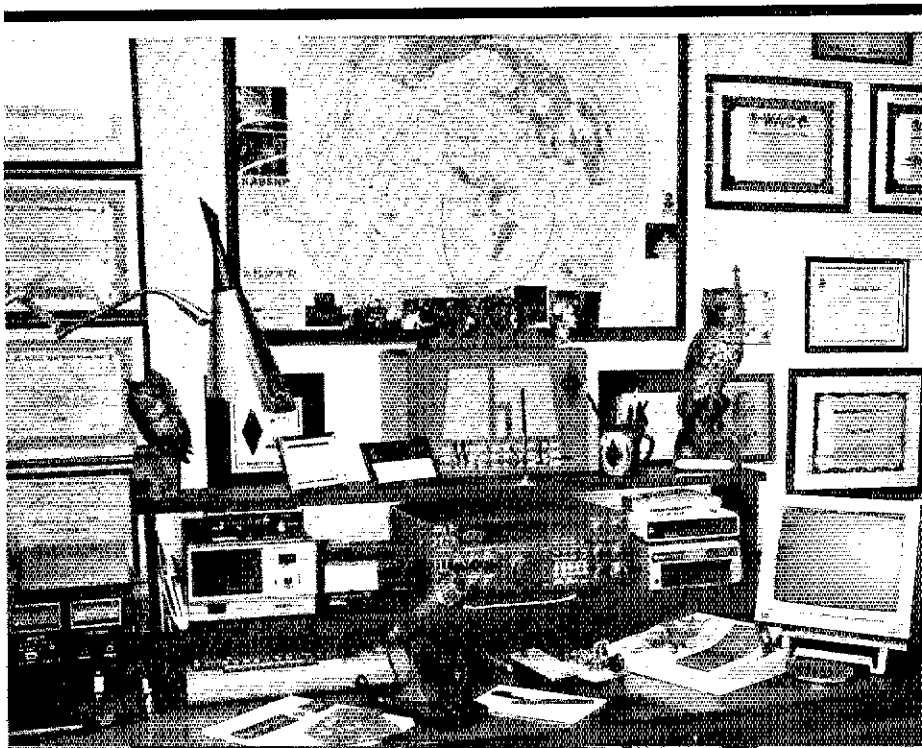
The Key

If a straight key is used, it should be of good quality, intended for radio operation. The key's contacts should be adjusted to approximately 1/16 inch apart, and the trunions (the horizontal screws) should be only loose enough to permit the key to move freely up and down without binding. The key should be mounted far enough back on the operating table to permit most of your forearm to rest on the table. If your key is adjusted and placed properly, you should be able to handle long QSOs without tiring.

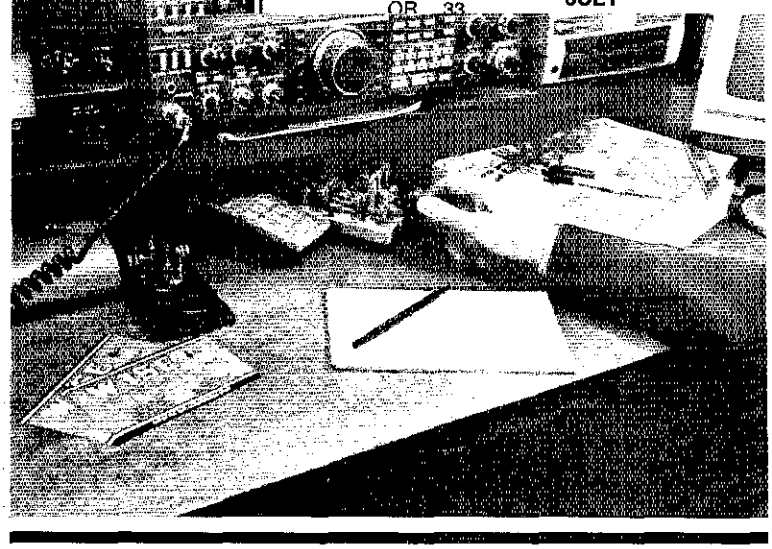
Keying paddles, used with electronic keyers, are generally adjusted for the closest possible contact spacing. The idea is that it should take very little time and energy to move the paddles. The smaller the space, the less time it takes to close the contacts. Before getting on the air, you will want to adjust the speed of the dits and dahs of the electronic keyer to the total speed at which you intend to send.

The Microphone

Any placement of the microphone that is convenient for you is good. However, it is important to develop good microphone technique. This includes talking *across*, and not directly into, the microphone. This will help you to avoid the "essss" sounds, which are undesirable and can annoy operators on nearby frequencies. Develop



Your ham shack may not always be this neat, but a little organization goes a long way in making your operating more comfortable and efficient.



The key should be far enough back on the operating table to permit most of your forearm to rest on the table. If the key is adjusted and placed properly, you should be able to handle long QSOs without tiring.

the habit of always talking to the microphone at the same angle. If you don't, some words could sound louder than others, and some may be barely heard.

Always use a microphone that is compatible with your rig—usually, the radio manufacturer will recommend one. The use of a low-impedance microphone with a rig that features a high-impedance input, for example (or vice versa), may result in a loss of audio power and distortion of the transmitted signal.

The 24-Hour Clock

Inexpensive 24-hour clocks, either analog or digital, are readily available. Buy one that is easy to read at a glance. Placing the clock at eye level is a good choice, since you will refer to it frequently.

Okay, if you don't intend to work stations out of your time zone, perhaps you can get by with a 12-hour clock. But the radio world tells time, and keeps its logs, in 24-hour Coordinated Universal Time (UTC). Even if you don't plan to work DX, there are five time zones in the continental US and Canada, plus one each in Alaska and Hawaii, to contend with. When you ask other operators to confirm a contact with a QSL card, it is very helpful if each of you uses the same 24-hour UTC system. It will permit him to find the contact in his log more readily, and will greatly improve your chances of getting that coveted confirmation of contact.

When you work DX—anything outside of North America—it is absolutely imperative that you use a 24-hour clock. UTC does not change with the seasons, as does local time; it is always the same anywhere in the world.

The SWR Bridge

Even if your transceiver has SWR and power meter functions as part of the information that may be selected from the front panel meter, you may wish to consider getting a separate meter. That way, both of these functions can be performed simultaneously. For example, you might want to monitor the ALC (automatic level control) on the transceiver when using SSB so that modulation may be kept constant and excessive output peaks avoided. On CW, you may wish to monitor final amplifier collector current or voltage while, at the time, monitoring the SWR at the input to the antenna feed line, or the power output at the transmitter. To do all of that simultaneously requires a separate meter. It is also a good idea to compare the reading of one meter with another occassionally.

When shopping for a meter that will read *power output*, you should consider one that is of the *peak*-reading type. It will not make any difference when you tune up on CW, but it will read those SSB peaks, and help you to avoid the slings and arrows of outrageous splatter.

Headphones and Speaker

Nothing very complicated here. There are times when you will want to use headphones, perhaps to avoid the wrath of other family members or to dig out the signal of that weak station you've been looking for.

Often, the audio quality of the small speakers included with modern transceivers, and pointed toward the ceiling, leave something to be desired. They are satisfactory only if you are on a DXpedition, have a severe time and distance problem and somehow forgot to bring the headphones. An investment in a good "outboard" speaker will bring many years of operating enjoyment.

Pens or Pencils

I choose ball-point pens over pencils because they don't break at the moment you are copying that elusive call, and they don't have to be sharpened. Others prefer pencils, but whichever you choose, always keep a few within easy reach of the operating position.

Copy Paper

Even experienced hams are sometimes caught short in this department. Nothing

Operating fatigue is reduced considerably if the transceiver and other major items are positioned slightly below eye level. . . generally about 7 inches above the surface of the table—on a shelf, for instance.

No Ham Shack Should Be Without 'Em

Most likely, you've expended most of your energy so far on getting just the right rig, putting up the most effective antenna and finding the perfect spot for your shack. And rightly so! But there are also a variety of operating aids available that shouldn't be overlooked. You'll find them to be invaluable tools to have around the ham shack—no matter what level of proficiency you're at or hope to achieve. Here's a list to get you started. All of these items are available from ARRL (see order form on page 169), or a page reference found in the Mini Directory in this issue of *QST*.

- ☐ ARRL World Map
- ☐ US Call Area map
- ☐ A list of Q signals
- ☐ CW-abbreviations list
- ☐ The latest ARRL *Operating Manual*
- ☐ The latest edition of ARRL's *FCC Rule Book*
- ☐ W1AW schedule
- ☐ Coordinated Universal Time (UTC) conversion chart
- ☐ *Net Directory*
- ☐ Frequency Privileges and Power Limits charts
- ☐ *Callbook*
- ☐ DXCC Countries List
- ☐ A list of the countries with which the US shares third-party and reciprocal-operating agreements
- ☐ *Repeater Directory*
- ☐ 1987 ARRL Calendar of Events

to write on—except perhaps a page torn in desperation from the log, or the back of an old envelope. Loose sheets are messy and tend to clutter the operating position, so just about any kind of note pad will do. Reports, names, frequencies, comments and station locations written on the pad can be transferred easily to your log at the end of the contact, or after you're through operating. A spiral-bound stenographer's pad is a good choice. When it's filled, you have only to turn it over to start again with a clean pad.

The Log Book

Some time ago, the FCC decided that it would no longer require hams to keep a log of station operations. Their reason was that logs of amateur stations did not figure significantly in enforcement of the rules. There are some good reasons why you should keep a log, however.

Primarily, it's an excellent record of station operations. It is useful, for example, to make comparisons of performance, such as just how much improvement did that new antenna provide?

If you expect to exchange QSL cards, the information contained in the log is vital. This information becomes even more important if you're working toward an award, such as Worked All Continents (WAC), Worked All States (WAS) or DXCC (100 countries). Cards from DX stations may take a year or more to make the trip via the bureau system. If your first QSL doesn't bring the desired card, you'll need the information in the log for a follow-up.

Last but not necessarily least, your log can be used as evidence to show that you were not operating at a particular time some on-the-air violation took place. More than one ham has been saved that embarrassment by producing a complete log covering the period in question.

The Antenna Selection Switch

For the ham fortunate enough to have more than one antenna, there must be some method for selecting the desired one. This is customarily done with a coaxial antenna switch. When purchasing one, make certain it will accommodate several antennas. A good buy is one that will accommodate four or five antennas (one can never predict how fast antenna farms grow), and that has a shorting position which, when selected, will ground all antennas. Then, install a heavy-gauge wire directly from the switch to ground. The antenna switch provides convenience and a measure of safety—a difficult combination to ignore, even if you have only a single antenna.

PUTTING IT ALL TOGETHER

Now that we have identified the basic items that comprise an amateur station, there are just a few more thoughts on how it can all go together. They involve eye-level positioning of the major station items, all within reach, and lighting for the operating position.

The Eyes Have It

Most experienced operators discovered long ago that operating fatigue is reduced considerably if the transceiver and other major items are positioned slightly below eye level. Precisely where, of course, is a matter of individual preference.

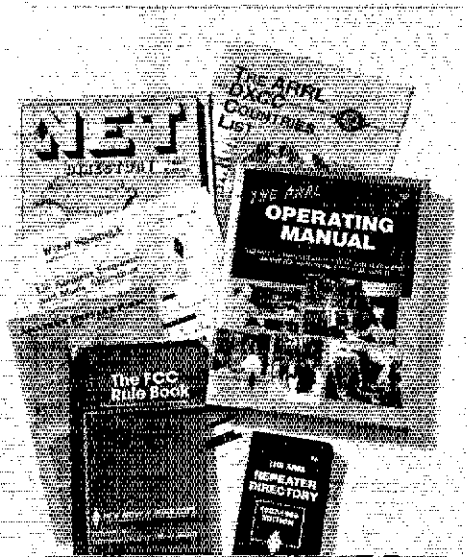
Generally, if you start with the feet of the transceiver being raised about 5 to 7 inches above the surface of the operating table—on a shelf, for instance—it will be fairly easy to find the best position for you. The shelf can be of any material strong enough to support the equipment to be placed upon it.

A good source of finely finished shelf material can be found at a local building-supply or furniture store. Dining-room tables frequently come with more leaves than people need, or want. Odd leaves can be bought for just a few dollars, and can be supported at the desired height by blocks at each end. Don't forget that old doors can be turned into sturdy shelves quickly and inexpensively, too.

Lighting

The final thing to consider—one that can add significantly to comfort and convenience—is lighting for the operating position. Bright light should be avoided; it's tiring on the eyes. You will need only enough light to write notes and to keep a log. This may be a great deal less than might be imagined. Generally, a small, directional light, targeted on the area of interest, will be adequate. An overhead light, of course, is better for general lighting. Experiment. The results will only improve your operating pleasure.

That's about all there is to it. You need only remember that none of the things we've discussed is required, only operator comfort and convenience—yours!



There are a variety of operating aids available. You'll find them to be invaluable tools to have around the ham shack—no matter what level of proficiency you're at or hope to achieve.

Since first becoming licensed in 1946, Lee Aurick has gained much experience setting up and dismantling amateur stations, having operated from several QTHs over the years. Indicative of Lee's many moves, W1SE is his eighth call. The photos for this article were taken at Lee's station in Newington. Lee recently retired from the ARRL with a total of 13 years service, the last 10 of which were as Advertising Manager.

Region 1 Meets in Holland

By Richard L. Baldwin, W1RU
President, IARU

The International Amateur Radio Union (IARU), a union of national Amateur Radio societies, now has more than 125 members. Prominent among its several goals are the representation of the Amateur Radio Service at and between international telecommunications conferences, and the effecting of cooperative agreements on matters of common interest between national societies, such as band plans.

Like the International Telecommunication Union (ITU), the IARU world is divided into three regions. They consist essentially of Europe, the USSR, Africa and the Near East (Region 1), North and South America (Region 2), and Oceania and the Far East (Region 3). Each year, in rotation, one of the three regions holds its triennial conference. At these conferences, the members of the region—that is, the national societies in that region—get together to address common concerns. Preparation for future telecommunications conferences, band plans, contest coordination, common licenses, budget, election of regional officers—these are some of the topics covered, first by papers distributed prior to the conference and then in person in a series of intensive discussions.

As agreed three years previously, the Region 1 conference in 1987 was held during April in Noorwijkerhout, Holland. The site was the Leeuwenhorst Congress Center, a large facility which provided not only meeting rooms but also housing and meals. Our host for the meeting was VERON (Vereniging voor Experimenteel Radio Onderzoek in Nederland), the IARU member society for The Netherlands. Under the leadership of its president, Jan Hordijk, PAØAJE, the arrangements were first class. Why, during the week of the conference VERON even arranged for the tulips and daffodils to burst forth in full bloom—the colors were spectacular. Seriously, though, the week proceeded smoothly and many attendees remarked that they couldn't remember a conference that was conducted with a greater atmosphere of cooperation and unanimity.

Who Was There?

Mr. Jean Jipguep, Deputy Secretary-General of the ITU, was the honored guest, and addressed the opening plenary. Mr. Jipguep is well acquainted with Amateur Radio, having last fall also attended the Amateur Radio Direction Finding ("Fox-Hunting") championships in Yugoslavia, and is one of our good and important friends at ITU in Geneva. Other speakers at the opening plenary included the Mayor of Noordwijkerhout, PAØAJE, W1RU and Mr. C. Wit, Director General of The Netherlands PTT.

How It Works

Several months prior to an IARU triennial conference, the secretary of the region circulates a call for papers. In response, the member societies submit comments on subjects they have concerns about. Topics might include band planning, contest coordination, harmful interference from intruders, meteor-scatter operating procedures, proposals for changes to the Regional constitution, proposals for changes to the IARU constitution, packet radio, mailboxes, and so on. At the conference, these papers are assigned to various committees for discussion, and the committees report their conclusions to the final plenary. The final plenary may accept the report of the committees, or it may modify the decisions. In any event, everyone present at the conference gets a chance to provide input to any topic that is under consideration. Although it has taken you only a few seconds to read about the procedure, the actual process takes a good many hours of thorough discussion. The end result is a series of policy decisions which govern the region for the ensuing three years.

What we have described is a regional process, with regional decisions. However, international coordination is provided by the presence at the conference of observers from the other two regions. These observers are invited to provide input from their regions so that we can, for example, work internationally toward uniform band plans. (It is interesting to note here that only a small minority of countries have their band suballocations specified by their regulatory authorities. Everywhere else in the world, amateurs work out these band allocations themselves on a voluntary basis, through the mechanism of IARU.)

What Did the Conference Decide?

Here's a brief listing of some of the decisions taken at the conference.

- The conference reviewed its financial situation, with special regard to the possibility of another significant WARC by 1992.
- The conference adopted extensive revisions to the Region 1 Constitution.
- Pleased at its success with the concept of a common license, Region 1 voted to share its information with the other regions and to continue the work of the Common License Group. As DL1FL had to resign as CLG convenor for reasons of health,

An overview of the room in which the opening and closing plenaries were held.

LX1JW is only one of two remaining participants in the 1925 founding of IARU. He seems to have lost none of his charm.

One Delegate's Perspective

By Larry Price, W4RA, President, ARRL

Spring in Holland. Tulips in bloom. Dishes in Delft. Cheese in Gouda. Wooden shoes, canals and dikes. It's everything you've heard as a schoolchild, and more.

The host society was VERON (the Association for Experimental Radio Research in the Netherlands is the English translation of their initials). And the PA-hams of VERON worked tirelessly (on second thought, they probably were pretty tired by the end of the conference). The VERON friendliness and courtesy began right at Amsterdam's Schipol Airport, where, after an 8-hour flight, deplaning and passing through passport control, it was certainly reassuring to see a smiling face holding up a sign reading "IARU." From that moment on we didn't have another worry about rooms, meals, transportation or other logistical arrangements for the next week!

Following an opening Plenary session were the important, but mostly ceremonial, opening speeches. Here the feature was an address by Mr. Jean Jipguep, Deputy Secretary-General of the ITU, who traveled from Geneva to be with us for the first few days of the conference. It is a noteworthy mark of the respect with which international Amateur Radio is held at the ITU that such an important official would address the conference. Also welcoming the delegates was Mr. C. Wit, Director General of the Netherlands PTT. He was *most* welcome because all the licensed amateurs in attendance had received an automatic courtesy license to operate "portable PA" during their stay in Holland. The Burgomaster (mayor) of Noordwijkerhout also welcomed the visitors (he also made a plea for the use of Esperanto by radio amateurs, but that's another story).

The real business of the opening Plenary session, though, is to divide into committees to review the various proposals that have been submitted in advance on behalf of individual member societies. For example, paper #47 from BFRA (Bulgaria) dealt with the use of the World Locator System, while paper #138 from SSA (Sweden) made a proposal with regard to AFSK tones for VHF use in Region 1. More than 170 papers were submitted.

Administrative and operational (HF) papers were considered first by Committee A. VHF and microwave matters were dealt with in Committee B, which often met simultaneously.

The committees labored over the papers for three days (and nights, too), discussing, modifying, arguing and finally agreeing on a position to recommend to the conference. On Thursday, the delegates were all shooed away from the Congress Centre for an outing to allow all the paperwork to be organized—and to give us a chance to see light of day and breathe a little fresh air. Courtesy of VERON, we were given a tour of the Delta Project, a massive feat of civil and hydraulic engineering that is designed to keep back the ravaging North Sea while eventually creating thousands of acres of farm and recreation land. In the museum describing the project, we saw an exhibit showing the role of Amateur Radio in the terrible disaster of the early 1950s, when more than 1600 Dutch were drowned when a dike was breached by the sea. Among the items displayed is a transmitter used by Nol, PAØNOL, who coincidentally was in attendance on the trip as one of the VERON members. The final Plenary session considered all the various committee recommendations. The actions approved are summarized in the accompanying article.

A few words about the next WARC are in order here. While a future WARC is not something to be sought by radio amateurs, it will likely be held sometime in our future. There is legitimate disagreement about whether a WARC is more likely in the early or late 1990s. Whenever it is, the Amateur Radio Service must be prepared. Conferences such as this one, where the leaders of Amateur Radio societies can get together and discuss their common and shared goals and concerns, go a long way toward making certain that we *will* be prepared at the right time. No report would be complete without a big word of thanks to Jaap Dijkshorn, PAØTQ, IARU liaison officer for VERON. At this conference that meant not only being a delegate, but taxi driver to our hotel at all hours of the day and night—and he took care of all the recording equipment used to tape the sessions!

A final note: There was shouting, there was fellowship. There was even an Amateur Radio station. But, when all was said and done, this conference, like IARU conferences from the beginning, had as its purpose to bring together radio amateur representatives of the national societies from all over the world for a common purpose: *preserving and protecting Amateur Radio.*

ON8MC was invited to continue the work of the group.

• Within Region 1, the official Award Manager of the member society should be entitled to check QSL cards on behalf of the organizing member society, as long as the organizing society agrees.

• Where written proof of contact is not required when award application is being made, a simple list of claimed contacts, showing full log details, should be accepted.

• The conference proposed to provide a lower margin on the information side or the back of QSLs of at least 15 mm, with the addressee's call sign to be written into this information stripe. This margin would be kept free of any other printing. (The eventual goal is a QSL card which can be more easily handled by an automatic sorting machine—liaison with Regions 2 and 3 is needed on this matter.)

• It was agreed to set up a Region 1 Contest Committee, to better coordinate such activities within the region.

• The conference urged all member societies to continue to promote more experimentation and scientific involvement.

• In Region 1 the preferred 20-meter RTTY frequency segment was expanded to 14.070 to 14.099 MHz.

• Member societies should encourage experimentation with meteor scatter on 28 MHz.

• The International Beacon Project segment should be extended to 28.190 MHz, thus after 1990 occupying the segment 28.190-28.225 MHz.

• The conference adopted revised guidelines for the work of the Electromagnetic Compatibility (EMC) Working Group.

• The PADC (Promoting Amateur Radio in Developing Countries) Working Group was requested to continue efforts to prepare project planning.

• Region 1 societies were urged to promote greater use of amateur satellites.

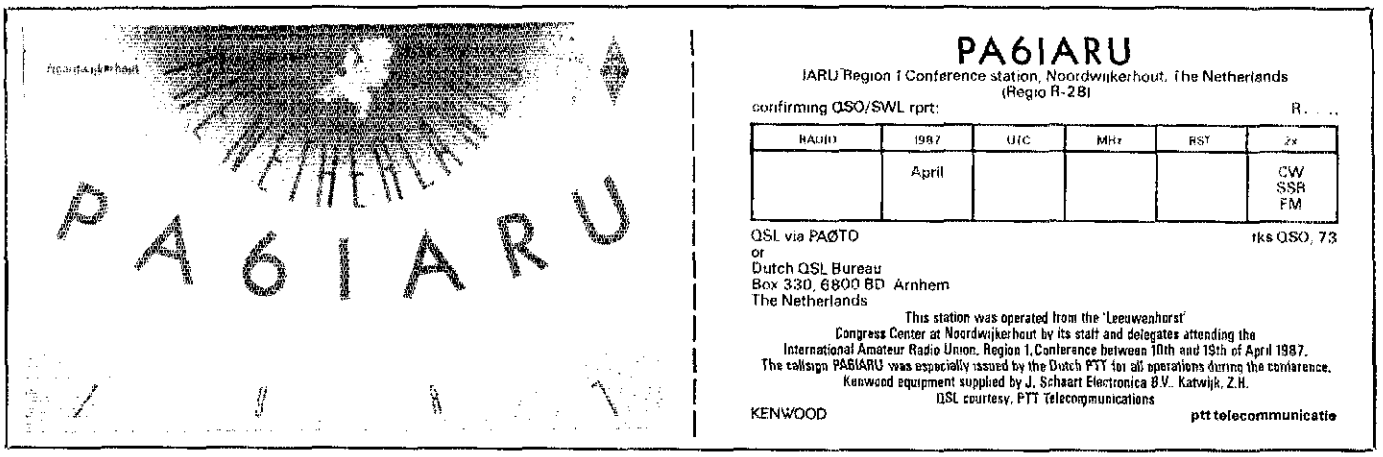
• The Conference requested the Region 1 Executive Committee and IARU Administrative Council to support implementation of a revised resolution relating to the prohibition of HF broadcasters from the frequencies 7.0-7.1 MHz. The revised Resolution 641 had recently been adopted at the HF Broadcasting WARC (HFBC-2).

• Member societies were urged, wherever possible, to provide QSL Bureau service for nonmembers.

• The conference recommended that the language used in the IARU Constitution, and in any amendments that might be made, be clear, unambiguous and consistent, and should reflect the fact that English is not the first language of many who will use the documents. (As an example, the conference felt that the language of a resolution prepared by the Administrative Council relative to the rights of a member society to represent IARU was unclear and, while accepting the principles set forth in the resolution, referred the resolution back to the Administrative Council for redrafting.)

• The conference voted that the provisions relating to the appointment of the

ARRL President Larry Price, W4RA (third from left), with three members of the Soviet delegation: Andrev Khartsiev, Yuri Zubarov (President of the RSF) and Vasily Bondarenko (manager of Box 88).



This handsome QSL card was designed for the station used by delegates to the IARU Region 1 conference.

president and vice president of IARU should be amended to put the procedures necessary for such an appointment beyond doubt.

That's just a sampling of the decisions taken by the conference. As you can see, the conference covered such matters as operating practices, the use of frequencies, the growth of Amateur Radio in the developing countries and plans for the future.

Elections

Louis v.d.Nadort, PAØLOU, was reelected for another three-year term as chairman of IARU Region 1, and Wojciech Nietyksza, SP5FM, was reelected as vice chairman. Also, John Allaway, G3FKM, was chosen to serve another term as secretary. Rosella Strom, I1RYS, was chosen treasurer of the Region, and the other three members of the IARU Region 1 Executive Committee are Alf Almedal, LA5QK, Driss Bendani, 7X4MD, and Mirko Mandrino, YT7MM.

For the next three years the following chairmen and coordinators will serve the following groups. Chairman of VHF/UHF/SHF Committee—PAØQC; Sporadic E Studies Coordinator—F8SH; Auroral Studies Coordinator—G2FKZ; Secretary of Propagation Studies Information Exchange Program—G3LTP; Satellite Coordinator—HA5WH; VHF/UHF/Microwaves Records Keeper—SM5AGM; VHF/UHF/Microwave Beacons Coordinator—Radio Society of Great Britain; Frequency Allocation Survey Convenor—PAØEZ; Chairman, HF Committee—DJ6TJ; Chairman, ARDF Working Group—SP5HS; Chairman, EMC Working Group—SP9ZD; International Beacon Project Convenor—G3DME; Chairman, PADC Working Group—OE3REB; and Coordinator, High-Speed Telegraphy Group—RZ3CSU.

Venue of the Next Conference

After a spirited presentation by the delegate from Spain, that country was chosen as the site of the 1990 IARU Region 1 conference.

The G2BVN Memorial Trophy

To honor the memory of the late Roy Stevens, G2BVN, long-time secretary of IARU Region 1, and a person who had literally devoted his life to Amateur Radio, there has been established the G2BVN Memorial Trophy. It was awarded this year for the first time. The recipients were Tom Clarkson, ZL2AZ, and Alfred Mueller, DL1FL. ZL2AZ has been active in the work of the New Zealand Association of Radio Transmitters and the IARU Region 3 Association for many years, and has attended a number of ITU conferences, including WARC-79. DL1FL has been a tireless worker on behalf of common licensing for a long period of time, and has seen his efforts crowned with success; he also attended WARC-79 as a member of the delegation of the Federal Republic of Germany. The two recipients, whose names were announced by Miss Audrey Jefcoate, received a standing ovation.

Other Awards

On behalf of ARRL, which serves as the International Secretariat of IARU, W4RA made plaque presentations to a number of societies that are observing significant anniversaries during 1987.

Mr Jean Wolff, LX1JW, was awarded the IARU medal by the IARU Region 1 Executive Committee, in recognition of his long service to IARU and to Amateur Radio.

On behalf of the American magazine *CQ*, W1RU made a presentation to G3FKM honoring his election to the DX Hall of Fame.

And so ended another IARU Region 1 triennial conference.

Who Was There

Algeria: 7X2SX, 7X4MD, 7X2BD. Bahrain: A92DQ. Italy: I4SN, I5MMS, I1BYH, I0PSK, I1ZCT, (SM6CPI). Monaco: 3A2AH. San Marino: T77J. Cyprus: 5B4JE. Czechoslovakia: OK3EM, OK1PG, OK1FSI, OK1ADM. Federal Republic of Germany: DK5FH, DL9TJ, DK2NH, DJ1BM, DF7VX, DJ7ZY, DK2BI, DL9ME, DJ1XK, DL9GS, DJ2MG, DL1PE, DJ8CY, DC6XT. Denmark: OZ5DX, OZ8CY, OZ7IS, OZ8QJ. Faroe Islands: OY1A. Israel: 4X4RC. Iceland: TF3KB, (SM4GL). Ireland: EI7CS, EI9V. Kuwait: 9K2DQ, 9K2DI. Liberia: EL2S, EL2M, EL2EA, EL2CY. Malta: 9H1O, 9H1EG. Hungary: HA6NN, HA4YD, HA5WH, HA2RD. Nigeria: 5NØBA, 5N9MBI, 5N8HEM, 5N9GM, 5NØMF. Norway: LA5QK, LA8SJ, LA2RR. Austria: OE1BKW, OE3REB, OE5MPL, OE5TKL, OE1KTC. Poland: SP5JR, SP6AZT. France: F8SH, F8BO, FE6ABJ, F9LT, F9IV, F6CER. Portugal: CT1BH, C. Nunes. Jordan: JY5MB, JY4YJ. Luxembourg: LX1JW. Oman: A4XKB, A4XJT. USSR: UW3AX, V. Bondarenko, A. Khartsiev, Y. Zubarov. United Kingdom: G3ZNU, G3ZAY, G3RPE, G3OUF, G3WSN, G4RWW, G6LX, G3AEZ, G2UK, G3VZV, G3GVV, G4KGC, G3PSM. Kenya: 5Z4DS. Sierra Leone: 9L1YL. Finland: OH5NZ, OH5LK. Yugoslavia: YU1AW, YU2RLI, YT3AA. Sweden: SM3CWE, SM4COD, SMØFSK, SMØDHP, SM3AVQ. Turkey: TA2M, S. Senay, B. Husniye, I. Hidayet. Belgium: ON8MC, ON4ZN, ON6JG, ON7TP, ON4VY. Andorra: C31LD, C31LU. Spain: EA3NA, EA5RV, EA1RF. Switzerland: HB9IN, HB9DX, HB9RG, HB9QQ, HB9AGA, HB9RO. Netherlands: PAØEHG, PAØGMM, PAØTO, PAØEZ, PAØJNH, PAØDIN, PAØAJE, PAØAD, PAØINA, PA3ADR, PAØVDV.

Also present were the following. IARU Administrative Council: W1RU, WØBWJ, K1ZZ, JM1UXU, ZL2AMJ, YV5BPG. Region 1 Executive Committee and Working Groups: G3FKM, LA4ND, DJ6TJ, SP9ZD, PAØQC, YT7MM, DL1FL, PAØLOU, SP5FM, SP5HS, I1RYS, G3DME, EL2BA, GØCCI, GM4ANB, Rosemary Evans and Heather Norman. Observers from societies outside of Region 1 included the following. Netherlands Antilles: PJ2ILR. Korea: HL1IFM. United States: W4RA.

Policymaking in the Peach State

The 1987 Second Meeting of the ARRL Board of Directors

By Michael R. Riley, KX1B
Assistant to the Executive Vice President

Genuine Southern hospitality, warm breezes, panoramic views of the city and the ARRL National Convention set the stage for the 1987 Second Meeting of the ARRL Board of Directors in Atlanta, Georgia, July 9-10.

The locale and attractions at the convention didn't prevent members of the Board from getting down to business, however. Several highly important items were discussed at length and acted upon.

From ARRL's Rib ... CRRL Becomes Independent January 1, 1988

The League's Board of Directors wishes the Canadian Radio Relay League continued success as it begins independent operation in 1988. After 67 years of brotherhood within the ARRL, the Canadian Radio Relay League will independently represent Canadian amateurs after they ring in the new year.

The imminent discussions regarding PRB-3 (secondary call signs) did not detract from the historic occasion of wishing our North American brothers well in their endeavors. Each of the many motions severing the closely sewn cloth of mutual cooperation was accompanied by bittersweet emotions felt by all in attendance. (Minutes 39-50 and Minute 68.)

Special Call Signs

Possible ARRL administration of a program to issue special Amateur Radio Service call signs was on the minds of all as the meeting began. An Ad Hoc Committee on PRB-3 presented a detailed implementation and management plan for consideration by the Board. After much debate, and impassioned and eloquent pleas from both sides, the League's reply to PRB-3 was approved. The reply identifies several specific issues that will need to be addressed by the FCC prior to implementation of the special call sign program. The basic concern of the Board of Directors is that the FCC is the most appropriate body to issue special call signs, but that if it chooses not to do so, then the League as a broad-based representative organization is the only entity qualified to do so. (Minute 70.)

Don't start sending cards and letters to ARRL Headquarters asking for special call signs yet (or even for information on special call signs, for that matter). The ball is in the FCC's court, and the League cannot consider requests until authorized to do so. If that occurs, every effort will be made to trumpet the announcement to all amateurs, affording everyone ample time to mail their requests.

Will We Be On the Air in 2001?

The Board of Directors, realizing that the present frequency spectrum enjoyed by radio amateurs is by no means guaranteed, and noting that international bodies may attempt to reallocate Amateur Radio Service spectrum to other services in the

WA6WZO (left) and WB5JBP during the discussions.

At the head of the table: ARRL President W4RA and Executive Vice President K1ZZ.

Filming for *The New World of Amateur Radio* was an unofficial part of Friday's agenda. The production crew of (standing, from left) N6ENV, K6DUE, NA1F and WA6ITF (kneeling) spent a few minutes capturing the atmosphere.

Table 1
Summary of Board Actions

Minute	Purpose	Disposition
23	Category 4 clubs not eligible to participate in club competitions	Adopted
24	New Field Organization appointments available to Novices	Adopted
25	1986 ARRL International Humanitarian Award to 9N1MM	Adopted
26	1986 Technical Excellence Award to WB4TLM and KB4KVE	Adopted
28	1986 Hiram Percy Maxim Memorial Award to N9FZS	Adopted
29	Changes to Advisory Committee rules and regulations and the standard operating procedures for Advisory Committees	Adopted
31	Draft ARRL/National Weather Service MOU	Adopted
32,34	Proposed change in rules and regulations concerning conventions	Lost
35	Authorization of specialty conventions	Adopted
36	ARRL National Emergency Response Committee	Adopted
37	Public Service Advisory Committee	Adopted
38-49	Delete references to Canada from Articles of Association, By-Laws and Miscellaneous Rules, effective 1/1/88	Adopted
56	Interim guidance on packet-radio frequencies	Adopted
65	1989 ARRL National Convention to Dallas/Ft Worth area	Adopted
68	Canadian Radio Relay League resolution	Adopted
69	"Diamond Jubilee Award"	Adopted
70	ARRL's resolution on PRB-3 (secondary call signs)	Adopted
72	ARRL Visitor Center/W1AW renovation resolution	Adopted
73	FCC approval for VEs who have had accreditation suspended or revoked	Adopted
74	"Coordination Status Pending" category in *Repeater Directory*	To Committee
75	Abolish Cover Plaque Award program	Lost
77	ARRL bulletin station in western US resolution	Adopted
78	ARRL bulletin program study	To Committee
79	Automatic beacon frequency segments	To Committee
80	Study of ARRL Volunteer Examiner Coordinator program	To Committee
81	Fund for Amateur Radio related artifacts	Adopted
83	Band-Plan study of 40 Meters	Lost
84	*Operating An Amateur Radio Station* publication study	To Committee
85	Amateur Radio Political Action Committee study	To Committee
86	ARRL Headquarters Personnel Manager study	To Committee
87	UN Convention on the Law of the Sea study for DXCC	To Committee
88	Emergency- and disaster-communications training materials study	To HQ Staff
89	Two- and six-meter DXCC plaques	Adopted
90	ARRL long-range organizational plan	Adopted
92	Interim band plan for packet radio	To Committee
93	VHF repeater coordination form information	Adopted
94	Arbitrators and mediators for repeater councils	To Committee
95	ARRL-sanctioned conventions	Adopted
96	1988 Annual Meeting of the Board of Directors dates	Adopted
98	New QRP Field Day category	To Committee
99	Status of "On The Air" publication	To HQ Staff
100	Facts about Amateur Radio antenna systems for planning boards and councils	To Committee

next decade, instructed the Officers of the League to draft a long-range plan for Board consideration, periodic review and updating as deemed necessary. (Minute 90.)

The ARRL Public Service Communications Committee (APSCOM)

Forget that name; the committee is now the ARRL National Emergency Response Committee (ANERCOM). The ARRL Board of Directors reaffirmed the League's strong commitment to public service by approving the establishment of this committee. It provided a budget of $5,000 for its first year of operation and requested that President Price appoint those to serve on this august group. (The ARRL Volunteer Resources Committee spent days fine-tuning this concept. ANERCOM is a direct result of League members' recommendations offered to the ARRL Blue Ribbon Committee on Emergency Message Traffic in 1986.)

The select members of ANERCOM should have the highest Amateur Radio public-service qualifications. They will be the League's "A-Team" (minus the gold chains!) when meeting with emergency-management and disaster-relief organizations and agencies in Washington, DC and will provide expert advice to ARRL HQ on request during Amateur Radio participation in major communications emergencies. (Minutes 30 and 36.)

An ARRL Transmitting Facility in the Western US?

The Board established a program to solicit donations for a station to provide code-practice and bulletin service, similar to that of W1AW, to amateurs west of the Rocky Mountains. HQ staff is to determine an optimum location for this proposed station. (Minute 77.)

ARRL/VEC System to be Studied, and Possibly Streamlined

The Board of Directors has perceived a need to reduce paperwork and time presently required of ARRL Volunteer Examiners without compromising the integrity of the program. (Minute 80.)

New ARRL Field Organization Appointments open to Novices

As a result of Novice Enhancement, seven new slots within the League's volunteer ranks are available to Novices. The new appointments are Assistant Section Manager, Official Bulletin Station, Official Emergency Station, Net Manager, Technical Coordinator, Assistant Technical Coordinator and Affiliated Club Coordinator. Novices, contact Field Services Department at ARRL HQ and ask for the *ARRL Field Organization Brochure* to find out how you can help. (Minute 24.)

New Category for Field Day?

The ARRL Contest Advisory Committee has been asked to study a new Field Day category for QRP stations that use a power source other than commercial mains or motor-driven generators. (Minute 98.)

Antennas: Helping You Before Problems Occur

The ARRL Legal Strategy Committee has been asked to study and determine cost-effective ways to deliver information about amateur antennas to local planning boards and councils. (Minute 100.)

Emergency and Disaster Communications Training Program to be Studied

ARRL HQ staff is directed to review and recommend necessary changes or additions to the present emergency- and disaster-communications training offerings of the League as well as review and recommend changes in the recognition of such efforts by amateurs. Their findings are to be reported to the Volunteer Resources Committee at the end of this year. (Minute 88.)

ARRL Diamond Jubilee 75th Anniversary Convention

After four secret ballots, the ARRL Board of Directors chose the Dallas/Ft Worth area as the location of the 1989 ARRL Diamond Jubilee National Convention. See y'all there! (Minute 65.)

These are simply a few highlights of the 1987 Second Meeting of the ARRL Board of Directors. As a member, you owe it to yourself to read the minutes and understand how your elected representatives are working for you.

Moved and Seconded ...

MINUTES OF THE 1987 SECOND MEETING OF THE BOARD OF DIRECTORS THE AMERICAN RADIO RELAY LEAGUE, INC July 9-10, 1987

SUMMARY AGENDA

1) Roll Call
2) Moment of Silence
3) Consideration of the agenda for the meeting
4) Approval of Minutes of 1987 Annual Meeting
5) Reports by the Officers
6) Receive reports and consider recommendations of the committees
7) Consideration of the site for the 1989 ARRL National Convention, in observance of the ARRL Diamond Jubilee 75th Anniversary
8) Directors' motions

1) Pursuant to due notice, the Board of Directors of the American Radio Relay League, Inc., met in second session at the Westin Peachtree Plaza Hotel in Atlanta, Georgia, on July 9, 1987. The meeting was called to order at 8:40 AM, EDT, with President Larry E. Price, W4RA, in the Chair and the following Directors present: Thomas B. J. Atkins, VE3CDM, Canadian Division; Frank M. Butler, Jr., W4RH, Southeastern Division; Rush S. Drake, W7RM, Northwestern Division; Thomas W. Frenaye, K1KI, New England Division; Paul Grauer, WØFIR, Midwest Division; Jim Haynie, WB5JBP, West Gulf Division; Fred Heyn, WA6WZO, Southwestern Division; Clyde O. Hurlbert, W5CH, Delta Division; Howard Mark, WØOZC, Dakota Division; Stephen A. Mendelsohn, WA2DHF, Hudson Division; Edmond A. Metzger, W9PRN, Central Division; Gay E. Milius, Jr, W4UG, Roanoke Division; Marshall Quiat, ACØX, Rocky Mountain Division; Rodney J. Stafford, KB6ZV, Pacific Division; Hugh A. Turnbull, W3ABC, Atlantic Division; George S. Wilson, III, W4OYI, Great Lakes Division.

Also in attendance as members of the Board without vote were Jay A. Holladay, W6EJI, First Vice President; Leonard M. Nathanson, W8RC, Vice President; William J. Stevens, W6ZM, Vice President; Tod Olson, KØTO, International Affairs Vice President; David Sumner, K1ZZ, Executive Vice President; and Treasurer James E. McCobb, Jr, K1LLU. Also in attendance at the invitation of the Board as observers were the following Vice Directors: Thomas W. Comstock, N5TC, West Gulf Division; C. Richard Dyas, WØJCP, Midwest Division; Evelyn D. Gauzens, W4WYR, Southeastern Division; Howard S. Huntington, K9KM, Central Division; John C. Kanode, N4MM, Roanoke Division; Harry MacLean, VE3GRO, Canadian Division; James M. Mozley, W2BCH, Atlantic Division; Lionel A. Oubre, K5DPG, Delta Division; Wayne Overbeck, N6NB, Southwestern Division; Allan L. Severson, AB8P, Great Lakes Division; William R. Shrader, W7QMU, Northwestern Division; Paul Vydareny, WB2VUK, Hudson Division; Robert Weinstock, KN1K, New England Division; and Hugh Winter, W5HD, Rocky Mountain Division. There were also present Harry J. Dannals, W2HD, President Emeritus; Honorary Vice President Jean A. Gmelin, W6ZRJ; Secretary Perry Williams, W1UED; Counsel Christopher D. Imlay, N3AKD; Paul Rinaldo, W4RI, Publications Manager; John F. Lindholm, W1XX, Membership Communications Services Manager; and Michael Riley, KX1B and Robert Schetgen, KU7G, Assistants to the Executive Vice President.

2) The assembly observed a moment of silence in recollection of those who have passed away since the previous Meeting of the Board, especially Bertrand Arnow, W2BCM, Jose Ahumada, LU2DX/W4, Ron Chiappari, N6AUV, David Davidson, W1GKM, and Everett G. Henry, W6AP.

3) On motion of Mr. Milius, seconded by Mr. Frenaye, the agenda was adopted as presented, with an additional listing of Ad Hoc Committee reports, relating to PRB-3, the Special Call Sign System.

4) On motion of Mr. Mendelsohn, seconded by Mr. Quiat, it was VOTED that the Minutes of the 1987 Annual Meeting are approved as they appeared in the March 1987 issue of *QST*.

5) Moving now to agenda item 5, reports of the Officers were presented. Mr. Price's oral report highlighted some points of his written Mid-Year Report. The latter mentioned attendance at ARRL sponsored conventions—five of them so far in 1987. Meetings of the Executive Committee (of which the President is chairman) had been held in New Orleans, Louisiana, on March 21 and Birmingham, Alabama, on May 16. Its next meeting, at which the 1987 election nominations will be reviewed and certified, is to be held September 5 in Montreal, Quebec. The site is specially chosen to honor the Canadian Radio Relay League which is scheduled to become fully autonomous at the end of 1987, after serving as the Canadian Division of the ARRL since 1920. Mr. Price, in that connection, mentioned the meeting in Toronto, Ontario, on May 23, 1987, of the ad hoc committee that has facilitated the transition. The President is charged in the By-laws with representing the League before governmental agencies. In discharging this responsibility, he visited Washington June 15-18, focusing on FCC General Docket 87-14 and the annual convention of the Armed Forces Communications and Electronics Association. Tasks assigned the President at the January 1987 Meeting included appointing members to two important new groups: the Education Task Force and the Ad Hoc Committee on Amateur Radio and the Media. Director Frenaye will head the first, and Director Atkins the second. On the international front, the President was an observer at the IARU Region 1 Conference in Holland in April 1987. The long-standing principles of the IARU on non-intervention of one society in the governmental affairs of another were adopted in principle at the Conference, paralleling the action taken in Region 2 last year. There were useful contacts with other societies in Region 1. The report also described Congressional correspondence re FCC General Docket 87-14 regarding the proposed reallocation of 220-222 MHz, and the ITU TELECOM 87 show in Geneva, in preparation for which the ARRL is assisting the IARU.

6) First Vice President Holladay presented his written report, and touched on its highlights orally. The report began with notes about the work of the Membership Services Committee, summarized in the MSC document. Mr. Holladay attended Executive Committee meetings in New Orleans and Birmingham. He was the President's representative on the Ad Hoc Committee on PRB-3, which developed recommendations for rules of eligibility in a Special Call Sign Program. The Special Study Committee on Advisory Committees, of which the First Vice President is Chairman, has prepared updated Rules and Standing Operating Procedures for the Advisory Committees which will be presented during the meeting. Progress continues on efforts to establish a small museum and amateur radio station in memory of Don Wallace, W6AM. The Rancho Palos Verdes City Council has approved development plans for the Wallace Ranch, which include seven-tenths of an acre for such a museum. Pursuant to an informal invitation which Mr. Holladay extended while at the JARL 60th Anniversary Celebration, the Chinese Radio Sports Association has indicated an interest in sending a delegation to the United States in October.

7) The Board was in recess from 9:58 AM to 10:35 AM.

8) Vice President Nathanson remarked on the success of the Novice Enhancement program; its wide acceptance is evident in a rejuvenated 10-meter band. Efforts to support Amateur Radio in the educational, organizational and legal fields are going well. The Legal Strategy Committee, of which Mr. Nathanson is chairman, will hold a seminar at the National Convention. There were also activities with the Administration and Finance Committee during the first half of the year. Mr. Nathanson went on to caution the Board about the potential for economic danger involved in taking on the PRB-3 program and with respect to the visitors' center. His oral remarks urged more complete marketing of our publications so that they will be available in every city. The Vice President also spoke against widespread solicitation of funds for support of personal antenna causes.

9) Vice President Stevens's written report focussed on meetings of the Volunteer Resources Committee. Its extensive agenda in the past six months included APSCOM composition and funding, Advisory Committee working groups, criteria for selection of sites and sponsors for ARRL hamfests and conventions, and the Herb S. Brier Instructor of the Year, Technical Excellence, Public Service, International Humanitarian and Hiram Percy Maxim Memorial Awards. The Vice President also attended numerous club meetings discussing League affairs, FCC actions and new publications. In his oral remarks, Mr. Stevens pointed out the need for long-range planning against the possibility of a World Administrative Radio Conference having reallocation powers early in the 1990s.

10) Next, Mr. Olson presented his report as Vice President for International Affairs, which commented extensively on the May 23 final meeting of the Ad Hoc Committee on the Strengthening of the CRRL. Assuming the CRRL becomes an independent organization as planned on January 1, 1988 we will maintain the close and mutually beneficial working relationship we have had with Canadian Amateurs since the early days, on matters such as contests, DX and so on. Amateurs north of the border will continue to read *QST*, purchased by CRRL from ARRL. Amendments to ARRL's Articles of Association and By Laws have been drafted by the Committee; among other things the changes to be effective January 1, 1988, would abolish the ARRL Canadian Director position, but grant a courtesy seat at the ARRL Board table to the CRRL President. A similar provision exists in the CRRL documents. In all, the evolutionary separation of the Canadians from ARRL as they establish their own autonomous organization has gone smoothly. IARU Vice President Carl Smith represented the Union at the ITU Broadcasting WARC in Geneva in February and March. Based upon his reports of the events of that meeting and the tenor of the delegates—particularly from the Third World countries—it appears that a WARC meeting will be scheduled circa 1992, with emphasis on expansion of the HF allocations for the International Broadcasting Service and the Mobile Service in the 1-3 GHz range. Through the efforts of Director Turnbull, Counsel Imlay and Secretary Williams we believe we have a method of providing complimentary call signs to delegates at the 1989 Region 2 Conference being held in the US as part of our 75th Anniversary observance.

11) The Executive Vice President, Mr. Sumner, presented an extensive written report. New amateur licensing for the first five months of 1987 was 70% ahead of 1986, though it would be unrealistic to assume that we will see such a large increase for the full year. Membership figures are also moving up and barring any dramatic reversal, by early next year the League should have more US licensed members than at any time in its history. On-the-air activity resulting from the Novice Enhancement program is even more encouraging. It is a joy to listen in on the 10-meter band, where sporadic-E propagation and some DX conditions have spurred action in the Novice/Technician segment. Also, there has been great progress toward assimilation of Novices in areas with good, club-oriented, 220-MHz repeaters. Other topics covered extensively:

• Personnel: Mr. Sumner first reported on the positive effects caused by the arrival of Larry Shima, WØPAN, as Controller, particularly in the computer arena. He also reported on the addition to his immediate staff of Bob Schetgen, KU7G and Mike Riley, KX1B as Assistants to the Executive Vice President. A tight labor market and high housing costs in the Greater Hartford area make it difficult to attract personnel locally or from outside the area. The minicomputer and PCs have enabled us to keep abreast of demands for service which go with expanding membership, with present staff, which—except for the VEC staff—is fewer in number than in 1982.

• Communications: The concept of a communications center at Hq., incorporating electronic mail, modern facsimile equipment and so on, to improve communication with the Board members and others, is being studied.

• Finances: With a final net gain for 1986 of $8,676 (see the financial statements published in the May issue of *QST*), we reached the virtual break even point. The budget plan for this year is similar, though net gain is ahead of budget for the first five months.

• Publications: The Publications Committee completed a "management audit" of the mission, objectives, strategy and activities of the Publications Group. Membership promotion campaigns late last year and so far this year have yielded encouraging results. April 1987 *QST* was a very special issue, with real team-work by the Membership Communications, Publications and Volunteer Resources groups to present all the information on Novice Enhancement in that issue in the short time available. The *QST* page count has been flat for six months because of low advertising content. Favorable financial results may allow for slightly larger issues later this year. *QEX* paid circulation has reached 5309 copies per issue. The League will

publish the *National Contest Journal* effective with the July/August issue. The 1987 *Handbook* will be out-of-print soon. The Spanish edition is available. Booklet supplements were furnished free during transition to Novice Enhancement and new editions have now appeared reflecting new rules and question pools. Several new and revised books are in the queue and will be available soon. The report concluded with a status report on the proposed visitors' center, reflecting a lack of broad and enthusiastic support from the membership and conflicting needs for resources in the coming years. During the course of the above, the Board was in recess for luncheon from 12:00 noon to 1:15 PM, reassembling with all those hereinbefore mentioned present.

12) Mr. Mendelsohn moved, Mr. Butler seconded, that the Board sit as a Committee of the Whole to discuss personnel matters, and that the Hq. personnel present, except for the Executive Vice President, be excused from the meeting. Mr. Metzger moved, Mr. Grauer seconded, that the matter be laid on the table, but the motion to table was lost. Whereupon, the question being on the motion for a Committee of the Whole, the same was ADOPTED, at 1:20 PM. The Committee arose at 2:04 PM and reported to the Board and staff members returned to the meeting. On motion of Mr. Frenaye, seconded by Mr. Mendelsohn, it was VOTED that the report of the Committee is adopted.

13) Treasurer McCobb presented his written report which covered the investment scene, with the Dow Jones rising from about 1900 at yearend to 2451 on June 25. Fixed-income investments moved lower in the first quarter, leaped in April and then slid down in May and June. Changes in our investments were limited to clearing out a few problems: nevertheless, the changes resulted in a net gain on securities trading of $25,000 so far this year. In oral remarks, the Treasurer noted that our total portfolio has a cost of $6,200,000, and a market value of $6,500,000. Two thirds of this is in the Life Member fund, which is mostly devoted to long-term bond-type investments, while the General Fund is mostly invested in short-term bonds with a small amount in stocks. He advised the Board to consider its projects for the next three to five years, and move quickly toward establishing the necessary resources now, while conditions are favorable.

14) The extensive report of Counsel Imlay began with a discussion of General Docket 87-14, under which 220-222 MHz would be withdrawn from the Amateur Service. A summary of actions to date was followed by an outline of strategy to be followed in the next few months. Next was a brief resume of the special call sign matter, PRB-3, which now has a comment date of July 31 (the ARRL position on PRB-3 is to be determined later in the agenda of this meeting). A petition from the League reflecting the IARU position on the matter of "backwards reciprocal call signs" (W1/G6CL instead of G6CL/W1) has been filed but not yet given an RM number. The comment period on a private petition for "instant Novice licenses," RM-5924, expired June 19, 1987. It was apparently motivated by the slowness of the Licensing Division earlier this year, when some Novices had to wait three months for their licenses. Docket 86-337, studying the desirability of automatic-identification systems is pending; the League filed comments opposing such for our service. In Docket 85-196, the Commission turned over maintenance of the question pool to the Volunteer Examiner Coordinators. On reconsideration, the FCC agreed that only one question pool should exist, that pool to be agreed to by all the VECs. PR Docket 86-163 set up rules for Land Mobile use of certain frequencies in 420-430 MHz in and near Buffalo, Cleveland and Detroit. The rules attempt to reduce the likelihood of interference to and from nearby amateurs located below Line A. Counsel Imlay reported that comments had been filed with regional offices of the US Forest Service, pointing out the inequities and problems that would be caused by higher rental fees for amateur repeater sites. The report also covered local antenna matters (with special reference to Federal preemption in PRB-1 and the interpretation thereof which led to victory in the Kentucky case involving John Thernes, WM4T) and local RFI matters.

15) The Board was in recess from 3:00 PM to 3:23 PM.

16) Mr. Grauer, as President, presented the report of the ARRL Foundation. Funds of the Foundation reached $221,352 with $5,212 in new donations and $6,071 in interest. There were no expenses charged to its holdings, since administrative costs of the Foundation are absorbed by the League.

17) At this point, the Chair recognized Mr. Metzger, who presented a $3,000 check to Foundation President Paul Grauer for the existing Edmond A. Metzger Scholarship Fund. Receipt of a $10,000 check from Alice and Phil Wicker for scholarships was also announced. (Applause.)

18) Turning now to Agenda Item 6, Mr. Metzger, as Chairman, presented the report of the Administration and Finance Committee. The Committee met in Orlando, Florida March 14-15, 1987 and affirmed the policy of providing special equipment and services, at ARRL expense, to handicapped participants at Board and Board Committee meetings. Education subsidies for Hq. personnel were also reaffirmed. The Committee next had explored costs and possible revenues related to participation in the Special Call Sign Program. It also determined that the official public announcement of a Special Call Sign Program should be by direct mail at Commission expense.

19) The report of the Membership Services Committee was presented by Chairman Quiat. The Committee clarified a proposed telephone bulletin service, discussed insurance matters, recommended issuance of certificates for 25 and 40 years of membership in the League (in addition to the pins presently available), recommended a band plan for packet radio, supported retention of three-tiered competition in certain ARRL contests, and suggested the League furnish self adhesive labels of the ARRL emblem. Mr. Quiat then moved, seconded by Mr. Milius, that officers, directors and members be requested to monitor League bulletins and gather suggestions by the January 1988 Board meeting to evaluate the bulletins and consider action to make improvements if indicated. After discussion, on motion of Mr. Haynie, seconded by Mr. Mendelsohn, the matter was LAID ON THE TABLE. Mr. Heyn requested to be recorded as being opposed to tabling.

20) It was further moved by Mr. Quiat, seconded by Mr. Milius, that the Packet Radio frequency recommendations of the Ad Hoc Committee on Amateur Radio Digital Communications be adopted as interim guidance, and that, in recognition of regional differences and the rapid expansion of this mode, the Ad Hoc Committee is requested to continue development of Packet Radio frequencies for consideration by the Board through the Membership Services Committee. After discussion, on motion of Mr. Hurlbert, seconded by Mr. Wilson, the matter was LAID ON THE TABLE. Mr. Heyn requested to be recorded as being opposed to tabling.

21) On further motion of Mr. Quiat, seconded by Mr. Metzger, it was VOTED to continue study of the relationship of the Awards Committee and the DX and Contest Advisory Committees until the January 1988 Annual Meeting.

22) Mr. Olson, as chairman, presented the report of the Publications Committee. It had studied *QST* coverage of club activities, as requested by Minute 74 of the 1987 Annual Meeting, and recommended no change in editorial policies. The Committee does recommend, however, that staff encourage clubs to submit more people-oriented material for *QST*. The group endorsed the revised Publications Mission Statement for adoption by the Board, and also endorsed criteria for initiating or discontinuing a publication. A Publications Order Form for directors designed for use on MCI had been developed. The Committee reviewed the work of the various departments of the Publications Group: Advertising, Circulation, Production and the Technical Department. It studied the budget information associated with each department, its plans for 1987, staffing and the issues and opportunities as seen by the Department managers. The Committee urged renewed activity, including greater use of the minicomputer and associated microcomputer systems, to identify Amateur Radio prospects, solicit recruits and reactivate lapsed members. Efforts toward, and consideration of rewards for, "zero-defect" shipping were suggested to staff. There are ongoing studies of *Gateway* and "non-paper" distribution of it and other League materials. On motion of Mr. Mark, seconded by Mr. Olson, it was VOTED that the Publications Mission Statement is adopted as proposed by the Publications Committee.

23) The report of the Volunteer Resources Committee was presented by Chairman Stafford. After review of criteria for Special Service Clubs, the Committee agreed no changes were needed, but staff was urged to study ways to make the program more attractive to clubs and to strengthen ties between SSCs and the Field Organization. The badge program was reviewed and is functioning satisfactorily. Observation of the 75th anniversary of Amateur Radio emergency communications in 1988 was discussed. A study of club-affiliation matters continues. Other actions of the Volunteer Resources Committee resulted in motions to be introduced; Mr. Stafford yielded to Mr. Turnbull for the first of those. On his motion, seconded by Mr. Frenaye, it was VOTED that the last sentence of Paragraph four in the Rules and Regulations concerning Affiliated Societies is replaced by

"Category 4 affiliated club groups are not eligible to participate in club competitions, but individual clubs are encouraged to submit entries."

24) It was moved by Mr. Mendelsohn, seconded by Mr. Stafford, that:

"The Board of Directors adopts the changes recommended by the Volunteer Resources Committee regarding license-class requirements for various positions in the field organization. Additionally, the station level appointments of Official Relay Station, Official Emergency Station, Official Bulletin Station and Net Manager shall require a minimum of six months as a licensed Amateur Radio operator in addition to the requirement of League membership." After discussion, on motion of Mr. Frenaye, seconded by Mr. Grauer, it was VOTED to amend the motion by striking its second sentence, beginning "Additionally." Whereupon, the question being on the motion as amended, the same was ADOPTED; Messrs. Hurlbert and Mendelsohn wished to be recorded as voting no. As a result of the above vote, Novice members of the League are newly eligible for appointments as Assistant Section Manager, Official Bulletin Station, Official Emergency Station, Net Manager, Technical Coordinator, Assistant Technical Coordinator and Affiliated Club Coordinator; they were already eligible for Official Relay Station, State Government Liaison, Public Information Officer and Public Information Assistant.

25) On motion of Mr. Stafford, seconded by Mr. Mendelsohn, it was unanimously VOTED that the 1986 ARRL International Humanitarian Award be presented to Father Marshall M. Moran, SJ, 9N1MM, for his lifetime commitment to the furtherance of international brotherhood and peace through Amateur Radio. (Applause.)

26) On motion of Mr. Butler, seconded by Mr. Frenaye, it was unanimously VOTED that Rich Arndt, WB4TLM, and Joe Fikes, KB4KVE be named the recipients of the 1986 Technical Excellence Award and that they be awarded the Pewter Cup for their article, "SuperSCAF and Son—a Pair of Switched-Capacitor Audio Filters," which appeared in the April 1986 issue of *QST*. (Applause.)

27) The Board was in recess from 5:48 PM to 9:15 PM, for dinner and to meet informally with Ralph Haller, N4RH, Deputy Chief, FCC Private Radio Bureau, who was in Atlanta for the ARRL National Convention, reconvening with all persons hereinbefore mentioned present.

28) On motion of Mr. Metzger, seconded by Mr. Mendelsohn, it was unanimously VOTED that the ARRL Board endorse the Volunteer Resources Committee's selection of Scott L. Young, N9FZS as the winner of the 1986 Hiram Percy Maxim Memorial Award for his outstanding efforts in Amateur Radio, including public service activities, recruiting new amateurs, and improving the general public awareness of Amateur Radio. (Applause.)

29) On motion of Mr. Stafford, seconded by Mr. Mendelsohn, it was VOTED that the Board of Directors adopts the changes to the Advisory Committee Rules and Regulations and the Standard Operating Procedures for Advisory Committees as set forth in the report of the Volunteer Resources Committee.

30) Mr. Mendelsohn, seconded by Mr. Stafford, moved the adoption of a Resolution proposed by the Volunteer Resources Committee:

ARRL NATIONAL EMERGENCY
RESPONSE COMMITTEE

WHEREAS, the Blue Ribbon Committee in its report to the Board of Directors at the 1987 Annual Meeting recommended the establishment of a national emergency communications steering committee, and

WHEREAS, the Board of Directors tasked the Volunteer Resources Committee with determining the composition and funding for such committee, now, therefore,

BE IT RESOLVED, that the Board of Directors establishes a national emergency communications steering committee under the following terms and conditions:

A. The name of the Committee shall be the "ARRL National Emergency Response Committee" (ANERCOM).

B. ANERCOM shall be a committee of experts who shall more efficiently plan, integrate, utilize and manage the various aspects of Amateur Radio's response to disasters.

C. The initial assignments for ANERCOM shall include, but not be limited to, the following:

1. Study procedures for integrating all voluntary amateur radio emergency communications activities under the American Radio Relay League

2. Interface with served agencies for the purpose of

a. establishing points of contact

b. assessing the emergency communications needs of served agencies

c. recommending procedures for satisfying those emergency communications needs through Amateur Radio

3. Study the feasibility of dispatching "Emergency Response Teams" and equipment packs to crisis areas. Considered in the study shall be the physical and psychological dangers likely to be faced by Emergency Response Teams, the geographic scope envisioned (eg, national, North American continent, Region 1, worldwide), equipment acquisition costs, operation costs, funding sources, insurance and other relevant issues.

4. Recommend procedures for implementing the "Gateway concept."

5. Periodically review the ARRL Headquarters Emergency Operations Plan.

D. The members of ANERCOM shall be appointed by the President of the ARRL.

Packet Radio Frequency Recommendations of the Ad Hoc Committee on Amateur Radio Digital Communication

These recommendations are in response to Board Minutes 45(a) (study designation of packet-radio traffic channels) and 45(h) (study recommended operating frequencies for VHF packet and HF packet radio) of the 1986 Annual Meeting and Minute 80 of the 1987 Annual Meeting.

1. General

According to Part 97 of the FCC rules, packet radio may be operated on any frequency where digital communications is permitted.

2. Frequency References

A. The primary references to packet-radio frequencies should be by center frequencies.

B. Display frequencies (what appears on the transceiver frequency readout) are not uniform and should be used only for secondary reference when transceiver settings and modem center frequencies are known. Mark and space frequencies vary according to the modem in use.

3. 80-20 Meter Bands

A. General:

(1) The packet-frequency selection objective is to minimize impact on existing operations, recognizing that the spectrum in these HF bands is a limited resource.

(2) Using the spectrally conservative mode of minimum-shift keying (MSK), 1200-baud operation should be possible within a 2-kHz bandwidth. Thus, a 2-kHz raster is recommended for packet frequencies in these bands.

B. The use of the RTTY subbands is encouraged for packet operations in these bands. The frequencies listed below are exceptions to this general rule to provide usable channels for automatic message forwarding:

(1) 80 Meters (kHz)
3594.3 Intercontinental message forwarding
3607.3 North American message forwarding

(2) 40 Meters (kHz)
7038.3 Intercontinental message forwarding
7091.3 North American message forwarding

(3) 30 Meters (kHz)
10145.3 Intercontinental message forwarding
10147.3 North American message forwarding

Note: These frequencies are subject to noninterference with fixed stations outside the United States.

(4) 20 Meters (kHz) (Experimental)
14102.3 Intercontinental message forwarding
14108.3 Intracontinental message forwarding

Note: The lowest frequency provides sufficient protection to receivers using CW bandwidths to receive 14100-kHz beacons.

4. 160 and 17-10 Meters

The frequencies listed below conform to the RTTY subbands and are suggested for automatic message forwarding when propagation is favorable.

A. 160 Meters (kHz)
1802.3

B. 17 Meters Pending FCC Allocation (kHz)
18106.3
18108.3

C. 15 Meters (kHz)
21096.3
21098.3

D. 12 Meters (kHz)
24926.3
24928.3

E. 10 Meters (kHz)
28102.3
28104.3

Note: These 28-MHz frequencies may be considered for both automatic message forwarding and network entry points for Novices and Technicians.

5. VHF/UHF Frequencies (MHz)

A. Specific VHF/UHF channels recommended below may not be available in all areas of the US.

(1) Prior to regular packet-radio use of any VHF/UHF, it is advisable to check with the local frequency coordinator.

(2) The decision as to how the available channels are to be used should be based on coordination between local packet-radio users.

B. 6 Meters

(1) National packet simplex frequency: 51.70

(2) Duplex pairs to consider for local coordination for uses such as repeaters and meteor scatter:

50.62/51.62	50.72/51.72
50.64/51.64	50.74/51.74
50.66/51.66	50.76/51.76
50.68/51.68	50.78/51.78

Note: Where duplex packet-radio stations are to be co-sited with voice repeaters, use high-in, low-out to provide maximum frequency separation from low-in, high-out voice repeaters.

C. 2 Meters

(1) Automatic/unattended operations should be conducted on 145.01, 145.03, 145.05, 145.07 and 145.09 MHz.

(a) 145.01 should be reserved for inter-LAN use.

(b) Use of the remaining frequencies (above) should be determined by local user groups.

(2) Additional frequencies within the 2-meter band may be designated for packet-radio use by local coordinators.

D. 1.25 Meters

(1) 100-kHz-bandwidth channels:

220.55	220.75	220.95
220.65	220.85	

(2) 20-kHz-bandwidth channels:

221.01	
221.03	
221.05	
221.07	
221.09	
223.40	National packet simplex
223.42	Candidate packet simplex channels
223.44	shared with FM voice simplex. Check
223.46	with your local frequency coordinator
223.48	prior to use.

E. ANERCOM shall consist of one ARRL Headquarters staff member, one ARRL Board of Directors Liaison, each of whom shall have a background in emergency communications, and not fewer than six nor more than eight additional radio amateurs, each with demonstrated expertise and experience in two or more of the following areas: emergency communications preparedness, high-volume traffic handling, volunteer management, communications networks, digital communication modes, dealing with served agencies working with the news media and effective practical writing.

Though no one appointee is expected to be knowledgeable in all of these areas, all areas shall be represented on the Committee.

F. ANERCOM shall be funded in the amount of $10,000 for its first year of operation.

After discussion, it was moved by Mr. Hurlbert, seconded by Mr. Grauer, that the matter is referred back to the Volunteer Resources Committee. On the motion of Mr. Holladay, seconded by Mr. Haynie, it was VOTED that the matter is LAID ON THE TABLE.

31) It was moved by Mr. Frenaye, seconded by Mr. Haynie, that the Board of Directors approve the draft ARRL/National Weather Service Memorandum of Understanding and that the President of the ARRL is authorized to sign the Memorandum of Understanding on behalf of the ARRL. After extended discussion, Mr. Haynie, seconded by Mr. Heyn, Moved the Previous Question, but the motion was lost. After further discussion, the question being on Mr. Frenaye's motion, the same was ADOPTED. Mr. Milius requested to be recorded as voting no.

32) It was moved by Mr. Stafford, seconded by Mr. Frenaye, that the Rules and Regulations Concerning American Radio Relay League Conventions be amended to provide that any group, or any parties sponsoring an ARRL-sanctioned hamfest or convention shall be an ARRL affiliated club at the time of application for ARRL sanction. It was moved by Mr. Heyn, seconded by Mr. Haynie, that the motion be amended by substituting the word, "should," for the word, "shall." On motion of Mr. Wilson, seconded by Mr. Grauer, it was VOTED at 10:25 PM, that the Board recess until 8:15 AM on the morrow.

33) The Board was called to order at 8:15 AM. All persons hereinbefore mentioned were present, except Mr. Drake, who entered the meeting at 8:28 AM, and Messrs. Holladay, Comstock, and Imlay, who were attending a meeting of Volunteer Examiner Coordinators on behalf of the Board.

34) Discussion resumed on the motion regarding conventions, moved the previous night by Mr. Stafford. After further discussion, the question being on Mr. Heyn's amendment, the same was LOST. The question then being on the original motion, it too was LOST.

35) On motion of Mr. Stevens, seconded by Mr. Heyn, it was VOTED that Paragraph I of the Rules and Regulations Concerning American Radio Relay League Conventions be amended to read as follows:

"American Radio Relay League conventions and hamfests are meetings of persons interested in Amateur Radio which are authorized and conducted in accordance with the rules to follow. ARRL conventions may be sanctioned at the section, state and division levels, and in some cases as operating-specialty conventions; there will not be more than one convention at each level in a given area per year."

36) On motion of Mr. Stafford, seconded by Mr. Mendelsohn, it was VOTED that the motion at Minute 30, regarding the ARRL National Emergency Response Committee, be lifted from the Table. On motion of Mr. Mendelsohn, seconded by Mr. Frenaye, it was VOTED that paragraphs E and F of the resolution are amended to read as follows:

E. ANERCOM staff shall consist of one ARRL Headquarters staff member, one ARRL Board of Directors Liaison, the Chairman of the Public Service Advisory Committee, each of whom shall have a background in emergency communications, and not fewer than four nor more than six additional radio amateurs, each with demonstrated expertise and experience in two or more of the following areas: emergency communications preparedness, high-volume traffic handling, volunteer management, communications networks, digital communication modes, dealing with served agencies, working with the news media and effective practical writing.

Though no one appointee is expected to be knowledgeable in all of these areas, all areas shall be represented on the Committee.

F. ANERCOM shall be funded in the amount of $5,000 for its first year of operation.

Whereupon, the question being on the resolution as amended, the same was ADOPTED.

37) On motion of Mr. Frenaye, seconded by Mr. Stafford, it was VOTED that the Board of Directors adopts the change in the name of the Emergency Com-

munications Advisory Committee to the Public Service Advisory Committee and the changes in the terms of reference for the Public Service Advisory Committee as recommended by the Volunteer Resources Committee in its report.

38) Mr. Price, as chairman, reported for the Executive Committee. A study of Article 9 requested at the July 1986 meeting was completed at the March meeting of the Committee. The study determined that the only change needed in Article 9 was a technical one to delete the reference to "Air Mail," a class of service no longer available domestically. It was moved by Mr. Haynie, seconded by Mr. Butler, that Article 9 of the ARRL Articles of Association is amended by striking the last 15 words of the fourth sentence, so the sentence reads as follows: "Notices shall be sent by First-Class Mail." A roll-call vote being required, there were 16 votes in favor to none opposed, so Article 9 was AMENDED. Mr. Gmelin departed from the meeting at 9:00 AM.

39) Mr. Atkins, as chairman, reported for the Ad Hoc Committee on the Strengthening of the CRRL. The Minutes of its May 23, 1987 meeting in Toronto show satisfactory progress toward autonomy. The group decided that Canadians would continue to participate in the Advisory Committees and NTS Area Staff meetings, with any necessary travel not to be undertaken at ARRL expense. ARRL Hq. would continue for now its support of the Field Organization in Canada, though CRRL is in the process of developing its own version of the necessary forms and reports. The status of Canadians in contests would remain as it is now until Canadian participants request change; Canadian applicants for ARRL operating awards will continue to be required to be CRRL members. Financial arrangements between the two Leagues were generally confirmed, and the feasibility of a Canadian insert for *QST* is under investigation. Amendments to the ARRL Articles of Association, By-Laws and miscellaneous rules and regulations, removing the references that have integrated Canadians into the ARRL, were approved for introduction at this ARRL Board meeting.

40) It was then moved by Mr. Atkins, seconded by Mr. Olson, that Article 4 (of the ARRL Articles of Association) is amended effective January 1, 1988 by removing references to Canada, so that it now reads: "The affairs of the Corporation shall be governed by a Board consisting of fifteen Directors, each representing a territorial Division comprising a geographical area as defined in the By-Laws. The Directors shall be elected for terms of two years by the members eligible to vote. Seven Directors shall be elected for terms beginning on even-numbered years and eight Directors shall be elected for terms beginning on odd-numbered years. Election of Directors shall be by mail vote in accordance with the rules and regulations prescribed in the By-Laws. The Board shall meet twice each year at times and places as provided in the By-Laws. The first meeting shall be called the Annual Meeting and the second shall be called the Second Meeting. Special meetings of the Board shall be called by the President upon written request of at least one-half of the membership of the Board as then constituted." A roll-call vote being required, the question was decided with all the Directors voting in favor. So the Article was AMENDED.

41) It was moved by Mr. Atkins, seconded by Mr. Olson, that Article 5 is amended effective January 1, 1988 by deleting the last sentence thereof, which recognized the Vice President of the CRRL as the Vice Director of the Canadian Division. A roll-call vote being required, the question was decided in the affirmative, with all the Directors voting in favor. So the Article was AMENDED.

42) It was moved by Mr. Atkins, seconded by Mr. Olson, that Article 7 is amended effective January 1, 1988 by deleting the opening phrase, "Except in the Canadian Division." A roll-call vote being required, the question was decided in the affirmative, with all the Directors voting in favor. So the Article was AMENDED.

43) It was moved by Mr. Atkins, seconded by Mr. Olson, that Article 11, which requires, inter alia, the holding of an amateur license by certain officeholders, is amended effective January 1, 1988 by removing the words, "or Canada," after the phrase, "regulations of the United States." A roll-call vote being required, the question was decided in the affirmative, with all the Directors voting in favor. So the Article was AMENDED.

44) It was moved by Mr. Atkins, seconded by Mr. Olson, that By-Law 1 (a) is amended effective January 1, 1988 by removing references to Canada in the qualifications of a Full Member of the ARRL. A roll-call vote being required, the question was decided in the affirmative, with all the Directors voting in favor. So the By-Law was AMENDED.

45) It was moved by Mr. Atkins, seconded by Mr. Olson, that By-Law 10 is amended effective January 1, 1988 by removing the Note at the end thereof, referring to Life Member candidates from Canada. A roll-call vote being required, the question was decided in the affirmative, with all the Directors voting in favor. So the By-Law was AMENDED.

46 It was moved by Mr. Atkins, seconded by Mr. Olson, that By-Law 13 is amended effective January 1, 1988 by removing the phrase, "or a Canadian Amateur Certificate" in license-class requirements for certain officeholders. A roll-call vote being required, the question was decided in the affirmative, with all the Directors voting in favor. So the By-Law was AMENDED.

47) It was moved by Mr. Atkins, seconded by Mr. Olson, that By-Law 16 is amended effective January 1, 1988 by striking the text and substituting therefor the following:

"16. Recognizing the long association between the Corporation and the Canadian Radio Relay League (when the latter was one of the Divisions of the Corporation), and in order to provide continuity of communication and liaison between these two entities, the President of the CRRL or his designated representative shall be invited to attend and to participate in all meetings of the Board, but shall have no right to vote thereat."

It was moved by Mr. Hurlbert, seconded by Mr. Nathanson, that the text be amended by replacing the word "shall" the first time it appears with the word "may." A roll-call vote being requested, the question was decided in the negative, 1 vote in favor to 15 votes opposed; all the Directors voted no except Mr. Hurlbert, who voted aye. So the motion to amend was lost. The question then being on the original motion, and a roll-call vote being required, the same was decided in the affirmative, with all the Directors voting in favor. So the By-Law was AMENDED.

48) It was moved by Mr. Atkins, seconded by Mr. Olson, that By-Law 30 is amended effective January 1, 1988 by deleting the Canadian Division and its component provinces from the list of ARRL divisions. A roll-call vote being required, the question was decided in the affirmative, with all the Directors voting in favor. So the By-Law was AMENDED.

49) On motion of Mr. Atkins, seconded by Mr. Haynie, it was unanimously VOTED that the Rules and Regulations of the ARRL Field Organization and the Rules and Regulations Concerning Affiliated Societies are amended as proposed by the Ad Hoc Committee, to delete references to CRRL, Canada, provinces and words related thereto.

50) With the adoption of these amendments, the report of the Ad Hoc Committee on the Strengthening of CRRL and its principal tasks were finished. Mr. Atkins, as CRRL President, spoke graciously in appreciation for the stewardship of the ARRL over Canadian amateur affairs since 1920, for the cooperation and goodwill of Committee members, officers and the ARRL Board family in smoothing the transition from ARRL Canadian Division to the autonomous CRRL, and for the many expressions of support and good wishes for the future. (Applause.)

51) Mr. Butler, as Liaison, presented a brief report of the Ad Hoc Committee on Spread Spectrum. *QEX* has reported the continuing Spread Spectrum experiments of Committee member Andre Kesteloot, N4ICK; there is still no evidence of SS experiments outside the Committee. The report recommends that past *QST* and public-domain material on spread spectrum be published by the ARRL; Hal Feinstein, WB3KDU is working with Technical Editor Hutchinson toward that end. The Committee's mandate ends in November 1987; its final report will be filed for the 1988 Annual Meeting.

52) The Ad Hoc Committee on Amateur Radio and the Media having just been formed, it had no written report. Chairman Atkins remarked that the Committee was getting underway now, and expected to have its report for the 1988 Annual Meeting as scheduled in its mandate.

53) Mr. Turnbull, as Chairman, presented the report of the RFI Task Group. Activities included attendance at the meeting of the ANSI Accredited Standards Committee C-63, Ad Hoc Committee on Public Law 97-259. Both the FCC and the EIA appear to favor the generating of an information sheet for inclusion with consumer electronic equipment; it is suggested that the ARRL present a draft of such a sheet at the August meeting. The group also discussed complaints of interference by amateurs to consumer-owned telephone equipment. Complainants should be advised that the equipment had design deficiencies and should be returned to the vendor for repair, replacement or refund. The Committee has attempted to recruit a representative from the Control and Security Devices industry for its work, without success up to now. The initial report with its one-volt-per-meter standard for immunity is scheduled to be updated at the next session. The ARRL has been asked to participate in a Working Group of an international technical body addressing the immunity and emissions of information technology equipment. President Price has selected Mr. Turnbull as League representative, with Technical Editor Hutchinson as alternate. Both the National Cable Television Association and the League have filed in an FCC proceeding comments urging adequate (eg, 90 dB) isolation between cable and antenna transfer switches.

54) An oral report was presented for the Committee on the Biological Effects of RF Energy by its new chairman, Mr. Mozley. He has reviewed the fine efforts of the Committee over the past eight years under the chairmanship of Past Director Wangler; he has also reviewed *QST* since 1980, finding 12 items discussing bio effects, which he regarded as excellent coverage. Mr. Mozley noted with regret the death of a committee member, Dr. David Davidson, W1GKM. With other resignations, the committee is short-handed. He will have some nominations to suggest to President Price. The chairman noted that the FCC had exempted amateurs from having to report the environmental impact of their stations relative to bio effects. However, in return, the amateur community is requested to have question pool coverage of the subject and there should be continuing education on it in *QST* and other League publications. Studies into the subtle effects of RF energy continue; meanwhile, ARRL officials can help the cause by counseling a calm and reasonable approach to the subject in their respective communities. (Applause.)

55) Mr. Rinaldo, as chairman presented the report of the Committee on Amateur Radio Digital Communication. The report covered the ARRL request for special temporary authorizations for automatic control of specific stations for the HF Packet network (Skipnet) filed on June 3; a study of message handling by packet radio due in January 1988 in response to Minutes 68 and 74 of the 1987 Annual Meeting; development of networking and transport protocols (See On Line, May 1987 *QST*) and of modems; the impact of AMSAT Phase 4 geostationary satellites on packet networks, and the need for development of 2.048 megabit-per-second TNCs and modems in the next five years; and a need for attention to AMTOR specifications. The Committee also prepared recommendations for packet frequencies responsive to Minutes 45(a) and 45(h) of the 1986 Annual Meeting and Minute 80 of the 1987 Annual Meeting, and sent them to the Membership Services Committee, which presented them at Minute 20 of this meeting.

56) On motion of Mr. Quiat, seconded by Mr. Atkins, it was VOTED that the motion at Minute 20, pertaining to packet frequencies, is lifted from the Table. On motion of Mr. Stafford, seconded by Mr. Mendelsohn, it was VOTED to amend the motion to read:

"The Packet Radio frequency recommendations of the Ad Hoc Committee on Amateur Radio Digital Communications for frequencies below 225 MHz are adopted as interim guidance, and, in recognition of regional differences and the rapid expansion of this mode, the Ad Hoc Committee is requested to continue development of Packet Radio frequencies for consideration by the Board through the Membership Services Committee." Whereupon, the question being on the motion as amended, the same was ADOPTED. Mr. Hurlbert requested to be recorded as voting no.

57) The Board was in recess from 10:12 AM to 10:31 AM.

58) Mr. Nathanson, as chairman, presented an oral report for the Legal Strategy Committee. The Committee continues to utilize PRB-1, the FCC's declaration of limited preemption over amateur antennas and towers, though it should not be regarded as a passport but rather as a good start. There are still proscriptive ordinances out there; Volunteer Counsels are helping. He and Counsel Imlay plan a meeting with League of Cities officials to explain the significance of PRB-1 and other FCC declarations. The problem of restrictive covenants is being addressed by Vice Director Overbeck and others, including some volunteers in the real estate business. There are plans for a library of antenna ordinance material at Headquarters. The Legal Seminar at the ARRL National Convention on July 11, has been accepted for credit by the states that require Continuing Legal Education training sessions (CLEs) for their attorneys.

59) Mr. Oubre, as Liaison, presented the report of the VHF Repeater Advisory Committee. The Committee has studies in progress on a number of issues: whether FCC should officially recognize coordination-council actions; the need for a national frequency coordination plan; questions on a national repeater data base; the question of repeaters being allowed in 51-52 MHz; operating frequencies for digipeaters and a packet band plan.

60) Mr. Kanode, as Liaison, presented the report of the Contest Advisory Committee. The Committee decided against recommending changes in the CW DX Contest date. ARRL Awards Committee and CAC joint action resulted in Yukon VY1 counting as a separate multiplier for DX stations in future DX Contests and a QRP category (5 watts or less) for stations in Sweepstakes. Subjects under discussion include changes in multipliers for the 10-meter contest, multiple single-band entries from a single station, the publishing of "all-time" records in *QST*, a meteor-

scatter contest, use of packet-radio spotting networks, the ARRL band-plan versus contest activity in the 160-Meter contest, DX input into the work of the CAC, encouraging more activity on bands above 902 MHz, and Novice contest categories reflecting Novice Enhancement.

61) Mr. Drake, as Liaison, presented the report of the DX Advisory Committee. Proposals to add the Council of Europe and Tierra Del Fuego to the list of countries were defeated. The special study of the DXCC (Minute 59, Second Meeting of 1986) continues in progress. The report suggests that a separate study of country criteria might be folded into the special study on the DXCC.

62) Mr. Vydareny, as Liaison, presented the report of the Emergency Communications Advisory Committee. Studies in progress include packet radio and emergency communications, liability concerns, accountability of Hq to volunteers, evaluation of memoranda of understanding, review of the Blue Ribbon Committee Report, review of Simulated Emergency Test guidelines, guidelines for bike-a-thons and the like, and the 75th anniversary of emergency communications.

63) Mrs. Gauzens, as Liaison, presented the report of the Public Relations Advisory Committee. The Committee is involved in five projects: a slide show for served agencies, rewrite of guidelines for Public Information Officers and Public Information Assistants, a guidebook for PIAs and club publicity chairmen, monitoring results from the Archie comic book, and the ARRL-sponsored video, *The New World of Amateur Radio*, whose producer is PRAC member Frosty Oden, N6ENV.

64) Mr. Overbeck, as Liaison, presented the report of the VHF-UHF Advisory Committee. The hottest issue before the Committee is General Docket 87-14 regarding 220-222 MHz allocations and assessment of its potential impact. If authorized, the Committee plans to form a Working Group which could hold its first meeting at the Central States VHF Conference in late July. VUAC will present a motion offering its recommendations for coordination of, and frequencies for, VHF and UHF beacons. Committee recommendations on VHF/UHF packet frequencies were forwarded to the Membership Services Committee, the report said.

65) Reaching Agenda Item 7, the Board considered sites for the 1989 ARRL National Convention, in observance of the ARRL Diamond Jubilee 75th Anniversary. Mr. Wilson presented the proposal of the Committee for Amateur Radio that the Convention be held on September 15-17 in Cincinnati, Ohio. Mr. Haynie presented the proposal of Ham-Com, Inc that the Convention be held on June 2-4 in the Dallas/Ft Worth area. Mr. Quiat presented the proposal of the Colorado Council of Amateur Radio Clubs that the Convention be held on August 11-13, in Denver, Colorado. Mr. Hurlbert presented the proposal of the Hot Springs Amateur Radio Club that the Convention be held on July 7 to 9 in Hot Springs, Arkansas. Mr. Haynie presented the proposal of the Central Oklahoma Radio Association that the Convention be held on July 21-23 in Oklahoma City, Oklahoma. Mr. Butler presented the proposal of the Orlando Amateur Radio Club that the Convention be held on March 10-12 in Orlando, Florida. Mr. Heyn presented the proposal of the San Diego Amateur Radio Club that the Convention be held on August 24-27, in San Diego, California. The Chair appointed Mr. Olson as teller and four secret ballots were taken, with the proposal having the fewest votes being dropped off after each ballot. On the fourth ballot, the Teller announced that a majority of Directors had chosen the proposal of Ham-Com, Inc., to hold the ARRL 1989 National Convention in the Dallas/Ft Worth area of Texas from June 2 to 4, 1989. (Applause.) During the course of the above, at 11:50 AM, Messrs Holladay and Imlay returned to the meeting after attending the first part of the VEC meeting.

66) Mr. Holladay, as Chairman, presented the report of the Special Study Committee on Advisory Committees. Proposals for revising the terms of reference, rules and standard operating procedures have been prepared by the Committee for decision by the Directors at this meeting. Remaining work is minor; the Committee anticipates that it will complete its assignments before the 1988 Annual Meeting.

67) The Board was in recess for lunch from 12 noon to 1:00 PM, reconvening with all persons hereinbefore mentioned present, except Mr. Gmelin, as previously noted and Mr. Comstock, who remained at the VEC meeting. There were also present Roy Neal, K6DUE, Forrest "Frosty" Oden, N6ENV, William Pasternak, WA6ITF and George Barker, NA1F, at the invitation of the Board to record a segment of the meeting for use in the video, *The New World of Amateur Radio*.

68) On motion of Mr. Olson, seconded by Mr. Turnbull, the following resolution was unanimously ADOPTED:

WHEREAS, on January 1, 1920, at the request of Canadian Amateurs, the ARRL created a Canadian Division, with the understanding that at some future time Canadian amateurs would choose to establish their own national organization, and

WHEREAS, on January 1, 1988, the Canadian Division of the ARRL will disappear, and in its place will be an independent and well-supported national organization, the Canadian Radio Relay League, committed to serving Canadian amateurs, carrying on the activities and traditions of the League in Canada; it is therefore

RESOLVED, that the American Radio Relay League wishes the Canadian Radio Relay League continued success as it begins its independent operation in 1988 as the representative of Canadian amateurs, and that the ARRL reaffirms its intent to continue the mutually rewarding cooperation and associations which marked the relationship between United States and Canadian amateurs over the past 67 years. (Applause.)

69) On motion of Mr. Wilson, seconded by Mr. Mendelsohn, it was VOTED that the Executive Vice President is instructed to institute and suitably publicize a "Diamond Jubilee Award," similar in operation to the present "Golden Jubilee Award," requiring the applicant to complete "Worked All States" on twelve meters and one other band. This award will be available for contacts made during 1989. Written confirmations will not be required. During the course of the above, the video crew departed from the meeting, at 1:27 PM.

70) Mr. Wilson, as Chairman, presented the report of the Ad Hoc Committee on PRB-3, the FCC proceeding on a Special Call Sign Program. The report discussed conditions under which the ARRL might support PRB-3 and bid to become its coordinator. A general discussion followed. It was moved by Mr. Hurlbert, seconded by Mr. Stafford, that the following resolution be adopted:

WHEREAS, the American Radio Relay League is the largest organization representing the Amateur Radio Service in the United States, and

WHEREAS, the ARRL is a democratically structured organization, responsible to its membership, as well as to the Amateur Radio community as a whole, and

WHEREAS, there is no other national membership organization so broadly based as the ARRL to represent all segments of the Amateur Radio community, and

WHEREAS, it is appropriate for the ARRL, through its Board of Directors, to formulate and announce a clear policy with reference to PRB-3, and

WHEREAS, other organizations, both Amateur-Radio oriented and non-Amateur-Radio oriented, some of which are 'profit' and some of which are 'non-profit,' have expressed interest in PRB-3, such interest being motivated variously from a desire to render service to the amateur community to a desire for financial gain as a result of perceived opportunity, and

WHEREAS, this Board is mindful of its duties and responsibilities to all Amateur Radio operators as opposed to only ARRL membership, which duties and responsibilities on occasion lead to the undertaking, for the common good, of unwanted, odious or unpopular tasks and

WHEREAS, although many feel that the FCC should continue to administer the rules and regulations pertaining to Amateur Radio, particularly with reference to the issuance and assignment of call signs, nevertheless, recognizing that the assignment, issuance and renewal of amateur call signs or licenses may be delegated even though the ARRL and others oppose the concept, now, therefore, it is hereby

RESOLVED, by the Board of Directors of the American Radio Relay League that the official policy of this organization, the implementation of which is charged to all officers and staff, is as follows:

(a) The ARRL strongly supports the concept that the assignment of call signs, and the issuance thereof, is a governmental function which should not be relinquished or contracted away by the FCC.

(b) Should the FCC nevertheless determine that the assignment and issuance of call signs, or any phase thereof be delegated, then this Board, recognizing its responsibility to all amateurs, as the only national, broad-based, democratically-organized non-governmental entity capable of administering and operating a call-sign program sensitive to the needs of, and responsible to, all amateurs, would seek to have ARRL undertake the program as follows:

1. The ARRL should be the only entity involved in any non-FCC call sign program.

2. There should be no delegation of any responsibilities devolving under such a program, directly or indirectly, to maintain maximum sensitivity to the needs of amateurs, and maximum control by amateurs.

3. The FCC must continue to maintain its own database for enforcement and all other governmental purposes.

4. That any such program be self-supporting and financed by fees to be authorized on a reasonable basis.

After discussion, Mr. Quiat, seconded by Mr. Mendelsohn, successfully Moved the Previous Question, terminating debate. The question then being on the resolution, the same was ADOPTED. Mr. Wilson tequested to be recorded as voting no.

71) The Board was in recess from 2:50 PM to 3:20 PM. Without objection, general discussion on PRB-3 resumed. The Board was again in recess from 4:28 PM to 4:45 PM, at which time Mr. Comstock rejoined the meeting.

72) On motion of Mr. Frenaye, seconded by Mr. Mendelsohn, the following resolution was unanimously ADOPTED:

WHEREAS, the Amateur Radio community is now successfully facing the challenge of recruiting new amateurs, and now faces such challenges as a World Administrative Radio Conference in the early 1990s, and a new exciting generation of amateur satellites; and

WHEREAS, these challenges will require a significant commitment of resources by the Amateur Radio community, and

WHEREAS, the ARRL Visitor Center project—though meritorious and desirable—may be competing with these other high-priority activities,

BE IT RESOLVED, that the Visitor Center project be held in abeyance until a more fortuitous time. However,

WHEREAS, the Maxim Memorial Station, W1AW, is sorely in need of extensive renovation in order to continue to meet its operating mission, and

WHEREAS, the amateur community has long held dear the W1AW bulletin and code-practice programs as being immensely beneficial to individual amateurs' growth,

BE IT RESOLVED, that the Executive Vice President is directed to begin W1AW renovation, including a plan for fundraising, on a time schedule to coincide with the Diamond (75th) Anniversary of the ARRL in 1989, with the Administration and Finance Committee charged to monitor progress in the development of such plans. During the course of the above, Messrs. Rinaldo and Sumner and Mrs. Gauzens left the meeting on ARRL business.

73) On motion of Mr. Wilson, seconded by Mr. Mendelsohn, it was VOTED that ARRL petition FCC to require express FCC approval of the accreditation of any prospective Volunteer Examiner who has previously had Volunteer Examiner accreditation suspended or revoked by any VEC.

74) On motion of Mr. Mendelsohn, seconded by Mr. Butler, it was VOTED that the VRAC study the desirability of adding to the ARRL *Repeater Directory* a new category of listing, that of "coordination status pending." This shall be a single character indicator showing a repeater or emitter as having its coordination status investigated by the cognizant coordination body. Mr. Grauer requested to be recorded as voting no.

75) It was moved by Mr. Grauer, seconded by Mr. Butler, that the Cover Plaque Award program be abolished and no further awards be presented. After discussion, the motion was LOST.

76) It was moved by Mr. Drake, seconded by Mr. Stafford, that the ARRL publication, *Operating an Amateur Radio Station*, be reviewed, revised and republished. The price shall be kept as low as possible. On motion of Mr. Wilson, seconded by Mr. Heyn, it was VOTED that consideration of this motion be deferred until the return of Mr. Sumner.

77) On motion of Mr. Stafford, seconded by Mr. Milius, the following resolution was unanimously ADOPTED:

WHEREAS there is a need to provide ARRL bulletin service and code practice in the western United States, similar to those services provided in the eastern United States, Therefore, be it

RESOLVED that:

1. The ARRL Board of Directors hereby establishes a program for the solicitation of donations for the establishment of a transmitting facility in the western United States that will provide the same ARRL bulletin service and code practice to the western US, Hawaii, US possessions in the Pacific and Alaska that are currently provided to the eastern and central portions of the US by W1AW.

2. Staff is directed to make a study of the optimum location of such a transmitting facility to provide the best overall propagation to the western US, Hawaii and the US possessions in the Pacific and Alaska. During the course of the above Mr. Sumner returned to the meeting.

78) On motion of Mr. Quiat, seconded by Mr. Mendelsohn, it was VOTED that the motion at Minute 19 is lifted from the Table. On further motion of Mr. Quiat, seconded by Mr. Mendelsohn, it was VOTED to strike the text and substitute therefor the following: "In connection with Minute 77 of the Second 1986 Board Meeting directing the Membership Services Committee to study and make recommendations on improving the W1AW ARRL Bulletin program, that

(continued on page 72)

Happenings

Conducted By Phillip Sager, WB4FDT
Manager, Regulatory Information Branch, ARRL

87-14 Update

ARRL President Larry Price, W4RA, and Washington Area Coordinator Perry Williams, W1UED, met with FCC Commissioners James Quello, Mimi Dawson and Patricia Dennis and other FCC officials on June 17 and July 23, at ARRL request. In each instance, President Price explained the amateur views on Docket 87-14, and answered numerous questions, mostly concerning 220-MHz activity.

Meanwhile, the FCC Office of Engineering and Technology extended the deadline for reply comments in General Docket 87-14 until July 31, 1987, at the request of several petitioners because of the disorganized state of the more than 20 volumes of comments. The petitioners said they felt they had not found all of the significant comments to be able to reply.

Taking advantage of the extension, which was announced several days after the ARRL reply comments were filed, the League, on July 31, filed "Supplemental Reply Comments" clarifying specific points raised in materials previously filed with the Commission.

Earlier, on June 19, the ARRL had filed over 45 pages of reply comments in General Docket 87-14. These reply comments are in response to the comments filed, both pro and con, to the Commission in this proposal.

The ARRL reply comments, in noting the thousands of comments filed by the Amateur Radio community said: "The Amateur Radio Service has established, by its thousands of comments in this proceeding, a unified expression of righteous indignation at the proposed deprivation of two megahertz of critical support spectrum at 220-222 MHz.... The Comments of the amateur community establish, without exception, that the Commission's proposal to take 40 percent of the 220-222 MHz band from amateurs is based on an absolutely incorrect premise—that the 220-222 MHz segment is "not significantly used" by amateurs. The amateur comments are highly critical of the Commission's reference to the League's *Repeater Directory* as a basis for that premise, and rightly so; the *Directory* was never intended to be a listing of other than repeaters.... It contains essentially no information concerning non-repeater uses in the 220-225 MHz band." The ARRL also noted that the FCC received very few comments from individual land mobile users and said this reflected the lack of interest by the service due to the small amount of spectrum space in the proposal (most of the original Land Mobile Service petitioners in this docket wanted the 4 megahertz between 216-220 MHz). A number of comments were even received from land mobile users which suggested that amateur frequency allocations not be disturbed and recommended that the 216-220 MHz region be used instead.

The serious adverse effect on amateur emergency communications was addressed by the American Red Cross and many state and municipal emergency preparedness agencies. The American Red Cross stated that the "proposed reallocation stands to seriously harm the development of packet radio technology and the establishment of regional high-speed data links in the 220-222 MHz band. The emergency communications capability of this new, efficient technology is beyond that heretofore possible."

In its conclusion, the ARRL urged the FCC not to adopt the proposal, but to continue the amateur allocation on the 220-MHz band in its entirety.

ARRL NATIONAL CONVENTION

How does one describe an ARRL National Convention? Where do you start? The more than 70 forums covering virtually every aspect of Amateur Radio, from AMSAT to weather reporting? The commercial exhibits, with their shiny new equipment? The flea market, where many a middle-aged ham's heart was stolen by the sight of a forlorn Heathkit DX-40, the first transmitter for many amateurs during the 1950s and '60s? The banquet, where local radio personality Ludlow Porch kept the 500 attendees in stitches with his expose on "weirdness"? Perhaps the best place to begin would be to interview one of the few remaining survivors of the dreaded Wouff Hong midnight initiation rite.

How does one describe this National Convention? By describing the more than 6000 attendees present. A small group of them were ARRL Officers and Directors, who had attended the semiannual Board meeting the day before the Convention started. Other world-class amateurs, experts in their particular field, conducted seminars and forums. This gives the amateurs attending the unique opportunity to see, hear and question for themselves these "stars." Where else but at a National Convention could one question high-level FCC officials and the ARRL President all in the same afternoon?

This National Convention also boasted a real first: A legal seminar, primarily of interest to ARRL Volunteer Counsels (VCs), concerning "Land Use Regulation of Federally Licensed Communications Facilities and the Doctrine of Federal Preemption." The lawyers attending this seminar learned first-hand about PRB-1 and recent legal cases concerning zoning laws and deed restrictions and amateur antennas. They will now go back to their local communities in a better position to help other amateurs fight amateur antenna restrictions.

Sorry you missed this National Convention? Well, plan now for the 1988 National Convention, to be held in Portland, Oregon, September 9-11. For information, contact: 1988 National, c/o NARC Inc, PO Box 25088, Portland, OR 97225.

More than 6000 attended the Convention. Reports indicate that new-equipment sales were excellent.

The ARRL booth at the National Convention was ably manned (if that's the correct term) by (from the left) Libby Karpiej, KA1DTU, Joan Hushin, KA1IFO and Bernice Dunn, KA1KXQ (among others). *(photos by John Kanode, N4MM)*

FCC GRANTS UNATTENDED PACKET STA REQUEST

The FCC announced at the ARRL National Convention that they had granted the ARRL request to permit for a six-month period approximately 50 amateur packet stations around the country to conduct unattended automatic operation while transmitting third-party traffic on frequencies below 50 MHz.

The amateur stations included under this special temporary authority (STA) will be able to participate as relay stations in a long-haul HF net called "Skipnet." This net will operate on a single frequency in the 80, 40, 30 and 20-meter bands and stations will relay traffic via packet throughout the country. If these operations are successful, ARRL may decide to request a permanent rules change.

NEW GROUND RULES FOR FOREIGN RECIPROCALS

When the FCC issued its latest list of countries with which the US has reciprocal or third-party agreements, *it quietly changed the ground rules for reciprocals who also hold US licenses.* Now, a US license supersedes any US reciprocal permit which may be held by the foreign licensee. Thus, when an alien passes an amateur examination conducted by a VEC, *his new license will supersede his reciprocal license.*

This action is meant to correct potential abuse by foreign nationals who hold lower-class US amateur licenses. They sometimes go back to their native country, show their US license, and receive a new license. They then go back to the US and apply for a reciprocal license (with Extra Class privileges) on the basis of their home country's ticket!

On the other side of the coin, however, this new rule may discourage many reciprocal licensees from taking a US examination. Reciprocals now receive the equivalent of an Extra Class license. Reciprocals would not want to take a US exam unless they were sure they were going to pass the Extra Class to avoid losing privileges.

A number of reciprocal licensees also hold US licenses in order to have a US call sign. Unless these licenses are Extra Class, holders of these license will have reason to consider submitting them for cancellation, which would be contrary to what the Commission presumably is trying to accomplish.

FCC DENIES 40-METER NOVICE BAND EXPANSION IN ALASKA, HAWAII

The FCC has decided not to act on its own proposal in Docket 86-397, an NPRM which proposed to open a new Novice/Technician subband at 7050-7075 kHz in Alaska, Hawaii, Region 2 Pacific insular areas and Caribbean insular areas. The NPRM was in response to a petition filed last fall by KH6B, who said that the Novice/Technician subband at 7100-7150 kHz was unusable at night because of broadcasting by stations in Regions 1 and 3. The FCC, in terminating the docket, said that special privileges for Novice/Technicians in these areas is unwarranted since interference from international broadcast stations is no greater there than to Novice/Technician operation in the continental US. The ARRL had filed comments against the proposal.

FCC ADOPTS UNIFORM STANDARDS FOR CABLE TERMINAL DEVICES

The FCC has now adopted uniform standards in General Docket 85-301 for all terminal devices connected to cable systems, such as converters and decoders, making them subject to Subpart H of Part 15 of the FCC Rules.

Previously, terminal devices owned or supplied by a cable operator were subject to Part 76 of the rules, while those owned by subscribers were subject to Part 15. The FCC said this made little sense since the equipment, whether owned by a subscriber or cable company, served the same functions and in some cases was identical. There was often confusion as to which standards were applicable to certain "stand alone" devices.

How does this affect amateurs? The Part 15 standards are more lax than the Part 76 standards in regard to cable leakage and RF interference into the cable system. Amateurs have noted interference to and from cable terminal devices, especially relative to cable-connected VCRs. Last October, the ARRL had filed comments in this Docket urging the Commission to retain the Part 76 limitations on RF leakage. In that filing the ARRL said: "League engineering studies have established that even present Part 76 limits permit cable systems to leak RF (on amateur frequencies) at sufficient levels to produce severe interference at distances in excess of 100 feet. To permit emissions at 10 to 20 times that level through terminal devices in close geographic proximity to amateur stations is extremely ill-advised."

The FCC responded to the ARRL's comments saying: "We are aware of the concerns in this matter of the ARRL...and that amateur stations generally operate in communities where cable terminal devices are located. However, we observe that the interference to amateur radio service found in the study submitted by ARRL resulted from incorrect cable connections and cable breaks and was not attributable to Part 15 devices that were directly connected to a cable system. On this basis, we find that the field strength emission limits provided in Section 15.610 of our rules are sufficient to prevent harmful interference by cable terminal devices."

The FCC released this Report and Order June 5, and copies are available from the Regulatory Information Branch at HQ for a large SASE with 56 cents postage.

FOREST SERVICE FEE PROPOSAL UPDATE, ARRL FILES COMMENTS

The Southern Region has joined three other Forest Service Regions in proposing new rental fee schedules for the various radio and television services, including amateur, that rent US Forest Service land sites. The Southern Region administers approximately 720 such sites in the following states: AL, AR, FL, GA, KY, LA, MS, NC, OK, SC, TN, TX and VA, as well as Puerto Rico.

According to this proposal, the fees for amateurs would vary in the Region, ranging from $300 to $1200.

The ARRL has completed a survey of more than 230 repeater owners/trustees in the Rocky Mountain Region of the Forest Service. The survey shows that Forest Service users already pay more for their sites than for other privately owned or municipal sites. In fact, the survey reveals that 90% of non-Forest Service users pay nothing for using their repeater sites, while some Forest Service users pay as much as $670 annually.

With the survey completed, ARRL has now filed comments to the Rocky Mountain, Northern and Eastern Regions of the US Forestry Service. In its comments, ARRL explains the purposes of Amateur Radio and emphasizes its noncommercial character. The ARRL said: "The entire cost of amateur station operation is borne by amateurs, who must use their own post-tax dollars to provide public service communications. This, amateurs are willing to do because communicating is enjoyable for them. There is, however, absolutely no way to recoup any out-of-pocket expenditures for amateur pursuits.... Amateur use of electronic sites is thus qualitatively different from all other radio services which use electronic sites. It is neither in the public interest nor in the interest of the Forest Service, which benefits in times of forest fires and rescue efforts in federal forests from communications provided by amateurs, to discourage amateur repeater stations by clearly prohibitive fees."

ARRL also emphasized in its comments that 90% of repeater owners pay nothing for the use of their sites, and said that the "fair market value" that the Forest Service should charge "is nothing, or at most a nominal fee."

The ARRL concluded that the Forest Service should recognize the valuable public service and emergency communications rendered by amateurs, together with the non-pecuniary nature of the Service, and provide electronic site space to amateur repeaters free or at nominal cost.

ARRL EDUCATION TASK FORCE UPDATE

ARRL President Larry Price, W4RA, has completed his appointments to the ARRL Education Task Force. When the Education Task Force was created at the January Board meeting, there was no way of knowing how many qualified and enthusiastic volunteers would step forward. The response to the recent call for volunteers in *QST* exceeded expectations, and has made it possible to organize and distribute the work of the group through the creation of separate "working groups" to address the elementary school, high school and adult education levels.

ARRL New England Division Director Tom Frenaye, K1KI, will serve as Chairman of the Task Force, and J. A. "Doc" Gmelin, W6ZRJ will serve as Vice Chairman.

The membership of the Task Force is as follows:

General: KZ1Z, WB1GDA, KB2BAH, N3EEA, W8JRK, KG0C.

Elementary Working Group: NR2S, K4AVX, WB6QNR, KD8YY, N9DGQ.

High School Working Group: W2HUX, KB4VIN, WD6DKI, AC8R, K9DIY.

Adult Education Working Group: WA2UNP, KA5AKY, KF5LW, AA6BD, KF6MZ.

The main purposes of the Education Task Force are:

- to review and update curricula for the teaching of all classes of Amateur Radio license using techniques currently available in the education discipline; and
- to explore and report innovative methods

of establishing Amateur Radio clubs in elementary, junior and senior high schools.

ARRL Club Services Department Manager Lee Hayford, AH2W, will serve as staff liaison to the Education Task Force.

MAY FCC LICENSING FIGURES

The May FCC licensing figures contain some good news for amateurs who have been concerned about the Gettysburg backlog and about amateur growth. For awhile this spring, some applicants for new licenses were waiting as long as 12 weeks for their licenses. The ARRL raised this issue with the FCC, and we were promised that some additional personnel would be assigned to process amateur applications.

The May FCC statistics show that the FCC processed 18,889 applications, which includes 6797 new amateurs. This brings the five-month total for 1987 to 14,679 new amateurs. The comparable figure for the same five months last year was 8613, so new amateur licensing so far this year is running 70% ahead of 1986.

HQ has also heard from several Novice instructors, who tell us that their students are now receiving their licenses in as little as four weeks.

Here are the license totals as of the end of May:

Novice	86,175
Technician	87,631
General	115,045
Advanced	97,880
Extra	42,136
Total	428,867 (up 2.8% from one year ago)

FCC DENIES WARNING LABELS ON CELLULAR PHONES

The FCC has denied a request by the Washington Legal Foundation (WLF) that the Commission issue a proposal to require a warning label on cellular telephones reading "Privacy of communications may not be ensured when using this phone." The WLF had argued that warning labels would be the most cost-effective means of informing cellular telephone users that their calls are subject to interception.

In denying the request, the FCC noted that the Electronic Communications Privacy Act of 1986 passed by Congress had made it a crime to intercept cellular telephone calls. The FCC said that it would be premature to go forward at this time with a rulemaking without knowing the effectiveness of the legislation.

AMATEUR RADIO MEDIA COMMITTEE NAMED, SEEKS INPUT

Whenever there's disruption or overload of conventional communications circuits, or something important happens where such circuits do not exist, radio amateurs may be called to bridge the communications gap. Any one of us may find ourselves, without warning, in such a position.

Recently there have been a number of such cases where, in addition to supplying communications for government and relief agencies, amateurs have been asked to provide a variety of communications services to the radio, television and print media. When do such services constitute emergency communications in the public interest, and when are we simply being taken advantage of for competitive gain? The line is not easy to draw, particularly under pressure.

To help, ARRL has established an Ad Hoc Committee on Amateur Radio and the Media consisting of four League members with extensive experience on both sides of the question. The chairman is Tom Atkins, VE3CDM; members are Rich Moseson, NW2L, Roy Neal, K6DUE, and Ed Tobias, KR3E. Over the next several months, the committee members will be drafting a suggested set of ethical guidelines for use during Amateur Radio/media contact. The guidelines, it is hoped, will help to educate media representatives as to what radio amateurs can and cannot do for them, and to ease some of the pressure on the individual amateurs in the field.

Do you have some experience or insight that would be of help to the committee? If so, your input is sought. In particular:

1) How have you assisted the news media in the past?

2) To what extent should media representatives be allowed to involve radio amateurs in news coverage?

3) Is news/Amateur Radio interaction something that should be encouraged or discouraged?

Please address your comments to Michael R. Riley, KX1B, ARRL Staff Liaison, Committee on Amateur Radio and the Media, 225 Main St, Newington, CT 06111.

A draft set of guidelines is due for completion in December, so please respond as soon as you can, and if possible no later than September 30.

JOIN ARRL "ALL RISK" HAM RADIO INSURANCE PROGRAM DURING SPECIAL ENROLLMENT PERIOD

A special enrollment period is currently in progress until November 1 for the ARRL "All Risk" Ham Radio Insurance Program. All members may enroll with guaranteed acceptance.

Insured equipment and accessories are covered for loss due to theft, damage caused by fire, lightning, collision, short circuiting due to fire, flood, tornado or other natural calamity.

Coverage includes equipment at home, in your car and at a Field Day or hamfest site. Furthermore, if new equipment is purchased during the policy year valued up to $1000, that equipment is fully covered at no additional cost until the next renewal of the policy.

The most outstanding feature of the program remains its cost. This fully comprehensive insurance program can be purchased for an entire year for only $1.25 per $100 of replacement cost value, plus a $5 yearly administrative fee. A $20 minimum premium is required. Other policies on the market can cost up to per $100 of replacement cost value.

To date, over $1,000,000 in claim payments have been made to League members under this "All Risk" program.

Complete details about the coverage provided by the ARRL "All Risk" Ham Radio Equipment Insurance Program will be sent to League members. An application is also provided on page 111 in this issue of *QST*. Simply complete the short application and mail it with your first annual premium check to the ARRL Insurance Administrator: Albert H. Wohlers and Company, ARRL Group Insurance Plans, 1500 Higgins Rd, Park Ridge, IL 60068-5750. Call toll free: 800-323-2106. In Illinois: 312-698-2221.

DAYTON SCHOLARSHIPS

The Dayton Amateur Radio Association has announced the winners of the Association's 1987 $1000 scholarships. They are: Douglas Kleeman, KA9LWM, Shawano, WI; Carol Colby, KA8PLF, Midland, MI; Robert Jackson, KA7OCV, Tucson, AZ; and Michael Wozniak, KD8TA, Martin's Ferry, OH.

These scholarships are open to any FCC licensed amateur graduating from high school in the year the awards are given. There are no restrictions on the license class of the student or the course of study.

Information and applications for the program are available after January 1 by writing to: DARA Scholarships, 317 Ernst Ave, Dayton, OH 45405.

SECTION MANAGER ELECTION RESULTS

The following Section Manager will begin a two-year term of office October 1, 1987:

Uncontested:

San Francisco — Robert Odell Smith, NA6T

Amateur Radio Call Signs

Amateurs often ask HQ what call signs have been assigned lately. This list shows the last call sign to be assigned by the FCC in each group as of July 1, 1987.

District	*Group A Extra Class*	*Group B Advanced*	*Group C Tech/Gen*	*Group D Novice*
Ø	NZØF	KEØOX	NØIFJ	KBØAYS
1	NK1V	KC1ES	N1EZS	KA1QQQ
2	NX2S	KE2AZ	N2HIX	KB2EBW
3	NI3L	KD3DP	N3FQE	KA3RZG
4	AB4CA	KK4OL	N4QNK	KC4AZZ
5	AA5AU	KG5AI	N5KYX	KB5DYT
6	AA6DL	KI6VB	N6PVF	KB6TGU
7	WD7G	KF7BK	N7JON	KB7CNT
8	NX8P	KE8MT	N8IOP	KB8CWS
9	NT9L	KE9FG	N9GRH	KA9ZET
Alaska	**	AL7IZ	NL7KU	WL7BPG
Hawaii	**	AH6IC	NH6KG	WH6BTI
Puerto Rico	**	KP4NP	WP4IX	WP4HHI
Virgin Is	KP2T	KP2BI	NP2CE	WP2AFR

** All group A call signs have been assigned

Correspondence

Conducted By John Hennessee, KJ4KB
Regulatory Information Assistant, ARRL

TAKE THE PLUNGE: BUILD A *QST* PROJECT

☐ I have seen many construction projects in *QST* over the years, but somehow I've never gotten around to building any of them. Several projects caught my attention in the past, but I always managed to convince myself that they would be of little use in my shack. Actually, the real reason I've never put any of the *QST* projects together was my mistaken belief that they were too difficult for someone like me to build.

An article on page 33 of June 1986 *QST* challenged me to face my self-doubt. Ted Hart's article on a small, high-efficiency loop antenna was a project I couldn't afford to pass up. Living in an apartment made my 24-foot vertical useless. The only way I could get on the air would be with a small HF antenna. I decided to take the plunge and construct this antenna.

There are few moments I will remember with such happiness and satisfaction as that late January afternoon when I finally got the antenna operational. I watched with delight as the SWR meter dropped to zero. It was pure ecstasy! I had finally done it; I had finally built a project from *QST*!

I've been a ham for nine years, and I have seen my share of triumphs. Making my first contact, pulling in a rare call, passing my Extra Class examination were all experiences I shall never forget. Few of these milestones have given me more satisfaction than that of building this antenna.

Since there may be members who are in my same situation, I have compiled a few hints for the first-time builder: (1) Read all the directions involved in building your project before starting the actual construction. This can save you big headaches down the line. (2) Use good quality tools. Bargain tools may not turn out to be a bargain in the long run. (3) Pace yourself. There may be a few setbacks and frustrations in your project. Don't be afraid to put things away for a while and come back to them later. (4) Keep the faith. The hard work and frustrations will be worth it once you've gotten the project completed.

To those of you who have yet to construct a project, I encourage you to take the plunge. You don't know what you are missing!—*Timothy Chandler Lanham, NY7A, Rawlins, Wyoming*

TO CQ, OR NOT TO CQ

☐ Dave Newkirk's article in June *QST* entitled "Plain Talk About Voice Operation" advises Novice operators that "CQ" calls are out of place on repeaters. I am sure that many Novices will be puzzled by this departure from established procedures. I recently began 2-meter operation after two years of operating mainly on HF and have found the use of the terms "monitoring" and "listening" seem inappropriate and confusing in establishing a contact. They do not indicate that the caller wants to talk. It is not unusual to hear two or more stations sign on a local repeater this way within a two or three minute period rather than make contact with each other. It therefore appears that these terms are not universally understood to be, or intended to be, the equivalent of a "CQ."

"CQ" simply means that the caller will talk to any amateur station. It seems just as appropriate on a repeater as it does anywhere else in Amateur Radio, The calling of a short "CQ" is encouraged on at least one repeater in the Baltimore-Washington area, and I have heard it used on others. I certainly feel more comfortable calling "CQ" than I do advising people that I am "listening" or "monitoring." A number of amateurs have told me that they feel the same way.—*Mike Young, N3EBX, Rockville, Maryland*

NOVICE ENHANCEMENT: IS IT WORKING?

☐ Something needs to be said about the efforts of recruiting new hams and the new Novice Enhancement. Here are my thoughts.

I am becoming a little worried about the new Novice Enhancement. When I operate on 10 meters, I hear many things that do not remind me of what Amateur Radio should be. I hear a lot of Novice/Technicians who do not have any aspirations of upgrading their license. I can't believe that these amateurs don't want to upgrade! The average Novice would really love to get into at least some of the various aspects of our hobby that are afforded only to higher class licensees.

Much of the blame rests on us—the upper class licensees. How many Novice/Technicians have you tried to expose the many facets of our hobby with which they are probably not familiar? It seems that everyone wants to bring more amateurs into Amateur Radio, but after initiation with a Novice license, many are just left there.

This is not just a matter of whether or not all amateurs like Novice Enhancement. It is here to stay. Now, we just need to be sure that we use it to the best of our ability. It can work out to be a definite plus, but only if all hams come together.

We upper class hams have the job of exposing our hobby to Novice/Technician operators who may not know how much Amateur Radio really has to offer. Try to show them as much diversity as possible. Don't just show them the few modes you operate; take them to other shacks with different types of gear and capabilities. Of course, there will be some hams who have absolutely no desire to get past Novice. This is fine, but it is bad when there are many out there who would probably love to get involved in at least one of the many activities that this great hobby has to offer.

I am not an old-timer who is upset with Novice Enhancement. I am only 17 years old, but I know that when I was in the process of learning about Amateur Radio, help was given by many other hams. I did receive the exposure which we should give to all new Novices and Technicians.—*Roger C. Newton, WN6L, Chula Vista, California*

☐ My heartiest congratulations to all involved in bringing about Novice Enhancement. I do have a question—Why has it taken so long for the FCC to finally serve the needs of all of us who have been opposed in principle to the ridiculous restrictions imposed upon Novices in past years?—*Bruce Patrick, KAØTGF, Aurora, Colorado*

☐ My call is NØHME and I am currently using Packet Bulletin Board Systems (PBBS) on a frequency of 28.105 MHz. When Novice Enhancement first came about, I put up a PBBS on 10 meters. After weeks of listening and waiting, I finally heard other stations and I even worked them! After that happened, my interest really started to grow. When the band is open, which is about every day, 28.105 MHz sounds like a flock of chirping birds. There are now at least 100 new users on Novice packet. So to all you packeteers who may be wondering how packet is going in the Novice 10-meter subband, I want to tell you that it is alive and well and growing with each day.—*Tom Tory, NØHME, Ft Madison, Iowa*

☐ As a Novice, Novice Enhancement has really spurred me on. Operating on phone is great! I've been a Novice since 1979, but I am presently studying to upgrade and I will upgrade. If I fail at first, I will try again and again. I will make it!—*Martha Blackwood, KA4JCT, LaGrange, Georgia*

AMATEUR RADIO COINS

☐ A sad note for the writer of the article on page 12 of July *QST*, which tells of a coin that is "the only one in the world that depicts an Amateur Radio station." It isn't! The lovely Republic of San Marino has a thriving ham population. Many of the hams operate out of one of the three legendary castle towers atop Monte Titano which, of course, covers the entire Republic of San Marino. Many coins from this small country depict the "tre torri"—the three towers.

By the way, visitors to San Marino will love the towns, the towers, the coins and stamps, and the hospitality that super guys like T77C and T77I display. On the way to the "three towers," amateurs ought to look for ham (especially repeater) antennas atop the scenic mountains. Visitors should also meet the European hams. This is my way of saying that in 10 years in Europe with the Air Force, I was amazed and delighted by the hospitality and fraternity that hams in each country offered! We can only hope to be as nice to visitors here in the States. But then again, that's what ham radio's all about!—*Ed Mehnert, N3NN, Ocean Springs, Mississippi*

How's DX?

Conducted By Ellen White, W1YL/4
19620 SW 234 St, Homestead, FL 33031

A Pacific Crossing by G4AAL

Operation Raleigh is a 4-year, around-the-world, multinational expedition, combining scientific, conservation and community programs with adventure projects both on land and at sea. Here are some notes by John Layton, G4AAL, on his 4-month involvement with GBØSWR/MM.

The April 1985 issue of *Radio Communication* contained a request for radio amateurs to take part in Operation Raleigh, and a number of British hams were selected. Each was assigned to one of the trip phases. The trip will ultimately involve 4000 young people between the ages of 17 and 24, in 16 segments ending November 1988.

Although limited opportunity for Amateur Radio work exists, the potential on this voyage for an out-of-the-ordinary DXpedition was realized. G4RUL, G4TAW and myself, G4AAL, were given the chance to become involved with this particular stage of the expedition. May 1986 saw the departure of the *SES Sir Walter Raleigh* from South America, with Radio Officer G3SYF assigned the call GBØSWR/MM. Calls I was to use during the crossing included G4AAL, /CE7, /CEØ, /KH8, VR6HIJL, ZK1XP, A35JF, 5W1FK and 3D2CM. (That 4-letter-suffix call came as a result of my request for a special group call for Henderson Island. I wrote suggesting VR6HI as being suitable. This was refused, and I received instead the individual call VR6HIJL. Apparently HI had already been issued and the authorities in New Zealand simply tacked my initials onto the call I had asked for.)

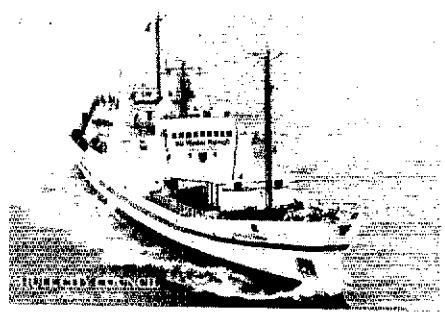
Ship equipment included a couple of Yaesu FT757 transceivers, antenna tuner units, power supplies, batteries, generators, masts and wire antennas for the HF bands, with converters, transverters, linears and Yagis for VHF and UHF. Satellite work through OSCAR 10 was also envisaged on those islands where our stay was to be longer than a day or two. A dipole was used on board the ship until we reached the Cook Islands. We left, stopping first at the port of Valparaiso, where we planned to top off with fuel and water for the long journey ahead. Almost all of us suffered from sea sickness as the ship rolled its way through heavy seas.

Our first really successful operations began as we headed west to the Juan Fernandez Islands, working G6ZO for the first of many British stations. May 25 saw our arrival in Cumberland Bay, Robinson Crusoe Island, where we established camp 1700 feet up on the mountains overlooking the settlement and harbor. Deteriorating heavy weather made our situation very uncomfortable, and permitted us to work just 24 stations on 14.025 MHz, then moving to sideband. Our success on this island with expedition communications was to establish a pattern to be followed on the other islands. We were now to be considered a part of base camp, and as such able to set up the radio equipment ashore. (The only disadvantage was our inability to choose our own site.)

An overnight stormy journey of some 103 miles saw us arrive at Alexander Selkirk Island, slated to be a very brief stay with the weather again deteriorating. We left the Juan Fernandez group on May 28, on a westerly voyage of 1769 miles. It wasn't until June 4 that Easter Island was sighted. We landed, a scary operation through the surf, and established base camp. The level of local noise at times was such as to mask out all but the very strongest signals. Most of the electrical joints of the overhead power distribution system were exposed to the weather and were in a very poor mechanical condition. Our stay coincided with HF Field Day weekend, but just a handful of Europeans were heard and worked. My one sideband contact was with VR6TC (Tom was the only station I worked on phone from any of the islands during the crossing). We left Easter June 9, bound for Pitcairn, over 1000 miles away. Shipboard illness then required a trip adjustment, and we had to alter course for Henderson Island, an uninhabited coral island some 118 miles northeast of Pitcairn. Another hazardous landing took place on June 14. We had obtained special permission from New Zealand to transmit on 70 cm. The OSCAR 10 beacon was heard at good strength for some considerable time, but we failed to hear signs of other activity (the transponder was out of action). This was a great disappointment because with strong beacon signals received success should have been assured.

Among sand and palm fronds (from left) John, G4AAL, Alastair, G4RUL and Nick, G4TAW operate VR6HIJL from Henderson Island beach.

HF continued poor but our operation accounted for over 1500 contacts.



SES Sir Walter Raleigh served as the flagship and floating HQ for Operation Raleigh, a multinational expedition.

Dawn June 23 saw our arrival on Pitcairn. During our brief stay I was able to spend time operating from the shack of Tom and Betty Christian, VR6TC/VR6YL, as well as Irma Christian, VR6ID, and Karie Young, VR6KY. This must have been the greatest concentration of radio amateurs on Pitcairn Island at any one time ever: VR6s ID KB KY TC YL, G3SYG, G4s AAL RUL TAW, and LA8HY. (Tom, LA8HY, was a young Norwegian who had left Norway on a 40-foot yacht with some companions some 11 months previously, and had no plans to return home for several years.) I made some 163 contacts while on Pitcairn, as VR6HIJL. I also completed delivery of a diesel fuel pipe to VR6TC which had come from G3WCQ. (Just by chance I had met G3WCQ the previous April at an RSGB show. He had been helping out at one of the stands, when I just happened to stop, inquiring about the goods for sale. He noted my Operation Raleigh sweatshirt which bore the legend "Around the World" and mentioned that he was looking for a way to deliver a parcel to VR6TC, who lived in a place "Out of this World." I'm sure he didn't believe me when I offered a person-to-person delivery service. Talk about truth being stranger than fiction!) The hospitality we received from the 49 island inhabitants was tremendous. On our departure most of them came down to the small jetty at Bounty Bay to see us off, and to sing their farewell song. They're a truly remarkable people and we feel the experience will never be forgotten.

Raratonga in the Southern Cook Islands was next, over 1900 miles away. A brief stop there accounted for 117 contacts on 20 meters and then on to Atiu, some 132 miles away. Here we had a stroke of luck, as we were able to make use of an antenna belonging to the interisland net (used solely for discussion among various groups of people in the Cook Islands). We had previously met ZK1AA, the net instigator and controller in Raratonga. To obtain the coverage they require, a 400-foot V beam was used. The local power supply on Atiu was intermittent and not available during the day. No problems were encountered, however, as a 12-volt battery was used for power, being kept fully charged by permanently connected solar panels. This setup served us well, accounting for 254 CW contacts.

A short journey brought us to the island of Mitiaro where we left a small group of scientists, while we moved on to the island of Mauke. Luckily, the local hospital was devoid of patients and we were able to make base camp here. ZK1CT, the doctor, lived next door and was kind enough to let us use his shack—where we had the luxury of a beam and TS430, leading to 342 contacts. One of these contacts was with GBØORH, the special-event call of the Operation Raleigh Support Center (located in Queens Dock Avenue, Hull).

The 900-mile passage between the Cook Islands and American Samoa, with our new

3-element J beam, immediately started to produce results. The extra gain on receive made for better pileup control. I was able to operate for a couple of hours every day and most continents were worked. Once in Pago Pago harbor, the ship was able to berth for the first time since Valparaiso, and at last we were able to replenish our almost-empty water and fuel tanks. By the time we left on July 29 a total of 677 KH8 contacts were made. An overnight voyage from Pago Pago brought us to Apia in Western Samoa. During our time on this island a survival exercise was accomplished requiring a continuous 24-hour radio watch. Using a manpack radio and vertical for expedition purposes, 5W1FK on 14.023 was activated at the same time. Interaction between the two systems was minimal and the reasonably good "takeoff" resulted in over 1000 contacts before the exercise was concluded.

Nuku'alofa, the capital of Tonga, was our next port of call, where we stayed briefly before taking the ferry to the island of Eua, some 25 miles to the south. After a 4-hour rough, wet crossing, base camp was set up in the middle of a rain forest. With a generator supplying power, and an FT757 supplying RF to an inverted V, another survival and map-reading exercise was in progress. Conditions proved good during this period, yielding 842 contacts for A35JF.

Fiji was our next stop, and we arrived in Suva on August 21. Even with licensing complications, thanks to the president of the Fijian Radio Club (3D2CM), I was able to stay in his home and work his station, making some 453 CW contacts as 3D2CM.

During the voyage many attempts were made to operate both sideband and RTTY, but as a rule continuously noisy bands made reception difficult. On CW, however, most signals were at least workable even if not very strong. From my own log a total of 6354 QSOs were made during the crossing, nearly all on 14.023 MHz. Of these, 2026 took place on board using GBØSWR/MM. Even where a relatively active Amateur Radio population exists, very little CW emanates from the South Pacific.

My participation with the operation ended August 19, when I returned to the UK after a 4-month absence. I am indebted to G3LZQ and G4IVJ who kept everyone informed as to our movements. My grateful thanks to the hams worldwide whose help, encouragement, support and patience made the project worthwhile. Keep looking for the ship; it could just be heading for other exotic and unusual places as it continues its journey around the world.

[G4AAL suggests that anyone contemplating a similar multicountry expedition is advised to start collecting application forms well in advance. Some of the licenses took much longer than originally planned. If possible, when applying, send a letter written in the language of the country you wish to visit. ARRL HQ has a helpful packet of information for those attempting to obtain DX licensing permits.—Ed.]

Troster's Tips for Easy Listening

Malicious Interference—II

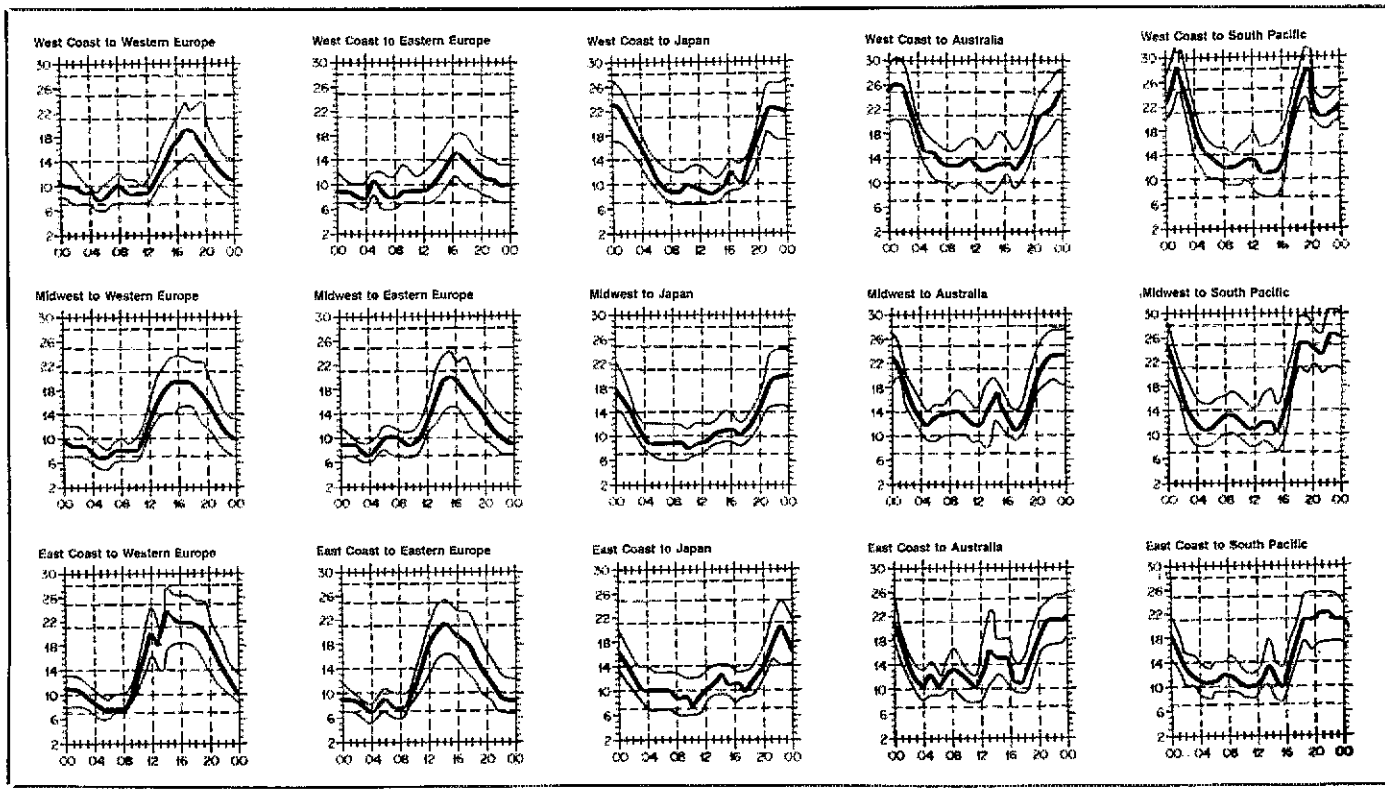
You are the DX op. What can you do if a policeman or malicious interfering station ("jammer") comes on the frequency and begins to ruin your operation. Usually policemen try to help, but they also manage to interrupt and distract. They don't completely destroy your operation (at least not intentionally).

But consider the *malicious interferer*—the jammer. You should be working split frequency (that is, listening on a frequency different from that you're transmitting on) and you may not really be aware of the magnitude of the chaos on your transmitting frequency. (Rest assured, someone will tell you.)

The best procedure for you, the DX op, is to continue to work stations the best you can. You may have to repeat calls and reports several times, but do not give in to the marauders. Jammers may be a continent or two away from your DXpedition; so, they too are subject to skip. Consequently, they may not be too destructive in some parts of the world where you can be copied okay. Another thing to remember: Jammers will get tired after a while. They also may be recognized if they stay on too long. They also might make a mistake and inadvertently give their call.

You, the DX op, should *not* threaten to QRT or QSY. The basic objective of some jammers is to get you to do that. You went to a lot of trouble to get to that particular spot. Work hard. Ultimately you'll win and a lot of DXers will be grateful to you.

(More next month from W6ISQ.)



When are the bands open? These charts predict this month's average propagation conditions for high-frequency circuits between the U.S. and various overseas points. One chart for East Coast to West Coast is also included. On 10 percent of the days of the month, the highest frequency propagated will be at least as high as the uppermost curve (highest possible frequency, or HPF). On 50 percent of the days of the month, it will be at least as high as the middle curve (maximum usable frequency, or MUF). On 90 percent of the days of the month, it will be at least as high as the lowest curve (optimum traffic frequency, or FOT). See April 1983 *QST*, page 63, January 1977

QSL Corner

Administered By Joan Hushin, KA1IFO

ARRL-MEMBERSHIP OVERSEAS QSL SERVICE

Send outgoing cards: American Radio Relay League, QSL Bureau, 225 Main St, Newington, CT 06111, USA.

This is an "outgoing" service that allows ARRL members to send DX QSL cards to foreign countries at minimum cost and effort. While QSLing direct to foreign amateurs is faster, it is also more tedious. Time spent searching for addresses in the foreign *Callbook*, addressing and stuffing envelopes, and mailing could be better spent operating DX. And, the cost of IRCs, airmail postage and envelopes can be prohibitive.

An unlimited number of QSLs may be sent for distribution 12 times per year. The fee is just $1 per pound or portion thereof (155 QSL cards average a pound). Recommended size of QSL cards is 3½ × 5½ in (90 mm × 140 mm).

The ARRL-Membership Overseas QSL Service operates *only* in an outgoing capacity. To receive QSLs from DX stations, see "The ARRL DX QSL Bureau System" (Incoming), June 1987 *QST*, page 54, or send an SASE to ARRL QSL Bureau, 225 Main St, Newington, CT 06111.

US amateurs may send SWL reports to foreign shortwave listeners. Unlicensed (associate) members may send SWL cards to foreign amateurs. QSL managers: write for details.

Note: The ARRL QSL Service should not be used to exchange QSL cards within the 48 contiguous states.

Requirements

1) Presort your DX QSLs alphabetically by call-sign prefix (AP, C6, CE, DL, F, G, JA, LU, PY, 5N, 9Y, and so on).

2) Enclose the address label from your current copy of *QST*. The label shows that you are a current ARRL member.

3) Enclose payment of $1 per each pound (or less) of cards—approximately 155 cards weigh one pound. In other words, $1 is the *minimum charge* whether you send 1 card or 155 cards. Please pay by check (or money order) and write your call sign on the check. Do not send cash.

4) Include only the cards, address label and check in the package. Wrap the package securely and address it to the ARRL Outgoing QSL Service, 225 Main St, Newington, CT 06111.

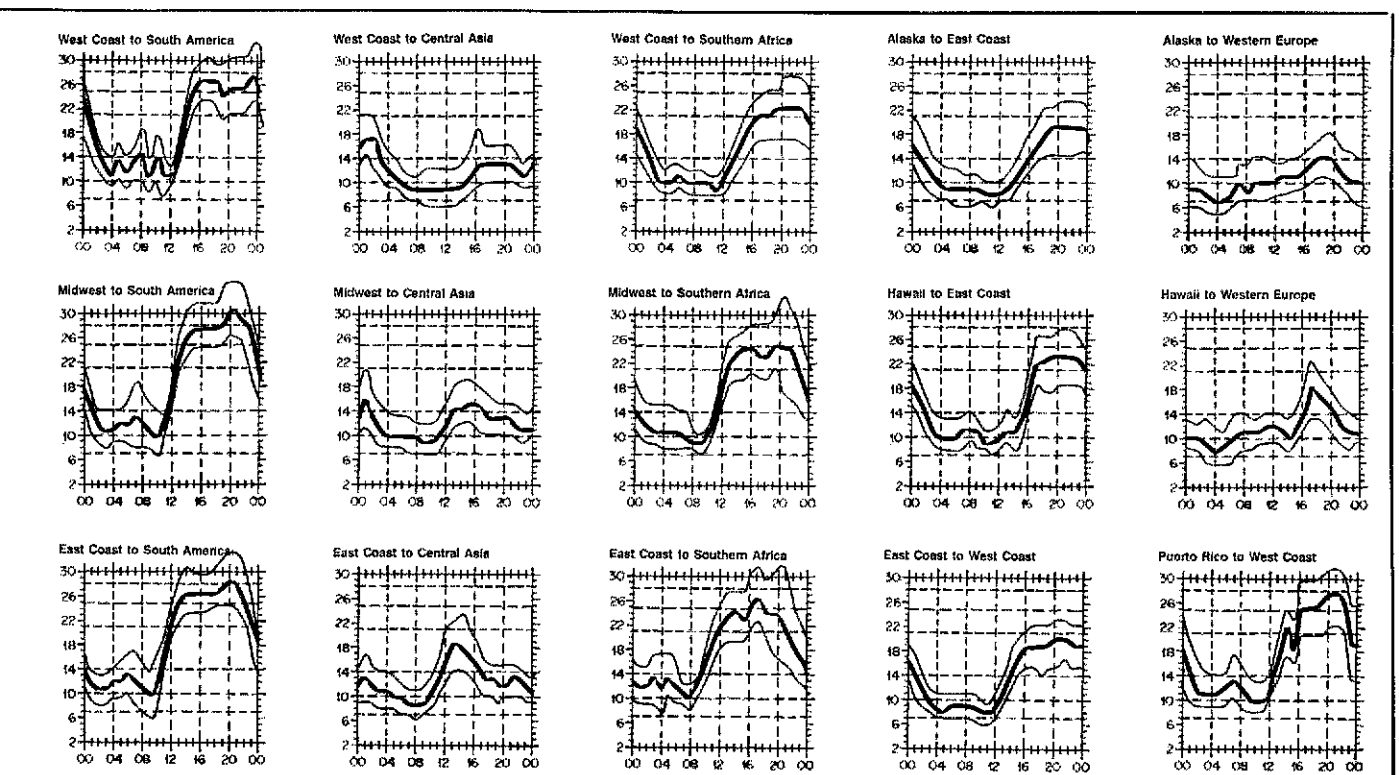
5) Family members may also use the service by enclosing their QSLs with those of the primary member. Include the appropriate fee with each individual's cards and indicate "family membership."

6) Blind members who do not receive *QST* need only include the appropriate fee along with a note indicating that the cards are from a blind member.

7) ARRL affiliated-club stations may use the service when submitting club QSLs by indicating the club name. Club secretaries should check affiliation papers to ensure that affiliation is current. In addition to sending club station QSLs through this service, affiliated clubs may also "pool" their members' individual QSL cards to effect an even greater savings. Each club member using this service must also be a League member. Cards should be sorted "en masse" by prefix, and a *QST* label enclosed for each ARRL member sending cards.

Countries not Served

A5	Bhutan	TZ	Mali
A6	United Arab Emirates	V4	St Christopher and Nevis
A7	Qatar	VP2E	Anguilla
BV	Taiwan	VR6	Pitcairn Is
C9	Mozambique	XT	Burkina Faso
D6	Comoros	XU	Kampuchea
ET	Ethiopia	XW	Laos
HZ	Saudi Arabia	XX9	Macao
J5	Guinea-Bissau	XZ	Burma
KC4	US bases in Antarctica	YA	Afghanistan
		ZA	Albania
KC6	Belau	ZD7	St Helena
KC6	Micronesia	ZD9	Tristan da Cunha
KH1	Baker and Howland Is	ZK2	Niue
		ZK3	Tokelau
KH3	Johnston Is	3C	Equatorial Guinea
KH5	Palmyra and Jarvis Is	3V	Tunisia
		3W	Vietnam
KH7	Kure Is	3X	Guinea
KH9	Wake Is	4W	North Yemen
KP1	Navassa Is	5A	Libya
KP5	Desecheo Is	5H	Tanzania
P5	North Korea	5R	Madagascar
SU	Egypt	5U	Niger
T2	Tuvalu	5X	Uganda
T3	Kiribati	7O	South Yemen
T5	Somalia	7Q	Malawi
TJ	Cameroon	8Q	Maldives
TL	Central African Rep	9G	Ghana
		9N	Nepal
TN	Congo	9U	Burundi
TT	Chad		
TY	Benin		



QST, page 58, September 1977 *QST*, page 35, and January 1979 *QST*, page 11, for a complete explanation. The horizontal axis shows Coordinated Universal Time (UTC); the vertical axis, frequency in MHz. Data are provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for September 16 to October 15, 1987, assume a sunspot number of 31, which corresponds to a 2800-MHz solar flux of 87.

DX Century Club Awards

Administered By Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 25-country increments through 250, 10-country increments through 300 and 5-country increments above 300. The totals shown below are exact credits given to DXCC members from June 1 through June 28, 1987. An SASE will bring you the rules and application forms for participation in the DXCC program.

New Members

Mixed

DF1PY/107 DL9NC/332 GM4WZC/104 PAØJMJ/110 7P8CL/137 K3ZLK/101 KC5TA/102 WB6OHH/103 K9JPI/115
DF6UQ/128 F6EFY/110 HA4YK/104 TA1KT/121 K1NCD/104 NB3E/101 WA5CMI/113 KA7T/234 KB9WC/109
DJ4AZ/110 FE8DD/131 JO1XOK/139 TA1NC/126 KB1LE/107 W3BNN/170 WC5D/174 ND7J/108 NC9T/106
DK8IZ/134 FT8XA/109 JH2TJN/112 3D6BW/103 K2HSY/111 AA4V/6Y/100 KB6IUA/110 NJ7H/108 W9JEK/117
DK8NI/129 G3CPT/108 JR3EGA/233 5T5LW/101 K2KBT/112 N4OJJ/109 N6IV/KL7/109 NN7T/101 WØCM/360
DL4DAW/105 GØEHW/109

Radiotelephone

CP5LE/113 EA3EXW/110 IK2DUU/218 3D6BW/103 KA1AE/110 AA4RZ/103 WC5L/109 KY7U/108 KD9NA/107
DJ2FB/144 G4WEJ/109 JO1XOK/130 5Z4EV/100 KA1UJ/101 AA4SU/106 K8MXR/100 K8YVI/101 NJ9X/111
DL1SN/101 GM3SNP/115 XE1KH/107 5Z4BP/109 NF1H/100 KI4FW/107 KI6GI/102 K9BSL/100 WB9RRU/115
DL5NCC/106 GM4WZC/104 YC7DF/115 9K2KW/111 N3FBN/125 N5JPC/110 AL7HG/110/USA KB9WC/106 NXØI/110
EA1AEB/102 I2MMH/224 ZC4AK/105 K1YDG/153

CW

DL1ZQ/103 HA8IR/105 HB9LF/109 JAØRHA/110 PY2LMA/104 KA2AJT/143 WT4Y/105 WN5M/116 NJ9X/111
DL6BO/103 HB9BMZ/131 JI1XTZ/110 LA9SN/100 VK4DA/103 W2EJG/103 WC5D/147 KA7T/234 WB9RRU/102
EA7XC/108 HB9CRV/132

RTTY

PY2BW/101 Y39XO/110 W1AX/101 KA2BHD/101 W5VT/100

160 Meters

FsYZ/101 GM3ITN/104 SMØAJU/102 W1FZ/104 W2GVX/103 WØPGI/112 WAØIDK/102

5BDXCC

KQ8M LA7SI K5BDS J3BG JA2ODS JA4DND YU5GBC K4MF AA2F
W1VRL KN4F NI5M OZ2E PT7SD

Endorsements

Mixed

CE3GN/310 I1ZL/354 OZ5EV/322 K1EM/311 W2NC/343 KF4ZR/200 NA5U/250 W6TWZ/346 W8YMB/270
CT4YN/281 I2ZZZ/329 PAØLEG/312 K1YR/300 W2PN/343 KI4HL/202 NJ5X/282 W6YQ/305 W8ZCQ/356
CX2CS/293 IK2FCZ/202 PAØLOU/355 N1CNC/199 W2QXA/315 KS4G/176 NY5F/351 WA6WZO/320 WD8IFX/268
CX4CR/304 I5FLN/332 PT2VE/281 N1CPC/204 W2RS/325 N4SU/364 W5GEL/353 WB6OTB/251 AB9O/304
DJ2MN/316 I7WL/335 PY1HQ/357 N1QY/193 W2SY/331 N4TX/313 W5IO/361 WJ6O/250 K9ALP/279
DJ4PI/335 I7ZPB/346 PY1HX/356 N1XX/341 W2VYX/336 N4WB/328 W5MCH/260 WM6P/159 K9CJK/341
DJ7ZG/344 I8AA/340 PY2PE/344 W1AX/364 WA2TMP/251 NE4R/319 W5QK/354 N7NG/339 K9ECE/352
DJØUJ/328 I8YRK/338 PY5ATL/330 W1AXA/359 WB2ABD/273 W4AIT/366 W5TO/340 W7BGH/349 K9GPN/282
DK3SF/324 IK8BQE/248 SM5BBC/337 W1GKK/369 WB2BNJ/320 W4BQY/365 WA6IEV/336 W7CG/359 KA9CFD/230
DK5PR/327 IT9AF/316 SM5KDM/185 W1MIJ/349 K3AV/346 W4CZU/319 WD5GJB/305 W7FR/318 KG9N/300
DK9FB/329 JA1KRW/169 SM6DUA/204 W1MLG/313 K3GL/361 W4DR/359 WD5HRX/269 W7GN/359 KG9Z/283
DL1BO/359 JA1OCA/333 SM7BAU/313 W1OO/342 K3JGJ/300 W4DRK/348 WD5IQA/288 W7HHP/184 KS9K/296
DL4FL/305 JA1UQP/334 SM7DMN/326 W1PNR/307 K3SKE/130 W4EX/367 WS5E/201 W7IR/362 N9AB/334
DL7HZ/348 JA1UTN/165 SM7LOX/152 W1RED/323 K3UA/321 W4FPW/334 WS5O/206 W7JBS/277 N9NB/225
DL9OH/354 JH1OJU/316 SM7QY/355 W1UU/349 K3YL/174 W4FX/352 K6FM/305 W7KS/330 N9ZN/347
F3AT/354 JR1MOO/150 VE1YX/321 WA1UDH/260 KA3DDT/281 W4JVU/341 K6IR/329 W7MB/367 NC9N/152
F5LQ/331 JA4ZA/344 VE3BX/339 WB1CTV/173 KZ3H/182 W4OMQ/333 K6KCM/276 W7OC/260 W9AQ/342
G2FSP/353 JR4ISK/156 VE3GMT/335 K2AX/252 N3AKD/280 W4OMY/300 K6LQA/330 W7OF/360 W9CA/300
G3AAE/362 JA5AUC/316 VE3JGC/205 K2BZT/359 W3CWG/359 W4ROM/151 K6MA/346 W7ORH/332 W9DE/329
G3FKM/360 JA5ELM/301 VE3LDT/303 K2CL/337 W3DJZ/349 W4UG/345 K6OZL/334 W7PHO/361 W9GU/352
G3FXB/360 JA7EHU/327 VE3WT/343 K2FB/350 W3EVW/363 W4VUL/278 K6WR/348 K8EJ/341 W9HK/348
G3JEC/338 JA7TAP/227 VE3WW/339 K2MUB/341 W3GG/333 W4XJ/341 K6XW/342 K8RWL/330 W9OKL/305
G3MXJ/327 JA8ADQ/340 VE5KX/295 K2TQC/350 W3MP/365 W4XQ/331 KB6CLL/208 W8BKP/356 W9ROK/250
G3NLY/339 JA8AIP/243 VE6VM/320 K2UFM/326 W3NB/323 W4ZD/353 KD6GC/154 W8CHV/312 W9TKD/351
G3RCA/318 JA8CFR/299 VE7BD/328 KA2AJT/281 W3OP/339 WA4JTI/322 N6NBB/150 W8CT/341 WA9USE/305
G3UML/339 KP4BJD/308 VK3YL/350 KA2AOT/178 W3VT/382 WB4BBH/251 N6UC/334 W8DN/202 WB9YXY/313
G3VMW/261 LA8LF/345 XE1OD/229 KA200G/178 AA4FS/157 WC4B/252 W6BJI/325 W8GZ/366 WD9DZV/153
G4BWP/299 LU6DJX/367 XE1VV/297 KM2V/329 K4AIM/351 WN4G/180 W6BS/359 W8ILC/337 KØAW/291
GM3ITN/351 LU8DWR/174 YU1GTU/305 NK2W/173 K4CEB/337 K5BDX/291 W6BSY/358 W8JBI/361 KØBS/332
GW3AHN/362 OE1ZL/281 ZL1ARY/341 NO2U/332 K4CNW/302 K5FA/310 W6BZE/363 W8LKH/362 KØIEA/329
HB9AHA/338 OH2LU/329 ZL3IS/355 W2AG/363 K4DJ/340 K5JW/333 W6CF/344 W8MEP/260 KCØEJJ/225
HB9BMZ/199 OH2QQ/355 ZL3QN/331 W2BAI/327 K4DY/338 K5KX/328 W6GMF/350 W8NJC/320 KEØY/213
HB9CRV/158 OH3KN/247 ZS6NK/212 W2BOK/359 K4KFH/305 K5UC/362 W6KH/354 W8OK/353 WØAIH/357
HB9LF/143 OH3NY/321 ZS6RM/254 W2BXA/367 K4LNM/357 KA5DOB/213 W6KTE/345 W8PR/345 WØBW/364
HB9MX/353 OH3SR/336 4Z4DX/324 W2GK/344 K4PT/275 KC6M/304 W6MI/340 W8QBG/318 WØELA/366
HB9PL/352 OH4NS/343 AB1A/299 W2GW/360 K4PRK/351 KE5PO/154 W6ONZ/354 W8QFR/336 WØJMZ/321
I1APQ/331 OZ1ABA/263 K1AR/312 W2IOT/322 K4RZ/322 N5DC/301 W6QNM/352 W8RT/361 WØTU/182
I1BRB/164 OZ3Y/357 K1DFC/336 W2MT/313

Radiotelephone

CE3GN/310 IK2FCZ/202 OA4BS/317 VK6LK/329 KA2AJT/278 AA4JQ/129 K5UC/357 W6KTE/344 KB9PO/177
CT3BM/293 IV3IOX/236 OA4OS/335 VK6RU/364 KM2V/328 K4AIM/351 KA5DOB/201 W6MKB/271 KC9SF/176
D44BC/293 I4WZK/313 OE1ER/365 VO1CU/325 W2AYJ/361 K4DJ/325 KC5PR/275 WA6RTA/328 KG9N/284
DF4TI/154 I5FLN/332 OH3NY/272 XE1OD/229 W2BXA/365 KE4VU/272 N5DGQ/310 WA6WZO/320 KS9K/295
DF5BD/305 I6FLD/348 OH3SR/335 XE1VV/295 W2FGD/339 N4AH/322 NJ5X/281 K7TUH/150 W9CA/280
DJ7ZG/343 I8AA/340 ON4DH/358 YV1BJY/216 W2GK/341 N4ONI/125 W5IO/360 W7FR/295 W9DE/300
DJ9ZB/330 I8IHG/305 OZ3Y/350 YV1EAH/300 W2IOT/320 NE4R/308 W5OPZ/175 W7GN/349 W9GU/329
DJØUJ/328 I8KNT/316 OZ5EV/322 YV1KZ/334 W2NC/314 W4BQY/328 WA5IEV/335 W7HHP/178 W9JT/341
DK3SF/321 I8YRK/338 PAØHBO/355 ZL1ARY/334 W2YYL/347 W4CYC/327 WD5IQA/285 W7JBS/271 W9OKL/305
DK8JS/270 IK8BQE/246 PAØLEG/312 ZL3NS/341 WA2ICE/158 W4DPS/335 K6IR/329 W7PHO/361 W9ROK/201
DL4NN/207 IK8GCS/204 PAØLOU/312 ZS5NK/210 WB2BNJ/320 W4DR/355 K6MA/316 K8MDU/129 W9TKD/340
DL9OH/354 IT9LYF/208 PT7SD/229 ZS6RM/249 WB2DND/305 W4DRK/331 K6WR/348 K8ZZU/300 W9VSL/229
EA4GT/256 I0MPF/321 PY2PE/344 8P6OV/261 WB2SZH/300 W4EX/365 KB6CLL/208 W8CT/311 W9WHM/360
EA8LD/316 JA1KRW/166 SM7LOX/138 K1DFC/304 K3FNW/203 W4JVU/340 N6HVZ/201 W8GMF/346 KØBS/332
EI9FE/151 JA1OCA/330 SM6LPC/173 K1EM/287 K3SKE/125 W4OMY/288 N6UC/334 W8GZ/366 KØHSC/272
F3DJ/348 JA1UQP/332 TI2HP/365 KA1FXI/230 N3AKD/258 W4UG/344 NG6W/271 W8ILC/331 KEØY/151
G3FKM/356 JA1UTN/165 TR8SA/222 KA1YK/150 W3AZD/345 W4UWC/344 W6ARJ/334 W8JBI/348 KNØL/274
G3JEC/338 JH1OJU/312 VE1YX/321 W1AX/333 W3CWG/357 WA4JTI/319 W6BAF/362 W8PR/326 WØBW/358
G3RCA/317 JA4ZA/340 VE3BX/327 W1BIH/339 W3DJZ/348 WA4QMQ/305 W6BJI/322 W8QBG/314 WØCM/360
G3UML/339 JA7EHU/320 VE3GMT/335 W1GKK/352 W3DR/283 WB4BBH/214 W6BSY/352 WD8IFX/175 WØDFT/226
G3ZBA/331 JA8ADQ/335 VE3MR/345 W1JWX/340 W3EVW/347 WD4KXB/296 W6CCB/332 WD8PUG/299 WØJMZ/318
G4BWP/275 JA8AIP/202 VE3MRS/312 W1PNR/307 W3FDP/320 K5GZ/306 W6CF/278 AB9O/299 WØRWC/315
GW3AHN/359 KH6OR/348 VE3WT/343 K2BZT/352 W3FWD/339 K5IH/284 W6GVM/364 K9ALP/252 WØSFU/340
I1APQ/331 LA1ZI/329 VE3WW/339 K2TQC/326 W3GG/331 K5JW/331 W6IYV/146 K9ECE/351 WØUQD/324
I1JS/311 LA8LF/340 VE4AS/320 K2UFM/325 W3MP/342 K5OVC/332 W6KOE/333 KA9TNZ/224 WAØCLN/200
I2YBC/325 NP4CC/278

CW

DK5PR/280 JA1UQP/294 VE3BX/301 K2BZT/298 W3EVW/303 W4PBC/203 KC5M/256 NG6W/253 W8PR/258
DL4NN/143 JH1OJU/276 K1EM/202 K2JF/260 W3GG/278 W4WJ/305 WB5ZDP/177 W6YQ/269 W8ZCQ/302
F6IIA/151 JA8CFR/280 KA1KPH/141 K2TQC/316 K4CEB/307 WA4JTI/293 WD5DBV/270 KY7M/226 WD8IFX/253
G4BWP/250 LA8CE/201 N1CPC/153 W2NC/306 K4PR/210 WA4QMQ/215 WD5T/201 W7KS/203 W9DE/230
IK3GER/125 OZ1ABA/229 N1QY/189 WB2ABD/228 KA4QZJ/151 WB4BBH/188 K6MA/260 W7NEJ/126 KEØY/174
I8YRK/201 SM6OLL/174 W1AX/232 K3UA/300 N4EM/129 WC4B/209 KA6BPR/157 KC8OD/129 WØBW/307
IT9VDQ/270 SMØLPC/235 W1MLG/295 KZ3H/153 W4BQY/267 K5BDX/267 KD6WW/157 W8DN/133

RTTY

160 Meters

CE3GN/125 F5JA/157 W6JOX/192 4Z4DX/132 K1MEM/178 W1JR/149 K2CL/135 W3UM/136

DXCC Notes

Reminder: Those wanting to update their totals for the December 1987 *QST* DXCC listing must submit confirmations during the month of September. They must reach HQ on or before September 30, 1987 to be listed. You must comply with DXCC Rule 5, including the once-a-year exception, to update the listing.

The New Frontier

Conducted By Bob Atkins, KA1GT
103 Division Ave, Millington, NJ 07946

Injection Locking on 10 GHz

Injection locking is a technique in which a small amount of power from a highly stable source (for example, a crystal-controlled oscillator) is used to stabilize the frequency of a higher-powered, free-running oscillator. On 10 GHz, this technique might be realized by using a few hundred microwatts of RF from a crystal oscillator/diode multiplier chain to injection lock a Gunn oscillator capable of generating 10-20 mW of power at 10 GHz. Injection locking is an attractive way to generate stable, higher power at this frequency.

In theory, injection locking controls only the frequency of the higher-power source and not its amplitude. Therefore, this technique is usually thought of as being limited to CW and FM systems. In a report in the RSGB *Microwave Newsletter*, however, G4TXB says that he uses an injection-locked Gunn diode with an ordinary SSB input and the resulting signal sounds okay at the other end. This certainly seems like an area for further experimentation!

One possible method for injection locking a Gunn oscillator at 10 GHz is shown in Fig 1. This scheme uses a ferrite circulator (see The New Frontier, May 1985 *QST*, p 62). The highly stable source in this case is a G3JVL-type 10-GHz transverter that puts out 0.5 mW of crystal-controlled power.

On transmit, power from the transverter is coupled from port 1 to port 2 by the circulator and is fed into the Gunn oscillator. This power injection locks the oscillator, and power output from the Gunn oscillator is coupled from port 2 to port 3. Port 3 feeds the antenna.

Signals received by the antenna are coupled from port 3 to port 1 and into the receive-antenna input on the transverter. The Gunn oscillator must be approximately tuned to the locking signal frequency and dc power must be removed from it during receive.

I would be interested to hear the results of anyone who tries such a scheme. How well does it reproduce SSB signals? I will report any information received in a future column.

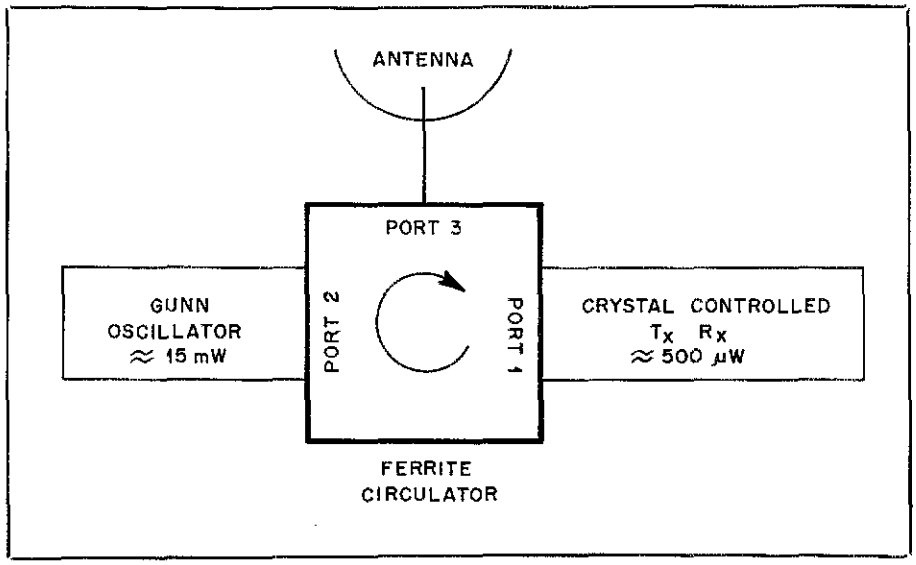


Fig 1—10-GHz injection locking scheme.

MICROWAVE OVEN MAGNETRONS

Another question which seems to pop up from time to time is the use of microwave ovens as a source of RF for communications. This is an attractive idea—500 W of RF on 2450 MHz for less than $100! Unfortunately, I don't know of anyone who has succeeded in taming an oven magnetron for use in communications. Magnetrons are not very frequency stable devices. It might be possible to devise some kind of injection locking scheme, but this would probably require a reasonable amount of clean, frequency stable RF at 2450 MHz anyway. This is definitely not work for a beginner—500 W of RF at 2450 MHz is something to be treated with great respect, as should be evident to anyone who has used a microwave oven for its intended purpose!

SOLID-STATE EME ON 13 CM

On May 9 and 10, a group of New Jersey amateurs made a number of EME contacts on 13 cm (2304 MHz). Using the club call sign WA2WEB, this group contacted OK1KIR, OE9XXI, F2TU, W4HHK, SM6FHZ and LX1DB. Operating at WA2WEB were Andy Furlong, WA2FGK, Al Katz, K2UYH, Bill Ashby, K2TKN, and Russ Pillsbury, K2TXB. They used an SSB Electronics transverter, the K2UYH 28-foot dish and a circularly polarized feed designed by Dick Turin, W2IMU. An unusual aspect of this operation is that the transmitter final is a 100-W solid-state unit requiring only 100-mW drive. Built by WA2FGK and Garth Conover, N2BMP, this amplifier uses a pair of Microwave Semiconductor Corp MSC 82223-12 transistors driving four specially selected MSC 82327-15 devices. All power combining and splitting is done with Sage Wireline®. The amplifier requires 24 V at 12 A and weighs only 6 pounds! Dick Frey, Device Development Manager at MSC, was very helpful with this project.

SILENT KEY

It is with deep regret that I must report the untimely death of Terry Clark, WA1VUW. Terry was a good friend. He and I worked on many projects when I lived in Connecticut, from ragchewing on 2 meters to DXing on 10 GHz. He exemplified the spirit of Amateur Radio. Always willing to take on a new challenge, Terry often enjoyed working on a bigger and better antenna or equipment for a new and higher band, or driving to a hilltop for microwave DX. I will miss Terry, as will his many friends both on and off the air.

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	Jun 1987, p 51	Novice Enhancement Report and Order	Apr 1987, p 64
Club Contest Rules	Jan 1987, p 81	QSL Bureaus Incoming	Jun 1987, p 54
DX Contest Awards Program	Feb 1987, p 82	Outgoing	This issue, p 63
Element 2 Question Pool, New and Revised Questions, Answers	Apr 1987, p 23	Reciprocal-Operating Agreements	Jul 1987, p 51
Frequency/Mode Allocations	Apr 1987, p 70	September VHF QSO Party Rules	Aug 1987, p 78
Golden Jubilee of DXCC Award	Sep 1986, p 60	Tech and General Written Exams	Apr 1987, p 29
Hamfest Calendar Rules	Sep 1986, p 84	Third-Party-Traffic Agreements	Jul 1987, p 51
License-Renewal Information	Apr 1987, p 70	10-GHz Cumulative Contest Rules	Jun 1987, p 82
Major ARRL Operating Events and Conventions—1987	Jan 1987, p 57	1987 Can-Am Contest Rules	Aug 1987, p 77
		220-MHz Band NPRM	Apr 1987, p 16

The World Above 50 MHz

Conducted By Bill Tynan, W3XO
Send reports to PO Box 117, Burtonsville, MD 20866,
or call 301-384-6736 to record late-breaking information.

A Sporadic-E Season to Remember

The 1987 summer E_s season has truly been one of the most outstanding since amateurs first discovered the mode in the early '30s. Not only were 6 and 2 meters affected, but also our 1¼-meter band produced its first documented two-way Sporadic-E contact. In order to better cover the numerous happenings of the period, I am dispensing with the usual lead story this month.

ON THE BANDS

6 Meters—Finding a way to describe the events taking place so far this summer on 6 meters is, as uttered in *The King and I*, a "puzzlement." The sheer volume of reports is impossible to convey in the space available here. Nevertheless, I'll give it a try.

Probably the biggest story is the transatlantic propagation, followed closely by the almost continuous and widespread openings during the June VHF QSO Party. The biggest transatlantic opening for this conductor's immediate area took place on the evening of June 17 EDT, beginning about 2200Z. Although signals from across the pond were not particularly strong, the band seemed alive with Gs. This conductor managed to work six English stations, the last one disappearing about 0045Z June 18. In the midst of this was a 2-meter E_s opening to Arkansas and Texas, and reception of the OX3VHF beacon on 50.045 MHz. Unfortunately, no one could contact OX3LX by phone to alert him to the existence of propagation between Greenland and much of the Northeast US. The opening is known to have extended to beyond the British Isles. I received an SWL card from The Netherlands and OH1ZAA in Finland reports that he completed 10- to 6-meter crossband contacts with VE1YX, W2CAP/1 and WA1EKV between 2157 and 2224Z. The widespread nature of the E_s conditions at the time is underscored by the report that about two-and-a-half hours after the Europeans faded out, K1TOL worked KH6IAA.

Two days later, the afternoon of June 19, brought probably the biggest E_s opening between North America and Europe ever. This opening was particularly good for the more northerly located stations. One example of what could be worked comes from W9IP/2 in northern New York State. Mike lists a total of 86 European stations in G, GI, GW, GM, GJ, EI, PAØ, F and CT beginning about 1820Z and lasting for about three hours. WA1OUB and K1TOL had similar results; OUB working 94 and TOL 98. Included in WA1OUB's list are PAØXMA and F6DBI! Among K1TOL's contacts was an LA and a 9H1. I also understand that K1LPS worked both active 9H1s, CG and BT. Later that evening, NØLL in Kansas worked KL7NO, VY1AU plus several VE7s.

Another report attesting to the E_s conditions prevailing over much of the world during the mid-June period comes from the Far East. JA1VOK reports that about 2230Z June 15, he worked KH6IJ and KH6JJI, the latter reaching S9 plus 30 dB. Hatsuo comments that the strength of the signals was reminiscent of the better days of the last solar cycle. He also passes along the information that in their June 5 to 11 operation from Taiwan, BVØAE contacted approximately 1660 stations including all JA districts plus HL9TM and KG6DX. Every year seems to produce at least one instance of E_s propagation between the West Coast and Japan. To keep the string going, N6CW reports that between 0530 and 0540Z June 21 he heard JE2KPC calling CQ. Unfortunately, his 50 W wasn't enough to get the JA's attention.

W6JKV's sojourn to the Caribbean provided much interest and excitement. Along with N4HSM, Jim operated the Contest, and several days after, from Antigua, V2A. From that QTH, the two of them completed a total of 555 QSOs in all 10 US call areas plus VE, KP4, KP2, VP5, ZF, FM, HI8, FY, CT, G, GW and GJ. Best DX was about 3800 miles to the Seattle area, although the Gs are almost as far. His eagerly awaited trip to Aves Island (YVØ), although preceded by the proper documents including a reciprocal YV license and full permission to visit and operate from the island, unfortunately for most of us, had to be cut short. In the approximately six hours of actual operating time on the island Jim, with the help of his companions KB6AFZ, N6BFM, and a YV friend managed to contact two dozen US stations in all call areas except W6, including one VE3 and a single KP2. In addition, and here is the shocker, they worked 74 Gs, 17 GWs and 2 EIs. The trip was completed with a two-day visit to St Kitts, where as W6JKV/V47, some 40 US stations were worked. By that time, conditions had deteriorated considerably, limiting the number of contacts. Once again, we owe a debt of gratitude to W6JKV and those who assist him on these always expensive, and sometimes perilous, trips which add so much spice and pleasure to our 6-meter operating.

Attempts to report on E_s happenings here in the US and Canada, short of writing a small book, would be fruitless. Suffice to say that there has been more doublehop than any summer this conductor can remember. The opening during the June VHF QSO Party was probably one of the most intense and widespread on record. The 6-meter band was open almost continuously from the beginning of the contest until after it ended. Portugal was worked by several East Coast stations and at least two in the Midwest, KØTLM and WØRT. There are reports that G stations were hearing the US but could not break through due to contest QRM. However, WB4OSN did manage a CW QSO with GJ3YHU at 1452Z June 14. [Another argument for a DX window.—Ed.] KH6IAA worked a number of stations on the West Coast and Midwest. As reported above, W6JKV/V2A did well. Although I haven't heard from them as yet, I know that the K1FJM/WA1AYS team on Martinique had great success as well.

Despite the super conditions, the 1987 E_s season was not without its sad note. Word has reached me of the untimely passing, on June 22, of Scotty, W5DZF of Miami, Florida. It is understood that he was in his shack at the time, probably combing the band for a trace of DX. Scotty was a real gentleman and devoted 6-meter operator. His familiar voice on the band will be sorely missed.

2 Meters—The excitement which took place on 6 meters was matched by the conditions visiting this band. The weekend of the June VHF QSO Party brought one of the most massive E_s openings of all time, and coinciding as it did with the contest, there was plenty of activity to take full advantage of it. I wouldn't doubt that the weekend produced the greatest number of 2-meter E_s contacts for any two days ever. Nor was the tremendous number of QSOs the only thing which characterized the E_s conditions during this weekend. Evidence points to a number of doublehop contacts being made. As anyone who operates 2 meters knows all too well, doublehop is a very rare phenomenon on this band.

Detailing all of the reports sent in on E_s openings during June would be impossible in the space available. What follows, then, is merely a sample of the stack of reports turned in. Once again, I wish to thank all of those who submitted reports, whether I was able to find room for them in the column or not. They have all been read and are being saved for anyone who wishes to study the unusual Sporadic-E conditions we have been privileged to witness this summer.

One example of what certainly appears to be doublehop E_s is reported by WA7JTM, who operated from 11,000-foot Mt Graham, Arizona in DM52. Using a Boomer and a 160-W solid-state amplifier, Pete made a total of 32 E_s contacts in Florida, Georgia, Texas, Arkansas, Oklahoma, Louisiana, Missouri and Kansas between 1520 and 1710Z Sunday June 14. Some of his best DX were contacts with W5HUQ/4, and N4ATM in EM9Ø near Jacksonville, FL and WD4AFY and WU4E in EM92 in southeast Georgia. In addition to the distance involved, the case for doublehop includes the fact that stations at normal singlehop distance were being heard at about the same time as the East Coast stations. Another with a similar account is WB4SLM Centerville, GA in EM82. Like a number of others, Vic included a grid map to show graphically the fact the stations in Texas and Oklahoma were heard along with several in the Phoenix, AZ area. Best DX for him was N7CKE Phoenix in DM33 whose 25 W and 8-element beam produced S9 signals. Vic also worked AA7A and W7RV in DM43 as well as many stations in between including several 10-W mobiles in Texas. N14Z Orlando, FL got in on the super DX as well, working W7CI Arizona DM34 and a bunch of singlehop stations to up his grid total from the mid-60s to enough for VUCC. KI4CI Hilliard, FL relates a similar story. Carl worked a total of 50 E_s stations in six states including WA7JTM. A number of people have commented that this was their first experience with 2-meter E_s. Many picked up a new country by working XE1FUX/XE2.

KD4WF Savannah, GA wonders if he and NW7O Las Vegas, NV have the North American E_s DX record. Their contact of 1976.7 miles during the Contest sure comes close to any contacts that this conductor remembers.

Another major opening took place the evening of June 29, and it rivaled the one during the Contest both in duration and distances worked. I don't ever recall Colorado being worked from the Washington-Baltimore area before, but this night literally dozens of contacts were completed. WB3LJK New Market, MD about 30 miles

70-cm Standings

For WAS holders, listings are WAS number, call, state, call areas worked and grids worked. For others, call, state, US states worked, call areas worked and grids worked. Call areas are the 10 US 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 those Maidenhead designators worked since the VUCC award was instituted January 1, 1983. In order to make the standings a true reflection of stations currently active on 70 cm, those not reporting activity within the past two years are subject to being dropped. They will be reinstated upon written presentation of continuing activity. It is not necessary to have worked any additional states or grids in order to remain in the standings or to be reinstated, merely an indication that you are still on the band. WAS holders are listed in any case. Compiled July 11, 1987. Deadline for the next update is January 5, 1988.

WAS Holders

1	W0YZS*	MO	—	—
2	K2UYH*†	NJ	55	—
3	K5JL*†	OK	48	—
4	WB5LUA*	TX	41	—
5	W5FF*†	NM	28	—
6	W1JR*†	MA	50	157
7	W0RAP*†	IA	38	176
8	WB0TEM*	IA	—	—
9	KA0Y*	IA	—	—
10	WA4MVI*†	SC	26	—
11	K5FF*†	NM	29	—
12	DL9KR*	—	—	

K1FO*†	CT	45	39	166
W2SZ/1*	MA	29	12	79
K1PXE	CT	25	11	—
K1LPS*	VT	22	12	—
W1RIL	MA	14	8	31
W1GXT	MA	13	6	—
N1AIS	MA	11	5	—
KA1DHO	MA	9	4	11
K2RIW*	NY	28	12	—
W2VC	NJ	27	11	67
WB2NPE	NJ	24	9	79
K2GK	NY	24	9	71
W2PGC	NY	23	10	40
WA2FGK	NJ	22	9	—
WA2FUZ	NY	18	8	—
K2YCO	NY	17	8	—
K2OVS	NY	16	6	13

*Some contacts made via EME
†WAC
—Information not provided

N2WK	NY	15	9	41
N2BJ	NY	15	5	32
W3RUE	PA	30	10	56
W3IP	MD	27	7	—
WA3FYJ	PA	25	10	44
WB3LJK	MD	24	10	50
AE3T	PA	23	8	—
KB3QM	DE	23	—	54
K3HZO	MD	22	10	51
W3ZZ	MD	22	9	58
W3WFM	MD	21	9	60
K3IUV	PA	19	5	—
AC3T	DE	13	5	18
W3XO	MD	13	5	12
WA3DMF	MD	10	5	13
K4QIF*	VA	48	38	—
W5HUQ/4*†	FL	36	39	—
WB4NXY	KY	29	8	90
KC4EG	KY	28	8	65
WA4PCS	KY	27	9	—
W4FJ*	VA	25	8	—
W4ISS	GA	25	8	—
WA4CQG*	AL	25	8	—
WS4F	GA	23	8	61
WA4SBC	VA	21	7	46
K4OF	AL	21	—	—
W3IY/4	VA	19	7	—
WD4DGF	TN	15	6	29
WB4RUA	GA	15	4	31
K4KAE	SC	14	6	—
K4LHB	VA	13	6	—
WA4OWC	FL	11	—	—
WA4OFS	FL	10	3	20
NI4Z	FL	9	3	—
KB4CRT	FL	9	2	31
WB4SLM	GA	9	2	31

WD4FAB	FL	9	—	25
KA4CRT	MS	8	2	16
WD4AHZ	FL	7	2	27
NA4I	GA	5	1	9
W0RRY/5*	OK	46	35	170
WB5AFY*	TX	39	30	146
W5RCI*	MS	36	14	118
K5UR	AR	27	9	133
K5SW	OK	27	9	104
W5HN	TX	26	8	62
WA5VJB	TX	22	7	—
KB5MR	OK	21	5	71
W5DFU	OK	20	8	58
WA5HNK*	TX	19	6	44
KE5EP	TX	19	—	75
W5ASH	TX	18	6	64
W5SXD	TX	17	5	36
K5JRH	TX	17	4	—
K5WE	OK	15	4	35
K5DHU	TX	14	5	44
WA5DBY	TX	14	4	—
N5BBO	TX	12	3	58
W5UWB	TX	11	3	17
W5NZS	OK	6	—	50
W6ABN*		43	34	—
N6AMG*		9	16	—
K6JYO		9	6	—
K6QXY		4	3	—
WA6HXM		4	2	—
W4WD/7	UT	38	33	—
W7JF*†	MT	34	25	—
W7HAH*	MT	25	20	42
K7ICW	NV	4	2	20
K8WW*	OH	45	34	—
W8IDU*	MI	41	11	—

NI8O	OH	31	10	119
WB8BKC	MI	30	9	73
W8YIO	MI	30	9	67
WB8PAT	OH	23	9	—
WA8MIL	MI	20	9	55
WB9SNR	IL	34	11	77
W9ZIH	IL	33	11	—
WB9MSV	IL	25	5	91
NC9F	IL	20	9	51
K9SM	IL	16	7	16
W9YCV	WI	13	6	25
KB9NM	WI	9	3	—
K0TLM*†	MO	47	24	91
K0ALL*	ND	29	14	—
W0PW*	CO	28	10	—
W0RT	KS	28	7	79
K0DAS	IA	26	7	—
W0FY	MO	24	8	46
WB0DRL	KS	21	6	74
W0OHU	MN	20	6	46
W0JRP	MO	18	8	55
KC0OG	NE	18	6	56
W0VB	MN	17	6	—
KF0M	KS	16	5	60
KC0QR	NE	15	6	62
WA0TKJ	KS	15	5	50
WB0DGF	NE	10	3	25
WA0NOK	MO	9	3	—
WB0ZKG	IA	9	3	—
N0BTN	NE	6	3	19
KH6HME		2	2	6
VE1UT	NS	14	6	—
VE3LNX		20	10	62
VE4MA*†		45	43	—
G3SEK*		19	38	152

west of Baltimore, after working a number of 5s in EM12, EM13, EM22, EM25 and EL09 beginning about 2230Z, hooked up with W5SFW Amarillo, TX DM95 at 2215Z followed by a few more closer-in 5s and, then, at 2300Z, NK0P DM78 in Colorado for state number 38. Mike then went on to work four more Colorado stations: N0EOQ DM89, N0CMW DM78, WB0QMN DM79 and WB0RRV DM78. The opening lasted until about 0300Z June 30—over five hours! From the western end, KX0O Colorado Springs reports working a total of 101 East Coast stations including K2TXB FM29 in southern New Jersey, a distance of 1530 miles. Lauren says that the band was open for him from 2220Z June 29 through 0230Z June 30. N0LL tells a similar story, noting that he made 95 contacts in 35 eastern grids while having to be away from the rig for almost two hours during the middle of the opening. Another with an outstanding total of QSOs is K5SW Muskogee, OK. Sam reports 80 stations worked in 45 grids. It is interesting to see the pattern of the opening unfolding with the map plots which he put together for each half-hour period. Some periods show most of the contacts to be to the east or northeast, while for other half-hour periods, they are almost due north into Minnesota, Wisconsin and western Ontario. The report of WB5N Houston shows a similar pattern, with a contact with K0MVJ EN36 at 2225Z followed at 0017Z with K2SPO FN13, 0022 WA3BUX FN01, 0031 K2GK FN12 and then a string of stations in EN34, EN37, EN42, EN52, EN57 and EN64 between 0116Z and 0234Z.

Although most of the news this month is of Sporadic-E, the West Coast's fascinating pastime of working Hawaii via tropo-ducting put in its first major appearance for 1987, fortuitously during Field Day. WB6ESQ says that KH6HME made 120 2-meter contacts with stations between San Diego and the Bay Area as well as a few QSOs on 70 cm. Paul also worked K6QXY north of San Francisco on 23 cm. Randy asks that those hearing any KH6 beacons report details to him. Address: WB6ESQ, 7836 La Corona Way, Buena Park, CA 90620. In addition to KH6HME, KH6FOO is looking for contacts with the Mainland. Those hearing the KH6 2-meter beacon may call Russ at 808-959-7122.

FIRST 1¼-METER E_s TWO-WAY

As noted last month, the Es opening that turned the 2-meter band into a madhouse for several hours for many in the southern part of the country during the contest, also produced the first documented two-way contact via Sporadic-E on our 220-MHz band. It's worth noting that this contact most probably would not have taken place if we did not have the 220- to 222-MHz portion of the band that the FCC threatens to take away.

I have heard from both K5UGM Irving, TX and W5HUQ near Jacksonville, FL and there is absolutely no doubt from their descriptions that their contact was completed and that it was via Sporadic-E. K5UGM says that the intensity of the 2-meter signals encouraged him to try for a 1¼-meter contact. After asking a number of people on 2 meters if they were equipped for the higher band, he finally found W5HUQ. They first made the attempt at 1510Z June 14. K5UGM immediately heard W5HUQ but could not get a response. Back on 2 meters, John told him that he had heard him and WB5LUA. More attempts at a contact were made by both K5UGM and WB5LUA, but to no avail. Again on 2 meters, signals between the Dallas area and northern Florida were getting stronger, and when K5UGM heard W5HUQ announce, at 1544Z, that he was going to try 220 again, Bill called him immediately. When John came back on 220.1, his signal was 40- to 60-dB over S9. Bill received a similar report from John and they easily exchanged the required Contest data.

The equipment at K5UGM consists of 600 W output to a Boomer at 40 feet. A home-brew GaAsFET preamp with a noise figure of 0.3 dB helps the receive department. W5HUQ runs 20 W output to a Boomer and has a receive preamp in the 0.5 dB range. Although WB5LUA, WA5DBY and KD5RO were on at the time, this was the only contact completed.

Congratulations to both Bill Duval, K5UGM and John Moore, W5HUQ for accomplishing this historic feat.

EME DXPEDITIONS

W0SD writes that he, WB0TEM and NS0N are planning a series of 70- and 23-cm EME treks to most needed states. The first of these operations is expected very soon. Check the weekend 70-cm EME Net on 14.345 MHz or the K2UYH *432 and Above EME News* for exact schedules and locations.

MID-ATLANTIC VHF CONFERENCE

The annual VHF Conference and Hamarama sponsored by the Mt Airy VHF Radio Club, or Pack Rats as they are better known, will be held as usual the first weekend in October. That puts the Conference on Saturday the 3rd and the big Hamarama hamfest the following day. The Pack Rat Conference is always an excellent meeting of some of the most accomplished and knowledgeable VHFers from the eastern part of the country, and Hamarama is one of the best hamfests around, especially for VHF-related gear. For details, call Gary Hitchner, WA2OMY, at 215-539-6409 or drop an SASE to his *Callbook* address.

FM/RPT

Conducted By Stan Horzepa, WA1LOU
75 Kreger Dr, Wolcott, CT 06716
CompuServe ID no. 70645,247

Trouble In Paradise

Lately, there has been an influx of data here at the FM/RPT desk indicating that all is not well out there in FM-repeater radioland. Let's take a look at what's been received; we'll air our laundry and weigh its merits.

A DISCOURAGING WORD HEARD IN NOVICELAND

Lee Gross, KI4FF, sent the following comments complaining about the operating practices of some of the Novices using his 220-MHz repeater.

"As the owner of a 220-MHz repeater and a long-time member of the ARRL, I have found Novice Enhancement to be a mixed bag. I feel that since the ARRL pushed for Novice Enhancement, then the ARRL should be responsible for educating the Novices.

"Since the enhancement went into effect, I and three other repeater owners I know have been plagued with problems. First, let me say that the consensus is that all of the Novices who have been courteous enough to identify and talk have been a welcome addition to 220. Not all, or perhaps none, are to blame for the abuses, but the fact is, that's when it began.

"Prior to Novice Enhancement, it was unusual to hear more than two 'kerchunks' (accessing the repeater momentarily without speaking) a day without identification, even though my machine has many users. It was unheard of to have people trying to access the autopatch without permission and no one ever held dead carriers on any 220 repeater in this area [Hollywood, Florida—Ed.] without a good reason, such as testing, and never without identifying.

"Since Novice Enhancement, these are just a few of the problems we face. My machine is 'kerchunked' without anyone identifying at least 50 times a day. Numerous people have tried to bring up my autopatch and other autopatches in the area. Some have gone as far as accessing a 'patch and trying to make a phone call. I have experienced many dead carriers, some for two to three minutes, which I attribute to people checking SWR, but not having the courtesy to identify.

"I believe it is your responsibility to explain proper repeater operation to these people. To explain repeater inputs and outputs (so they stop transmitting on our inputs and between inputs). To explain that it is illegal to make any transmission without identifying, and that includes 'kerchunking.' That an autopatch is not an automatic privilege, that they must join a group, club, or whatever in order to use the autopatch."

[Editor's Note: Some repeater organizations provide open autopatch facilities for the traveler. In many instances these organizations offer this service without the requirement of membership.]

KI4FF is right! If someone is operating their station contrary to FCC regulations or contrary to gentlemen's/ladies' agreements, it is our duty as ARRL members to educate our brother and sister hams as to the proper operating procedures. Novices, as the name of their license implies, are especially "green" when it comes to the FM and repeater mode. They need our assistance in becoming acclimated to this new mode and it behooves us all to take their hand and enhance the means of using their enhanced privileges.

Speaking of which... Bob Froeb, WA2PWS, telephoned to complain that Novices were using his 220-MHz repeater in violation of their enhanced operating privileges.

The input of Bob's repeater in Dix Hills, New York is 222.1 MHz and Novices may transmit between 222.1 and 223.91 MHz. However, the typical VHF FM signal has a bandwidth of 16 kHz and if you place that 16-kHz-wide signal smack dab on 222.1 MHz, the signal actually occupies the spectrum of 222.092 to 222.108 MHz, the low half of their signal being 8 kHz below the Novice band. Therefore, it is impermissible for a Novice to use a repeater with an input of 222.1 MHz.

20-kHz SPREAD COOLS

It appears that the spread of the "Northwest 20 kHz" 2-meter band plan has come to a halt. The following areas have adopted and/or are operating with the 20-kHz plan (20-kHz channel spacing): Arizona, British Columbia, Hawaii, Idaho, Michigan, Montana, Nevada (outside of Las Vegas), New Mexico, Oregon, Texas, Utah and Washington, with a mixture of 30-kHz and 20-kHz channel spacing in Alabama and in some Canadian provinces.—*from the Western Washington Amateur Relay Association Coordinator*

REPEATER LOG

According to May 1987 reports received, repeaters were involved in the following public-service events: 350 vehicular emergencies, 41 medical emergencies, 17 alerts/drills, 11 public-safety events, 10 fire emergencies, 6 weather emergencies, 6 criminal activities and 4 search and rescues.

The following repeaters were involved (followed by the number of events): W2VL 60, WA2ZWP 7, WD4ONK 10, WA6BJY 15, WD6DIH 22, KA6EEK 61, W6FNO 196, N6ME 26, K6TZ 14, K8DDG 10, N9DOK 13, K9LSB 11.

Strays

I would like to get in touch with ...

☐ anyone with a manual for a frequency-shift converter, Model CV89A/URA-8A. Phil Stanley, KD2XN, 6894 Stevens Rd, Jordan, NY 13080.

☐ anyone with a manual for a Precision Apparatus multirange VTVM, Model EV-10. Charles Smack, Jr, W3NB, 2520 Uniontown Rd, Westminster, MD 21157.

☐ anyone with information on a Waters Automatch 370-10 mobile loading coil. Richard Ellers, K8JLK, 426 Central Pkwy, Warren, OH 44483.

☐ anyone with a manual/schematic for a Delcon Corp T-210 linear amp and the PS-210 power supply. Bill Sheffield, KQ0J, 1444 Roslyn St, Denver, CO 80220.

☐ anyone with a manual/schematic for a Swan ST-3 antenna tuner. Henry Godbois, KA1XY, PO Box 19, Bailey Island, ME 04003.

☐ anyone with a manual/schematic for an NDI HC-1400 2-m FM mobile radio. Mr S. Westguard, G4RHN, 41 The Oval, Gloucester GL1 5EE, England.

☐ anyone with a manual/schematic for a Hy-Gain receiver preamp, Model 422B. Bob Truhlar, W9LNQ, 1701 W 101 St, Chicago, IL 60643.

☐ anyone with a schematic for an SBE SB2-LA linear amplifier or information on interfacing a Model 33 teletypewriter with a Kantronics UTU. Doug Alderdice, KA2WFT, 126 Mercer Ave, Buffalo, NY 14214.

☐ anyone with a manual/schematic for a Triplett VOM, Model 630-A. Cy Pruett, K4BHV, 4988 Flamingo Dr NW, St James City, FL 33956.

☐ anyone with information on a Central Electronics 20-A exciter and 458 VFO. Herman Hums, W9WDV, 58709 Ireland Trail, Mishawaka, IN 46544.

☐ anyone with a schematic for a Simpson 75-A transceiver. Timothy Mitchell, 48-14 188th St, Flushing, NY 11365.

☐ anyone with a manual/schematic for a Clegg FM DX 2-m transceiver. Glen Adams, K0USB, Box 183, Osceola, MO 64776.

☐ anyone with information for a Farnsworth ac generator. John Brus, W6EBK, 3923 N Merced Ave, Baldwin Park, CA 91706.

Canadian NewsFronts

Conducted By Harry MacLean, VE3GRO
500 Riverside Dr, London, ON N6H 2R7
Tel 519-473-1668

Plans for Polar Expedition Move Ahead

Four Canadians selected from more than 500 applicants will take part in a joint Soviet-Canadian polar expedition scheduled for next February. The expedition, a privately funded venture, will begin at Cape Arktichesky on the Severnaya Zemlya Archipelago, cross the North Pole, and proceed to Cape Columbia on Ellesmere Island. Expedition members, who expect to ski the 2000 km of ice and snow in 90-100 days, will be supported by six air drops of food, fuel, batteries and equipment with which to conduct scientific experiments en route. Amateur Radio will be their sole means of communication with the outside world.

The logistics of using Amateur Radio communications are still being worked out. Key to this will be the granting of reciprocal operating privileges to the various Soviet and Canadian operators. The expedition will rely heavily on a 10-watt channelized SSB transceiver operating in the 80, 40 and 20-metre bands. Most communications are expected to take place in the 80- and 40-metre bands. Because of the low power being used and poor propagation in the Arctic, direct communications will likely be possible only with a limited number of stations in the north. Thus, relays will be needed. This is where amateurs in the south come in.

CRRL President Tom Atkins, VE3CDM, has met with expedition leaders and is coordinating the Canadian communications effort. Tom mentioned that while CRRL was asked to provide communications, providing communications was not, per se, a CRRL project, but a *Canadian* project in which *all* Canadian amateurs might take part. If you think you can help, please make yourself known to Tom. He'll be glad to hear from you.

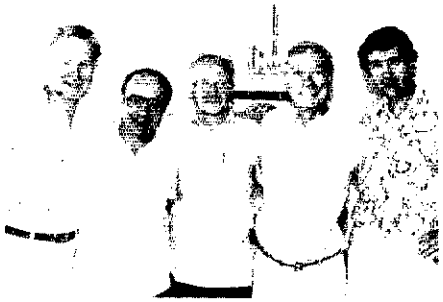
CRRL: SOME FINANCIAL NOTES

CRRL members who requested a copy of the CRRL *1986 Financial Statement* will know that CRRL did very well in its first year as an independent financial entity. At the end of 1986, CRRL and its wholly owned subsidiary, CRRL Publishing, was worth just over $267,000.

Why did CRRL do so well? Not, as we have occasionally heard, because CRRL's operation is being underwritten by ARRL. The only financial assistance received from ARRL was a one-time-only $US 10,000 grant for startup expenses. The rest of CRRL's money came from book sales and from membership dues. Some of these dues were turned over to CRRL when CRRL became an independent financial entity. These dues represented the total value of the unexpired portions of all Canadian League members' memberships as of 1986 January 01. (No dues were turned over for Life members; while Canadian ARRL Life members are now considered to be CRRL Life members, ARRL maintains financial responsibility for these.) Other dues came from new memberships and subsequent renewals.

CRRL is operated extremely prudently. It does not spend members' money as it is received. If you renew your CRRL membership this month (September), only 4/12 of your dues (because, including September, there are four months remaining in the year) will be spent on *QST* and other services in 1987. The remaining 8/12 will be placed in an interest-bearing account and saved to provide *QST* and other services in 1988. Because past membership campaigns have been conducted in the fall, most membership renewals take place then. As a result, CRRL tends to have most of its money for the following year in the bank at the end of the preceding year—a happy circumstance that allows CRRL to plan its programs for the following year with a fairly clear idea of how much money will be available.

We thought you should know these details. CRRL is *your* membership organization working with *your* money.



Here's the group that met in Toronto to plan communications for the upcoming Soviet-Canadian polar expedition. From left: VE3AND; Soviet Arctic expert Arkady Cherkasov; Leonid Labutin, UA3CR; VE3CDM; and Expedition Leader Dimitry Shpara, UA3AJH. *(photo courtesy VE3AND)*

DOC QUESTIONS BANK BOOKS NOW AVAILABLE

Studying for DOC Amateur Radio Examinations or conducting a licensing class? Start with the *Canadian Amateur Radio Licensing Manual* by Ralph Zbarsky, VE7BTG. Reinforce what you've learned with the *Canadian Amateur Radio Questions Book* and the *Canadian Amateur Regulations Book* by Mitch Powell, VE3OT. And for that final review, use the new *Canadian Amateur Questions Bank* or the *Canadian Advanced Amateur Questions Bank*, containing all questions—and their answers—currently used on the technical portions of DOC examinations. Parlez-vous français? Production problems associated with integrating the diagrams and text for the French version of the *Canadian Amateur Radio Licensing Manual* have now been overcome. *Manual de Formation*, translated for CRRL by DOC, is now available, as are French versions of the two *Question Bank* books, produced in association with RAQI, Radio Amateur du Quebec. Prices? $20.25 postpaid for either the English or French licensing manual, and $10.75 postpaid for each of the other books. (Discounts are available on group orders; write for details.) Order from CRRL, Box 7009, Station E, London, ON N5Y 4J9.

NOTES FROM ALL OVER

☐ DOC has announced a new third-party-traffic agreement with Saint Vincent and the Grenadines in the West Indies. The agreement, which is limited to non-phonepatch traffic, took effect on July 01.

☐ On July 29, DOC announced that Canadian amateurs could begin operating on the 18.068-18.168 MHz band and 24.89-24.99 MHz. More details next month.

Hail, the gang's all here. Well, almost. Manning the CRRL booth at the recent Tracey-Sorel Hamfest are (from left): VE2BP, VE2IJ, VE2WH, VE2ZZ, VE2ED and VE2FT. We're advised that the bottle behind VE2FT contains ginger ale. *(photo courtesy VE2GMP)*

YL News and Views

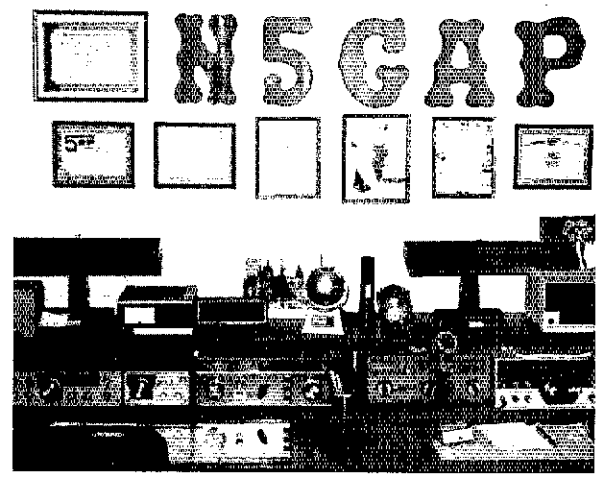
Conducted By Joan Gibson, KG1F
RR 1, Box 1465, Waterbury, VT 05676

N5GAP and the African Queen Net

The stateside YL who keeps the African Queen Net in order on Monday afternoons is N5GAP. Carol McClure has been instrumental in bringing Liberian YLs as well as other DX YLs to 14.305.

Carol was born in Newark, Ohio and has lived in several areas of this country as well as countries across the Atlantic, first due to her father's business and then with her husband Bud, K5IUO, when he was in the Air Force. When they were stationed at Scott Air Force Base in Illinois during 1963, Carol earned her Novice ticket. "At that time the Novice ticket was good for one year and I let mine lapse. I had to take time out to have children," says Carol. "But, after the children grew up I still had an interest in Amateur Radio and in 1981 I became KA5MYR." With encouragement and able assistance from Bud, Carol upgraded to General in October 1983; one month later she had earned her Advanced. "I haven't been off the air since," she says laughingly.

N5GAP keeps in contact with amateurs from Liberia through the African Queen Net.



Carol's station has earned her many awards and found her many friends.

Carol's impressive station consists of a Ten-Tec Corsair II with Titan 425 linear amplifier to a TH6DXX at 65 feet. She also operates three Ten-Tec Omni D's with two SB-201's and an HL2200 amplifier, one each for 80, 40 and 15 meters! Since she is an avid QRP operator, her station consists of an HW8 and HW9.

N5GAP's many hours of radio operation have reaped an award harvest for her. Her certificates include United Nations at Forty, Century Cities, DXCC, Q-5 Award of Excellence, Worked the World, Liberian West African Award, 5L QSO. She belongs to ARRL, Liberian Radio Amateur Association, INDEXA, Northern California DX Association, YLRL, YLISSB, TYLRUN and the 3905 Century Club.

When she is not award hunting, DXing, running control for the African Queen Net or 3905 Century Club, she spends her allotted radio time meeting new amateurs and rag chewing with them. One of her most memorable experiences was when she was first licensed and running CW. Carol recalls, "I had been on the air for days, just burning up the airwaves with CW. One day I was tuning across the bands and heard someone calling me. I was so surprised I couldn't believe what I was hearing. But I went back to him and he was even more surprised to hear me come back to him! Apparently, he had taken the chance that he might come across me!"

She also corresponds with her many friends from all over the world including Kamal, EL2AY, Diane, EL2EF, Mildred, EL2M and Anin, UA3AJ. "I can't imagine my world without Amateur Radio and the many friends I have made. It's always exciting to work a new country or meet a new Novice in the CW bands." Carol's amateur operations are soon to have a new horizon. Listen for Carol during October when she will be sporting her new Liberian call, EL2AP.

N6KAG PROMOTED TO RACES EXECUTIVE STAFF OFFICER

Public Service is her hobby, and Amateur Radio is one of the tools of her hobby. Shelley Patz is more than an active member, she is also a leader despite her youthful years.

Jim Johnson, WA6FUT, Chief Communications Officer for the Los Angeles County Disaster Communications Service, recently announced the promotion of Shelley to the Executive Staff position of Communications Services Officer. The 1000-plus-member Los Angeles County Disaster Communications Service (DCS) is the only organization, under Los Angeles County ordinances, authorized to provide county governmental auxiliary communications with RACES rules and regulations.

Shelley's new responsibilities include supervising the operation of the County Information Center (CIC), which is the RACES headquarters facility, keeping in touch with EOCs located in each of the many county department headquarters, and keeping track of the RACES field equipment, such as portable repeaters and communications vehicles. She is also responsible for the supervision and planning of endeavors such as drills, exercises and other activities of the quick-response teams. Shelley supervises four staff officers who are responsible for several of these activities. In addition to overseeing these specialized activities, Shelley must be prepared to serve as the Acting Chief Communications Officer during extended operations.

Shelley first joined DCS in 1982 when she accompanied her husband Dan, N6FFT, on his Monday evening drills as a CIC operator. Because Shelley spent her Monday evenings working on DCS record keeping, it was only natural that she would take an interest in Amateur Radio and go for her Novice ticket. After earning her license Shelley was appointed DCS Records Officer. This responsibility was followed by appointments as Support EOC Staff Officer and CIC Staff Officer.

During this time, Shelley was active in the planning and operation of DCS' participation in the 1984 Olympics during which the organization provided backup and support communications for the Olympic Security Coordination Center. The Center was responsible for coordinating security communications of international, federal, state, county and city security agencies. She also supervised DCS participation in the Mexico City earthquake operation.

When not busy with her DCS responsibilities, Shelley is a net control with the Tournament of Roses Radio Association (TORRA). Recently, her interests have turned to learning about her home computer as well as packet radio.

In her spare time, Shelley is a Rescue Certified SCUBA diver and is a member of the National Divers Alert Network. *(Thanks W6NAA—Ed.)*

Shelley Patz, N6KAG, observes operators conducting Monday evening drill operations from Los Angeles County RACES Control Station K6CPT.

Silent Keys

Administered by Nancy A. Slipski

It is with deep regret that we record the passing of these amateurs:

N1AK, Henry W. Bartsch, Rutland, VT
KA1AQZ, Harold J. Smith, Groton, CT
W1FX, Paul Skitzki, Portsmouth, RI
W1MPT, Edward J. Doherty, Braintree, MA
K1OKE, William C. Hinckley, Chelmsford, MA
K1ORF, Frederick M. Adams, Canaan, CT
W1YAZ, Stuart Stockwell, Meriden, CT
WD2AKL, Kirby McElhearn, Bayside, NY
*W2AO, Aaron Spiro, Dobbs Ferry, NY
N2DFE, Melvin K. Weber, Jersey City, NJ
WA2DGP, Charles F. Unger, Boca Raton, FL
KD2EF, Irving Megeff, Palm Springs, FL
W2HBC, William B. Desnoes, Oneida, NY
WB2HXL, Charles H. Ambron, Elmont, NY
W2IPR, Stephen Kokinchak, Yonkers, NY
WA2JBV, Emil T. Rusin, Lancaster, NY
W2JJD, Louie F. Brown, Jackson Heights, NY
WA2KCG, Charles Knoell, Jr, Medford, NJ
W2KGU, Gerald F. Livingston, Poughkeepsie, NY
WA2KTM, Roy Sunderland, Morristown, NY
WA2TRA, Thomas H. Hoffman, Edison, NJ
K2YBN, Walter F. Middleton, Jr, Moorestown, NJ
K2ZFY, Robert A. Hunter, Tinton Falls, NJ
W3BNL, Lewis W. Rice, Silver Spring, MD
W3DTO, Richardson S. Roberts, Sr, Millsboro, DE
W4ADG, Cecil C Earnhardt, Jr, Charlotte, NC
W4AKQ, Duncan A. Scott, Cape Coral, FL
N4BEY, Charles B. Shackleford, Fort Walton Beach, FL
K4BTA, Walter F. Spitzform, Sr, Cropwell, AL
W4EL, Joseph P. Edwards, Durham, NC
KD4EY, Leo H. Redmond, Defuniak Springs, FL
W4FIZ, Harold DeVaughn, Columbus, GA
N4FUW, Miles D. Baker, St Simons Island, GA
WA4LAZ, John A. Shay, Middleburg, FL
K4MFE, Benjamin T. Gates, Fort Myers, FL
WA4MHX, Arthur F. Neuenhaus, North Palm Beach, FL
K4MQ, Charles Ross Acklin, Fort Lauderdale, FL
KD4OG, C. J. Stone, Louisville, KY
W4RUW, Horace E. Wright, Cookeville, TN
K4SIA, Julius A. Knight, Huntsville, AL
W4UKH, William S. Mellons, Jr, Kingsport, TN
*K4YF, John L. Wilson, Arlington, VA
KA4YMH, Roscoe T. Woodcock, Eustis, FL
W5ANZ, Charles W. Newton, Shirley, AR
W5CAB, Carl Keppler, Jr, Houston, TX
W5DAC, Richard F. Scholtz, Wichita, KS
W5DOZ, J. Lee Norman, Jr, Houston, TX
W5LTP, Samuel C. McIntosh, Dallas, TX
W5PY, Gauvian C. McClain, Moscow, TX
WB5UJN, Laurence R. Chute, Corpus Christi, TX
KA5UJR, Robert H. Harrah, Gillchrist, TX
W5YEA, E. Allen Lee, Baton Rouge, LA
*N6AUV, Ronald F. Chiappari, Portola Valley, CA
WA6BCH, Fred H. Wickman, Los Altos, CA
K6EVQ, William C. Long, Buellton, CA
N6GCI, Marston A. Blood, San Marcos, CA
N6HYE, Dorothy I. Rohm, Hemet, CA
K6IGS, Elmer W. House, Santa Cruz, CA
W6NJC, H. Al Geisendorfer, Truckee, CA
N6NMG, William C. Byer, Yermo, CA
KA6OQD, Kenneth L. Ohran, Santa Nella, CA
K6PG, Philip K. Beisel, Claremont, CA
*WB6QXN, James W. Arlidge, Granada Hills, CA
W6SSA, Shigeki Mori, San Mateo, CA
WA6WET, Leolf M. Reese, Hawthorne, CA
W6WZF, Clyde J. Haggbloom, San Jose, CA
WA7AMS, Ernest K. Specht, Vista, CA
W7APK, Ralph M. Hinshaw, Kennewick, WA
W7ILJ, Wesley E. Calkins, Dayton, WA
W7KZL, Howard C. Rood, Sun City, AZ
KA7VZK, W. W. Wilson, Anacortes, WA
W8AHJ, Milton O. Wilson, Findlay, OH
W8AN, Charles G. Stuart, Toledo, OH
K8AOG, Donald R. Sellers, Barberton, OH
KA8BIK, Clarence W. Parrish, Charleston, WV
W8BPB, Harold L. Feighner, Detroit, MI
K8BZO, Margaret E. Tucker, Coshocton, OH
KD8IL, Earl J. Price, Portsmouth, OH
W8IRC, Robert H. Harris, Cleveland, OH
W8LGB, Elvan Lanham, Dunbar, WV
K8NSM, Hugh W. Williams, Ashtabula, OH
W8QXX, Bernard F. Arnold, Cuyahoga Falls, OH
K8RHW, Melvin A. Pittner, Otsego, MI
K8RRB, Lawrence E. Rhoades, Bad Axe, MI
W8STH, Clyde T. Kirkby, Traverse City, MI
WB8TUQ, Barden T. Watson, Girard, OH
W9ADF, Eugene R. Taylor, Colfax, IL
NM9B, Edwin R. White, Indianapolis, IN
WA9CPR, John Magenheim, Milwaukee, WI
W9FRE, Karl G. Briggs, Wheaton, IL
WA9KWQ, William J. Maurits, Morrison, IL
W9LFI, John W. Schild, Monroe, WI
K9LPQ, John L. McAleer, Danville, IL
W9MRT, Earl C. McLaughlin, Bloomington, IL
WB9PCA, Jack H. Muntz, Rockford, IL
WD0AII, Fletcher Guinn, Salt Rock, WV
W0AWM, Fred K. DeBeaubien, St Paul, MN
KE0GY, Robert J. Kunkel, Cottage Grove, MN
*W0HI, Richard M. Cobb, Wichita, KS
W0JTF, Richard L. Lighthart, San Antonio, TX
WB0KUF, Richard M. Rose, Martin, SD
W0MYB, Bernard N. Jacobs, Denver, CO
*KT0R, Ronald William Apelquist, Minneapolis, MN
KA0WOL, Jack Gauthier, Kansas City, KS
G4ATT, Francis Rigg, West Yorks, Great Britain
4X4CW, Zvi "Ozzie" Osrin, Kefer Shemaryahu, Israel

*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.

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

September 1937

☐ Technical Editor Jim Lamb and John Stadler of Canada are in Bucharest, Roumania, relating amateur accomplishments, particularly extended v.h.f. propagation successes, to the technical arm of the International Telecommunication Union. Foreign delegates were much impressed, which should improve our chances for success at the Cairo frequency conference next year.

☐ Responding to the Board's request for more information in *QST* on broadcast interference problems and remedies, George Grammer illustrates how receiver images can beat with a local broadcast station. He points out that a careful choice of operating frequency can avoid trouble with a local b.c. station.

☐ W3AKU made an intensive study of how piezo-electric crystals fracture under conditions of excess current. He found that besides low oscillator plate voltage, a high-mu or pentode-type tube is good insurance against crystal loss.

☐ A pair of the new RK48 power pentodes turns out a hefty half-kilowatt, with only a simple 6L6 oscillator driving 'em, in W1SZ's new rig.

☐ W1BZR gets wide-range (0.3 to 7 kc.) variable selectivity with a 1560-kc. i.f. and a differential condenser which changes phase but not capacity.

☐ An SW3 receiver, used by W1JPE as the i.f. system for his 5-meter high-stability converter, was too selective for modulated-oscillator signals. Making the detector super regenerative solved the problem.

☐ The Communications Department announces a new DX award "to be made to any operator who can submit satisfactory proof that his amateur station has been in communication with 100 or more different countries." Thus the DX Century Club is born! *QST* will list each month stations with 75 or more countries confirmed.

☐ League questionnaires show the average age of 1937's amateurs as 27, with peaks in the 17-20 range and again at 28-33. The Editor muses that youthful enthusiasm takes a back seat in the early 20s to marriage and a family, and then a few years later the prodigal returns to brasspounding.

☐ Two persons winding coils for a home-built receiver, even closely following *QST* specs, will end up with slightly different inductance values. W8MYB points out this can reduce receiver efficiency by imperfect tracking, and shows us an easily-applied method for checking coils and condensers without lab equipment.

☐ So far eight hams, including *QST*'s Editor W1EH, have applied for membership in the A.R.R.L. 20-Year Club (licensed twenty years ago and still holding an amateur ticket).

25 Years Ago

September 1962

☐ Our bands are getting crowded, a seemingly solid mass of QRM from one end to the other. The Executive Committee has recommended a new crusade to improve conditions, with more material in *QST* on proper tuning of modern transmitters, understanding today's transmitter circuits, and the building and use of effective test equipment.

☐ Hawaii to Massachusetts on 1296 Mc.! KH6UK and W1BU accomplished the feat via moonbounce, after months of careful planning and a series of "almost" non-successes.

☐ The feat should boost interest in W6GGV's description of a 1296-Mc. converter, attaining top performance with simple circuits.

☐ W4AVW makes use of a standard electric windshield-wiper motor picked up in an automobile graveyard to drive a variable tuning inductor for his 75-meter whip antenna.

☐ Transistor prices are coming down, and VE3ABU provides us some highly useful general information on the handling of power transistors.

☐ K9YHT combined the basic design of K4EEU's phasing-type exciter with v.f.o. and VOX circuits suggested by W6TEU, and the beam-deflection-tube balanced modulator described by K2FF, with the result of an efficient and flexible unit.

☐ That good old warhorse Heath DX100 was brought up to date by W4JA, adding vernier controls, grid block keying, r.f. pickup for monitoring, and improved neutralization.

☐ WAR, AIR and NSS represented the Army, Air Force and Navy, respectively, in the annual military-to-amateur crossband tests. Over 4,100 QSOs resulted.

☐ Bill Orr, W6SAI, writes a gripping summary of Oscar 1, the world's first radio amateur satellite. Though in operation only 22 days (battery-life limit), the 10-pound 145-Mc. beacon transmitted the friendly c.w. greeting "HI" to amateurs from Alaska to Antarctica, from Japan to Estonia. Considerable technical data was amassed from world-wide amateur reports. Project Oscar is hard at work on the next design.

☐ W3GKP's "CQ machine" avoids the punched tape method by use of magnetic tape and a play-back head; tapes are easily made by tone recordings on a tape recorder.

☐ At its July meeting the Executive Committee appointed Arthur Meen, VE3RX, to the new post of associate counsel for Canada.

☐ Hams who were first licensed in 1912, the year of first government licensing, and who still have tickets today, will be honored at the Golden Anniversary Banquet in conjunction with the Hudson Division Convention in New York City in October.—*W1RW*

Moved and Seconded ...

(continued from page 56)

the Executive Vice President is directed to solicit further improvement input from the membership on this subject by the 1988 Annual Meeting." The question then being on the motion as amended, the same was ADOPTED.

79) It was moved by Mr. Heyn, seconded by Mr. Haynie, that the ARRL recognize the following segments of the 144-MHz to 10.5-GHz bands as automatic-beacon segments and modify the ARRL band plans accordingly: 144.275-144.300, 432.300-432.400, 902.300-902.400, 1296.300-1296.400, 2304.300-2304.400, 3456.300-3456.400, 5760.300-5760.400 and 10368.300-10368.400. Counsel is directed to petition the FCC to amend Part 97.87(e) as needed to authorize these beacon segments. On motion of Mr. Hurlbert, seconded by Mr. Frenaye, the matter was REFERRED to the VRAC for further study.

80) On motion of Mr. Haynie, seconded by Mr. Wilson, it was unanimously VOTED that the Volunteer Resources Committee is directed to audit current VEC procedures and, together with the Executive Vice President, find ways to streamline the process, reduce paperwork and time required by Volunteer Examiners in administrative detail and to eliminate unnecessary procedures, without compromising integrity, or accountability, and thereby improve the overall ARRL VEC program. The committee will report results at the 1988 Annual Board Meeting.

81) On motion of Mr. McCobb, seconded by Mr. Atkins, it was unanimously VOTED that funds previously set aside for the purpose of acquiring artifacts and to act as a reserve to be drawn on for the operation of the proposed Visitors' Center be combined into a single fund for the purpose of acquiring, restoring and preserving Amateur-Radio-related artifacts and that the appropriate committee be charged with the responsibility for administering these funds.

82) At this point, 6:13 PM, without dissent, the Chair recognized Messrs. Hofladay and Comstock for informal reports on the VEC meeting, just concluded. During the course of these reports, Mr. Kanode replaced Mr. Milius, Mr. Winter replaced Mr. Quiat and Mr. Comstock replaced Mr. Haynie at the Table.

83) It was moved by Mr. Hurlbert, seconded by Mr. Kanode, that the following resolution be adopted:

WHEREAS, the band 7.0 to 7.1 MHz is the only forty-meter international frequency allocation for general amateur use and

WHEREAS, no voice operating privileges are permitted to Continental US amateur operators in the segment 7.0 to 7.1 MHz, although this is the only internationally protected portion of the forty-meter band, and

WHEREAS, because countries adjoining, and in close proximity to the Continental US, permit voice operation in the segment 7.0 to 7.1 MHz and

WHEREAS, the band plan for the US forty-meter band should be studied to determine whether or not changes are needed to insure that US amateurs are fairly treated, now therefore, be it hereby

RESOLVED, that the DXAC and the Membership Services Committee, independently and cooperatively, study the forty-meter band plan and make their recommendations to the Board, considering, but not limited to, the following:

(a) Whether it is fair to US amateurs to be excluded from voice operation in the international 7.0 to 7.1 MHz range,

(b) Whether some exclusive cw and digital segment might be justified in the 7.150 to 7.3 MHz segment currently available for voice operation by US amateurs, and

(c) Whether any changes should be made in the forty meter band plan based on privileges available to various classes of amateur operator licenses. It is further

RESOLVED, that both committees using all resources available, solicit the widest possible input of opinion from the US amateur population.

After discussion, a roll call vote being requested, the question was decided in the negative, 5 votes in favor to 10 votes opposed. Messrs. Drake, Hurlbert, Kanode, Winter and Stafford voted aye; Messrs. Butler, Frenaye, Grauer, Comstock, Heyn, Mark, Mendelsohn, Metzger, Turnbull and Wilson voted nay. Mr. Atkins abstained. So the motion was LOST.

84) Returning now to the motion postponed at Minute 76, it was moved by Mr. Drake, seconded by Mr. Stafford, that the ARRL publication *Operating an Amateur Radio Station* be reviewed, revised and republished. The price shall be kept as low as possible. On motion of Mr. Holladay, seconded by Mr. Mendelsohn, the matter was REFERRED to the Publications Committee. During the course of the above, Mr. Severson replaced Mr. Wilson, Mr. Oubre replaced Mr. Hurlbert, and Mr. Weinstock replaced Mr. Frenaye at the Table.

85) On motion of Mr. Mendelsohn, seconded by Mr. Severson, it was VOTED that the Executive Committee research, document, and report the ramifications of the formation of an Amateur Radio Political Action Committee, with the information to be reported at the 1988 Second Meeting of the Board. At this point, Mr. Quiat resumed his seat.

86) On motion of Mr. Grauer, seconded by Mr. Mendelsohn, it was VOTED that the Administration and Finance Committee study the desirability of establishing the post of Personnel Manager on the Headquarters staff and make appropriate recommendations. At this point Mr. Vydareny replaced Mr. Mendelsohn at the Table; Mr. Frenaye returned to the Table.

87) On motion of Mr. Drake, seconded by Mr. Heyn, it was VOTED that the ARRL recognizes that the United Nations Convention on the Law of the Sea may have merit as a basis for determining country status for the DXCC Countries List and other applications in which the League requires determination of such status. The DXAC, pursuant to its tasking under Minute 59 of the Second 1986 Board of Directors meeting, is requested to study and consider the desirability of incorporating into its recommendations on country criteria all or part of said Law of the Sea. During the course of the above, Messrs. Wilson and Haynie returned to the Table.

88) On motion of Mr. Stafford, seconded by Mr. Butler, it was VOTED that HQ staff is directed to: (1) Review the ARRL training materials available for the training of amateurs to respond to emergencies and disasters and to report to the Volunteer Resources Committee 30 days prior to the 1988 Annual Meeting. (2) Recommend what types of materials, or changes to existing materials, could be developed in order to provide better ARRL training materials for training amateurs to respond to emergencies and disasters and to convey those recommendations to the Volunteer Resources Committee 30 days prior to the 1988 Annual Meeting. (3) Review and recommend any changes to the various ways in which amateurs are rewarded or recognized for their efforts and participation in the areas of emergency and disaster response and to report those findings and recommendations to the Volunteer Resources Committee 30 days prior to the 1988 Annual Meeting. (4) Materials as used in this case include, but are not limited to: (a) written materials; (b) video tape.

89) On motion of Mr. Kanode on behalf of Mr. Milius, seconded by Mr. Haynie, the following resolution was unanimously ADOPTED:

WHEREAS, a number of amateur stations throughout the world are approaching the elusive goal of making two-way contact in the 50-MHz band with other amateur stations in 100 DXCC countries, thanks in part to an encouraging increase in the number of administrations authorizing 50-MHz operation, and

WHEREAS, similar results are being achieved in the 144-MHz band, thanks to technical accomplishment by leaders in earth-moon-earth (moonbounce) communication, and

WHEREAS, it is the intent of ARRL to recognize such stellar accomplishment above and beyond the issuance of a single-band DXCC certificate, now therefore

BE IT RESOLVED, that ARRL shall award suitable commemorative plaques to the first ten amateurs to qualify for six-meter DXCC and also for two-meter DXCC, with certificates to be awarded to subsequent qualifiers, with rules to parallel those previously promulgated with respect to the 160-meter DXCC award, and

BE IT FURTHER RESOLVED, that ARRL shall continue this practice as other VHF enthusiasts qualify for DXCC on the higher-frequency bands.

Mr. Mendelsohn returned to his seat during discussion of this matter.

90) On motion by Mr. Quiat, seconded by Mr. Stafford, the following resolution was unanimously ADOPTED:

WHEREAS, significant progress has been made addressing the objectives established by the Board for growth in the Amateur Radio Service in this decade, particularly with the implementation of Novice Enhancement, and

WHEREAS, the challenges that will face Amateur Radio in the decade of the 1990s are beginning to emerge, including the prospect of an international allocations conference that could have a significant impact upon the Amateur and Amateur Satellite Services, now therefore

BE IT RESOLVED, that the officers of the League are hereby charged with collective responsibility, under general direction of the President, for drafting a long-range plan for the organization for consideration by the Board, and for periodic review and updating of any such plan as may be adopted by the Board, with progress reports to be rendered at each Board meeting, and that the Executive Vice President is instructed to provide such staff support as may be required by the officers in the discharge of this responsibility.

91) The Board was in recess from 7:22 PM until 7:34 PM. Messrs. Oubre and Kanode remained at the Table in place of Messrs. Hurlbert and Milius, respectively. All other directors were in their seats.

92) On motion of Mr. Oubre, seconded by Mr. Heyn, it was VOTED that the information contained in the Interim Band Plan for Packet Radio adopted by the Board, along with the frequencies in the 70-cm band and above contained in the Report of the Committee on Amateur Radio Digital Communications be referred to the VRAC and VUAC for their study and recommendations. A joint report shall be presented to the Board at the 1988 Annual meeting.

93) On motion of Mr. Mendelsohn, seconded by Mr. Frenaye, it was VOTED that the VHF Repeater Advisory Committee gather sample coordination forms from established repeater coordinators and spectrum management groups throughout the country. These forms are to be forwarded to ARRL Headquarters, duplicated and sent, as sets, to all known coordination groups to enhance their knowledge of what others in the field are doing. During the course of the above, Mr. Hurlbert returned to his seat at 7:45 PM.

94) On motion by Mr. Mendelsohn, seconded by Mr. Quiat, it was unanimously VOTED that the Legal Strategy Committee, in consultation with the Executive Committee, develop guidelines under which a voluntary panel of arbitrators and mediators could be chosen to arbitrate or mediate disputes between repeater councils. These guidelines should be reported to the 1988 Annual Meeting of the Board of Directors.

95) On motion of Mr. Frenaye, seconded by Mr. Mendelsohn, it was VOTED that the following ARRL conventions be approved:

Central Division Convention October 31-November 1, 1987, St. Charles, IL

New England Division Convention October 1-2, 1988, Boxboro, MA

Mississippi State Convention October 1-2, 1988, Biloxi, MS

96) It was moved by Mr. Frenaye, seconded by Mr. Heyn, that in accordance with the discretionary provisions of By-Law 25, the dates for the 1988 Annual Meeting of the Board of Directors are Friday, January 22 and Saturday, January 23. A roll call vote being requested, the question was decided in the affirmative, 9 votes in favor and 6 votes opposed with 1 abstention. Messrs. Atkins, Butler, Drake, Frenaye, Haynie, Heyn, Mark, Mendelsohn and Wilson voted in favor; Messrs. Grauer, Metzger, Kanode, Quiat, Stafford and Turnbull voted opposed, and Mr. Hurlbert abstained. So the motion was ADOPTED.

97) At 8:07 PM, Mr. Holladay assumed the Chair for Mr. Price.

98) On motion of Mr. Stafford, seconded by Mr. Mendelsohn, it was unanimously VOTED that the Contest Advisory Committee study modifying the rules for Field Day to create a new entry category (class F) for stations operating QRP (less than 5 watts) using a power source other than commercial mains or motor-driven generator.

99) On motion of Mr. Stafford, seconded by Mr. Kanode, it was VOTED that the Executive Vice President is directed to report to the Board of Directors at the 1988 Annual Meeting, any findings and recommendations pursuant to Minute 87, Second 1986 Board meeting dealing with the publication of an operating guide entitled *On the Air*. The proposed publication is directed to new hams and recent upgrades.

100) On motion of Mr. Mark, seconded by Mr. Mendelsohn, it was unanimously VOTED that the Legal Strategy Committee study and determine cost-effective ways to deliver to city, township, state planning boards and councils the relevant facts relating to Amateur Radio antenna systems with particular attention to be paid to national and statewide meetings. The results of the study are to be delivered to the Board at the 1988 Annual Meeting.

101) Mr. Price returned to the Chair at 8:26 PM.

102) On Motion of Mr. Nathanson, seconded by Mr. Kanode, it was unanimously VOTED that the Board heartily thanks and commends the staff, Messrs Lindholm, Riley, Rinaldo, Schetgen, Sumner and Williams for their quiet efficiency in preparing for, and working through, this Board meeting, under conditions sometimes made difficult by the distance of the meeting from the Headquarters.

103) At this point the Chair recognized Mr. Atkins, for the last time as Canadian Division Director, ARRL. He observed that this is an historic occasion, and observed that The Canadian Radio Relay League got to this point with the unflagging support and guidance of the American Radio Relay League and its Board of Directors. (Applause.)

There being no further business, the Board adjourned *sine die* at 8:45 PM.

103) Time in session as a Board, 17 hours, 31 minutes; as a Committee of the Whole, 44 minutes. Total direct appropriations: $5,000.

Respectfully submitted:

Perry Williams, W1UED
Secretary

Coming Conventions

DAKOTA DIVISION CONVENTION

September 18-20, Watertown, South Dakota

Lake Area Radio Klub is sponsoring the 1987 ARRL Dakota Division Convention from 6 PM Friday to 12 PM Sunday. Location is the west edge of Watertown on Hwy 212. Admission is $6 at the door, $5 in advance. Activities include packet, ARRL Forum, flea market, VE testing, displays and much more. Talk-in on 146.25/85 and 146.37/97. Tables first-come first-serve are $5 each. Banquet $10.50, guest speaker and entertainment on Saturday night. Motel rooms at the Ramkota, $36 single, $39 double. For more information and/or registration, write to the Lake Area Radio Klub, Box 642, Watertown, SD 57201. Make checks payable to Lake Area Radio Klub.

September 18-20
Dakota Division, Watertown, SD

September 26-27
Midwest Division, Des Moines, IA

October 2-4
Pacific Division, San Jose, CA

October 3-4
Virginia State, Virginia Beach, VA

October 9-11
Southwestern Division, Scottsdale, AZ

October 24-25
Tennessee State, Chattanooga TN

October 31-November 1
Central Division, St Charles, IL

ARRL NATIONAL CONVENTIONS

Sept 9-11, 1988—Portland, Oregon
June 2-4, 1989—Dallas/Ft Worth, Texas

MIDWEST DIVISION CONVENTION

September 26-27, Des Moines, Iowa

The Des Moines RAA is sponsoring their '87 Mid west Convention at the Adventureland Park 8 AM-5 PM Saturday and 9 AM-3 PM Sunday. Admission is $4 at door, $5 in advance. Banquet is $15. Plenty of activities available including Wouff Hong, packet, VE testing and more. Talk-in on 146.34/94 and 444.500 MHz. Preregistration required. For more info, contact Bob McCaffrey, Box 12065, Des Moines, IA 50312, tel 515-432-4738.

VIRGINIA STATE CONVENTION

October 3-4, Virginia Beach

The ARRL Virginia State Convention and 12th Annual Hamfest/Computer Fair will be held at the Pavilion. Admission for both days is $5 in advance, $6 at door. Tables are $8 per day, electricity $10 extra for both days. VE testing at 9 AM on Sunday, no registration necessary. Original license and a check for $4.35 payable to ARRL/VEC required. Show times are 9 AM-5 PM. For more info, contact Manny Steiner, K4DOR, 3512 Olympia La, Virginia Beach, VA 23452, tel 804-340-6105.

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 (Anniston)—Sep 26: The AAERC Hamfest will be held 7 AM-2:30 PM at the National Guard Armory on Hwy 431 North-Ft. McClellan Blvd. Exams given on site. Doors open for sellers at 6:30 AM, tables $5. Free admission. Talk-in on 147.64/04. For more info, contact Harold Romine, KJ4HU, 205-435-4833, Jacksonville, AL.

†**Alabama (Mobile)—Sep 12-13:** The Mobile ARC is sponsoring their hamfest at the Texas St Recreation Center. Talk-in on 146.22/82. Doors open at 9 AM. Admission is $2, both days. Dealers, tables, food, activities, free parking, free overnight parking of self-contained vehicles, hospitality room Saturday night and much more. For more info, contact MARC, PO Box 7232, Mobile, AL 36607, tel 205-471-4717 or 205-865-4404.

Alberta (Calgary)—Sep 19: The Novatel ARC is sponsoring their hamfest 9 AM-1 PM at the Parkhill Community Centre, 4013 Stanley Rd SW. Admission and tables are $2 each. Free parking and more. For more info, contact Novatel ARC, PO Box 7578 Station E, Calgary, AB T3E 3M3.

†**California (Sebastopol)—Sep 19:** The Sonoma County Radio Amateurs will hold their fifth annual hamfest 8 AM-2 PM at the Sebastopol Community Center, 390 Morris St (5 miles west of Santa Rosa just off Hwy 12). Admission and parking are free. Tables are $7 at the door, $5 in advance. Vendors setup at 7 AM. Talk-in on 146.13/73. VEC exams, food and more. For more info, contact SCRA, Box 116, Santa Rosa, CA 95402.

†ARRL Hamfest

Colorado (Boulder)—Sep 27: The Boulder ARC will sponsor its annual swap meet at the National Guard Armory, 4750 N Broadway 8 AM-3 PM. Talk-in on 146.10/70. Follow signs and look for white smokestacks. Donation is $3 per person, children free. Tables are $3. VE exams at 9:30 AM. Food available and much more. For more VE exam info, contact Barbara McClune, NØBWS, 5338 Spotted Horse Trail, Boulder, CO 80301, tel 303-530-1872. For additional info, contact Dale Scott, KAØQPV, 304 E Cleveland St, Lafayette, CO 80026, tel 303-665-2364.

†**Connecticut (Danbury)—Sep 13:** The Candlewood ARA will hold its annual hamfest at the Elks Lodge, 346 Main St, 9 AM-3 PM. (Dealers at 8 AM.) Admission is $3, tables $8, tailgating $5. Talk-in on 147.72/12. For table info, send check or money order to CARA, c/o Gene Marino, W1IDH, 31 Valley View Rd, Newtown, CT 06470, tel 203-426-8852. Same for general info also.

Georgia (Augusta)—Sep 20: The Augusta ARC is sponsoring their hamfest at Lake Olmstead Park. Hours are 9 AM-3:30 PM. Tickets are $2. Talk-in on 146.34/94. For more info, contact N4JA at 404-790-7802.

†**Georgia (Gainesville)—Sep 27:** The Lanierland ARC is sponsoring their hamfest at the Georgia Mountain Center on S Main St and Church St. Doors open 8 AM-3 PM, with free admission. VE exams and much more available. Talk-in on 146.07/67. For more info, contact Philip Loveless, 404-535-5728 or 404-532-9160.

†**Georgia (Rome)—Oct 4:** The Coosa Valley ARC is sponsoring their hamfest at the Rome Civic Center, Hwy GA 20 across from Shoney's Restaurant. Free admission. Doors open 9 AM-4 PM. Talk-in on 147.90/30. Food and much more available. For more info, contact J. C. Waller, NO4U, 24 Wellington Way SE, Rome, GA 30161, tel 404-235-5417.

Illinois (Grayslake)—Sep 26-27: The Chicago FM Club is sponsoring their hamfest 6 AM-6 PM for flea market, 9 AM-4 PM for exhibits. Located at the fairgrounds on Rtes 45 and 120 in Lake County. Free camping and parking available. Full food service. Admission (good for both days) is $5, $4 in advance, under 12 free. Tables are $7.50 each (8 ft). Electricity $4 per day. For more info, contact CFMC, PO Box 1532, Evanston, IL 60204.

Illinois (Glen Ellyn)—Sep 12: The Northern Illinois DX Assn is sponsoring their 35th hamfest at the Holiday Inn, 1250 Roosevelt Rd. For more info, contact Howie Huntington, K9KM, 65 S Burr Oak Dr, Lake Zurich, IL 60047.

†**Illinois (Harrisburg)—Sep 13:** The Shawnee ARA is sponsoring their hamfest at Southeastern Illinois College, 7 miles east of Harrisburg on Rte 13. Doors open 7:30 AM-3:30 PM. Admission is $3. VE exams, food and much more. Talk-in on 146.88 or 146.85. For more info, contact Mike, W9CJW, 618-453-2361 days, 618-549-5129 eve, or Bill, W9ERI, 618-457-7581 days, 618-457-7586 eve.

Illinois (New Berlin)—Sep 27: The Sangamon Valley Radio club is sponsoring their hamfest. Talk-in on 146.28/88. Camping and VE exams available. For more info, contact SVRC, PO Box 8252, Springfield, IL 62791.

Illinois (Peoria)—Sep 19-20: The Peoria ARC is sponsoring their Superfest at the Exposition Gardens, off W Northmoor Rd. Gate opens at 6 AM. Admission is $4. VE exams, food and much more. Guest speaker is Astronaut Tony England, WØORE, and Mike Stone, editor of *SPEC-COMM*. Camping facilities available. Talk-in on 146.16/76. For more info, contact Superfest '87, PAARC, PO Box 3461, Peoria, IL 61614, tel 309-674-5656.

Illinois (Shelbyville)—Sep 26-27: The Breakfast Club Hamfest will be held in Forest Park at the north edge of Shelbyville. Free admission. Ham-only flea market. Food and parking free. All hams and SWLs welcome. Talk-in on 3.973 and 146.52 MHz.

Indiana (LaPorte)—Sep 13: The LaPorte Hamfest will be held at the LaPorte County Fairgrounds on SR 2 west of town. Admission and tables are $3 each. Talk-in on 146.52. For more info, contact LaPorte ARC, PO Box 30, LaPorte, IN 46350.

Iowa (West Liberty)—Oct 4: The South East Iowa Hamfest will be held at the West Liberty Iowa Fair-

grounds. VE exams at 10 AM. Gate opens at 7 AM. Admission is $3, $4 in advance. Talk-in on 146.31/91, 146.25/85 and 146.52. Food and many activities available. For more info, contact Ken, KAØY, 319-648-5037, Tom, KEØY, 319-264-3259, or write to Muscatine-Iowa City ARC, PO Box 5466, Coralville, IA 52241.

†**Kentucky (Louisville)—Sep 12-13:** The Greater Louisville Hamfest Assn is sponsoring their 17th Annual Greater Hamfest at the Kentucky Fair and Exposition Center. At intersections I-65 and I-24 in Louisville. Hours 8 AM-5 PM Saturday and 8 AM-4 PM Sunday. Forums, flea market and many activities. Admission $5 in advance, $6 at the door. Talk-in on 146.10/70, 146.25/85 and 449.1/444.1. VE exams held both days. For more information, send an SASE to GLHA, Box 34444, Louisville, KY 40232, or Pete Bard, 502-368-6657.

†**Maine (Windsor)—Sep 12:** The Augusta Emergency ARC is sponsoring their hamfest at the Southern Kennebec Agricultural Society Fairgrounds. Admission is $2. Overnight camping is $3 for one night, $5 for two nights. Talk-in on 146.22/82. For more info, contact Phil or Dot Young, 47 Longwood Ave, Augusta, ME 04330, tel 207-622-1385.

†**Maryland (Ellicott City)—Oct 4:** The Columbia ARA is sponsoring their hamfest at the Howard County Fairgrounds. Directions are I-70 to Exit 80, MD Rte 32. South on 32 to blinking light at MD 144. Right ¼ mile to fairgrounds. Doors open 8 AM-4 PM. Admission is $4. Food and much more. Talk-in on 147.135/735 or 146.52. For more info, contact Mike Vore, W3CCV, 5492 Mystic Ct, Columbia, MD 21044, tel 301-770-9190 days, 301-992-4953 eve.

†**Maryland (Gaithersburg)—Sep 13:** The Foundation for Amateur Radio is sponsoring their hamfest at the Montgomery County Fairgrounds. Gates open at 7 AM. Admission is $4, under 12 free. Talk-in on 146.52 and 146.04/64. Exams, programs, food and much more. Tables are $9 each, free parking. For more info, contact Robert C. Moore, N3DKI, FAR, PO Box 1068, Laurel, MD 20707, tel 301-776-3571 eve.

Massachusetts (Cambridge)—Sep 20: Tailgate electronics, computer and Amateur Radio flea market Sunday, 9 AM-4 PM, Albany and Main St. Admission $1.50. Free, off-street parking for 500 buyers. Room for 200 sellers. In the event of rain, covered tailgate area available. Sellers $5 per space and admission, setup 7 AM. For space reservations or info call 617-253-3776. Mail advance reservations before Sep 10 to MITUHFRA, 4 Madison St, Belmont, MA 02178. Talk-in 146.52 and 449.2/444.2.

Michigan (Adrian)—Sep 20: The Adrian ARC is sponsoring their hamfest at the Lenawee Fairgrounds 8 AM-3 PM. Talk-in on 145.37 or 444.675 MHz. Admission is $3, $2 in advance. Full tables are $6, half are $4, and trunk sales are $2. Food and much more available. For more info, contact Adrian ARC, PO Box 2, Adrian, MI 49221. Make checks payable to AARC.

Michigan (Grand Rapids)—Sep 19: The Grand Rapids ARA is sponsoring their hamfest at the West Catholic High School, 1801 Bristol NW. From US 131 just north of 1196, exit at Leonard St. Go west to Bristol, turn north, school is located near the corner of Bristol and Richmond. Gates open at 8 AM, tickets $3, tables $4. For table reservation and info, contact Don Hazelswart, KA8BCI, at 616-363-0649, or write to Grand Rapids ARA, PO Box 1248, Grand Rapids, MI 49501. Talk-in 147.86/26 and 224.64

†**Michigan (Mt Clemens)—Sep 20:** The L'anse Creuse ARC is sponsoring their hamfest at the L'anse Creuse High School 8 AM-3 PM. Talk-in on 147.68/08 and 146.52. Admission is $3 at door, $1 in advance. Tables are $8 each. Trunk sales $4 per space. Food, parking and much more. For tickets and info, contact Ralph Wilcox, KA8YOJ, 39610 Chart, Mt Clemens, MI 48045, tel 313-469-3308.

†**Michigan (Utica)—Oct 4:** The USECA ARC is sponsoring their hamfest at the Eisenhower High School. Directions are M-53 north of Utica to 25 Mile Rd. Proceed west on 25 Mile Rd, for ½ mile to school. Admission is $3 at door, $1 in advance. Doors open 8 AM-3 PM. Talk-in on 147.18 MHz. Food, parking and much more. For more info, contact Art Sheff, 6971 Reber Dr, Utica, MI 48087, tel 313-731-4614.

Minnesota (Waseca)—Sep 26: The Viking ARS will be hosting its 17th annual swapfest starting at 8 AM. Location is at the Waseca Minnesota High School. Talk-in on 146.34/94. For more info, contact VARS, PO Box 3, Waseca, MN 56093.

†**Mississippi (Biloxi)—Oct 3-4:** The Mississippi Coast ARA is sponsoring their hamfest at the Point Cadet Plaza located on US Hwy 90 at the west end of the Ocean Springs Bridge. Admission is free. Doors open 8 AM-5 PM Sat and 8 AM- 2 PM Sun. Talk-in on 146.13/73. Food, parking and much more available. For more info, contact Bea Daniels at 601-863-1347 days, or Jan Carlson, 601-392-5331.

Missouri (Marshall)—Sep 13: The Indian Foothills ARC is sponsoring their hamfest at the Marshall Senior Citizens Building, one block south of Marshall Square. Tickets are $2 each, or 3 for $5 at door, 4 for $5 in advance. Tables are free, first-come first-serve. Registration at 8 AM. Food, parking and much more. Exams at 9 AM. Talk-in on 147.84/24. For tickets or more info, send SASE to Randy Ebers, KEØMV, 125 Lakeview, or George Gibbins, KØBVB, 692 N Ted, Marshall, MO 65340.

†**Missouri (St Peters)—Sep 27:** The St Peters ARC is sponsoring their hamfest at the Golden Triangle Park, located off I-70 south on Mid-Rivers Dr, east on Mexico Rd, first right is St Peters-Cottleville Rd, south until you see the park. Time is 6 AM-2 PM. Admission is $1 at the door. Food, parking and much more. Talk-in on 145.41 MHz. For more info, contact Jason Zwyers, KAØINR, 1084 Crestwood La, O'Fallon, MO 63366, tel 314-281-2404 or 314-327-3127.

New Jersey (Pennsauken)—Sep 20: The South Jersey Radio Assn will hold its 39th annual hamfest on Sunday at the Pennsauken Senior High School, Rte 73 and Remmington Ave, 8 AM-2 PM. VE testing for all classes of license, registration at 9:30 AM. Refreshments in cafeteria. Tickets $3 at gate, $2.50 in advance. Sellers $5 per space and admission. Talk-in 145.290 MHz. For more info or tickets, contact Fred Holler, W2EKB, 348 Bortons Mill Rd, Cherry Hill, NJ 08034, 609-795-0577.

†**New York (Ballston Spa)—Sep 12:** The Saratoga County RACES Assn is sponsoring their hamfest at the Saratoga County fairgrounds. Take I-87 to exit 12 and follow the red and white signs to hamfest. Talk-in on 147.00 or 147.24 MHz. Admission is $3. Inside space is $3 per 8-ft table. For more info, contact Dave Atwell, N2FEP, Box D15 RD 5, Ballston Spa, NY 12020.

New York (Elmira)—Sep 26: The Elmira ARA is sponsoring their hamfest at the Chemung County Fairgrounds. Gates open 6 AM-5 PM. Tickets available at gate. Send SASE to Steve Zolkosky, 118 E 8th St, Elmira Heights, NY 14903 for ticket info.

New York (Goshen)—Sep 26: The Orange County ARC is sponsoring their hamfest at the Burke Catholic High School. For more info, contact N2AWI, 914-564-0688.

†**New York (Niagara Falls)—Sep 12:** The BARRA is sponsoring their hamfest at the Niagara Falls Convention and Civic Center on 4th St, between Rainbow Blvd and Niagara St. Admission is $5 at door, $3.50 in advance. Doors open at 7 AM for vendors, 9 AM-5 PM for buyers. Talk-in on 146.31/91 and 146.52 MHz. Food, parking and much more. For more info, contact Bernie Norman, N2CJQ, 174 Dunlop, Tonawanda, NY 14150, tel 716-877-3780.

†**New York (Old Westbury)—Sep 20:** The Long Island ARC is sponsoring their hamfest at the New York Institute of Technology on Rte 25A, Northern Blvd. Admission is $3, seller's car space is $5. Non-hams, women and children free. Talk-in on 146.25/85. Food, parking and much more available. Take exit 39 N on Rte 495, go north on Glen Cove Rd, 2 miles to 25A, turn right 1 mile to site. Gate opens at 7:30 AM for sellers, 9 AM for buyers. For more info, contact Hank Wener, WB2ALW, at night 516-484-4322.

†**New York (Yonkers)—Oct 4:** The Yonkers ARC is sponsoring their hamfest 9 AM-4 PM. Admission is $3. Food, parking and much more available. Talk-in on 146.865 and 440.150. For more info, contact Otto J. Supliski, 53 Hayward St, Yonkers, NY 10704, tel 914-969-1053.

New Mexico (Santa Fe)—Sep 26-27: The Northern New Mexico ARC is sponsoring their hamfest at Camp Stoney, 8 miles east of Santa Fe, 8 AM-3 PM. Many activities available. Adults $5, under 12, $3. Registration with lunch both days, $8 for adults; under 12, $5. For more info, SASE to Bob Norton, N5EPA, Rte 3, Box 95-15, Santa Fe, NM 87505.

†**Ohio (Berea)—Sep 27:** The Cleveland Hamfest Assn is sponsoring their hamfest 8 AM-4 PM. Early setup at 6 AM. Admission is $4 at door, $3.50 in advance. VE testing, food, parking and much more. Talk-in on 146.52. For more info, contact the Cleveland Hamfest Assn, PO Box 81252, Cleveland, OH 44181-0252.

Ohio (Findlay)—Sep 13: The Findlay ARC will sponsor their hamfest at the Hancock County Fairgrounds starting at 8 AM. Admission is $4. Flea-market spaces are $4 each. Indoor tables reserved for $6. For tickets and table info, SASE and check to FRC Hamfest, PO Box 587, Findlay, OH 45839-0587.

†**Ohio (Springfield)—Oct 4:** The Independent Radio Assn will be holding the Fifth Annual Hamfest and Computer Expo 8 AM-4 PM at the Clark County Fairgrounds, ¼ mile west of the intersection of I-70 and Ohio Rte 41(exit 59). All vendor and swap-meet activities are indoors. Admission is $3 ($2 in advance) with under 12 free. Tables are $7 ($6 in advance). Talk-in on 145.45 or 224.26 MHz. For advanced reservations send SASE to the Independent Radio Assn, PO Box 523, Springfield, OH 45501, or call Steve, KA8QCS, at 513-882-6521.

Ohio (Youngstown)—Sep 27: The Twenty Over Nine Radio Club will hold its third annual hamfest at the Mahoning County Joint Vocational School one mile west of Canfield, Ohio on Rte. 224. Gate admission $3. Talk-in on 147.915/315 or 144.67/145.27. For info, call Paul Nemenz, N8HEX at 216-782-5903.

Oklahoma (Ponca City)—Sep 19: The Oklahoma Independent ARC is sponsoring their hamfest at the National Guard Armory on South St. Doors open at 9 AM. Admission is $2, with $3 more for a table. Tables free to commercial exhibitors. Wheelchair accessible. Talk-in on 146.37/97. Food, parking and much more available. For more info, contact Lin Jackson, KA5ZJM, 350 S Birch St, Ponca City, OK 74603, tel 405-762-7299.

Oregon (Milton Freewater)—Sep 26-27: The Walla Walla ARC is sponsoring their hamfest at the Milton Freewater Community Center 8 AM-5 PM both days. Talk-in on 146.28/88 and 146.52. Food, parking and much more available. For more info, contact Bernie Frazier, WA7CBX, 610 S First, Walla Walla, WA 99362, tel 509-529-9879.

†**Pennsylvania (Butler)—Sep 13:** The Butler County ARA is sponsoring their hamfest 2 miles west of Butler on Rte 68 at the Butler Farm Showgrounds, Roe Airport. Time is 9 AM-4 PM. Admission is $1 at door. Food, parking and much more available. Fly-in, mobile check-in also available. Talk-in on 147.96/36 and 147.84/24. For more info, contact John J. Varljen, K3HJH, or Donald Kenyon, KC3YF, 412-283-1234 or 412-283-9403.

Pennsylvania (Uniontown)—Sep 12: The Uniontown ARC is sponsoring their hamfest on Old Pittsburgh Rd, off Rte 51 and the 119 bypass, 40 miles south of Pittsburgh. Free parking. Free swap and shop with registration. Plenty of food. Pre-registration is $3 each, or 2 for $5. Talk-in on 147.645/045 and 144.57/145.17. For more info, contact John T. Cermak, WB3DOD, PO Box 433, Republic, PA 15475, tel 412-246-2870 or 412-246-9383.

†**Pennsylvania (Warrington)—Oct 10-11:** The Pack Rats ARC is sponsoring their 11th annual Mid-Atlantic VHF Conference on Saturday at the Warrington Motor Lodge, Rte 611, and 16th annual Hamarama on Sunday at the Bucks County Drive-In Theater on Rte 611. Advance registration for the Conference only $5, $6 at the door. Includes admission to the flea market. Send to Hamarama '87, PO Box 311, Southampton, PA 18966. Admission to the flea market is $4 each, $7 per carload. Selling space is $6 each. Gate will open at 6 AM, rain or shine. Bring own tables. For more info, contact Pat Cawthorne, WB3DNI, at 215-672-5289.

Quebec (Cote St Luc, Montreal)—Sep 13: The Cote St Luc Amateur Radio Assn annual hamfest will be held at the Butler Arena, 6985 Mackle Rd. Doors open 9 AM. Admission free. Flea-market tables

(continued on page 85)

Public Service

Conducted By Steven Ewald, WA4CMS
Assistant Public Service Manager, ARRL

Meet the 1987 SET Challenge: Get Involved!

The 1987 ARRL Simulated Emergency Test (SET) is scheduled for October 17-18. This nationwide exercise is a prime example of how Amateur Radio is working to meet its responsibility for providing emergency communications. The first fundamental basis and purpose of Amateur Radio states this challenge: "Recognition and enhancement of the value of the amateur service to the public as a voluntary noncommercial communication service, particularly with respect to providing emergency communications." [97.1 (a)]

Your ARRL Field Organization leaders and volunteers in public service are planning a test of communication skills under simulated emergency conditions. The scope of this exercise includes local, ARRL section and national-level activity. You are invited and encouraged to participate in any way that you can.

Aim for the Best

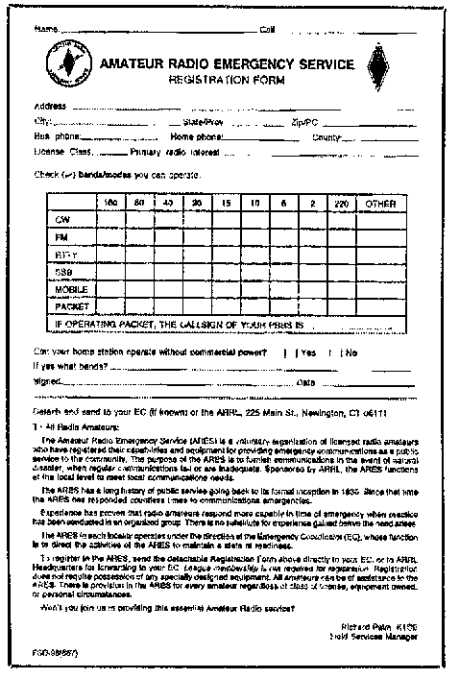
An important objective of this year's SET is to discover strengths and weaknesses of the Amateur Radio Emergency Service (ARES), the National Traffic System (NTS) and the Radio Amateur Civil Emergency Service (RACES). The SET will provide an opportunity to test the efficiency of traffic handling in and out of the local area and across the country. Traffic handling is a skill that can be learned and practiced around SET preparation. Use of digital modes for handling traffic is also encouraged. The SET weekend is a perfect time to experiment with emergency-related equipment and operating procedures.

Another objective of the exercise is community awareness. It is important to work with community agencies that would be involved in an emergency situation. Such groups include the Red Cross, the Salvation Army, and local police and fire departments. Amateur Radio can effectively provide supplementary communications for these public-service agencies only if they are aware of Amateur Radio's capability before an actual emergency situation exists. The ARRL currently has national-level agreements with the American Red Cross, Associated Public Safety Officers, the Federal Emergency Management Agency, National Communications System and the Salvation Army. Contact your local Emergency Coordinator (EC) for information on how these Memoranda of Understanding may be put to work in your area.

Your Part Is Important

How can you participate? If you are already enrolled as an ARES member or active participant in an NTS net, the local EC or Net Manager (NM) is making plans for your activity. Check with your Field Organization officials to be sure of the SET schedule for your area. Although October 17-18 is the official weekend, groups may conduct their tests anytime from September 1 to November 30 if another date is more convenient. This permits you to schedule the test to coincide with a communications activity that you may already have planned.

If you're a newcomer to Amateur Radio public service and are interested in joining the ARES or the NTS, the Simulated Emergency Test is an ideal time to get acquainted. Contact your local EC and become involved! If you don't know whom to call to participate, contact your ARRL Section Manager (page 8 of any *QST*) for direction. SET guidelines were published in the July 1987 issue of ARRL *Field Forum* and mailed to all ARRL Field Organization officials, station appointees and affiliated clubs. SET reporting forms are being sent separately. Make 1987 the year that you take part in emergency-communication preparations.



Name _____ Call _____

AMATEUR RADIO EMERGENCY SERVICE
REGISTRATION FORM

Address _____

City _____ State/Prov _____ Zip/PC _____

Bus. phone _____ Home phone _____ County _____

License Class _____ Primary radio interest _____

Check (✓) bands/modes you can operate.

	160	80	40	30	15	10	6	2	220	OTHER
CW										
FM										
RTTY										
SSB										
MOBILE										
PACKET										

IF OPERATING PACKET, THE CALLSIGN OF YOUR PBBS IS _____

Can your home station operate without commercial power? | | Yes | | No

If yes what bands? _____

Signed _____ Date _____

Detach and send to your EC (if known) or the ARRL, 225 Main St., Newington, CT 06111

1 - All Radio Amateurs:

The Amateur Radio Emergency Service (ARES) is a voluntary organization of licensed radio amateurs who have registered their capabilities and equipment for providing emergency communications as a public service to the community. The purpose of the ARES is to furnish communications in the event of natural disaster, when regular communications fail or are inadequate. Sponsored by ARRL, the ARES functions at the local level to meet local communications needs.

The ARES has a long history of public service going back to its formal inception in 1935. Since that time the ARES has responded countless times to communications emergencies.

Experience has proven that radio amateurs respond more capable in time of emergency when practice has been conducted in an organized group. There is no substitute for experience gained before the need arises.

The ARES in each locality operates under the direction of the Emergency Coordinator (EC), whose function is to direct the activities of the ARES to maintain a state of readiness.

To register in the ARES, send the completed Registration Form above directly to your EC or to ARRL Headquarters for forwarding to your EC. League membership is not required for registration. Registration does not require possession of any specially designed equipment. All amateurs can be of assistance to the ARES. There is provision in the ARES for every amateur regardless of class of license, equipment owned, or personal circumstances.

Won't you join us in providing this essential Amateur Radio service?

Richard Palm, K1CE
Field Services Manager

FSO-8/86(7)

ARES registration forms are used by ARRL Emergency Coordinators to enroll new ARES members and to keep abreast of the emergency-communication capabilities within their areas of jurisdiction.

FEEDBACK

Please note the following corrections to the 1986 Simulated Emergency Test results as printed in the article, "Plan of Action Tested," in July 1987 *QST*, page 43. In the photo caption, the correct call sign for Max Blood is N4NVV.

Update to 1986 SET Top Twenty for Local Activity

Section	Total Points
1) Ohio	8245
2) Indiana	3944
3) Eastern Pennsylvania	3874
4) North Carolina	3287
5) Southern Florida	2465
6) Georgia	2157
7) Maryland/DC	1952
8) Iowa	1905
9) Missouri	1813
10) Orange	1805
11) Illinois	1538
12) Alberta	1531
13) Southern Texas	1450
14) Michigan	1392
15) Northern Florida	1264
16) Western New York	1147
17) Oklahoma	1144
18) Northern New Jersey	1130
19) Washington	972
20) Santa Clara Valley	918

IN SERVICE...

☐ Waterloo, IN—May 1. A tanker truck carrying gasoline rolled over three times, breaking open and spilling 4000 to 5000 gallons of the flammable liquid. The county road near the sight was closed for seven hours. Four ARES members supplied additional communication links.—*Howard Hine, W9QWI, EC DeKalb Co*

☐ Mountain Home, ID—May 16. The first annual "Run For Your Life" race consisted of two separate runs: a one-mile race/walk, designed for senior citizens and youngsters, and a 10k run. Local radio amateurs provided essential communications along the route, accompanying law-enforcement agencies and ambulance services.—*Stan Massey, KE7JQ, EC, Elmore Co*

☐ Woodburn, IN—May 28. A chemical fire near this northeastern Indiana town caused the evacuation of 2000 people in the area, including several western Ohio communities. The fire lasted three days and occurred in a location where Amateur Radio communications provided the only links into and out of the area until commercial phone lines were installed. Twenty-eight radio amateurs supported tactical interagency communications during the evacuation proceedings.—*Ron Koczor, K9TUS, Section Manager, IN*

☐ Setauket and Stony Brook, NY—May 31. The American Red Cross asked our ARES group to provide emergency communications for a simulated air collision between two light aircraft. Real wrecked aircraft were utilized. In the simulation, pieces of wreckage fell on a house as one plane crashed into the school grounds of Ward Melville High School. The other plane crashed into the Stony Brook Railroad Station. The Setauket Fire Department Station No. 2 was

used as an emergency shelter for "victims" of the simulated disaster. Suffolk County ARES net provided a ham as a "shadow" for the American Red Cross Director of Disaster Services. There were 1000 participants including fire, ambulance and police units and 160 "victims" with various realistic wounds and burns.—*Bill Frisch, KA2JMA, EC Brookhaven*

☐ Loveland, CO—Jun 7. At 7:15 AM, NØDZA received a report that a hot-air balloon came down at an unknown location in the foothills west of Loveland, Colorado, on the way to Estes Park. Communication with the balloon had been severed with the chase vehicle when the balloon lost altitude, dropping behind the hills. NØDZA alerted members of the ARES who responded in three cars for a grid search of the reported down area. The balloon was found deflated, with the basket and four passengers suspended in air on a 50-foot sheer cliff. The balloonist had begun lowering the ropes of the basket to the ground. Larimer County Sheriff deputies and an ambulance arrived at the scene, though no injuries were discovered. NØFCP, providing base station relay from Loveland, made the necessary phone calls to alert ARES members. ARES members remained at the scene to assist in recovering the remains of the balloon for its owner. The $9000 balloon was completely torn and rendered useless, but the basket survived. —*PenDell Pittman, NØDZA*

☐ Butler, PA—Jun 8. About 3:30 in the afternoon, a one-inch pipe underneath a liquid hydrogen tank at a chemical company ruptured and began burning. The tank contained 60,000 gallons of liquid hydrogen when the fire broke out. Because of the danger of explosion, 300 residents of nearby Highfields were told to evacuate the area. The evacuation area extended approximately a square mile, encompassing the property.

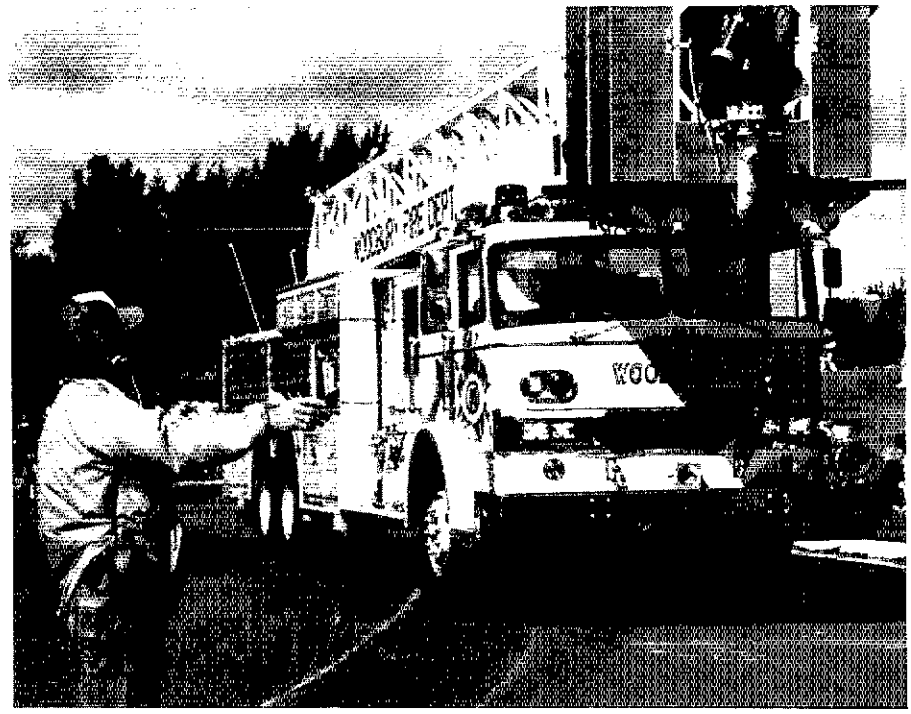
The fire was put out by 8 PM Monday, but the situation could not be declared safe until all the hydrogen had been removed from the tank. The evacuees could not return to their homes until company workers completed the task of pumping out the 35,000 gallons that remained in the tank after the fire.

Draining of the tank began Tuesday morning at 9 AM and was expected to take about 24 hours, but the residents were allowed to return to their homes Tuesday afternoon.

Butler radio amateurs were quick and efficient in their response to the potential disaster. Many important messages were handled for Red Cross, Emergency Management, security coordinators, Emergency Medical Services and other agencies. Messages included updates on conditions, cots and supplies for care shelters and information to and from evacuees.—*Ed Napoletan, WB3LKO*

☐ Kansas City, MO—Jun 13. Amateurs, primarily in western Jackson County, Missouri, participated in Operation Shakedown. The drill was a test of local Red Cross communications in the event of an earthquake in the New Madrid Fault. Amateurs from Johnson and Wyandotte Counties in Kansas and Jackson, Cass, Platte, Clay and Polk in Missouri participated. It was the first test of an Amateur Radio station at the new Red Cross offices.—*Michael Bellinger, KØUAA, PIA/AEC*

☐ Mill Valley, CA—Jun 14. Hams from the Amateur Communications Society and the Marin Amateur Club provided communications for 1500 participants in the Seventy-seventh Annual Dipsea Race, a 7.1-mile run from Mill Valley to Stinson Beach, using the ACS repeater facilities on 147.33 MHz, with simplex operation from the more difficult locations.



NØDGG directs a fire engine to its parking spot in the annual Burnsville (MN) Fire Muster and Community Celebration. *(NØHEC photo)*

The race course is laid out over a rugged, narrow, unpaved and mountainous trail that begins at 64 ft above sea level. It poses a challenge to both the runners and amateurs trying to cover it.

There were few injuries requiring attention, and fortunately none were serious, owing partly to the unseasonably cool and foggy weather on race day. Fourteen radio amateurs participated in the communications network.—*Robert R. Jenkins, KA6BQF*

☐ Columbus, OH—Jun 21. Around 1000 athletes participated in this year's Triathlon, which consisted of a 1k swim, a 40k bicycle ride, and a 10k run. The Delaware County ARES provided communications for the swim portion. Although the day was warm and humid, there were very few incidents during the event. One bike rider fell, but only minor scrapes resulted. There were some very irate motorists along the route, but we had good liaison communications with the police, and there was quick response. —*Robert R. Adams, W8BKO, EC, COARES*

SPOTLIGHT ON SERVICE

Fire Engines Converge on Burnsville

How many alarms does it take to get a response of 108 fire trucks? In Burnsville, Minnesota, in September it doesn't take any fire at all to get over 100 pieces of fire apparatus converging on a parking lot that will hold only 90 of them.

The cause of this bedlam is the annual "Burnsville Fire Muster and Community Celebration." The event started about 10 years ago when fire engine collectors were looking for a reason to gather their apparatus and have a little fun. The event has now evolved into a weekend of activities that is kicked off by the Saturday morning fire engine parade that now totals more than 100 units, ranging in age from 90-year-old hand-drawn hose carts to the very latest in fire-fighting technology.

As the parade grew in popularity and length, coordination and planning needed something better than a couple of fire radios and hoping. Enter the Twin Cities Repeater Club (TCRC), which has its repeater (147.81/21) in Burnsville. The parade was a natural activity for the club, and the club's communications expertise was sorely needed by the parade organizers.

Hams from the TCRC assisted in lining up parade participants in order of year of manufacture. Once that task was completed, members positioned themselves on fire trucks for the ride through the five-mile parade route, keeping a sharp eye out for mechanical or medical emergencies. Several of the amateurs went directly to the end of the parade route at the Burnsville Civic Center to assist in parking the incoming vehicles.

The parking is usually the fun part for the hams. There isn't enough space to accommodate all of the apparatus, or at least that is what the Fire Muster Committee claims. Each year a lot of hand signals and a lot more chatter on 2 meters manages to squeak trucks, including 100-foot aerial ladders, into spaces that they shouldn't be able to fit into. Only hams probing through the crowded parking lot with a keen eye, finding spaces that would not be seen by the average fireman from the street can allow this shoehorning to happen. TCRC members continue to have a great time improvising and using Amateur Radio to its fullest public-service capabilities.—*Nick Modders, KAØKLV*

Strays

QST congratulates ...

☐ George Uminski, K6YGK, of Del Mar, California, on being elected to *Who's Who in California.*

Field Organization Reports June 1987

ARRL Section Emergency Coordinator Reports

Thirty four SEC reports were received, denoting a total ARES membership of 17,812. Sections reporting were: AR, BC, IA, ID, KS, LAX, MDC, MI, MN, MO, MT, NE, NH, NV, OK, NFL, NNJ, NV, OH, ONT, ORG, PAC, SD, SDG, SFL, SJV, SV, VA, VT, WA, WMA, WNY, WPA, WV.

Transcontinental Corps

Area	Successful Functions	% Successful	TCC Function Traffic	Total Traffic
Cycle Two				
TCC Eastern	410	91.00	410	1063
TCC Central	86	95.60	303	646
TCC Pacific	103	85.83	332	637
Summary	599	90.81	1045	2346
Cycle Three				
TCC Eastern	50	83.33	34	68
Cycle Four				
TCC Eastern	107	89.17	472	945
TCC Central	78	78.78	337	807
TCC Pacific	106	88.33	413	814
Summary	291	85.42	1222	2566

TCC Roster

KA1AE KB1AF N1BHH W1CE K1EIC W1EFW WA1FCD K1GRP KN1K KA1KMJ KA1MKJ W1NJM KT1Q W1QYY KA1T KW1U N2AKZ WA2FJJ W2FR W2GKZ NN2H NQ2H KB2HM N2IC W2LWB W2RQ WA2SPL KA2UBD W2VY NE2W N2XJ W3OKN N3DPF WB3EPU KK3F WB3GZU W3PQ KQ3T AA4AT N4EXQ N4GHI WA4JDH W4JL K4MTX WB4PNY W4UQ K4ZK N5AMK N5BB N5BT W5CTZ N5DFO W5GHP K5GM AE5I W5JOV AJ5K W5KLV KD5KQ W5MXQ WZ5N W5QVK KD5RC ND5T N5TC W5TFB W5TL W5TNT W5VMP KB5W KV5X WB5YDD WV5Z W6EOT K6LL W6INH WF6O K6UYK W6VZT KA7CRT NR7E W7EP KB7FE W7GHT NN7H W7IGC KA7MUL W7LG K7OVK KF7R W7TGU W7VSE W8PMJ AF8V KA8WNO N8XX WB8YDZ W8YP W9BGE W9CBE W9EHS KA9FEZ W9HBI W9JUJ KA9RII AD9A WB9UYU KC9D KØDJ KAØEPY KØEZ WØFRC KJØG WØGRW NØIA NXØJ KEØNI AIØO WAØOYI KSØU ABØY VE3FAS VE3GSQ

National Traffic System

Net	Sess	Tfc	Avg	Rate	% Rep	% Rep to Area
Cycle Two						
Area Nets						
EAN	30	785	26.16	.589	90.0	
CAN	30	580	19.33	.479	100.0	
PAN*	56	419	7.48	.415	90.5	
Region Nets						
1RN	60	532	8.87	.413	92.0	100.0
2RN	59	206	3.49	.302	92.5	96.7
3RN	30	174	5.80	.400	94.0	86.7
4RN	60	523	8.71	.340	81.7	100.0
RN5	60	543	9.05	.376	83.0	100.0
RN6	59	154	2.60	.298	100.0	96.4
RN7	60	368	6.13	.423	92.1	98.2
8RN	58	191	3.29	.226	90.5	83.3
9RN	58	191	3.29	.299	74.0	100.0
ECN						73.3
TEN	60	548	9.13	.348	80.0	100.0
TWN	57	188	3.29	.273	69.7	96.4
TCC						
TCC Eastern	410	1063				
TCC Central	86	646				
TCC Pacific	599	1045				
Cycle Three						
Area Net						
EAN	29	149	5.14	.305	41.8	
Region Net						
1RN	28	57	2.04	.220	70.0	72.4
2RN	30	101	3.36	.302	96.0	51.7
3RN	17	11	0.64	.104	60.8	72.4
4RN						51.7
8RN						79.3
ECN						75.8
TCC						
TCC Eastern	50	68				
Cycle Four						
Area Nets						
EAN	30	1083	36.10	1.058	97.1	
CAN	40	994	24.85	1.182	100.0	
PAN	30	687	22.90	.818	96.6	
Region Nets						
1RN						96.6
2RN	48	162	3.37	.390	74.3	83.3
3RN	59	152	2.57	.286	95.5	96.6
4RN	60	362	6.03	.320	100.0	100.0
RN5	60	511	8.51	.500	100.0	100.0
RN6	60	319	5.31	.560	99.0	98.3
RN7	60	316	5.26	.600	85.8	100.0
8RN	54	243	4.50	.334	80.0	100.0
9RN	60	398	6.68	.463	92.9	100.0
TEN	60	525	8.75	.593	70.0	100.0
ECN						100.0
TWN	54	230	4.26	.360	83.85	91.6
ARN	30	174	5.80	.136	93.3	
TCC						
TCC Eastern	107	945				
TCC Central	78	807				
TCC Pacific	106	814				

*PAN operates both cycles one and two.
TCC functions not counted as net sessions.

ARRL Section Traffic Managers reporting: AL, AR, AZ, CT, DE, ENY, EPA, GA, IA, IL, IN, MDC, ME, MN, MO, MS, NC, NH, NFL, NLI, NTX, OH, OK, ONT, OR, ORG, RI, SC, SD, SF, SFL, SNJ, SJV, STX, UT, VA, VT, WA, WIN, WMA, WNY, WTX, WV.

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 NTS liaison, 3 points each, max 12; (6) Delivering a formal message to a third party, 1 point each, no max; (7) Handling an emergency message, 5 points each, no max; (8) Serving as Emergency Coordinator or net manager for the entire month, 5 points max; (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.

170
KAØEPY
163
VE3ORN
162
NK1Q
152
KA8TIK
144
N2EIA
137
W2MTA
130
KB1AF
W1PEX
128
N4GHI
126
WA4QXT
KA2F
125
NQ2H
122
K4NLK
119
KAØARP
118
KA9FFO
117
WA2VJL
116
WB4DVZ
W3FA
VE4LB
W9EHS
115
WX4H
114
KTIQ
113
W9FZW
KW1U
W9YCV
WB2VUK
K2YQK
KD7ME
111
WA9VND
WB2QMP
110
WA4PFK
WB1GXZ
WB2EAG
109
N1EDD
W7VSE
WF6O
N3DPF
KB5ADE
108
W2RRX
WB2ZJF
N4EXQ
W2RRX
107
WA2EPI
KEØNI
WB2OWO
WA2EPI
106
AA4JV
N9BDL
WA4JDH
KB4WT
KA2MYJ
KZ8Q
104
K4ZK
WØOYH
N1CPX
K5MXQ
AA4TE
103
N7BHL
N3EMD
W2QNL
K9CNP
WB1CBP
102
W9JUJ
W5WZ
AG9G
W9CBE
WB4KSG
W4ANK
AA4MP
WB7WOW
101
KA2UBD
WB1HIH
WB8JGW
100
N2XJ
WD5GKH
WB1HBB
N2XJ
WA1JVV
NC9T
99
WØIKT
98
WA4RLV
WA1FCD
N4KSO
97
KA1GWE
W6INH
K4JST
96
WA6ZUD
W4CKS
KBØZ
NE2W
WD5EEH
WB4WII
WB8KWC
94
W9DM
NØFOO
WA4LTO
WA2FJJ
VE4AJE
K8TVG
93
WA4LLE
W4PIM
K8UQY
92
KA9RNY
W4JLS
WA9VLC
WA2ERT
91
KDØCL
KA4TLC
90
VE3DPO
K8JDI
89
WD4KBW
K3JL
N3AZW
WB5J
N3EGF
WD9DZU
WD8QXT
88
N6MCY
NW7K
KJ9L
AA4ZV
87
WA4EIC
N3COY
K2ASP
KA2SPH
VE4IX
86
AA4HT
KA2INE
NJ9S
KA7AID
KA2INE
85
K9ZBM
NOØA
N7APC
W5VMP
84
KT9I
W7GHT
WA1KLG
NØDZA
83
NDØN
WB5EPA
WD8KQC
82
WAØTFC
KØSI
W5CTZ
WB4ZTR
K2ZVI
81
WDØGUF
KQ3T
KA9RII
VE3WM
N6EQZ
80
K2VX
AA4AT
K2JX
AJ5F
79
KØGP
KN1K
N7ELF
N8EFB
78
WB4HRR
77
WA1TBY
K4MTX
K2MT
76
KØERM
KI4YV
KA8CPS
75
KB4LB
KF4FG
ND2J
KJ3E
WA3UZI
N8IBS
74
WD2AH
NN2H
WD2AHD
VE4RO
W7LBK
N8EVC
73
KDØNH
NØDPF
N4KRA
KA4TWI
WB2RBA
KA9CTW/T
K4IWW
KA8WNO
KF8J
72
KC4VK
WBØWNJ
KJ9J
KV5X
WB6QBZ
KA2TVX
N2GQS
KC3Y
71
KB7FE
WZ5N
N2GPA
N8FXH
70
NTØB
K5UPN
NØHWB
69
N4PL
WØFRC
KØPCK
WA4RNP
KA1EXJ
68
KDØYL
WB9PFZ
WB5SRX
KA5QYV
VE3CYR
N8FWA
67
WA4RUE
N2DXP
W5KLV
N2DXP
66
WA6WJZ
WA6QCA
KU2N
VE3WV
W8FPA
65
WB5YDD
WA3UNX
KA7EEE
N2ABA/T
KB4BZA
W3YVQ
64
WAØHTN
KA2ZNZ/T
WA3YLO
K3NNI
VE3GSQ
KAØSBY
KD8KU
63
W4HON
K4ZN
VE3GT
WA4MNR
KE8JG
N7GGJ
WAØHTN
62
KA3DLY
NØBKE
K4BAI
KA8TNT
61
KA4YLH
KA4FZI
AJ5K
KB4JPN
AA4GL
KA4YEA
WG5S
N2AKZ
KB2BKE
KA2ZYX
WA8DHB
WD8RHU
60
WØOUD
WB5FQU
WØYMB
W0MZI
KA1LMR
W2FR
K2TWZ
N8FBE
K8ND
59
KA5UVY/T
KA6TND/T
KA1HPO/T
N2EVG/T
56
N4MMM/T
55
WD6BZQ
N2ETO/T
50
KA1NOI/T
N8GPU/T
49
KA3KNA/T
48
W1YOL/T
47
WA8DYS/T
46
WB4HXS/T
N6FWG
44
NØHMR/T
41
KA2JMA/T
40
N8HRW/T

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.

Call	Orig	Rcvd	Sent	Dlvd	Total
W3CUL	676	890	1284	71	2921
NØBOP	23	1331	36	879	2278
WB9YPY	0	721	69	483	1273
W3VR	483	290	284	69	1126
WA4JDH	2	401	419	5	827
WF6O	0	385	328	8	721
KT1Q	51	319	294	13	677
WBØWNJ	196	99	350	8	653
N4GHI	60	272	278	27	637
N3DPF	81	222	289	15	607
KA9FEZ	—	—	—	—	540
K4DOR	12	252	254	10	528
WX4H	0	260	238	16	514
W9JUJ	0	278	230	1	509
KW1U	0	298	193	12	503

BPL for 100 or more originations plus deliveries:

WA8EYQ	193
WØBMA	134
NQØG	124
N4PL	130
KAØEPY	112
WØUCE	102

Independent Nets

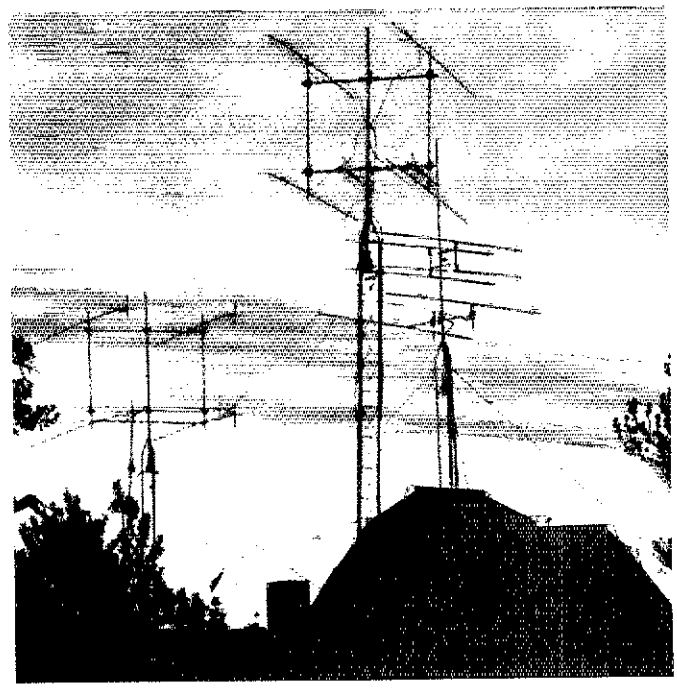
Net Name	Sess	Tfc	Check-Ins
Central Texas Traffic Net	27	18	123
Clearing House Net	30	365	386
Empire Slow Speed Net	29	61	243
Golden Bear Amateur Radio Net	30	42	1571
Hit and Bounce Net	29	211	494
IMRA	26	770	1542
Mission Trail Net	30	82	891
New England Novice Net	25	40	58
NYSPTEN	30	35	388
Southwest Traffic Net	30	179	1354
West Coast Slow Speed Net	30	92	528
75 Meter ISSBN	30	191	1029
7290 Traffic Net	48	378	2493

Results, 1987 June VHF QSO Party

By Billy Lunt, KR1R
Contest Manager, ARRL

and

Mark R. Burke, KA1MIS
Contest Assistant, ARRL



A night view of 5th-place multiop station N6CA, Southwestern Division leader.

Wow! Greatest openings ever! That sums up the whole contest weekend in just four words. With tropo, E-skip, meteor scatter, EME and possibly aurora openings, what more could you ask for? Conditions were fantastic on all bands.

Six meters was the hottest spot to be with terrific openings reported from all parts of the US and Canada. Grid-square totals looked like what one would expect to see for QSO totals. NE4L worked VUCC in just eight hours. K4WRP reported working 45 different states on 6 meters during the contest. W5SXD claims 6-meter openings to the entire country for hours at a time. W6CPL reports great 6-meter openings from the West Coast. WB2QLP worked all US Call Areas and seven countries on 6 meters. We were blessed with some of the best 6-meter openings in years, but this wasn't the only band with great conditions.

Two meters was another hot topic, especially in the South. E-skip brought smiles to the faces of many 2-meter contesters. WB4BKC picked up seven new states all on 2 meters. Great openings into Texas on Sunday were reported by KJ4HF. Three hours of 2-meter E_s made this the most exciting VHF contest W5UWB has been in. KA5TJI claims the Sunday morning 2-meter opening sounded like 20-meter pileups. N4FAC says this was the craziest June contest ever. Their two-man crew had to work hard to keep up with 2-meter openings to both coasts. With all these high spirited comments, one would think everything was golden—not so! W1AIM complains that his QSO and grid-square totals on the higher bands suffered as a result of everyone being on 6 meters. K1FO reports that 432 MHz was pretty slow and he had a sneaking suspicion where everyone was. Actually, all the bands, six through light, were represented with great amounts of activity.

The first confirmed Sporadic-E contact on 220 MHz was reported between W5HUQ/4 (near Jacksonville, FL) and K5UGM (Irving, TX) during the contest on June 14 at 1544 UTC. Was this the only one? Did anyone else make any unreported records?

There were 691 entries processed by the Contest Branch this year. Thanks to all who got their logs in early! With only a couple of weeks to process all logs and put everything together, those few extra days are really appreciated. Out of the 590 single op entries only 15 of them tried their luck at QRP Portable. 102 multiop entries were received.

Twenty-seven of the thirty-two division records were shattered with record high scores being turned in most all sections. Check the division leader box for the new division records (13 single op and 14 multiop).

This year's single-op crown goes to Rick, K5UR in Arkansas, who operated five bands for a whopping total score of 367,734 points. His best band was 6 meters with 587 QSOs and 206 grids, all done running barefoot! Rick's 2-meter effort wasn't too shabby either with 184 QSOs and 81 grids. Mark, AA2Z, guest oping at WA2OMY, was right on his heels with 305k to claim second place with KB3QM following with 272k for third.

Clarke, K1JX, showed us all how to win running away in the QRP portable class with 120k points. West Coaster Larry, N6NVF, won second place with 15k, and W8FK/7 took third with 10k. Don't forget QRP Portable is for single ops only. Check the rules for full details.

The multiop scene brought fierce fighting as usual with no one sure of a win 'til the end. When the dust finally settled, W2SZ/1 was the clear winner and remains as "King of the Mountain" with a new record of 947,226 points. The crew of W2SZ/1 piled up a total of 1772 QSOs and 399 grids on all bands, 50 MHz through 24 GHz, from the highest peak in Massachusetts, Mount Greylock. The 14 operators and helpers of Murgas ARC drove K3YTL to a second place win among the giants with a fantastic score of 887k. Kansas-based WBØDRL and crew took third place with 865k by working 1414 QSOs and 494 grids. The Illinois multiop gang of AA9D showed what they could do, making 1361 QSOs and 499 grids for a fourth place win. West Coasters from Santa Barbara manned N6CA and joined the fight ignoring the East Coast advantage and broke their way into the top ten with 752k for a fifth place finish. The seven Oklahoma operators of K5JL took advantage of the great openings and smashed their way to sixth among the big boys.

By popular demand, we have revitalized some of the boxes for more useful information. They should be more helpful in telling the story for those analyzers. Use this info in designing your next game plan and tune in again Sep 12-14 for the next QSO Party.

SOAPBOX

The Sunday evening E-skip was delightful! (WB2PID). Without a doubt this contest epitomized the so called "6-meter factor" (W1JR). Six meters was super! Best contest in the 20 years I have been a ham (WA1GDR). I didn't mind the rain, or the thunder, or the broken wires, or the splatter, but when a bat flew in the shack, I got upstairs and so did the YL (KA1BJ). Six meters—Wow! (W1RIL). Our best effort ever! I still did a double take at the call of ZF2BL when I worked him, even with 6 wide open (N1CPE). Double E-hop to AZ and CA with only 10 watts made the whole contest great (N1IW). Working portable on Mt Kearsage went fine even though I had more bug bites QSOs than anything else (KA1LMR). Timed contest perfectly—six was hot all weekend. Had a ball (NE1A). Thunderstorms and power failures nixed my ambitions (N2FGZ). Unbelievable conditions on 6! First time I have broken 100k, but suspect a lot of others did, too

Division Leaders

Single Operator Division

Call	*Score*	*Division*
WA2OMY* (AA2Z,op)	305,660	Atlantic
VE3ASO*	127,908	Canadian
WD9IIX*	219,114	Central
KØALL*	103,246	Dakota
K5UR*	367,734	Delta
WA8TXT	122,640	Great Lakes
N2BJ*	231,990	Hudson
KØTLM*	217,344	Midwest
WA1OUB	200,080	New England
NU7Z*	74,090	Northwest
W6RXQ*	65,985	Pacific
N4MM	120,225	Roanoke
KAØNNO*	118,260	Rocky Mountain
WB4SLM*	156,104	Southeast
WD6AUP*	101,895	Southwest
K5CM* (N5CG,op)	252,160	West Gulf

Multioperator Division

Call	*Score*
K3YTL*	887,760
VE3LNX	218,900
AA9D*	833,829
KAØUZZ	68,211
N4FAC/5*	221,589
W8VP*	582,900
W1XX/2*	590,020
WBØDRL*	865,488
W2SZ/1*	947,226
N7WW*	186,874
N6AMG*	390,633
W3CXX/8*	632,548
WØKEA*	129,688
WW4T*	125,100
N6CA*	752,028
K5JL*	685,059

* denotes new division record

Single Operator QSO Leaders by Band

50 MHz

K5CM (N5CG,op)	985
WD4MGB	645
NØLL	590
K5UR	587
WA1OUB	578
NE4L	570
W5SXD	556
K1TOL	550
W4OO	545
WB2QLP	534
KN5S	532
WB4SLM	522
K4KUZ	518
KØTLM	510
W3EP/9	495

144 MHz

N2BJ	316
K3NXH	316
WB1BXS	308
WB2QOQ	307
K1RZ	305
WA2RAT	295
K2SMN	263
N9EXU	262
WD9IIC	255
AK2F	249
K3TC	244
WA2OMY (AA2Z,op)	233
N4DT	227
KAØTLJ	225
K3ONW	219

220 MHz

N2BJ	82
WA2OMY (AA2Z,op)	60
W6CPL	60
WA2GEZ	58
K4LHB	56
WB9MSV	53
N2EOC	48
K2SMN	48
KB3QM	45
WA1HYN	44
AB1U	40
W2EIF	40
W1JR	39
N1DPM	38
N2BFJ	37
K9ES	37

432 MHz

K1FO	170
NI8O	112
N2BJ	111
WA8DXG	104
K2SMN	86
K1PXE	83
WA2OMY (AA2Z,op)	83
WB9MSV	82
WA1HYN	81
N2WK	81
W1RIL	80
WB2DNE	80
K2KM	74
K3HOE	74
KB3QM	71

902 MHz

K2SMN	15
W1JR	14
W1RIL	14
WB1FKF	11
WA1JOF	9
WA2OMY (AA2Z,op)	9
WB2YEH	9
W1EJ	8
NI1W	7
WA3AXV (WB3KRW,op)	6
VE3ASO	5
W2EIF	4
N2BFJ	2
WB6OPA	2
W7PUA (CN84)	2
WB7UUP	2
K9MK/5	2

1296 MHz

K2SMN	47
W1RIL	35
WA2OMY (AA2Z,op)	31
K6UQH	28
WA1OUB	27
K1RZ	27
NI8O	26
N2BJ	24
K4QIF	24
WØRAP	24
KØTLM	24
WA8TXT	23
N1DPM	22
KD5RO	22
W7RV	22

Multioperator QSO Leaders by Band

50 MHz

K5JL	969
WBØDRL	835
W1XX/2	759
AA9D	750
N6CA	730
W1TKZ	717
W2SZ/1	709
K1TR	689
K3YTL	660
WØUC/9	660
WA7JTM	656
W7CI	653
WD8ISK	605
XE1FUX/2	584
WB5RUS	566

144 MHz

W2SZ/1	615
K3YTL	609
K1TR	571
W1TKZ	518
W1XX/2	441
W8VP	422
NV2D	400
W3CCX/8	366
N8DKL	339
AA9D	336
WD8ISK	327
N6CA	322
WBØDRL	319
K3LNZ/8	291
W2DRZ	278
K6BPC	277

220 MHz

N6CA	339
N6AMG	167
K6BPC	143
W2SZ/1	127
K3YTL	110
K1TR	99
W3CCX/8	94
K2AA	82
W1XX/2	80
W1TKZ	78
KE6AR	70
W8VP	70
NU6S	65
K3LNZ/8	58
AA9D	58

432 MHz

W2SZ/1	206
K3YTL	166
W3CCX/8	155
K1TR	148
WBØDRL	142
N6AMG	135
W1TKZ	133
N6CA	132
AA9D	130
W8VP	122
W1XX/2	112
WB8BKC	108
K3LNZ/8	104
WD8ISK	100
WB2PSI	96

902 MHz

K3YTL	25
W2SZ/1	24
K1TR	20
W1TKZ	13
W1XX/2	13
VE3LNX	13
W3CCX/8	10
K1DS	10
AA9D	10
WB2WIK	8
K1WHS	7
N6AMG	7
WB8BKC	6
W1XM	5
N7NW	5

1296 MHz

K3YTL	60
N6AMG	55
WBØDRL	54
W2SZ/1	52
N6CA	42
W1XX/2	37
W1TKZ	36
AA9D	35
K1TR	32
W3CCX/8	31
WB8BKC	31
W3KWH	30
WB2WIK	28
W8VP	26
K5JL	25
K6BPC	24

(N4JS/2). Excellent 6-meter conditions—lower activity on other bands (K2GK). The rotor broke down and the 2-meter multi-mode rig lost its frequency display . . . must be time for the June VHF contest (WA2RUW). Let's hear it for 6 m! (N2BJX). New radio, new beam, new personal best! (WB2ZSY). Saturday alternated between operating and sitting out four lines of thunderstorms. Sunday on 6 sounded like 20 meters during Sweepstakes (K4BNC). Six meters was outrageous! I'm sure there are several stations in the Midwest with a single-band score over 100k on 6 (WB2DNE). Six meters was fantastic. As long as it was open I stayed there (WA3GYW). Great 6-meter conditions. Wish I had spent more time on it (WB3IGR). Could have doubled my score except that my son chose this weekend to come into the world! (KA3CXG). Wow! (W3HDH). Super weekend for 6 meters! Heard at least 20 more grids squares than I worked. Got to get a big antenna! (W1GOM). Was just going to make a few contacts and listen for "rare" ones, but—you know what happened! (KB3PD). Really blew it when I fell asleep during small opening to 5 land (K3TC). Six great! But long, long weekend—thanks KA4OAK for cold drinks! (NS4W). Couldn't believe the pileups, especially since I was on the receiving end on 6 meters. All in all—one great contest (KB4GBS). Two sweetest sounds heard here: a call from CT4KQ on CW while I was working a phone pileup, and QRM on 50 MHz CW—it's about time we used more CW (W4WHK). I thought it was nice of everybody to arrange the "E" opening for me as a newcomer to 2-m SSB (WB4MJE). We were blessed with wonderful E_s almost continuously on 6 m. Very intense propagation to all parts of the contiguous US, with short openings to Hawaii, Bermuda and the Caribbean (AA4FQ). If the bands will open like this, let's have a contest every weekend (K4KAE). There were some new records set! (N2CJP). Fantastic! Great Sporadic-E on 2 meters Sunday morning sure livened things up! (WD4AHZ). My first contest in 24 years as a ham. Already looking forward to the next one (WA4GSS). Wow! What a band opening on 6—coast to coast. I worked enough new grids to qualify for VUCC twice over (KB4OLM) It was wild! I worked Seattle and Virginia all in the same minute and without changing the beam! (W4HJW). Worked my first XE after three years of being a ham (KB4KKG). Band was so hot it was hard to decide which way to point the antennas. Sure was proud to work XE1FUX/2 and VP5D (WB4NIX). Greatest thrill: GJ3YHU answered my CQ (K4KUZ). I have been off 6 meters for 6 years—what a welcome-back party! (WB4IUX). Had a lot of fun on first contest! (KB4WVI). Fantastic opening on 6 meters, it stayed open most of the weekend (N4HB). Fantastic contest! Murphy had as much fun as we did. He wiped out two rotors and a 432 preamp (WB4LRA). Best contest ever (WA4JNE). My second contest and first multi-operator. I will be back for sure! (WW4T). Wow! Six meters sure was great (WB2WIK). Fine 6-meter conditions! Netted 140 grids on 6 m with 10 watts—what fun! (N5EPA). Great conditions on 6 and 2. Two meters sounded like 20 meters. On Sunday—just fabulous (WA5S). Twenty watts produced 130 grids on 6 m. K6HXW was pinning my S-meter off the back of the beam, and I had W4s S-9 off the front. Missed working my own grid during all this (K7CW). Great E_s Sunday morning. Had power failure while it was happening! Good old Murphy! (KF5PE). What can I say? It was the greatest opening in my 32 years operating on 2 meters! (W5FYZ). First contest for the family—they learned a lot and so did I. They will upgrade for sure now! (WD5CAN). This has been the best conditions for a contest on six meters in a long time, and if this holds out for the next QSO Party, I'm headed down the muddy MS to the lighthouse in EL58 (WD5BJT). The good news: I was heard 59+ by GJ4ICD. The bad news: I didn't hear him (N5JHV). Best contest I've ever seen since I've been a ham. Conditions were unbelievable. Worked new states like locals (WB5NAA). Most fun I had in a contest ever! Almost 10k on 6 meters using a 40-m dipole—who says VHF can't be for everybody? (WB5AFY). Great conditions and activity! (W5FF). Unbelievable 6-meter opening. Picked up states 48 and 49 (W6PFE). Saturday, dead. Sunday was like 20 meters had moved to 6 m! (KK6C). Six meters was very good on Sunday after a slow start on Saturday (W6RXQ). Those darn cows seem to think that rotor wire is better than grass—had to splice our 2-meter rotor no less than four times! (WB6WLE). There isn't enough room in all of *QST* to list everything that went wrong with my first portable operation—from leaving the microphone at home to convincing to police that what I was doing was not illegal (WA6PMX). Lightning, wind, rain and heat—just another Nevada contest (KD7M). Superb! (K2DNR). Great 6-meter opening Sunday. FB contest—for a change! (W7ABX). The "mountain toppers" made it more fun by activating rare grids (WB7ATP). One of the best 6-meter openings for the contest I have seen in years (N7DB). Late opening on 6 meters, then things went wild (W7HAH). Great contest! Lots of rare grids on 2 meters! (WA7VHW). In less than one hour, I worked 32 stations in 19 grids and 8 states in SE US (W7RV). Propagation and a contest at the same time? Fantastic! (KC3CL). Too busy working opening on 6 to worry about the other bands. Never dreamed I would get a point total this high (N8CCC). A super contest. Who bribed the propagation gods? Do it again! (KB8JI). My first contest on VHF. Had a good time (N8GWP). First attempt at VHF QSO party even though I have had this call almost 54 years. Be back again with better antenna (W8LHV). My first contest in a long time. Thank you NI8O for all the help (WD8BHO). A really good time (KE8BR). Wow! What a 6-meter opening! Almost qualified for VUCC that weekend! (WB8JAY). What a contest! Conditions were simply tremendous nearly everywhere—what else can one add? (W3EP/9). Sunday morning was a lifesaver due to the openings then or this contest might have been a disaster (W9YCV). No breaks, no sleep, just fun! (WA8FTA/9). Hello 6 meters, goodbye channel 2! (AJ9C). Would have liked more E-skip on 2 meters, but this was the best VHF Contest in my 23 years on the air (NE9O). Tropo and E_s on Sunday morning kept me hopping between radios (WB9MSV). Had a great time (K9VGE). Sure is great to see the spread of 6-meter activity all the way up to 50.280 MHz. With a little effort, one could work VUCC in one contest (WA9LZM). Great conditions on 6 and 2. I wish I had more bands! (AE9M). Somehow I overcame equipment problems at the contest start to enjoy dynamite 6-meter opening that just wouldn't quit (WD9IIX). Whew! What a weekend. . . .Six was really cooking. I worked at least ten new states and four new provinces as well as my first XE (NØGPD). Help! E-skip on 6 and 2, tropo on 220 and 432 at the same time! Which band does a single operator use first? (KCØQR). Six-meter conditions were excellent to all call areas. Best DX was W6JKV/V2A! (WØEET). First ever VHF operation and/or contest

Top Ten Single Operator

Call	Score
K5UR	367,734
WA2OMY (AA2Z,op)	305,660
KB3QM	272,538
K5CM (N5CG,op)	252,160
K2SMN	250,848
N2BJ	231,990
WD9IIX	219,114
KØTLM	217,344
WA1OUB	200,080
WB9MSV	200,043

Top Ten Multioperator

Call	Score
W2SZ/1	947,226
K3YTL	887,760
WBØDRL	865,488
AA9D	833,829
N6CA	752,028
K5JL	685,069
W3CCX/8	632,548
W1TKZ	630,576
K1TR	624,024
W1XX/2	590,920

Top Ten QRP Portable

Call	Score
K1JX	120,268
N6NVF	15,631
W8FK/7	10,419
N2FPB	5,580
NY7C	5,335
NG1W	1,659
KB1XD	1,416
KA1LMR	980
KA1CV	450
KAØZLF (DM89)	270

Single Operator Multiplier Leaders by Band

50 MHz

KAØNNO	270
K5CM (N5CG,op)	256
W5SXD	225
NE4L	209
KN5S	209
K5UR	206
WB4SLM	204
WA1OUB	202
NØLL	201
KB3QM	200
W5OZI	198
K1TOL	195
W3EP/9	192
WD4MGB	188
KØTLM	187

144 MHz

K5UR	81
NØEDQ	72
N5WS	66
N4DT	65
W4FF	64
W4ZD	64
AA4ZZ	60
K5SW	60
W7ZI	60
N9EXU	59
W8NJR	59
KAØTLJ	59
W8AC	58
WA8TJL	57
WD9IIC	56

220 MHz

WB9MSV	28
K2GK	27
K4LHB	26
N2BJ	25
K2SMN	25
KB3QM	25
WA2OMY (AA2Z,op)	24
WA2GEZ	23
K5UR	22
W9IP/2	22
N2BFJ	21
AB1U	20
WA4SBC	20
WA8TJL	20
WA8TXT	20
VE3ASO	20

432 MHz

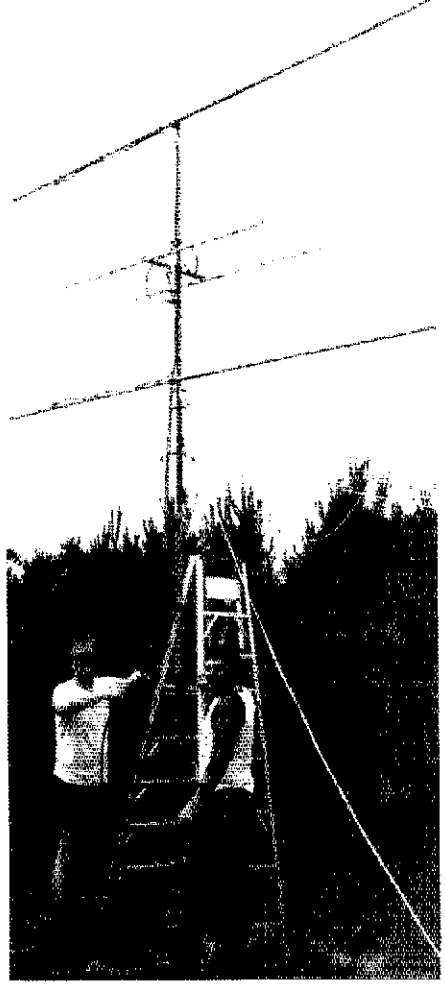
NI8O	53
WA8DXG	45
WB9MSV	43
K5UR	42
WA9GCB	39
K1FO	37
KR9G	36
K2SMN	35
W8AC	35
K9VGE	35
WØRAP	34
N2WK	33
WA8TJL	32
WA8TXT	31
WB2DNE	30
K4QIF	30
WD5AGO	30

902 MHz

K2SMN	10
W1JR	8
W1RIL	7
WA2OMY (AA2Z,op)	7
WB2YEH	6
WA1JOF	5
WB1FKF	4
NI1W	4
WA3AXV (WB3KRW,op)	4
VE3ASO	4
W1EJ	3
W2EIF	3
W7PUA (CN84)	2
K9MK/5	2
N2BFJ	1
WA3RMX	1
WB7UUP	1

1296 MHz

K2SMN	21
WØRAP	21
KØTLM	19
NI8O	17
K2GAL	16
WA2OMY (AA2Z,op)	16
K5UR	16
WA8TXT	16
WA1OUB	15
WD5AGO	15
K4QIF	14
KD5RO	14
W1RIL	13
K1RZ	13
N2BJ	13
N5WS	13



Putting the finishing touches on the 432 and 1296 antennas at W1QK's Cape Cod station.

Multioperator Multiplier Leaders by Band

50 MHz

K5JL	279
N6CA	253
WA7JTM	248
W7CI	243
AA9D	235
WBØDRL	228
XE1FUX/2	228
WB5RUS	220
WD8ISK	220
WØUC/9	219
W1XX/2	211
W2SZ/1	206
K3YTL	206
W8VP	205
WB2WIK	204

144 MHz

AA9D	110
W8VP	96
WBØDRL	93
K5JL	83
N8DKL	75
WD8ISK	75
WB8BKC	72
WD8LND	71
W3CCX/8	69
W2DRZ	67
N5HHS	66
WØUC/9	66
K3YTL	65
W3KWH	63
K3LNZ/8	59
WB5RUS	59
WØFY	59

220 MHz

W8VP	50
W3CCX/8	42
WBØDRL	41
AA9D	36
K3YTL	35
WD8ISK	34
W1TKZ	33
W2SZ/1	33
WB8BKC	32
K3LNZ/8	30
W1XX/2	29
K2AA	29
WB2PSI	29
K1TR	28
W3KWH	27

432 MHz

WBØDRL	74
AA9D	71
W8VP	65
W3CCX/8	55
WB8BKC	54
K5JL	53
W3KWH	47
WØUC/9	47
K3LNZ/8	44
WD8ISK	44
K3YTL	43
W2SZ/1	41
WB2PSI	38
W1TKZ	37
N8DKL	37

902 MHz

W2SZ/1	14
K3YTL	13
VE3LNX	11
AA9D	10
K1TR	9
W3CCX/8	9
W1XX/2	8
WB2WIK	7
N6AMG	7
W1TKZ	6
K1DS	5
WB8BKC	5
K1WHS	4
N7NW	4
K3LNZ/8	3
N6CA	3
WD8ISK	3

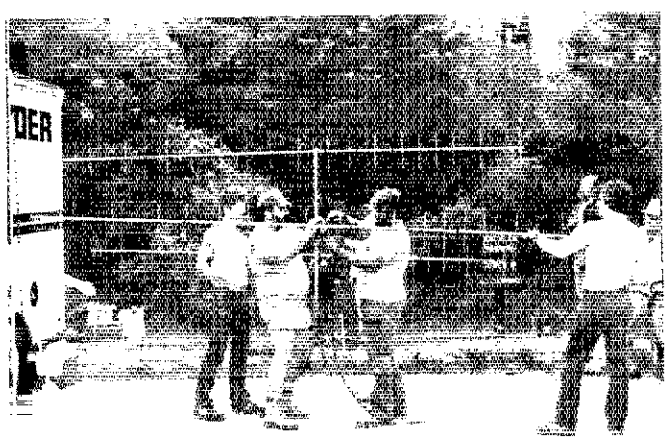
1296 MHz

WBØDRL	46
AA9D	27
K3YTL	26
W2SZ/1	22
WB8BKC	22
W3KWH	21
W1TKZ	19
W8VP	19
W3CCX/8	18
VE3LNX	18
K5JL	17
W1XX/2	16
N6CA	16
K1TR	14
K2BWR	13
WB2WIK	13
N6AMG	13

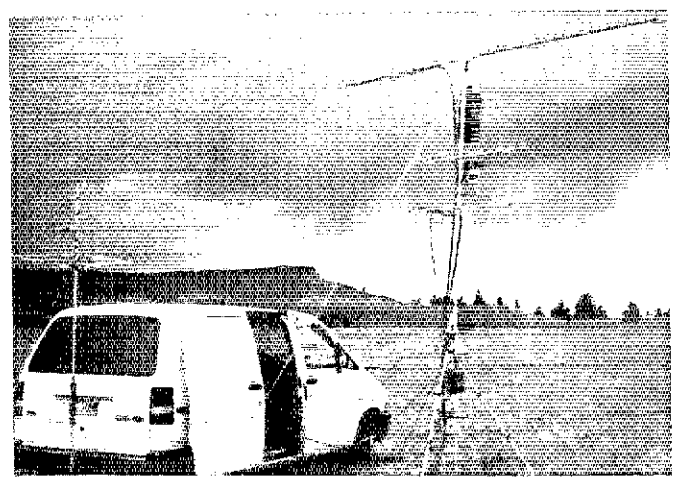
and it was a ball! (WØEUG). From the CT4 contact and two other new countries on 50 MHz to four new states on 1296 MHz, the conditions were beyond my best hopes (KØTLM). Fun! (WØNKO). My first contest—had a ball! Learned a lot about contesting and operating. I am looking forward to the next VHF contest (KDØABU). Six meters was like the weather here, hot! (WAØDCB). Band conditions were incredible. Six-meter E_s Saturday was followed by a big tropo opening on Sunday AM, which was later followed by E_s on 2 meters! (WØFY). Enjoyed the contest as usual. Six was great! (KDØSU). Excellent openings produced many new grid squares (VE3VET).

Feedback

Please note the following corrections from Sep 1986 *QST*: K2DNR should have been the A winner in AZ. K6LM/7 should have been K6LMN/7. WB4CTW was listed in TN, but he should have been in VA. AE3T was listed in OR, but he should have been in EPA.



The crew of Roanoke multiop Division leader W3CCX/8 assembling the 432-MHz array.



One of grid-hopper Hal's WØMXY, portable locations in New Mexico (DM76).

Scores

Call, score, QSOs, multipliers, 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; an (N) after the call indicates a Novice.

1

Connecticut

*K1JX 120,268- 516-214-ABCD
K1EM 103,550- 503-190-ABCD
K1PXE 59,136- 294-132-ABCDE
AB1U 50,344- 302-116-ABCDE
NE1A 33,360- 278-120-AB
W1WHL 23,653- 217-109-A
K1FO 12,580- 170- 37-D
KH6CP/1 12,375- 148- 75-ABDE
WB1BXS 10,164- 308- 33-B
WA1NLD 2,090- 110- 19-B
W1FAJ 2,024- 52- 23-BCD
WA1GTP 2,000- 50- 40-AB
*KB1XD 1,416- 78- 12-BCDE
WB1CWZ 780- 26- 15-C
*KA1CV 450- 45- 10-B
KA1QDC 2- 1- 1-C
WA1KGR (KA1s AHR,MDA,PAS,N1s EFQ,EJG,ND1K,ops)
66,367- 444-133-ABCFGH
W1AW (KA1CV,KJ4KB,ops)
8,201- 116- 59-ABDE

Eastern Massachusetts

W1JR 97,788- 404-174-ABCD9EF
WA1JOF 41,285- 245-115-ABCD9E
WB1FKF 37,164- 211-114-ABCD9EF
K1SRZ 32,538- 264-102-ABCD
KX1C 23,970- 211- 94-ABCD
WA1NPZ 17,340- 170-102-A
WA1NQV 15,543- 157- 99-A
K1TO 14,027- 164- 83-ABCD
W1GXT 9,727- 93- 71-ACDE
K5MA/1 4,248- 177- 24-B
K1VZI 2,700- 63- 27-ABCDE
KA1NSV 1,860- 124- 15-B
W1PSG 1,170- 78- 15-B
W1QXX 264- 12- 11-A
WB2PID 225- 19- 9-ABC
KA1DHO 156- 13- 12-A
W1ZNY 48- 16- 3-B
W1QK (+N1ABY,WA1WXV,WB1CVW)
71,574- 414-151-ABCDE
KB1NW (AB1X,KA1NPS,ops)
9,380- 127- 70-ABD
W1XM (KX1Z,W1GSL,K3MC,ops)
2,970- 91- 22-BCD9

Maine

K1TOL 107,250- 550-195-A
W3HQT 38,936- 280-124-ABCDE
N1BUG 1,500- 60- 25-AB
W1PLX 1,180- 59- 20-B
WB1APD 468- 36- 13-B
WA1TDO 21- 7- 3-B
K1WHS (+AF1T,K1MNS,KY1K,WA1s NIE,TFH)
236,096- 836-238-ABCD9EFGHIJ

New Hampshire

WA1OUB 200,080- 766-244-ABE
W1EJ 86,346- 469-162-ABCD9E
AC1T 56,032- 360-136-ABCD
NI1W 19,040- 170- 80-ABCD9E
KA1BJ 8,668- 191- 33-AB
NK1F 5,182- 178- 29-B
K1KA 4,732- 169- 28-B
WA1GDR 4,482- 83- 54-AB
W1JSM 1,008- 52- 18-BD
*KA1LMR 980- 45- 20-ABCD
W1GUA 874- 34- 23-ABD
N1DNC 30- 10- 3-B

Rhode Island

WA1HYN 17,755- 210- 53-BCD
WI6I/1 3,220- 70- 46-A
K1DS (+K1HGC,KM1X,KZ1K,N1s BAQ,BBM,W1EYN,WA1TAQ)
156,415- 668-205-ABCD9EI

Vermont

WB1GQR 91,836- 459-177-ABDE
WA1JGK 21,756- 222- 98-A
W1AIM 41,363- 282-133-ABCDE
WA1TBV 1,665- 45- 37-A
WA1WIF 810- 30- 27-A

W1TKZ (KA1s LDV,LQK,NDX,OOO,KB1WI, N1s ADY,CPE,ND1Z,NF1Z,W1GCI,WA1s YOJ,ZLQ,BUM,N2AWG,WA2s TEO,TIF,ops)
630,576-1497-348-ABCD9EF

Western Massachusetts

W1RIL 146,628- 569-188-ABCD9E
K9ES 105,570- 544-170-ABCD
N1DPM 101,675- 477-175-ABCDE
K1ISW 31,310- 239-101-ABCDE
KA1CRX 2,850- 89- 47-AB
K1JG 288- 18- 16-AB
W2SZ/1 (K1DH,KA1DZV,NC1J,NI1V,WA1s UGE, ZFK,ZMS,WB1s C8H,HIH,K2TR,K2WR, KA2s DEW,FWN,QHF,WRG,KB2DGA,NF2B, NJ2L,NT2X,N2s BNY,CJJ,WA2s AAU,GFP, SCA,SPL, WB2s KMY,PKO,AK4L, WA8USA,ops)
947,226-1772-399-ABCD9EFGHIJ
K1TR (+AK1A,K1BA,K1EA,K3WM,K5ZD, K8UR,N1AFQ,N1BEM,NG1A,WA1s PBU,VFJ, WB1DNL) 624,024-1563-324-ABCD9EFGHI
W1NY (AC1T,KA1MP,W1KK,WA1HFF,ops)
118,116- 557-193-ABCD
KA1KRJ (+KA1s MEW,MHY,WB1HAB)
79,750- 548-125-ABCD

2

Eastern New York

N2BJ 231,990- 804-222-ABCDE
WA2BAH 28,320- 220-120-ABCD
WA2ZPX 20,736- 216- 96-AB
WA2ALV 6,552- 101- 83-ABD
*N2FPB 5,580- 90- 62-A
WA2FUZ 2,046- 93- 22-B
KD2IX 728- 52- 14-B
KG2H 377- 29- 13-B
WB1BTJ/2 (N) 200- 20- 5-C
WA2RUW 180- 15- 6-C
W1XX/2 (+K1GX,KB9NM)
590,920-1443-340-ABCD9EF
AB2I (+AB2J,W2AWX,WA2IID,WB2OVV)
64,321- 436-131-ABCE
N1CVA (+KA1LLX)
15,249- 193- 69-ABD
W2YJO (+KA2Q)
2,438- 99- 23-BD

NYC-Long Island

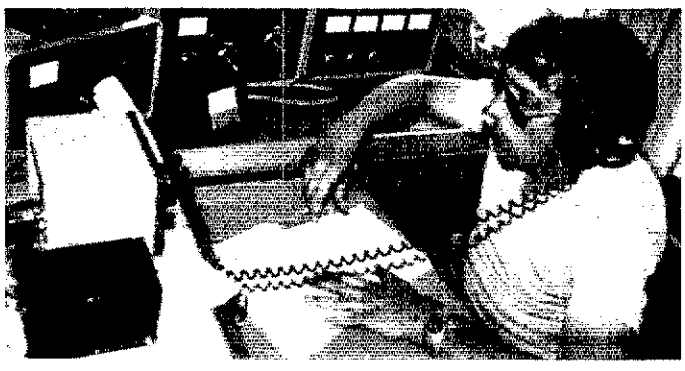
N2BFJ 103,626- 416-202-ABCD9E
K2MT 17,748- 174-102-AB
KA2VKD 17,739- 193- 81-ABD
WB2ALW 14,725- 141- 95-AD
WA2RAT 11,210- 295- 38-B
K2OVS 9,916- 117- 74-ABD
WA2SLY 9,558- 162- 59-AB
WA2EIO 5,076- 108- 36-BD
NB2T 4,525- 181- 25-B
WB2CUY 3,588- 111- 26-BD
K2KM 3,582- 205- 33-BD
WB2ZSY 1,548- 86- 18-B
KA2CKV 854- 61- 14-B

Northern New Jersey

K4BNC 33,221- 239-139-AB
WB2BPY 17,127- 173- 99-AB
WA2GEZ 14,697- 155- 69-ABD
AK2F 10,471- 266- 37-BC
WB2QOQ 10,438- 307- 34-B
K2DEL (N2DXP,op)
8,580- 132- 65-A
KA2VAD 7,695- 113- 45-BCDE
WA2UDT 1,680- 43- 28-BCD
N2EOC 1,632- 48- 17-C
KR2J 948- 79- 12-B
N2GSE 496- 31- 16-B
N2FGZ 230- 18- 10-BD
NV2D (KB2BNU,KE2AH,N2sERH,HEB,WM,K3QM, ops) 233,811- 824-249-ABCD
KC2GE (+WB2PSD)
12,616- 262- 38-BD

Southern New Jersey

K2SMN 250,848- 666-268-ABCD9EF
N2AHN 141,669- 509-243-ABCD
N4JS/2 107,352- 447-213-ABCDE
W2HRW 82,016- 422-176-ABD
WB2YEH 75,504- 322-176-ABCD9EF
K2YY 68,688- 391-159-ABDE



K9RO operating the 6-meter station at the 4th-place multiop station, in Bald Knob, Illinois

K2GAL 61,600- 298-154-ABDE
W2EIF 56,525- 312-133-ABCD9E
W2PAU 26,076- 212-106-ABD
N2GBY 13,363- 161- 83-A
WB2JHG 2,075- 40- 25-DE
K2BWR (+K2ZRJ)
83,922- 310-197-ABCDE
KA2ING (+WB2RFV)
2,280- 59- 38-ABC

Western New York

W9IP/2 171,999- 563-281-ABCDE
N2BJX 66,132- 376-167-ABD
KD2YB 38,745- 287-135-A
K2GK 24,732- 175-108-ABCD
N2WK 22,248- 228- 72-BD
WA2BPE 20,124- 172-117-AB
WA2CBU 15,229- 157- 97-A
WB2WBT 13,248- 144- 92-A
KA2ENE 5,586- 93- 57-ABD
WB2ELB 4,600- 64- 50-ABCE
W2WGL 2,465- 85- 29-B
N2DM 1,862- 49- 38-A
WA2URE 1,598- 46- 34-ABD
K2JIQ 1,584- 66- 24-B
W2HAX 738- 41- 18-B
KA1YE (FN02) 672- 32- 21-B
K2QR 330- 15- 11-D
W2AWF 259- 37- 17-B
KA1YE (FN03) 170- 17- 10-B
KA1YE (FN13) 135- 15- 9-B
KA1YE (FN12) 30- 6- 5-B
W2DRZ (+KA2GOJ,KB2CCQ,N3EYD,W2UCZ, WA2AWX) 313,938- 830-328-ABCD9E
WB2PSI (K2s OEQ,OS,N2s AJX,AJY,NA2O, W2s AV,CNS,IMO, WA2s ZKD,ZQN, WB2s KAO,QCJ,ops)
264,025- 732-295-ABCD9IL
WA2RQC (+W2CRS)
193,214- 688-259-ABCDEF
N2CZL (+KA2s HYY,MYD,KC2MI,NM2P)
35,581- 276-119-ABD
WA2AAZ (KA2YGS,N2s COJ,CSY,DIT, EVG,WA2s GAI,MCD,WB2JSB,ops)
5,341- 109- 49-AB

3

Delaware

KB3QM 272,538- 761-294-ABCDE
AC3T (KA3B,op)
63,917- 397-161-A
KA3KHZ 6,105- 185- 33-B
KB3PD 2,496- 52- 24-D

Eastern Pennsylvania

WA2OMY (AA2Z,op)
305,660- 831-290-ABCD9E
WA3AXV (WB3KRW,op)
23,562- 167-102-ABCD9EF
N3EXA 9,471- 190- 41-BCD
WA3USG 8,106- 152- 42-BD
K3ONW 8,103- 219- 37-B
W3CL 6,588- 88- 61-ABCD
W1GOM 5,733- 91- 63-AB
WB3IGR 4,565- 74- 55-ABD
W3VIR 2,376- 46- 27-BEF
N3BNA/M 30- 5- 3-D
K3YTL (WA1MKE,K2LNS,NA2T,K3MKZ, KA3EEO,KB3QI,N3FJA,W3DZW,WA3s NVS,YON,WB3s CAI,FAA,FKQ,FYT,ops)
887,760-1658-405-ABCD9EFGIJ
K2AA (KA2s FFS,MSM,QMP,N2s BAZ,DYC, FY,W2s EA,ORA,WA2s ABF,VYA,ops)
217,371- 768-231-ABCD
K3MTK (KA3s OOR,RGW,RGX,N2FOB,WA3s IAO,NAY,OTI,VUG,WAK,ops)
109,200- 543-175-ABCD
W3LP (K3GZN,W3s GFN,JUZ,WA3CUQ,ops)
41,528- 285-116-ABCDE

Maryland-DC

WB2DNE 124,976- 504-214-ABD
K3HCE 74,736- 328-173-ABDE
W3XO 51,240- 305-188-AB
W3IFM 41,976- 284-159-A
K3AKR 35,092- 239-124-ABCD
K1RZ 25,090- 332- 85-BE
WA3UJE 25,026- 246- 86-ABCD
K3NXH 15,188- 316- 48-B
K3TC 8,296- 244- 34-B
WA3GYW 5,684- 98- 58-AB
*NG1W 1,659- 79- 21-B
KC3YS 1,281- 61- 21-B
N3FHD 1,098- 61- 18-B
KB3HH 705- 47- 15-AB
KA3CXG 348- 29- 12-B
WA2VUJ/3 288- 36- 8-B
W3GN 36- 6- 6-B
K3IVO (N2GAR,N2GTE,N3DCI,K3YDX, KA4RHS,WB6VGI,ops)
58,914- 340-143-ABD
W3PGA (K3s PHH,ROJ,W3sJDF,VRD, WA3LAW,ops)
21,570- 300-123-ABD

Western Pennsylvania

W3HDH 52,200- 300-174-AB
WA3DJG 37,944- 243-136-ABCDE
W3JKM 6,693- 97- 69-A
KC3XD 1,012- 44- 23-B
W3KWH (KA3s KSD,OYI,QEV,N3EQP,NG3H, W3s HH,SVJ,WA3s FYJ,TTS,ops)
278,204- 676-313-ABCDEI

4

Alabama

NE4L 119,130- 570-209-A

WB4AXQ 35,200- 260-128-ABD
WB4NIX 29,312- 229-128-A
WB7ECS/4 29,172- 204-143-AB
N4AHJ 2,494- 58- 43-A
KB4KKG 380- 20- 18-A
WA4VUG 126- 14- 9-B
WA4RHK (+AA4YB,KA4IYO,KB4sI.ON,PON)
2,541- 77- 33-B

Georgia

WB4SLM 156,104- 632-247-AB
WA4NJP 153,517- 578-241-ABCDE
WA4NKL 84,080- 467-180-A
K4CKS 37,088- 220-152-ABD
NA4I 28,536- 229-123-ABD
KA4KKF 8,658- 103- 78-ABD
WD4AFY 2,923- 79- 37-B
AK4T 2,346- 51- 46-AB
WW4T (PE1AHX/W4)
125,100- 512-225-ABD
WB4LRA (+K4AEK)
52,190- 284-170-ABDE
WB4WXE (+WL7AZB)
39,368- 266-148-AB

Kentucky

AA4FQ 61,748- 337-172-ABD
N4KCM 30,008- 232-121-ABC
KK4BD 7,300- 146- 50-B
N4FFO 5,100- 85- 60-A
WA4GSS 3,320- 61- 40-BD

North Carolina

N4VA 29,799- 231-129-A
WA4GBE 23,364- 173-118-ABD
N2CJP 22,624- 193-112-ABCD
AA4ZZ 17,472- 199- 78-BC
N4DT 14,755- 227- 65-B
KJ4BF 5,832- 88- 64-A
KJ4HF 3,737- 76- 37-BCD
W4FSO 2,170- 62- 31-BD
KA4HKK 1,400- 56- 25-B
N4YN (+KA4ZBX,KB4RGB,N4PFZ, WA4LLR,WC4Z)
48,356- 292-154-ABCD
KB4TXZ (+WA5DJJ)
27,531- 197-133-ABD
W4NC (KA1LNM,K4KPV,KB4NHB,N4sIOZ, MBI,ops) 1,064- 34- 19-BDEF

Northern Florida

W5HUQ 111,588- 542-204-ABCD
W4WHK 71,832- 438-164-A
WD4FAB 52,260- 324-156-ABD
WA4JNE 41,904- 291-144-AB
KL7JGI 23,484- 192-114-ABDE
W4HJW 23,421- 208-111-ABCD
WB4BSZ 17,940- 195- 92-A

South Carolina

WA4MVI 25,284- 198-129-A
WA4LDU 23,880- 186-120-ABD
WB4TLX 21,080- 170-124-A
KK4NO 18,333- 155- 97-ABDE
WB4IUX 10,406- 121- 86-A
W2CUK 8,910- 110- 81-A
N4LTA 4,875- 75- 65-A
NB4S 4,680- 104- 45-B
WB4PCS 4,141- 101- 41-B
WD4JQV 3,010- 66- 35-BCDE
K4KAE 2,436- 58- 42-AB
WC4G 987- 47- 21-B
W4VIW 400- 20- 20-A
N4NFR 300- 20- 15-B

Southern Florida

WD4MGB 151,726- 695-214-ABD
WB2QLP 131,495- 595-221-AB
W4OO 94,285- 545-173-A
K4KUZ 83,916- 518-162-A
KB4CRT 79,709- 404-193-ABD
WA2YYR/4 34,960- 304-115-A
KB4GBS 33,033- 273-121-AB
K4SC 27,438- 269-102-A
K4WYN 24,720- 196-120-ABD
WD4AHZ 11,456- 152- 64-BD
WB4BKC 10,788- 124- 87-AB
W4FF 10,368- 162- 64-B
W4ZD 10,240- 160- 64-B
N4ILE 5,785- 89- 65-AB
WB4MJE 5,720- 110- 52-B
K3KTY 3,105- 69- 45-A
W1WLE/4 2,184- 52- 42-AB

Tennessee

K4RWP 60,348- 314-188-ABD
W2GU 52,909- 267-157-ABCDE
N4VC 50,071- 285-161-ABCD
WA4QYK 24,035- 208-115-ABD
WA4JGQ 16,170- 150- 98-ABD
K4RIG 12,150- 150- 81-A
N4OOA 5,074- 86- 59-AB
AD4F 4,002- 69- 58-A
W4FLW 2,420- 55- 44-AB
NS4W (KQ3P,KB4NEI,ops)
49,878- 291-153-ABCD

Virginia

N4MM 120,225- 493-229-ABD
KB4OLM 74,987- 381-187-ABCD
WA4SBC 44,362- 252-144-ABCD
WB4DBB 37,548- 238-149-ABCD
K4LHB 34,925- 205-127-ABCE
N4RA 34,632- 265-117-ABCD
WC4J 32,595- 259-123-ABD
K4FTO 24,610- 201-115-ABD
W4DO 21,939- 197-103-ABD
K9OYD/4 11,772- 170- 54-BD
K4QIF 9,240- 93- 44-DE

A view of 6th-place multiop station K5JL, and its operators.

N4KEQ 6,100- 92- 61-ABD
W4LMJ 5,015- 85- 59-AB
NQ4K 4,930- 85- 58-A
W4KMS 4,176- 72- 58-AB
KF4KI 3,668- 131- 28-B
K3ZJ 312- 28- 12-B
KB4WVI 90- 9- 5-C
WB2KQG 2- 1- 1-C
WB2WIK (+KT2B,KC2PX,WB2OTK) 330,215- 846-313-ABCD9E
N4HB (+WB4BVY) 178,089- 609-267-ABCD
W4IY (K4HWG,KA4CKI,KB4EUZ,N4JNL, WB4s NFS,RMJ,WD4ECK,ops) 171,710- 653-223-ABCDEIL
WY4D (+KB4NNE) 1,224- 51- 24-B

5

Arkansas

K5UR 367,734- 878-367-**ABCDE**
WB5IGF 16,468- 179- 92-A
N5HST 1,350- 45- 30-B
N4FAC/5 (+WB4LHD) 221,589- 710-283-ABCDE
WD5CAN (+KB5s BHI,BKL,BPC,BPD) 70,132- 377-178-ABCD

Louisiana

KB5LF 66,493- 413-161-**AB**
WB5NAA 38,400- 237-150-**ABD**
N4AZI 37,298- 250-144-ABD
WA5UFH 36,358- 298-122-A
WD5BJT 15,050- 175- 86-A
W5FYZ 5,238- 119- 44-B
NU5F 5,078- 108- 47-**B**
KB5AYX 777- 37- 21-B
N5IAQ (+KA5ULI,KB5BUV) 38,955- 253-147-ABD

Mississippi

W5RCI 61,074- 291-174-**ABCDEF**
AE5H 44,849- 301-149-**A**
N5KDA 903- 43- 21-B
N5JBZ/5 (+WW5P) 39,060- 310-126-A

New Mexico

KN5S 123,319- 553-223-**AB**
N5JHV 77,900- 408-190-**ABC**
KI3L 66,000- 375-176-AB
N5EPA 44,847- 297-151-AB
W5FF 41,499- 261-159-AB
W5IXR 13,741- 151- 91-AB
WB5AOX 5,885- 103- 55-ABD
KB5GY (DM66) 1,904- 56- 34-AB
W6MXY (DM88) 279- 14- 9-**BDE**
W6MXY (DM76) 147- 11- 7-BDE
KA5EBL (+W0RJM) 50,362- 288-169-ABD

North Texas

KD5RO 152,515- 526-235-**ABCDEFG**
NZ5C 49,419- 323-153-**A**
WD5ABF 39,050- 253-142-ABD
N5WS 18,407- 195- 79-**BE**
WB5AFY 9,804- 114- 88-A
K9MK/5 9,178- 133- 62-ABD9E
AA5C 8,662- 104- 71-ABDEF
KF5AL 8,393- 108- 77-A
KC5IJ 4,399- 83- 53-AB
KF5PE 2,975- 63- 35-BE
WA5ZKO 1,272- 53- 24-B
WA5TKU (+ops) 39,102- 228-133-ABCDEF

Oklahoma

K5CM (N5CG,op) 252,160- 985-256-**A**
K5SW 35,250- 200-125-**ABCDE**
W5NZS 30,888- 219-132-ABCD
KA5OXA 10,750- 125- 86-A
WD5AGO 6,783- 60- 51-**BDE**
N5HRF/5 1,794- 78- 23-B
N7DNU 224- 16- 14-A
*W5JRP/5 70- 10- 7-AB

K5JL (+K5CSL,N5DDB,W5s JCB,KBB,WA5s DSH,WCP) 685,059-1359-451-ABCDEFI
WN5J (+ops) 73,800- 410-180-AB

South Texas

W5SXD 172,515- 643-265-**ABD**
W5UWB 111,644- 489-226-ABD
W5OZI 91,476- 462-198-A
WA5IYX 35,424- 246-144-A
KC5GB 28,689- 208-131-ABCD
KA5TJI 3,306- 87- 38-B
KB5BZX 2,409- 73- 33-B
N5GQB 2,002- 77- 26-B
WB5YEA 221- 17- 13-A
N5HHS (+KE5CO) 228,570- 760-285-ABC
WB5RUS (+K5LZO,KE5IV,N5IVF) 207,018- 742-279-AB
WA5S (+K5TSQ,KC5FP) 69,524- 357-191-ABCD

West Texas

K7CW 55,998- 292-183-**ABD**

6

East Bay

N6EIO 31,218- 240-121-**ABD**
WA6LHD 1,694- 77- 22-**B**
KF6NY (CM87) 15- 3- 3-BCD
N6AMG (+N6s FRI,IG,LYE) 390,833- 993-273-ABCD9EI

Los Angeles

W6CPL 99,120- 423-177-**ABCDEI**
N6NJI 19,096- 196- 88-ABCD
W6PFE 13,031- 157- 83-ABCD
WB6OPA 4,794- 63- 34-BCD9**EFI**
KF4AU 3,200- 132- 20-**BD**
KE6AR (+KA6WGO,KB6LTY,WB6TIK, WD6s BJS,CGF,DRI) 20,930- 320- 46-ABCD

Orange

WD6AUP 101,896- 466-188-**ABCDE**
K6CH 46,505- 304-131-**ABDE**
*N6NVF 15,831- 178- 77-ABC
K6IBY 9,412- 125- 52-ABCD
N6FSL 4,802- 98- 49-A
K6PFW 4,725- 90- 45-ABD
W6XD 2,584- 68- 38-AB
KB6XG 2,508- 57- 44-A
WA6SNN 1,376- 66- 16-BD
WB9AJZ/6 1,274- 91- 14-B
*WA6PMX 168- 14- 4-E
K6BPC (KA6ZVP,N6MI,WA6HXD,WB6YVP, WA6MXA,ops) 216,876- 861-186-ABCD9EFI

Santa Barbara

WB6AAG 38,661- 263-147-**A**
WD6BCN 8,448- 92- 62-ABD
K6VMN 232- 29- 8-**B**
N6CA (WA2KDL,N4EPY,AE6E,AF6O,AJ6F,K6s AWO,LMN,N6s DBS,DLU,IDN,KN,MUL,VI,W6s OSM,OXX,YLZ,WA6s OTU TMJ,K9AKS, N6KV, ops) 752,028-1576-348-ABCD9EFI

Santa Clara Valley

W6RXQ 65,985- 308-159-**ABCDEFI**
KK6C 19,952- 172-116-A
KA6ING 12,994- 167- 73-ABD
K6BDK 6,138- 93- 66-AB
K6UQH 1,296- 34- 12-**EFI**
W6YVK 638- 58- 11-B
NU6S (+KA6IRT,KI6CG,NU6P,WA6AZP) 146,010- 807-186-ABCDE
KG6AO (+N6FPW) 4,042- 94- 43-AB
KB6LZJ (+KI6KS) 1,458- 69- 18-BD

San Diego

N6CW 37,440- 260-144-**A**
WA6SDC 19,776- 186-103-**ABD**
WA5BNH 9,520- 174- 35-**BCDEI**
WJ6A 2,268- 59- 36-ABD
W6OYJ 1,462- 65- 17-BCDI
WB6DTA (+K6DYD) 57,460- 316-170-ABDE

San Francisco

WA7KLK 38,676- 255-132-**ABCD**
N6GLI 25,576- 202- 92-**ABCDEF**
WA6JYO 7,360- 89- 64-ABDE

San Joaquin Valley

WB4AYE/6 20,097- 178- 99-**ABCD**
WB6YIY 1,615- 85- 19-**B**
N8OA 1,240- 40- 31-A
N6EJG 530- 53- 10-B
K6YK 315- 35- 9-B
KF6NY (CM98) 97- 8- 7-ABCDE
KF6NY (DM07) 45- 5- 5-ABCDE
KF6NY (CM97) 40- 5- 2-BCDE
KF6NY (DM08) 32- 4- 4-BCDE
WA6UZR (+W6YKM) 64,464- 321-158-ABCDE
WB6WLE (+WB6PGN) 31,787- 238-133-ABD

Sacramento Valley

KF6NY (CM98) 180- 10- 10-**ABCDE**
KF6NY (DM08) 45- 5- 5-BCDE
KI6O (+WA6NLJ) 54,495- 340-163-ABD

7

Arizona

W7RV 79,794- 326-198-**ABDE**
K2DNR 56,398- 298-173-ABDEI
AA7A 46,644- 272-169-ABD
WA7ZWO 34,181- 257-133-**A**
K1SC/7 25,830- 205-126-AB
W9SE 14,949- 151- 99-A
WB0GH 10,720- 134- 80-AB
N7BUP 4,819- 79- 61-A
WB7OHF 1,728- 48- 36-A
WB7OHF (DM42) 1,365- 39- 35-A
W7CI (+K7PBS,KY7B,WA7s CJO,LYI) 253,062- 781-306-ABDE
WA7JTM (+N7AMA) 220,922- 293-303-AB

Idaho

N7EIJ 35,862- 278-129-**AB**
WA7FSI 32,895- 255-129-**AB**
W7CVJ 4,212- 76- 54-**ABCD**
WA0BYU (+KC7IJ) 32,488- 248-131-AB

Montana

W7HAH 72,336- 274-132-**AB**
W7JF 18,700- 185-100-**AD**
KB7Q 9,085- 115- 79-A
KZ7N 3,290- 70- 47-A

Nevada

K7ICW 32,944- 232-142-**A**
KD7M 30,602- 210-143-ABD
W7LQV 11,440- 132- 80-ABD
W7ABX 10,488- 114- 92-A
W7KYT 9,730- 124- 70-**ABD**
KD7YZ 1,007- 53- 19-**B**
NW7O (+N7BPA,WA7JUQ,WA8YPL) 55,860- 331-140-ABDE

Oregon

N7BLS 32,349- 258-123-**ABD**
W7JXU 24,255- 217-105-ABCD
NR6E/7 18,600- 178- 93-ABCDE
W7TYR 18,584- 183- 91-**ABCDEI**
N7DB 12,166- 158- 77-A
KE7CX 11,590- 190- 61-ABCD
W7UDM 10,833- 154- 69-ABC
W7ZI 8,165- 115- 71-AB
*NY7C 5,335- 98- 55-ABC
K7HSJ 4,218- 86- 38-ABCDE
WA3RMX 2,350- 49- 25-ABCD9**EFGHIK**
WA7IQH 1,920- 53- 32-ABD
NR7U 765- 43- 15-BD
W7PUA (CN84) 1,701- 42- 21-**BD9E**
WB7UNU 975- 39- 15-ABCD**EFGHIK**
KA7ZOI 282- 47- 8-B
W7PUA (CN83) 55- 9- 5-BD

Utah

WA4GPM 27,950- 214-130-**ABD**
KE7NS 26,015- 215-121-**AB**
KB9ES 11,376- 144- 79-AB
NJ7A 180- 20- 9-B
KC7UB (KE7WI,WA7ADK,ops) 32,696- 232-134-ABCD

Washington

NU7Z 74,090- 428-155-**ABCDEI**
K7IEY 31,800- 285-120-A
WB7UUP 29,204- 253- 98-ABCD9E
KA7YOU 16,380- 214- 63-ABCDE
WA7SOU 8,960- 133- 64-ABD
WA7VHW 7,160- 140- 60-AB
N7BSN 4,845- 78- 57-ABCD
K7IDX 3,708- 206- 18-**B**
K7VNU 3,196- 83- 34-ABD
WA7PVE 777- 37- 21-AB
KT7G 888- 43- 18-AB
WB7ATP 189- 21- 9-B
N7NW (+K7ND,KA7SOL,KB7ST,NF7X) 186,874- 736-223-ABCD9EFI
KA7MCX (+N7CEA,W7WRK) 55,937- 399-131-ABCD
WB7PEK (+KA7ICT) 38,816- 277-118-ABCDE

Wyoming

WA7KYM 51,867- 312-153-**ABCD**
KT7V 13,590- 151- 90-A
*W8FK/7 10,419- 151- 69-A
KA7WOZ 5,248- 88- 71-A

8

Michigan

KB8JI 54,600- 271-168-ABCD
N8BMM 14,938- 139- 97-ABD
N8DGN 14,718- 175- 66-**BD**
KM8U 7,662- 167- 46-**B**
N8BWG 6,854- 149- 46-B
KD8YL 3,763- 71- 53-A
K8OOK 3,700- 74- 50-A
K8NTK 3,360- 84- 40-B
KE8BR 2,590- 63- 37-BD
WB8AAX 2,080- 65- 32-B
N8CSY 792- 38- 22-B
N8GWP 580- 29- 20-B
WB8BKC (+KB8BSW,N8ERM,NE8I, WA8VPD,WB8TGY) 373,430- 825-349-ABCD9EF

Ohio

WA8TXT 122,640- 409-219-ABCDEF
KC3CL 112,520- 446-232-ABCD
WA8TJL 87,800- 351-200-ABCD
WA8TTE 57,200- 294-176-ABDE
KA8ZOK 35,400- 267-120-ABD
WD8CTX 35,280- 249-140-ABD
K8TL 28,798- 194-119-ABDE
K8MFO 28,085- 205-137-A
N8CCC 24,056- 185-124-ABCD
WB8JAY 21,505- 162-115-ABD
NI8O 21,140- 138- 70-**DE**
WD8DCX 19,261- 177-103-ABD
K8DW 19,186- 149-106-ABDE
WB8PAT 15,252- 103- 93-ABCDE
K8TGC 11,397- 131- 87-A
W8AC 11,192- 182- 93-BD
W8NJR 11,151- 189- 59-**B**
WA8DXG 9,360- 104- 45-D
WB8TCZ 7,696- 102- 74-ABD
N8BJN 5,166- 87- 41-BCD
W8HBG 4,860- 84- 45-BD
N8HBF 4,399- 79- 53-ABC
WA8RCN 4,324- 92- 47-AB
K8CQA 3,855- 85- 43-B
K8LMN 2,790- 90- 31-B
KK7B 2,436- 37- 29-DE
WD8BHO 2,208- 46- 24-D
W8DN 2,190- 52- 30-BD
N8IAO 1,932- 69- 28-B
KV8M 1,316- 47- 28-B
W8LHV 1,150- 50- 23-B
KD8CJ 1,028- 27- 19-D
W8OUD 792- 41- 18-BD
K8AX 684- 36- 19-B
KA8QKY 680- 34- 20-B
WD8IFC 288- 18- 14-B
W8VP (K8s AL,KNL,YY,ZWF,KA8s BZV, RRL,SLT,ZDS,N8s BOZ,FXL,QUU,GUV,W5UA W8PR,WA8FHF,WB8s ERB,TRK,WD8EMS,op 582,900-1096-435-ABCDE
WD8ISK (+WA3OJX,N4AMG,KA8IFC,WA8s NJR,OGS,ONO,WB8sGEX,IGY,W9VNE) 503,366-1099-389-ABCD9EFI

West Virginia

W3CCX/8 (WA1YHO,WA2ONA,WB2s NPE,RVX AK3O,K3s EOD,ESJ,KA3MGB,N3CX,WA3s AXV,JUF,NUF,YUE,KF8AJ,ops) 632,548-1182-408-ABCD9EFGHIJ
K3LNZ/8 (K3DUA,K3ICH,W4PSJ,WA3s EOQ,OYW,NZL,ops) 307,000- 908-307-ABCD9E
N8DKL (KC8OO,N8s BZS,FWL,FCJ,HTR, WB8CNN,ops) 228,381- 732-283-ABCD
WD8LND (+KU8S,N8FMD,NR8X,WB8SKV, WD8PAD) 101,850- 464-210-ABCD

9

Illinois

WD9IIX 219,114- 740-259-**ABCDE**
WB9MSV 200,043- 582-279-**ABCD**
WA8FTA/9 77,463- 413-171-ABD
KA9MGR 51,360- 288-160-ABC
W9UD 39,334- 225-142-**ABCDE**
NG9R 29,643- 210-123-ABD
N9EXU 15,458- 262- 59-**B**
WD9IIC 14,280- 255- 56-B
KE9DK 6,566- 98- 67-A
W9JGV 6,255- 139- 45-B
WA9GCB 5,382- 69- 39-D
W9NB 4,704- 147- 32-B
KR9G 3,960- 55- 36-D
N9AQ 1,655- 53- 35-B
KA9CLP 1,633- 53- 23-BCD
WA9WXC 408- 30- 12-BC
AA9D (+K9s PW,RO,KA9s CKI,JYI, N9s EDT,KC,W9s WI,XA,WB9SNR) 833,829-1361-499-ABCD9EFIJL
AE9M (+K9CHZ,N9EZC,WB9QPI) 103,224- 508-204-AB
W9YH (KA9KLO,KD9VS,ops) 1,682- 58- 29-B
KA9CAI (+KA9VYZ) 1,155- 55- 21-B

Indiana

NE9O 123,060- 555-210-**ABD**
W3EP/9 95,040- 495-192-**A**
KA8MRI/9 74,938- 395-178-ABD
K9DZS 17,442- 158-102-ABD
KC4KK/9 17,284- 168-104-A
WA9PKL 16,300- 163-100-A
W9MBL 12,842- 147- 86-A
AJ9C 9,858- 159- 62-A
KA9CQC 9,308- 179- 52-**B**
K9LQZ 2,649- 91- 39-B
KU9C 1,938- 51- 38-AB
W9YB (KA9CCR,KC9RG,ops) 84,242- 375-166-ABD

Wisconsin

K9VGE 90,134- 425-187-**ABD**
WA9KVS 40,850- 271-150-**AB**
WA9LZM 26,180- 210-120-ABD
WA9OKB 12,717- 157- 81-AB
W9YCV 3,344- 72- 38-BD
KA9HKL 3,332- 98- 34-B
KA9VOK 2,409- 73- 33-A
WA9HCZ 999- 37- 27-AB

KD9WZ 903- 43- 21-B
W9CBE 264- 24- 11-B
W#UC/9 (+K#s FVF,GJX,N#s AKL,BSH)
348,161- 932-341-ABCDE

0

Colorado

KA#NNO 118,260- 436-270-**A**
W#ETT 63,104- 410-172-ABD
WB5JAR 35,532- 252-141-AB
W9MHL 21,965- 191-115-A
XD#SU 12,441- 143- 87-A
K#RZ 11,929- 112- 63-**ABDEFGH**
N#EOQ 11,160- 155- 72-**B**
KB5GY (DM67)
11,125- 125- 89-AB
N#CMW 10,744- 130- 68-ABCD
KB5GY (DM57)
1,480- 40- 37-AB
W#MXY (DM88)
1,334- 37- 29-ABDE
W#RTZ 833- 49- 17-B
W#MXY (DM87) 468- 20- 13-ABDE
W#MXY (DM89)
364- 17- 14-ABDE
N#TK 330- 33- 10-B
W#MXY (DN80) 275- 14- 11-ABDE
*KA#ZLF (DM89)
270- 21- 9-BD
*KB#CY 261- 29- 9-B
W#MXY (DM77)
168- 11- 7-BDE
*KA#ZLF (DM79)
64- 10- 4-BD
*KA#ZLF (DM88)
36- 8- 4-BD
W#KEA (+K#CL,N#s BRI,DVL,ND#E)
129,688- 542-232-ABD
W#IA (W1XE,KA#DXM,KR#U,ops)
81,700- 399-190-ABCD
KA#VOY (+N4MBA,K6NIZ,KA9s NEH,RBI, K#ZCO,KA#INE,N#sAJM,GTG,HLW,WB#s GCC,WSI,WD#HNP)
17,848- 184- 97-AB

Iowa

WB#TEM 90,200- 385-200-ABCDE
N#GPD 60,768- 342-167-**ABD**
WD#FOY 36,237- 257-141-AB
WA#DCB 28,560- 234-112-ABCD
K#DAS 23,956- 190-113-ABCD
KD#BT 23,760- 220-108-A
KA#TLJ 13,275- 225- 59-**B**
W#RAP 10,340- 82- 55-**DE**
K#VM 9,308- 173- 52-BC
N#CIH 5,808- 132- 44-B
WB#USU 4,085- 95- 43-BD
K#JQA 4,059- 99- 41-B
KD#RN 2,855- 59- 45-AB
K#GT 2,516- 68- 37-B
W#EUG 2,009- 49- 41-A
WD#GVY 546- 26- 21-B
KA#FTO 180- 15- 12-B
WB#VYV (KB#s AGI,AGU,AKB,AKD,AQO, KE#BX,N#HBP,ops)
131,208- 555-213-ABDE

Kansas

N#LL 176,276- 677-254-**ABD**
W#RT 34,704- 214-144-**ABD**
WB#ISW 32,292- 252-117-ABCD
KC#ZR 1,770- 59- 30-B
K#FPC 1,680- 56- 30-B
WD#ABU 1,244- 48- 28-B
WB#DRL (+AB#S,K#WA,KX#O,NO#Y,W#ULC, WA#TKJ)
865,488-1414-494-ABCDEFI
KC#W (+WA#CFQ)
17,510- 163-103-ABD

Minnesota

KB#ZQ (EN34)
27,775- 238-101-ABD
KB#ZQ (EN24)
8,128- 124- 64-ABD
W#QIN 3,111- 60- 51-ABD
WA#BWE 2,610- 45- 29-**D**
KA#UZZ (+KC#P,W#s OHU,VB)
68,211- 363-159-ABCDE

Missouri

K#TLM 217,344- 853-283-**ABCDE**
NJ#X 87,612- 401-198-**ABCDE**
K#IFL 56,144- 289-176-ABCDE
W#JRP 54,270- 311-162-ABCD
N#FQW 51,792- 301-166-ABD
N#GRS 25,851- 227-113-AB
WB9SKE 4,738- 103- 46-B
W#NKO 2,278- 67- 34-B
W#FY (+KA#GGI,KM#A)
104,346- 458-198-ABCD

North Dakota

K#ALL 103,245- 467-209-**ABCDE**
KV#R 45,438- 304-148-ABD

Nebraska

KC#QR 67,875- 314-181-**ABCDE**
N#AJU 24,069- 213-113-AB
W#BJ 23,632- 211-112-AB
W#KAV 5,868- 92- 64-A
WA#BOK 3,200- 64- 50-A
N#BQW 2,816- 64- 44-A
AE#G 840- 40- 21-B

South Dakota

WB#ULX 6,864- 100- 66-**ABD**
WB#HHM 5,673- 93- 61-**AB**

VE

Maritime-Newfoundland

VE1UT 29,400- 239-120-**ABCD**

Quebec

VE2DUB 20,584- 184- 97-**ABDE**
VE2TH 12,996- 171- 76-**A**
VE2YB 9,956- 131- 76-**AB**
VE2MLS 918- 34- 27-A

Ontario

VE3ASO 127,908- 464-228-**ABCD9EFI**
VE3DDW 68,134- 80-163-ABD
VE3EYR 23,548- 180-116-ABCD
VE3KKL 18,000- 160-100-ABD
VE3VN 16,068- 156-103-AB
VE3SMA 7,695- 107- 57-ABDI
VE3LQS 7,275- 97- 75-AB
VE3VAL 5,207- 127- 41- B
VE3FN 5,040- 77- 48-BDE
VE3DSS 960- 26- 24-ABCD
VE3VET 825- 55- 15-B
VE3ETQ 780- 30- 26-A
VE3DJ 476- 26- 14-BD
VE3UOT (VE3OHG,op)
170- 17- 5-D
VE3UOI (VE3OHG,op)
160- 16- 5-D
VE3EQQ 36- 6- 6-B
VE3LNX (+VE3s ADJ,NSQ)
218,900- 608-275-ABCD9EF

Saskatchewan

VE5LY 11,700- 129- 90-**ABD**

Alberta

VE6SW 1,739- 45- 37-**ABD**
VE6BCC 1,350- 40- 34-**A**
VE6AFO 60- 8- 5-**BD**
VE6JW (+WA2TMC)
49,339- 303-149-ABD

British Columbia

VE7ASI 7,991- 122- 61-**ABD**
VE7VHF (VE7s ACI,CDX,CFV,CIM,FKM, FYC,FZX,JAG,ops)
62,208- 412-144-ABDI

DX

K1FJM/FM (+WA1AYS)
4,984- 89- 58-**A**
XE1FUX/2 (+NF6L)
204,605- 726-271-**ABD**
ZF2BL 2,009- 49- 41-**A**

Checklogs

KA1ICR, KA2ICH, WB3DNA, WB4RUA, WB9EEA, VE4IN

1986 CAN-AM Contest Results

By Yuri Blanarovich, VE3BMV/W2
Box 282, Pine Brook, NJ 07058

The 1986 edition of CAN-AM contest ran both phone and CW on the same weekend. Propagation was not all that great. Many stations commented that 10 and 15 meters were practically out of commission. Participation and amount of fun in a contest is directly proportional to the amount of activity, which depends on the propagation conditions. We hopefully hit the bottom of the sunspot cycle and by the fall of 1987 we should start climbing up and have more fun in the contests and on the bands generally.

The big winner of the Multi Operator category trophy, sponsored by the International Radiosport Association, was Mike Fulcher, KC7V, together with Lee Finkel, KY7M, who piloted the KC7V station into the number one score. Their station equipment included 5-el 20-meter beam at 120 ft, 3-el 40-meter beam at 110 ft, 6-el 15-meter beam at 52 ft and 5-el 10-meter beam at 60 ft. A Butternut vertical was used for 80 and 160. The rig was a Kenwood TS-930S and Henry 2K4 amplifier. KC7V won both categories, phone and CW, by a nice margin.

The number two finisher was WA7EGA, the Hal Blegen station, operated with the help of WB7RBJ, W7TJ, NQ7M, NR7B and KC7MM. A very nice effort with a computerized log.

The Canadian Multi Operator Champion trophy, sponsored by the Albuquerque DX Association, goes to Kelly Taylor, VE4ALO, and his helper, VE4VV, who produced the highest score from Canada. Second place was taken by Vitaly Markasin, VE6JO, and his XYL, who helped with logging and duping.

The highest single operator score and winner of the American Champion Trophy (sponsored by the Canadian Radio Relay League) was achieved by Richard Hallman, KI3V/7. Richard really likes operating domestic contests from the West Coast. We should see him more often at the top of contest results. Second place was taken by John Hawkins, K5NW, while William Petlowany, KV6H, finished third.

Trophy Winners

Canadian Champion, Single Operator Combined ARRL Trophy: Wilf Barby, VE7QO

American Champion, Single Operator Combined CRRL Trophy: Richard Hallman, KI3V/7

Canadian Champion, Multioperator Albuquerque DX Assn Trophy: Kelly Taylor, VE4ALO

American Champion, Multioperator IRSA Trophy: Mike Fulcher, KC7V

The Canadian Champion Trophy, sponsored by the American Radio Relay League, was won by Wilf Barby, VE7QO, who was the highest scoring single operator Canadian in both modes. Jim Wade, VE1DH, was second place winner and D. R. B. McArthur, VE6DZ, was third.

The West Coast stations traditionally dominate the single operator CAN-AM scores, and this contest was no exception. Propagation on the higher bands favors the West Coast stations, allowing them to clean up the higher density East Coast. If there was more activity on the low bands, the East Coast could have had an advantage. KI3V/7 and KV6H topped the single operator list on phone, N6OP and K5NW on CW. Canadians had VE7QO, VE7DLM and VE1DH leading the phone mode, while VE7QO, VE3KP and VE1DH topped the CW part.

The single band category in the contest lumps all bands together. This year's phone winner from USA was KE7KF operating 40 meters, with NK7L and AG7M operating 20 meters close behind him. The CW portion was won by W5ASP, ahead of NM2L and WS4E. The Canadian phone winner was VE3OZB on 40 meters, ahead of VO1QU and VE1AGZ. The CW part was won by an American in Newfoundland KA9LXP/VO1, ahead of VE3OEQ. This year the 40-meter band was good to single band operators.

The highest scoring QRP station from the USA, KH6CP/1, won both modes ahead of KB4GID. Canadian QRP phone saw only one entry, VE2AEJ/3. QRP CW was taken by VE3OOL.

We congratulate the winners and thank all the participants. We hope that improving propagation conditions will increase participation. For 1987, we are returning to separate weekends per mode and the Saturday 1800 UTC starting time.

Please mark your calendar for the dates of the 1987 CAN-AM Contest. Phone: 1800 UTC Saturday, Sep 19 until 1800 UTC Sunday, Sep 20. CW: 1800 UTC Saturday, Sep 26 until 1800 UTC Sunday, Sep 27.

Contest Comments

Canadian

VE3DJ/1: FB—lots of fun in a different QTH. VE1AGZ: Great contest. The broadcast stations (on 40 m) didn't help my score, but they didn't spoil the fun either. VE3AXV: Note that you will

find that there are stations claiming phone QSOs with me with QSO numbers up to about 165. They are correct. My computer had a disk I/O failure that wiped out contacts 123 to 165 or so. You know your day is going well when your computer eats your software and log files during the contest! Had fun. See you next year! VO1QU: Started receiving QSL cards 5 days after the contest. You operate and take your chances, Hi. VE6JO: One OM called me and asked why I am in the contest, because in his Callbook I am listed as "Silent Key"...? VE7QO: Phone conditions were good—lots of Ws, CW very poor. VE7KGW: First time, first rate! VE3KK: A most enjoyable contest where I met several old friends including W1BFT that I last had a QSO with when I was CT2AA in 1929. I was not competing for top place but was trying to see if I could work WAS and all provinces during the test. Missed only NE, OH, KH6 and VE5.

US

KI3V/7: I had an excellent time in this year's CAN-AM. My first stateside contest from new QTH—what a difference! I hope that conditions are better next year for 10 and 15 meters, keep up good work! N3EYD: The contest was great I really enjoyed it. My age is 16 and this is the second contest I have been in. I worked the CW part also but didn't send the log. I only made 100 contacts so I didn't think it would matter, Hi. KJ4XM: My first contest ever. I didn't decide to try until my first contact of the day with NV7R. I have never made a VE contact before, but worked 11 during the contest. It was nice to know my 100 W and 80 m Inv Vee got out as well as it did. W5NR: Participation seems to be increasing and hope next year is helped by the sunspot cycle. NØFMR: I stayed on 40 meters this year to avoid the crowds, Hi. W5ASP: Having phone and CW on same weekend is not a good idea. Go back to old format and start Sat 1500 UTC. CW turnout down. N6OP: More activity this year! K5NW: This is a great contest, don't know why more people don't enter it. Absolutely no 15 meters this year really hurt scores. Maybe next year. KC7V: Where was everybody hiding on 75 m? Very little activity compared to CW. Noise levels were very bad here. 40 and 20 meters provided the bulk of the contacts. N5IJI: This was my first contest and I enjoyed it. At the age of 10, I think this gave me valuable experience. W4KM: In the rules you forgot DC! It is not part of Maryland. Contests using states and provinces as multiplier should include DC as a separate multiplier! WN3VAW: Biggest thrill of the contest: working my first Yukon Territory (VY1CW) in 15 years, I hope he QSLs. W8YGR (ex 3JL, C3GJ): I was a personal friend of Jimmy Cotter, VE3JW when he was C3EN in my home town of Ottawa. Most of my radio chums in the '20s are now incapacitated or silent keys. KN1H: Sorry I didn't have more time for the contest, it's definitely one of my favorites—hopefully next year. N1CC: Good to see so many VEs on. Give 2 hour break between modes. KH6CP/1: Somehow I don't think a dipole at 30 feet is adequate for contesting. N7IBG: Need to hear more VEs! A real fun contest for my first one, I'll be back next year. W7KZK: No signals on 10 and 15 m, basically a three band contest for me. See you next year. WDØGVY: Best CAN-AM yet, these bands are not dead!

Scores

Combined mode: Place, call sign, multiplier area (state, province), category (A—all band, Q—QRP, 7—7 MHz single band, M—multi operator), *denotes certificate winner, combined score, phone score, CW score.

Phone and CW listings: Place, call sign, multiplier area, category, *if certificate winner, score, number of QSOs, multipliers.

US Combined Single Op

1	KI3V/7	NV	A*	400595-	290195-	110400	115
2	K5NW	TX	A*	212870-	35535-	177335	113
3	KV6H	CA	A*	150776-	146520-	4256	117
4	N1CC	CT	A*	150125-	104646-	45479	113
5	K9LJN	IL	A*	122427-	1911-	120516	113
6	W6UQF	CA	A*	109338-	26862-	82476	113
7	WC4E	FL	A*	106805-	48425-	58380	113
8	WA1JVV	VT	A	49136-	7826-	41310	113
9	NV7R	MT	A	36961-	26202-	10759	113
10	KW2J	NY	A	34818-	308-	34510	113
11	W3ARK	PA	A	30344-	11169-	19175	113
12	W2DW	NY	A	29218-	3658-	25560	113
13	WB8YJT	KS	A	27027-	15960-	11067	113
14	KH6CP/1	CT	Q	24085-	3675-	20410	113
15	KB4GID	GA	Q	19236-	1296-	17940	113
16	N5IJI	OK	A	18316-	8436-	9880	113
17	W3SOH	VT	A	17475-	3780-	13695	113
18	N6NF	CA	Q	17344-	704-	16640	113
19	N02FFZ	CO	A	17055-	2128-	14927	113
20	WA2LBT	NJ	A	10242-	90-	10152	113
21	KA1LMR	NH	A	8716-	5476-	3240	113
22	AL7CQ	AK	A	7088-	403-	6685	113
23	N2FZJ	NY	A	6915-	1587-	5328	113
24	N2FBV	NY	A	5972-	1725-	4247	113
25	KJ4WH	FL	14	5252-	3472-	1780	113
26	W5NR	TX	A	4700-	252-	4448	113
27	W8YGR	OH	A	1344-	252-	1092	113
28	N3CZB	PA	14	1090-	352-	738	113
29	K7RJ	UT	1.8	296-	140-	156	113
30	KB8AC/9	IN	1.8	39-	27-	12	113

US Combined Multiop

1	KC7V	AZ	M*	489900-	283500-	206400	113
2	WA7EGA	WA	M*	358194-	209568-	148626	113

Canadian Combined Single Op

1	VE7QO	BC	A*	280792-	159572-	121220	113
2	VE1DH	NB	A*	204947-	111051-	93896	113
3	VE6DZ	AT	A*	89423-	59228-	30195	113
4	VE3AXV	ON	A*	61329-	17493-	43836	113
5	VE3CWE	ON	A	25551-	3978-	21573	113
6	VE3MFA	ON	1.8	6693-	5037-	1656	113
7	VE7IQ	BC	A	4733-	1037-	3696	113
8	VE2AEJ/3	ON	Q	323-	203-	120	113

Canadian Combined Multiop

1	VF4ALO	MB	M*	335405-	165352-	170053	113
2	VE6JO	AT	M*	234737-	138528-	96209	113

Phone, US Single Op, All Band

1	KI3V/7	NV	A*	290195-	1102-	127	113
2	KV6H	CA	A*	146520-	639-	110	113
3	N1CC	CT	A*	104646-	461-	107	113
4	W6JTI	CA	A	95462-	378-	118	113
5	WD8GVY	IA	A*	73656-	317-	108	113
6	WA4TWB	WI	A*	52640-	260-	94	113
7	WC4E	FL	A*	48425-	350-	65	113
8	W7KZK	MT	A*	40756-	206-	92	113
9	N3EYD	PA	A*	38048-	317-	59	113
10	K5NW	TX	A*	35535-	239-	69	113
11	W8UQF	CA	A	26862-	172-	74	113
12	NV7R	MT	A	26202-	196-	68	113
13	KB1VL	MA	A*	22933-	149-	71	113
14	KE7QA	UT	A*	16650-	156-	50	113

Phone, US Single Op, Single Band

1	KE7KF	UT	7*	49608-	452-	53	113
2	NK7L	WA	14*	34921-	366-	47	113
3	AG7M	OR	14*	27979-	273-	49	113
4	WD4FIP	KY	7*	20562-	246-	41	113
5	KJ4WH	FL	14*	3472-	50-	31	113
6	WN3VAW	PA	14*	940-	20-	20	113
7	WL7BEM	AK	14	846-	18-	18	113
8	N5JEE	TX	14	520-	18-	13	113
9	WA4KDO	KY	14	405-	20-	9	113
10	N3CZB	PA	14	352-	13-	11	113
11	N7ICC	MT	7	275-	11-	11	113
12	K7RJ	UT	1.8*	140-	14-	5	113
13	KØJVZ	CO	14	55-	5-	5	113
14	W7LQU	ID	14	39-	6-	3	113
15	KB8AC/9	IN	1.8	27-	4-	3	113

Phone, US Single Op, QRP

1	KH6CP/1	CT	Q*	3675-	47-	35	113
2	KB4GID	GA	Q*	1296-	30-	18	113
3	N6NF	CA	Q*	704-	21-	16	113

Phone, US Multiop

1	KC7V (+KY7M)	AZ	M	283500-	1079-	125	113
2	WA7EGA (+WB7RBJ, W7TJ, NQ7M, NR7B, KC7MM, KE8DM)	WA	M	209568-	918-	111	113
3	N2GFA (+ N2GRO)	NY	M	4470-	70-	30	113
4	KE8CI	MO	M	833-	21-	17	113

Phone, Canadian Single Op, All Band

1	VE7QO	BC	A*	159572-	661-	82	113
2	VE7DLM	BC	A*	125476-	562-	76	113
3	VE1DH	NB	A*	111051-	488-	81	113
4	VE6DZ	AT	A*	59228-	385-	52	113
5	VE1CBF	NS	A*	50836-	253-	71	113
6	VE3AXV	ON	A*	17493-	122-	49	113
7	VE7KGW	BC	A	10260-	78-	45	113
8	VE3CWE	ON	A	3978-	53-	26	113
9	VY1CW	YU	A*	504-	53-	24	113
10	VE7IQ	BC	A	1037-	21-	17	113

Phone, Canadian Single Op, Single Band

1	VE3OZB	ON	7*	82194-	488-	57	113
2	VO1QU	NL	14*	15470-	164-	34	113
3	VE1AGZ	NS	7*	6475-	89-	25	113
4	VE3MFA	ON	1.8*	5037-	78-	23	113
5	VE1AGE	NS	14	1720-	30-	20	113
6	VE7AV	BC	3.5	1062-	43-	9	113

Phone, Canadian Single Op, QRP

1	VE2AEJ/3	ON	Q*	203-	11-	7	113

Phone, Canadian Multiop

1	VE4ALO (+VE4VV)	MB	M	185352-	642-	88	113
2	VE6JO (+ XYL)	AT	M	138528-	604-	78	113

CW, US Single Op, All Band

1	N6OP	CA	A*	196396-	612-	148	113
2	K5NW	TX	A*	177335-	568-	145	113
3	KBØG	KS	A*	152592-	512-	136	113
4	K9LJN	IL	A*	120516-	422-	132	113
5	KI3V/7	NV	A*	110400-	429-	120	113
6	W6UQF	CA	A*	82476-	326-	116	113
7	NA8J	IL	A*	76120-	316-	110	113
8	KA1LZR	CT	A*	72039-	294-	111	113
9	WC4E	FL	A*	58380-	254-	105	113
10	N1CC	CT	A	45479-	240-	89	113
11	WA1JVV	VT	A*	41310-	226-	85	113
12	KA1T	MA	A*	41118-	211-	89	113
13	AG7M	OR	A*	38976-	217-	84	113
14	KW2J	NY	A*	34510-	188-	85	113
15	W2DW	NY	A	25560-	164-	71	113
16	W3ARK	PA	A*	19175-	134-	65	113
17	KA4JMZ	KY	A*	18695-	117-	63	113
18	W4YE	VA	A*	18554-	122-	62	113
19	WB1CNM	MA	A	15960-	131-	56	113
20	N6FFZ	CO	A*	14927-	111-	59	113
21	W3SOH	VT	A	13695-	112-	55	113
22	K7EW	OR	A*	11718-	105-	54	113
23	WB8YJT	KS	A*	11067-	97-	51	113
24	NV7R	MT	A*	10759-	96-	53	113
25	WA7RCT	UT	A*	10600-	92-	50	113
26	WA2LBT	NJ	A*	10152-	87-	54	113
27	N5IJI	OK	A*	9880-	85-	52	113
28	WA8YTM	WV	A*	8385-	92-	43	113
29	N7IBG	MT	A	7092-	69-	42	113
30	AL7CQ	AK	A*	6685-	85-	35	113
31	N2FZJ	NY	A	5328-	68-	36	113
32	W5NR	TX	A	4448-	61-	32	113
33	KV6H	CA	A	4256-	63-	32	113
34	N2FBV	NY	A	4247-	63-	31	113
35	KA1LMR	NH	A*	3240-	60-	30	113
36	W2WOE/9	WI	A*	2944-	80-	23	113
37	KL7UR	AK	A	2163-	47-	21	113
38	WA2ASQ	NJ	A	2158-	38-	26	113
39	W8YGR	OH	A*	1092-	26-	14	113

CW, US Single Op, Single Band

1	W5ASP	TX	14*	29050-	287-	50	113
2	NM2L	NY	7*	16023-	157-	49	113
3	WS4E	FL	7*	12810-	140-	42	113
4	NØFMR	KS	7*	4031-	64-	29	113
5	KJ4WH	FL	14*	1780-	38-	20	113
6	K2SX	NY	3.5*	1659-	38-	21	113
7	N3CZB	PA	14	728-	23-	14	113
8	KA8KKV	MO	14	224-	11-	8	113
9	K7RJ	UT	1.8*	156-	13-	6	113
10	W4KM	MD	14	84-	7-	6	113
11	W3UIU	PA	7	75-	6-	5	113
12	KB8AC/9	IN	1.8	12-	4-	1	113

CW, US Single Op, QRP

1	KH6CP/1	CT	Q*	20410-	144-	65	113
2	KB4GID	GA	Q*	17940-	129-	65	113
3	N6NF	CA	Q*	16640-	119-	64	113
4	N8CCA	MI	Q*	10240-	102-	64	113
5	K5DP	OK	Q	5434-	64-	38	113
6	W2JEK	NJ	Q	4588-	56-	37	113
7	KN1H	NH	Q	602-	21-	14	113

CW, US Multiop

1	KC7V	AZ	M	206400-	636-	150	113
2	WA7EGA	WA	M	148626-	503-	138	113

CW, Canadian Single Op, All Band

1	VE7QO	BC	A*	121220-	378-	110	113
2	VE3KP	ON	A*	119040-	344-	120	113
3	VE1DH	NB	A*	93896-	338-	97	113
4	VO1QU	NL	A*	77352-	307-	88	113
5	VE3KK	ON	A*	47690-	177-	95	113
6	VE3AXV	ON	A*	43836-	200-	76	113
7	VE6DZ	AT	A*	30195-	172-	61	113
8	VE3CWE	ON	A	21573-	160-	47	113
9	VE2RO	PQ	A*	19198-	115-	58	113
10	VE2HN	PQ	A	12691-	90-	49	113
11	VE3DJ/1	NS	A*	10320-	76-	48	113
12	VE5AGM	SK	A*	6780-	59-	34	113
13	VE1BSD	NS	A	5425-	54-	35	113
14	VE7IQ	BC	A	3696-	45-	28	113

CW, Canadian Single Op, Single Band

1	KA9LXP/VO1	NL	7*	8090-	73-	29	113
2	VE3OEQ	ON	7*	4416-	48-	32	113
3	VE3MFA	ON	1.8*	1656-	33-	18	113

CW, Canadian Single Op, QRP

1	VE3OOL	ON	Q*	12428-	85-	52	113
2	VE7EKS	BC	Q*	360-	14-	9	113
3	VE2AEJ/3	ON	Q*	120-	9-	5	113

CW, Canadian Multiop

1	VE4ALO	MB	M	170053-	467-	127	113
2	VE6JO	AT	M	96209-	370-	89	113

Checklogs: AE7K, K1UCA

Rules, ARRL International EME Competition

This year's EME contest rules are the same as last year's rules. The fall weekends continue to be successful for EME contacts and the scheduling of the contest will continue to be in the fall whenever possible. The 1987 contest will be the weekends of Oct 17-18 and Nov 14-15.

Special thanks to K1WHS, WA1JXN, W5UN and KB8RQ for help in picking the contest dates. Official forms are available for an SASE to ARRL HQ.

Rules

1) **Object:** Two-way communications via the earth-moon-earth path on any authorized amateur frequency above 50 MHz.

2) **Contest Period:** Two full weekends, Oct 17-18 and Nov 14-15; full 48-hour period UTC each weekend.

3) **Categories**

A) Single operator: One person performs all operating and logging functions, equipment adjustment and antenna alignment.

(1) *Multiband.*

(2) *Single-band:* Single-band entries on 50, 144, 220, 432, 902 and 1296-and-up categories will be recognized in awards offered. Contacts may be made on any and all bands without jeopardizing single-band entry status. Such additional contacts are encouraged and should be reported. Also, see Rule 8, Awards.

B) Multioperator: Two or more persons participate; includes neighboring amateurs within one call area, but with EME facilities for different bands on different team members' premises, as long as no two are more than 50 km (30 miles) apart. Multioperator neighborhood groups cannot use the same call signs at each location; all calls will be listed in the results.

C) Commercial equipment: Stations using equipment that is not amateur (such as a dish antenna for lab equipment owned by an institution or government agency) will have their scores listed separately.

4) **Exchange:** For a valid contact to occur, each station must send and receive both call signs and a signal report in any mutually understood format, plus a complete acknowledgment of the calls and report. Partial or incomplete QSOs should be indicated on your log, but not counted for contest credit. Stations may be worked once per band for credit.

5) **Scoring**

A) QSO Points: Count 100 points for each complete EME contact.

B) Multiplier: Each US and Canadian call area, plus each DXCC country (not US/Canada) worked via EME on each band.

C) Final Score: Multiply QSO points by sum of multipliers worked on each band for your final score.

6) **Miscellaneous**

A) Fixed or portable operation is permitted. Stations operating outside traditional call areas *must* indicate so, identifying the call area of the operating site.

B) Contacts may be on CW or SSB. Only one signal per band is permitted.

C) A transmitter, receiver or antenna used to contact one or more stations under one call sign may not be used subsequently under any other call sign during the contest, except for family stations where more than one call has been issued, and then only if the second call sign is used by a different operator.

D) There is no specified minimum terrestrial distance for contacts, but all communications must be copied over the moonbounce path, regardless of how strong (or weak) a nearby station's terrestrial signal may be.

7) **Reporting:** Entries must be postmarked no later than 30 days after the contest and must include complete log data. Your summary sheet should show a band-by-band breakdown of QSOs and multipliers, and include details of your station setup and a photo.

8) **Awards:** Certificates will be issued to the top five stations worldwide in each of the entry categories: single operator, multiband; single operator, single band (separate awards for each band); and multioperator. Additional awards will be issued where significant achievement or competition is evident. In addition, each station that successfully completes at least one EME contact during the contest period will receive a certificate commemorating that achievement.

9) **Disqualifications:** See January 1987 *QST*, page 81.

Hamfest Calendar

(continued from page 74)

available on a prepaid reserved basis $8 each, or $10 each day of hamfest, if available. Talk-in on 147.87/.27. For more information or table reservations, contact Joe Ship, VE2JS, 5637 Melling Ave, Cote St Luc, PQ H4W 2C1.

Texas (Wichita Falls)—Sep 19-20: The annual WARS hamfest will be held at the Wichita Falls Activity Center on 10th and Indiana St, Sat 8 AM-4 PM and Sun 8 AM-2 PM. Advance tickets $6, $7 at the door. Preregistration ends September 16. Swap tables $5 each. Talk-in on 147.74/14, 146.34/94, 449.30/4.30. Food, parking and many more activities available. VE testing at 1 PM Sat. Bring original copy of FCC license. Mail preregistraion and table reservation with check payable to WARS Hamfest, PO Box 4363, Wichita Falls, TX 76308.

Wisconsin (Waukesha)—Oct 25: The Kettle Moraine Radio Amateur Club Inc will hold its annual Ham, Computer, Video Fest at the Waukesha County Exposition Center, Hwys J and FJ. Tickets are $2.50 in advance and $3.00 at the door. Admission ticket required in addition to table reservation. Reservations accepted until Oct 11. Indoor facilities, will be open rain or shine. Doors open at 8 AM for general public, 7 AM for dealers. For reservations send a check payable to KMRA Club, 313 Hillview Cir, Waukesha, WI 53188. Please include an SASE with order, or order will be held at the door.

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.

Exam Info

THOSE TEMPORARY IDENTIFIERS

Section 97.35 permits newly upgraded licensees to exercise the privileges of the license class just earned for the period of one year following the date of the session where the candidate was tested. However, it also requires hams who are waiting for upgraded tickets to identify using their call sign followed by the word "temporary" on voice and "/" on CW plus the appropriate suffix that reflects the pending license class, KT for Technician, AG for General, AA for Advanced and AE for Extra, when using the new privileges.

We recently heard on the air several amateurs who we knew had just upgraded to Extra and forgot to identify properly (/AE) while they were in the heat of the chase of a recent DXpedition that was operating in the 20-meter CW Extra band. Not good; operating that way could get them Notices of Violation from the FCC!

What do proper identification practices have to do with exams? Not much, except that in order to pass your test recently, you had to study the regulations and are probably more familiar with the regs right now than most hams. It's important that you demonstrate that you understand the material you just studied, not just knew it well enough to pass a test!

Contest Corral

Conducted By Billy Lunt, KR1R
Contest Manager, ARRL

September

2

West Coast Qualifying Run, 10-35 WPM, at 0400Z Sep 3 (9 PM PDT Sep 2). W6OWP prime, W6ZRJ alternate. Frequency is approximately 3590 kHz. Underline one minute of the highest speed you copied, certify your copy was made without aid and send to ARRL for grading. Please include your full name, call sign (if any) and complete mailing address. A large SASE will help expedite your award/endorsement.

5

73 National CW Championship, sponsored by *73 Magazine*, from 0000Z-2400Z Sep 5. (*73* National SSB Championship 0000Z-2400Z Sep 6.) Single operator, all band, within 50 US states only. Work only 18 hours. Work stations once per band. Bands: 160, 80/75, 40, 20, 15 and 10 meters. Exciter output must not exceed 200 watts, external amplifiers prohibited. Exchange RST and state. Entries must operate on a single band during the following time frames: 0000Z-0300Z; 0300Z-0600Z; 0600Z-0900Z; 0900Z-1200Z; 1200Z-1500Z; 1500Z-1800Z; 1800Z-2100Z. You must stay on a band during a time frame and can not change bands until the next time frame. At no time from 0000Z-2100Z may you work the same band during two consecutive time frames. From 2100Z-2400Z, you may changes bands as often as you like. Count 10 points per QSO on 160 or 10 meters, 5 points per QSO on 80/75, 40, 20, 15 meters. Multiplier points: 1 per state worked on 80/75, 40, 20, 15 meters; 2 per state worked on 160 or 10 meters. Multiplier average: total all multiplier points and divide by number of bands worked. Antenna multiplier: 3 antenna multipliers for each band worked with a wire design or vertical antenna (quads are not considered wire antennas for contest). Antennas must be fed with a single feed line and not be in phased configuration. Two antenna multipliers for each band worked with duo-, tri- or quad-band antenna fed with a single feed line and not in a phased configuration. One antenna multiplier for each band worked with an antenna not specified in the previous two categories. More than one antenna may be used on a band but only one antenna at a time. Final score equals QSO points times multiplier average times antenna multiplier. Separate logs per band. Awards. Send logs before Oct 20 to The National Championships, 2665 Bushby Rd, Oak Harbor, WA 98277.

6

LZ-DX Contest, Aug *QST*, p 79.

73 National SSB Championship Contest, see Sep 5 listing for details.

9

W1AW Qualifying Run, 10-35 WPM, at 0200Z Sep 10 (10 PM EDT Sep 9). Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 147.555 MHz. See Sep 2 listing for more details.

12-14

ARRL September VHF QSO Party, Aug *QST*, p 78.

European DX Contest, Part 2, Jul *QST*, p 81.

Washington State QSO Party, sponsored by the Boeing Employees ARS, from 0100Z Sep 12 until 0100Z Sep 14. All bands and all modes. Work stations once per band and mode. CW contacts in CW subbands only. Work WA stations again as they change counties. WA to WA QSOs allowed. Exchange serial number, signal report and state/province/country (county for WA stations). Suggested frequencies: CW—3.560 7.060 14.060 21.060 28.060; phone—3.925 7.260 14.280 21.380 28.580; Novice—3.725 7.125 21.150 28.160. Count 2 points per phone QSOs, 3 points per CW QSOs and 5 points per mobile QSOs. WA stations multiply by total counties/states/provinces/countries. All others multiply by total WA counties worked. Certificates to the top scorers in each state, province, country and WA county. Mail logs (SASE for results) by Oct 15 to BEARS, c/o David Long, N7FNG, 2117 N 52nd St, Seattle, WA 98103.

13

North American Sprint, CW, Aug *QST*, p 79.

19-20

ARRL 10-GHz Cumulative Contest, Jun *QST*, p 82.

Can-Am Contest, phone, Aug *QST*, p 77.

Scandinavian Activity Contest, CW, sponsored by the Eksperimenterende Danske Radioamatorer (EDR-Denmark), from 1500Z Sep 19 until 1800Z Sep 20. (Phone contest 1500Z Sep 26 until 1800Z Sep 27.) Work LA-LB-LG-LJ, JW, JX, OF-OG-OH-OI, OHØ, OHØM, OX, OY, OZ, SJ-SK-SL-SM and TF stations on 3.5, 7, 14, 21 and 28 MHz only. Work stations once per band; no crossmode QSOs. Categories: single op, all band; single op QRP (max input 10 watts); multiop single transmitter; and SWL. Multi-single stations may have only one transmitted signal at any given time and must remain on a band at least 10 minutes after a band change. Exchange signal report and serial number starting with 001. Non-EU stations count 1 point per Scandinavian QSO on 14, 21 and 28 MHz, and 3 points on 3.5 and 7 MHz. Multiply total QSO points by the number of different Scandinavian call areas worked per band. (LA1 = LB1 = LJ1 and W1XX/OZ = OZØ, etc) for final score. Avoid contest traffic in these subbands: 3.560-3.600, 3.650-3.700, 14.060-14.125 and 14.300-14.350 except when this conflicts with national regulations. In that case, split-operation must be used. Mail entries for both modes by Oct 30 to SRAL Contest Manager, Erkki J. Korhonen, OH4NRC/OH8RC, PO Box 44, SF 00441 Helsinki, Finland.

20

W1AW Qualifying Run, 10-35 WPM, at 1300Z (9 AM EDT) Sep 20. See Sep 9 listing for more details.

North American Sprint, phone, Aug *QST*, p 79.

26-27

Scandinavian Activity Contest, phone, see Sep 19-20 listing for details.

Can-Am Contest, CW, Aug *QST*, p 77.

CQ World-Wide RTTY DX Contest, sponsored by *CQ Magazine*, from 0000Z Sep 26 until 2400Z Sep 27. Single ops operate no more than 30 hours. Rest periods must be not less than 3 hours and noted in logs. Multiop stations can operate 48 hours. Classes: single operator, all band; single operator, single band; multioperator, single transmitter, all band. Modes: Baudot, AMTOR (FEC/ARQ), ASCII and AX.25 (no digipeated QSO allowed). Bands: 160, 80, 40, 20, 15, 10 meters. Work stations once per band regardless of mode. Exchange RST, state or VE area (W/VE only) and CQ zone. Count 1 point per QSO with own country, 2 points per QSO with same continent, 3 points per QSO with different continent. Multipliers: 1 per each state (48), VE area (13), DX country (DXCC and WAE lists), CQ zones per band. For final score multiply QSO points times total multipliers. Separate log, dupe sheet, multiplier check list per band. Awards. Send logs before Nov 1 to CQ RTTY Contest, 76 N Broadway, Hicksville, NY 11801.

All Mode 10-Meter QSO Party, sponsored by the Calumet Area Radio Enthusiasts from 0000Z Sep 26 until 2400Z Sep 27. Single op only. Work each station once. Exchange call sign, name, QTH, Ten-Ten number (if any) and Steel City number (if any). Score 1 point per contact without Ten-Ten number, 2 points per contact with Ten-Ten number. Multiply QSO points times total number of Steel City numbers worked. Suggested frequencies: 28.100-28.500. Dupe sheet required if over 100 QSOs. Send logs within 30 days after contest to Glenn Yerby, ND9Y, 11023 Ave D, Chicago, IL 60617.

Italian YLRC International Contest, sponsored by the Italian YLRC "Elettra Marconi," 1300Z Sep 26 until 1300Z Sep 27. Phone and CW. Classes: single YL operator; single OM operator; SWL. Bands: 1.8, 3.5, 7, 14, 21 and 28. No crossmode or crossband QSOs. Work stations once per band. Exchange RS(T) and QSO no. RC members add RC to exchange. Count 1 point for QSO between stations in the same country. Count 3 points for QSO between stations in different countries. Multipliers are DXCC countries and call areas in USA, Canada, Japan, Australia worked per band. A multiplier of 5 for each member of the Italian YLRC. Final score is total QSO points times total number of multipliers. Separate logs per mode and band. Send logs before Nov 30 to Ornella Torri, ISØTUE, Sez ARI, PO Box 22, 09012 Capoterra CA, Italy.

27-28

Fall Classic and Homebrew Radio Exchange, sponsored by the *Classic Radio Newsletter* from 2000Z Sep 27 until 0400Z Sep 28. Object is to restore, operate and enjoy old equipment at least 10 years old and home-brew equipment. Exchange name, signal report, state/province/country, receiver and transmitter type. The same station may be worked with different equipment combinations on each band/mode. Suggested frequencies: phone—3.910 7.280 14.280 21.380 28.580; CW—60 kHz up from lower band edges; Novice—20 kHz up from lower band edges. Add the number of all the different transmitters and receivers worked plus the different states/provinces/countries worked per band. Multiply that number by total number of QSOs. Multiply that total by total years old of all your transmitters and receivers used (minimum three QSOs per unit). For transceivers, multiply years old by 2. For home-brew, count as 25 years old unless older. Mail logs (include SASE for results) to Jim Hanlon, W8KGI, 5560 Linworth Rd, Worthington, OH 43085.

October

3-4

California QSO Party, sponsored by the Northern California Contest Club, from 1600Z Oct 3 until 2200Z Oct 4. Single ops limited to 24 hours, time off periods at least 15 minutes and noted in log. Work stations once per band and mode. California stations may be worked again if they change counties. CW QSOs must be in CW subbands. No repeater or MCW QSOs. Suggested frequencies: CW—1805 and 50 kHz up from low end; phone—1.815 3.850 7.230 14.250 21.300 28.500; Novice—10 kHz up from band edges and 28.490. Try CW on the half hour; 10 on the hour 1700Z-2000Z; 147.54 at 2000Z, 0000Z, 0400Z; 160 at 0500Z; 80 at 0700Z. Exchange QSO number, state (county in CA), province or country. Scoring: phone 2 points, CW 3 points. Multiply QSO points times number of CA counties (max 58). California stations multiply by number of states, provinces or counties. Awards. Submit entries by Nov 15 to NCCC, c/o Gary Caldwell, WA6VEF, 1830 Polk St, Concord, CA 94521.

International DX-HC Middle of the World Contest, sponsored by the Guayaquil Radio Club, from 0000Z Oct 3 until 2400Z Oct 4. SSB only. Entry classes: single operator 7 MHz; single operator 14 MHz; single operator both bands; multioperator single transmitter both bands. No crossband QSOs. Work HC stations. Exchange RS plus 3-digit serial number. Count 10 points per QSO with HC stations

and 20 points per QSO with HD stations (HD1GRC, HD7GRC, HD8GRC, HDØGRC). Multipliers are the sum of the numerals in the HC zones worked (HC1 = 1, HC2 = 2, HC3 = 3, HC4 = 4, HC5 = 5, HC6 = 6, HC7 = 7, HC8 = 8). Count zones once per band (max 36). Final score is total QSO points times multiplier points. Send logs before Dec 31 to Contest Manager, Guayaquil Radio Club, PO Box 5757, Guayaquil, Ecuador.

VK/ZL/Oceania DX Contest, phone, sponsored by the New Zealand Assn of Radio Transmitters and the Wireless Institute of Australia, from 1000Z Oct 3 until 1000Z Oct 4 (CW contest 1000Z Oct 17 until 1000Z Oct 18). Single op and SWL classes. Operate only 12 hours in even one-hour blocks (1000Z-1100Z, 1200Z-1300Z, etc; not 1035Z-1135Z, etc). Work stations once per band. No crossband QSOs. Exchange signal report and serial number starting with 001. Count 2 points per VK/ZL/O QSO. Multiply by total VK/ZL/O prefixes worked per band. Use separate log for each band and mode. Mail entries to be received by Feb 15 to NZART Contest Manager, ZL2GX, 152 Lytton Rd, Gisborne, New Zealand.

Columbus Contest, sponsored by the Italian Amateurs Radio Association, from 0000Z Oct 3 until 2400Z Oct 4. 1.8, 7, 14, 21, 28 (no 3.5 MHz). Modes: CW, SSB, RTTY, SSTV, Mixed. Classes per mode: single op, single band; single op, all band; multiop, single band; multiop all band. Also QRP in each class (5 watts output). Single ops operate only 30 hours. Rest periods must be at least 30 minutes each and no more than 5 rest periods and noted in log. European stations work non-European stations. W/VE exchange RST and state/province; Italian exchange RST and province; others exchange RST and ITU zone. Multipliers are Italian provinces and call areas of European countries. Count 3 points per QSO on 14, 21, 28; 6 points per QSO on 1.8 and 7. For final score multiply QSO points times total multipliers. Use separate logs per band and only 40 QSOs per log sheet. Awards. Send logs to ARI, PO Box 347, 16100 Genova, Italy.

6

West Coast Qualifying Run, 10-35 WPM, at 0400Z Oct 7 (9 PM PDT Oct 6). See Sep 2 listing for more details.

8

W1AW Qualifying Run, 10-40 WPM, at 0200Z Oct 9 (10 PM EDT Oct 8). See Sep 9 listing for more details.

10-11

Radiosporting Championship Contest, sponsored by *Radiosporting Magazine,* phone from 0000Z-2400Z Oct 10; CW Contest 0000Z-2400Z Oct 11. Phone and CW are separate contests, however, the combined phone and CW scores will be listed and awards issued. Classes: single operator all band, single operator single band, multioperator single transmitter, multioperator multitransmitter. In each class there are subclasses of high power (legal limit), low power (200 W PEP) and QRP (10 W PEP). Also, club competition for combined phone and CW. Club competition entries may claim a maximum of one station per category in selected power groups on each mode (max 18). Single-operator stations may operate no more than 22 hours (they must take 2-hour rest period in one or two periods and noted in log). Multioperator stations may operate the full 24 hours. Bands: 1.8, 3.5, 7, 14, 21, 28 MHz. Work stations once per band and mode. Exchange RS(T) plus serial number starting with 001. Count: 1 point for each exchange sent; 1 point for each exchange received on phone; 2 points for each exchange received on CW (2 points for complete phone contact; 3 points for complete CW contact). Multipliers: DXCC counties; call areas in the following countries—USA (W1-Ø), Japan JA1-Ø), Australia (VK1-8), Canada (VE1-8, VO1, VO2, VY1), USSR (UA1,3,4,6,9,Ø) per band. When counting call area as multiplier do not count country as multiplier. Also, a multiplier of one for each of the land, maritime and aeronautical mobile stations (/M, /MM, /AM). Final score equals total QSO points times total multipliers. Awards. Send logs before 30 days after the contest to Radiosporting Contest Chairman, Walt McGugan, W3FG, PO Box 7, Odenton, MD 21113-0007.

GARTG-SSTV Contest, Part 2, sponsored by the German AR Teleprinter Group, 0000Z-0800Z Oct 10, 1600Z-2400Z Oct 10 and 0800Z-1600Z Oct 11. 3.5, 7, 14, 21 and 28 MHz only. Work stations once per band. Exchange call signs, signal report and serial number. GARTG members also send membership number. Count 10 points per QSO. Multipliers: countries as defined by the WAE and DXCC lists and W/K, VE/VO, JA, PY, VK call areas. Final score = QSO points × multipliers worked per band × continents worked per band. Add 50 bonus points per GARTG member worked. Mail logs to be received within 2 months to Wolfgang Punjer, DL8VX, PO Box 90 11 30, D-2100 Hamburg 90, Fed Rep of Germany.

Pennsylvania QSO Party, sponsored by the Nittany ARC, from 1600Z Oct 10 until 0500Z Oct 11 and from 1300Z-2200Z Oct 11. Classes of entry: Single-op, mobile (multi-op is OK), multi-single, multi-multi, QRP (max 5 W output), Novice (identify with /N on CW and "Novice" on SSB). Phone and CW. CW contacts in CW subbands only. Work stations once per band and mode. No repeater QSOs. Work mobiles again as they change counties. Exchange signal report, serial number and QTH (county for PA stations, ARRL Section for others). Suggested frequencies: CW—40 kHz up from low end and 1.810 MHz, Phone—1.850 3.980 7.280 14.280 21.380 28.580; Novice—10 kHz up from low end; mobile window—5 kHz below listed frequencies. Try 160 around 0300Z Oct 11. Count one point per phone QSO, 1.5 points per CW QSO and 2 points per 80/160 meter CW QSO, 10 points per Novice CW QSO and 5 points per Novice SSB QSO. PA stations multiply by total ARRL sections plus PA counties, plus max 1 DX country. Others multiply by total PA counties (max 67). Stations on county lines count for 1 QSO credit but multiple county multipliers. Mobiles add 500 bonus points for each county from which 10 or more QSOs are made. QRP and Novice entries multiply score times 2 for final score. Awards: plaques, certificates, club trophy, club gavel. Mail entry by Nov 15 to Douglas R. Maddox, W3HDH, 1187 S Garner St, State College, PA 16801.

11

RSGB 21/28 MHz SSB Contest

11-12

Illinois QSO Party, sponsored by the Radio Amateur Megacycle Society, from 1800Z Oct 11 until 0200Z Oct 12. Phone and CW. No repeater QSOs. Suggested frequencies: CW—3.550 7.050 14.050; phone—3.890 7.290 14.290; Novice—30 kHz up from bottom. Other bands may also be used. IL stations exchange RST and county; others exchange RST and state/province/country. Count 1 point per phone QSO, 2 points per CW QSO, 25 points per contact with K9CJU. Work stations once per band and mode, and once per band, mode, county for IL mobile stations. IL stations multiply QSO total by sum of states plus VE provinces plus a maximum of five DX countrires. Count additional DX for points but not multipliers. IL portables and mobiles may add 200 to final score for each country from which 10 or more contacts were made. All others multiply QSO points by the number of IL counties worked. All stations may take one bonus multiplier for each eight QSOs with the same IL county. Awards. Send logs by Nov 9 to RAMS, c/o Joe LeKostaj, WB9GOJ, 9134 Ewing Ave, Evanston, IL 60203.

17-18

ARRL International EME Competition, This issue, p 85.

Rhode Island QSO Party

VK/ZL/Oceania DX Contest, CW, see Oct 4-5 listing for details.

Simulated Emergency Test

18

RSGB 21 MHz CW Contest

24-25

CQ WW Contest, phone

25

W1AW Qualifying Run

31-Nov 1

MD-DC QSO Party

GARTG-RTTY Contest, part 4, sponsored by the German AR Teleprinter Group. HF portion is from 1300Z-1700Z Oct 31. VHF portion is from 0800Z-1200Z Nov 1. Score HF and VHF portions separately. Bands are 80 and 40 meters; 144, 432 and 1296 MHz for VHF. No repeater QSOs. Exchange RST, QSO number, name, QTH; VHF add grid-locator. Work each station once per band. Scoring: HF—1 point per QSO; VHF: 144—1 point per kilometer; 432—2 points per kilometer; 1296—3 points per kilometer. Total of QSO points is the final score. Classes are A—more than 200 W input, B—less than 200 W input, C—SWL, D—VHF. Logs must include all information. Mail within 20 days to Wolfgang Punjer, DL8VX, PO Box 90 11 30, D-2100, Hamburg 90, Fed Rep of Germany.

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 **Oct 1** to make the **December issue.** Please include name of contest, dates, times (Z) and complete rules. Send to Contest Corral, 225 Main St, Newington, CT 06111.

Strays

DXers, ATTENTION S'IL VOUS PLAIT

☐ The Clipperton DX Club will hold its ninth annual convention near Paris at Le Raincy on Saturday, September 19. For details, contact Yannick Delatouche, F6FYD, BP8, 78570 Andresy, France, tel (1)39 74 06 05.

QST congratulates . . .

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

- Earl Reichman, W8NBK, of Dennison, Ohio
- Benji Hara, WU4O, of Boynton Beach, Florida
- Bill Werner, W3FYK, of Bethlehem, Pennsylvania
- Wilson Davidson, K4TM, of Lynchburg, Virginia
- Paul Hudson, WA6AVJ, of Riverside, California
- Richard Stevens, W1QWJ, of Ashuelot, New Hampshire
- Edward Caldwell, K4GI, of Chapel Hill, North Carolina
- Paul Kuhlmeier, WØWMP, of Fort Madison, Iowa
- Killian Dolsberry, NØOA, of Leavenworth, Kansas
- Lester Peterson, W9YCV, of Greenfield, Wisconsin
- Norman Gillin, W1PLX, of Deer Isle, Maine
- Duncan Copley, W2RME, of Norwich, New York
- Grant Storey, W6NTK, of Oakhurst, California

☐ Mel Granick, KS2G, of Syosset, New York, on receiving the 1987 Ohio State Award for excellence in broadcasting on the natural and physical sciences.

☐ Andy Clark, W4IYT, of Miami Springs, Florida, on receiving the Exchange Club's 34th Annual Book of Golden Deeds award.

Special Events

Conducted By Mark R. Burke KA1MIS
Contest Assistant, ARRL

Waterford, Connecticut: The Tri-City ARC will operate KA1BB, 1700Z **Sep 5** until 2300Z **Sep 7**, from the Waterford, CT I-95 weigh station to promote safe Labor Day holiday auto travel, and to commemorate Connecticut's historical role in the creation of the US Constitution, 200 years ago. This event is in conjunction with the fifth annual Stay-awake Coffee Shop offered by BSA Troop 24, Niantic, CT. Suggested frequencies: phone—3.895 7.245 14.295 28.325; CW—7.075 7.130 14.045. Talk-in to coffee shop on FM 146.52 direct and CB channel 19. QSL with letter-size SASE via Tri-City ARC, PO Box 686, Groton, CT 06340.

Heston, Indiana: The Porter Co ARC will operate N9RD **Sep 5-6**, 1300Z-2300Z each day, from the Heston Steam Museum for the annual Steam Show. Suggested frequencies: 3.966 7.266 14.266 21.266 28.466. For a special QSL with a postage cancellation from the special Post Office set up at the site, send QSL and SASE to PCARC, PO Box 1782, Valparaiso, IN 46383.

Tombstone, Arizona: The Old Pueblo RC will operate W7GV, 0000Z **Sep 5** until 2200Z **Sep 7**, sponsoring their 6th annual special event from the OK Corral, site of the famous shootout between the Earps and the Clantons in 1881. Suggested frequencies: phone—3.980 7.280 14.280 21.380 28.380; CW—3.730 7.130 14.060 21.130 28.130; FM—ZIA link and packet. For certificate, send 9- × 12-in (39 cents) SASE to W7GV, PO Box 42601, Tucson, AZ 85733.

Milan, Indiana: The Ripley County Repeater Assn will operate N9DOK **Sep 6**, 1300Z-2200Z, to honor the Milan High School Basketball Team, 1954 Indiana State Champions, the basis for the movie "Hoosiers" now playing around the world. Suggested frequencies: 7.245 14.245 28.320. Also, contacts can be made locally through 146.205/805. Novice/Technician contacts on 10 meters especially sought. For unfolded certificate, send 9- × 12-in SASE, or for folded certificate, send legal-size SASE to RCRA, Box 318 R3, Osgood, IN 47037.

Schaumburg, Illinois: The Schaumburg ARC will operate WB9TXO **Sep 6**, 1500Z-2000Z, from the Schaumburg Septemberfest site. Suggested frequencies: 7.250 14.250 28.400. For certificate, send QSL to SARC, PO Box 68251, Schaumburg, IL 60168-0251.

Smith Center, Kansas: The First Christian Church of Smith Center will operate WAØHOZ **Sep 6**, 1900Z-2100Z, to commemorate the 100th anniversary of the church. Operation will be on 14.300. For QSL or certificate, send QSL and SASE to WAØHOZ, PO Box 103, Smith Center, KS 66967.

Farwell, Michigan: The Mid-Michigan Amateur Radio Club will operate a special events station, 1300Z **Sep 6** until 0200Z **Sep 7**, to commemorate Michigan's sesquicentennial. Send SASE to N8ARI, PO Box 696, Farwell, MI 48622.

Ledyard, Connecticut: The Tri-City ARC will operate K1SFC **Sep 11**, 1400Z-2400Z, and **Sep 12**, 1800Z-2000Z, from the Ledyard Fair, to commemorate Connecticut's historical role in the creation of the US Constitution, 200 years ago. Suggested frequencies: phone—7.245 14.295; CW—7.130. QSL with letter-size SASE via Tri-City ARC, PO Box 686, Groton, CT 06340.

Valparaiso, Indiana: The Porter Co ARC will operate N9RD **Sep 12**, 1800Z-2400Z, to celebrate the annual Orville Redenbacker Popcorn Festival. Suggested frequencies: 3.966 7.266 14.266 21.266 28.466 146.52. For certificate, send 9- × 12-in SASE to PCARC, PO Box 1782, Valparaiso, IN 46383.

Milford, Connecticut: The Greater Bridgeport ARC will operate WA1RJI **Sep 12**, 1400Z-2200Z, at the 16th annual Engine 260 Antique Fire Apparatus Show and Muster at Eisenhower Park. Suggested frequency: phone—14.300. For special certificate, send a 9- × 12-in SASE to GBARC, c/o Sterling House Community Center, 2283 Main St, Stratford, CT 06497.

Mount Lebanon, Pennsylvania: The Mount Lebanon High School ARC will operate their club station **Sep 12**, 0700Z-2300Z, to commemorate the 75th anniversary of the Mt Lebanon Township. Suggested frequencies: phone—14.250 21.370 28.480; CW—14.050 28.150; FM—146.355/955. For certificate, send QSL to Mt L HSARC, 7 Horseman Dr, Pittsburgh, PA 15228.

Winsted, Connecticut: The Quinnipiac Council BSA will operate W1GB, 2330Z **Sep 11** until 0400Z **Sep 12** and 1200Z **Sep 12** until 0400Z **Sep 13**, during the first annual Trader-O-Ree Camp Sequassen. Suggested frequencies: phone—3.920 7.240 14.290 21.340 28.400; CW—3.725 7.125 21.150. For special QSL, send QSL and SASE to Skip Paquette, KA1EAJ, 121 West Dayton Hill, Wallingford, CT 06492.

Clay Center, Nebraska: The Hastings ARC will operate WØWWV, 1800Z **Sep 12** until 1800Z **Sep 13**, at the Old Trusty Antique and Collector Show. Operation will be in the general portion of the 80, 40 and 20-meter bands. For a QSL, send business-size SASE to HARC, PO Box 128, Hastings, NE 68901.

Bethlehem, Connecticut: The Hen House Gang ARS will operate W1FHP **Sep 12-13**, during daylight hours, celebrating the 63rd annual ARGI Fair. Operation will be 40- and 20-meter SSB, and Novice 40-meter band. Send stamp to W1FHP, Hard Hill Rd, Bethlehem, CT 06751.

Idaho Falls, Idaho: The Eagle Rock ARC members NO7B and KX7C will conduct a special-event station **Sep 17**, 1800Z-2400Z, in commemoration of the 200th anniversary of the adoption of the Constitution of the United States of America. Suggested frequencies: phone—14.250; CW—7.125. For certificate, send 9- × 12-in SASE (2 units of First Class postage) or SASE for QSL card, to NO7B, 455 East 24 St, Idaho Falls, ID 83401.

Wright-Patterson AFB, Ohio: The Wright-Patterson Air Force Base MARS Station, AGA1WP, and the Dayton ARA, W8BI, will operate two special-event stations, **Sep 18-20**, 1300Z-2100Z each day, in honor of the Air Force's 40th anniversary, "The Festival of Flight." Suggested frequencies: 3.2295 7.7285 14.5285 20.8745. Listening frequencies inside the amateur bands will be announced. Amateurs are cautioned on operating split to be sure they are transmitting on amateur frequencies. W8BI will be operating on the General-class phone portions of the amateur bands and in the Novice/Technician 10-meter phone/CW band. For a special Festival of Flight Commemorative QSL, send QSL and SASE to W8BI, PO Box 44, Dayton, OH 45401.

Detroit, Michigan: Members of the Southeastern Michigan DX Assn will operate K8JP **Sep 19**, 0001Z-2400Z, commemorating the visit of Pope John Paul II to the Detroit area. Operation will be 10-80 meters, both phone and CW. For special commemorative QSL, send QSL and SASE to Larry Zabkowski, K8NLD, 18082 Gaylord, Fraser, MI 48026.

Leavenworth, Kansas: The Pilot Knob ARC will operate WBØVZG, **Sep 19**, celebrating Buffalo Bill Days. Suggested frequencies: all General-portion frequencies, 10-meter Novice frequencies and 147.000 MHz. For certificate, send QSL and SASE to Bill Meyers, WBØIEL, 202 S Main St, Lansing, KS 66043.

Norman, Oklahoma: The South Canadian ARS will operate W5OU **Sep 19**, 1400Z-2400Z, celebrating their 10th anniversary. Suggested frequencies: phone—7.237 14.237 21.337 28.337; RTTY/AMTOR—14.087; packet—145.01; FM—147.060; ATV—439.25. For a certificate, send QSL and 9- × 12-in SASE (39 cents) via SCARS, c/o KD5IT, 2735 Poplar La, Norman, OK 73072.

Washington, Pennsylvania: Washington Amateur Communications will operate KA3MZS **Sep 19**, 1400Z-2100Z, and **Sep 20**, 1600Z-2000Z, in honor of the Covered Bridge Festival. Suggested frequencies: 3.875 7.250 14.250 21.350 28.333. For a special Covered Bridge QSL card, send QSL and SASE to W. A. COM, PO Box 1386, Washington, PA 15301.

Wellesley, Massachusetts: The Wellesley ARS will operate W1TKZ, 1300Z **Sep 19** until 0100Z **Sep 20**, to celebrate the new Novice 10-meter privileges. Operation will be SSB at 28.350. For a special QSL card, send QSL and SASE to Wellesley ARS, 211 Washington St, Wellesley, MA 02181.

Monticello, Illinois: The Piatt County ARC will operate K9IYP, 1400Z **Sep 19** until 2100Z **Sep 20**, to commemorate the Railway Museum. Operation will be in the lower 25 kHz of the General 80, 40, and 20-meter bands. For commemorative certificate, send QSL, contact number, and 9- × 12-in SASE to K9IYP, Box 3, Monticello, IL 61856.

Clyde, Ohio: The Clyde ARS will operate station NF8E **Sep 19**, 1600Z-2400Z, and **Sep 20**, 1600Z-2200Z, from the Winesburg Fall Fair. Suggested frequencies: phone—3.900 7.250 14.300 21.400; CW—7.125 21.150.

San Benito, Texas: The San Benito ARC will operate WA2VJL **Sep 20**, 1400Z-2200Z, celebrating the 80th birthday of Mr San Benito Montolovo, the first person born in San Benito after it was incorporated as a city in 1904. Suggested frequencies: 21.360 28.410. For certificate, send QSL and contact number with business-size SASE to San Benito ARC, PO Box 1382, San Benito, TX 78586-1382.

Chicago, Illinois: The Chicago ARC will operate a special-event station **Sep 20**, 1600Z-2200Z, during their open house. Live demonstration of Amateur Radio, movies, information on all aspects of ham radio will be provided by expert hams.

Findlay, Ohio: The Findlay RC will operate W8FT, 1700Z **Sep 26** until 2200Z **Sep 27**, to commemorate the 100th anniversary of the area's oil and gas boom. Operation will be in the General band, the Novice 10-meter phone band and club repeaters. For QSL, send SASE to Findlay RC, Box 587, Findlay, OH 45839.

Lumberton, North Carolina: The Carolina ARL will operate KS4S, **Sep 26-27**, 1300Z-2100Z on both days, from the Lumberton Municipal Airport to commemorate the 200th anniversary of the founding of Robeson County, North Carolina. Suggested frequencies: 3.870 7.240 14.290 28.400. For certificate, send QSL to CARL, PO Box 2208, Lumberton, NC 28359.

Boston, Massachusetts: The council of EMA AR Clubs will operate KA1SM **Sep 26** and **Sep 27** 1300Z-2100Z both days, from a special Amateur Radio exhibit at Boston's Museum of Science. Operating will be on all General-portion HF bands, primarily 20 meters, and the Novice portions of 40, 15, 10 and 1¼ meters. QSL to Richard Clancey, KA1SM, 25 Rolling La, Dover, MA 02030.

Fairmount, Indiana: The GCARC will operate W9EBN 1700Z **Sep 26** until 1700Z **Sep 27** to celebrate Museum Days in the home town of James Dean. Operation will be 10 kHz from the lower end of the General 20, 40 and 80-meter bands, also 28.350. For certificate, send QSL and SASE to KA9TBM or N9FBB via *Callbook* address.

Strays

I would like to get in touch with ...

☐ anyone with information on a Vomax split-band speech processor. Jim Nazar, VE4NC, 20 Main St, Flin Flon, MB R8A 1J4, Canada.

☐ anyone with information on modifying a Kenwood TS-520D for 30 meters. John Thomas, K4OSR/PA3CTN, Drogteropslagen 58, 7705 PH Drogteropslagen, Netherlands.

Section News

Administered by Steven Ewald, WA4CMS

The ARRL Field Organization Forum

CANADA

ALBERTA: SM, Bill Gillespie, VE6ABC—A/SM: VE6AMM. SEC/TC: VE6AFO. OO: VE6TY. STM/DEC/SM: VE6ABC. CALGARY AMATEURS PROVIDE 3-day radio communications for bicycle tour plus Banff to Calgary running relay race. Edmonton amateurs host the Namao Hamfest May 29-31 and a great time had by all. Record attendance at all events including banquet/dance/pancake breakfast. Traffic: APSN QNI 874, QTC 10, Informal 31. ATN QNI 231, QTC 66. Personal totals: VE6CHK 60, VE6GUS 36, VE6XG 11, VE6QN 7, VE6AKY 3.

BRITISH COLUMBIA: SM, H. Ernie Savage, VE7FB—British Columbia Public Service Net, 3729 KHz, nightly at 0130 Universal Time. VE7DDF Ford Warner has retired as Net Manager. Ford was Assistant Net Manager starting September 1979 until VE7QC Sil Shaw became a Silent Key in October 1986. Ford took over as Net Manager until June 1987. His record will stand as one of the hardest working members and we will all sincerely miss him. Many thanks Ford, from all of us. I enjoyed being able to help you and the net as your SM. We now must welcome VE7BLO, Jim Wallace, who has volunteered to be our Net Manager. Jim is handicapped in his writing. Also he will be operating from Pearson Hospital in Vancouver. Jim is also a first class CW operator, and an old member of both BCPS net and BCEN. British Columbia Emergency Net. 3650 at 0300 UTC N M Ferdi VE7EJU reports June was slow. QNIs 817-QTCs 237 BCPS net reports High 179-Low 100 Total 3900. We are looking for more members to join CRRL AREC. Send a QTC or phone your SM/SEC for a form seven. TI. Traffic: VE7BNI 308, VE7EJU 157, VE7EJW 88, VE7ANG 73, VE7XA 45, VE7FME 42, VE7FB 26, VE7DJ 17, VE7EGM 11, VE7BZI 10.

MANITOBA: SM, Jack Adams, VE4AJE—How many Amateur Radio clubs have a special person who silently works away for the betterment of the club, by volunteering to do this or that, in fact doing things without being asked. We here in (Dauphin Amateur Radio Club) are fortunate to have such an individual in the person of Doris Dunfield, VE4APL. As SM and on behalf of the club, we thank you Doris! Who else out there in this big province is a special person in your club or group? Let me know about them, they are jewels and should be recognized. Net reports: CRRL EPN. Mgr., VE4LB-0000Z on 3759 KHz- 30 sessions, 750 QNI, 10 QTC. MMWX: Mgr., VE4TE MAC 1330Z on 3743 KHz 30 sessions, 636 QNI 36 QTC. MTN (CW) Mgr., VE4IX MAX 18 sessions, 144 QNI, 45 QTC. Individual Traffic: VE4AJE 47, VE4RO 38, VE4TE 31, VE4IX 30.

ONTARIO: SM, Larry Thivierge, VE3GT—A/BM: VE3GT. SEC: VE3GV. STM: VE3CYR. TC: VE3EGO. VE3CLX enjoying QRP activities on 40 meters and restoring old amateur equipment including an old Howard receiver, model 440 that I used to own. I have a request for an Ontario amateur call sign car license plate — if anyone has an old one for barter or sale, please contact me. During a recent sporadic E opening on two meters, VE3FN worked a number of stations in Texas, a distance of 1400 miles from Ottawa. VE3IGD, VE3FIT and VE3FGU enjoyed their operation of ZF1IC for a week on all bands, phone and CW. VE3WM is busy taking up residence in Ottawa after a number of years in London. Due to the efforts of Metro Toronto EC VE3HSF, ARES membership there is now well over the 80 mark, an increase of 25%. Gord issued exercise participation awards to VE3EJW, VE3POJ, VE3PQ and VE3OV for their help in the search for a missing girl in Unionville recently. Despite the late call at night, they were all ready to assist. Congratulations to the Ontario Trilliums and their helpers who do such a great job in the sorting and distribution of our QSL cards — make sure you have a supply of envelopes on hand with them. New members of their Club are VE3HZL and VE3NVH. VE3LVH in St. Catharines has a message board called Radiogram on his BBS which allows the non amateur user as well as amateurs to send messages via amateur radio through the amateur BBS. VE3OCF and VE3ISD pick them up for relay to the NTS nets. Scarborough ARC sponsoring the Canadian County Century Club Award for contacting 100 counties or districts in Canada. So far there have been only 9 certificates issued. London ARC "roasted" their swap shop manager, "Crazy Eddie" VE3EWO to congratulate him on his dedication and for a job well done for the past 25 years in that post. Joining present Directors VE3DQK, VE3IOG, VE3JPX, VE3NGF of the Toronto FM Society are new Directors VE3BDJ, VE3BDW, VE3EKF, VE3SST. New amateurs in the Section are: VE3DOR, VE3LFT, VE3WHT, VE3SLL, VE3XOF, VE3PVN. New Advanced are: VE3PFZ, VE3TUR, VE3OOU and VE3NGZ. Traffic: VE3GSQ 350, VE3FAS 288, VE3ORN 177, VE3OCF 135, VE3GNW 126, VE3CYR 103, VE3BCZ 80, VE3DPO 71, VE3GT 61, VE3WV 50, VE3AJN 40, VE3BUO 40, VE3DQK 36, VE3EAM 33, VE3KCZ 32, VE3BAJ 23, VE3WG 22, VE3WM 16, VE3KXB 14, VE3FGU 6, VE3BDM 2.

QUEBEC: SM, Harold Moreau, VE2BP—STM: VE2EDO. BM: VE2ALE. TC: VE2ED. OO: VE2DNH. In spite of the bad WX, participants were out for Field Day as in the past years. It seems that most had a QSO on Packet. The next weekend was Canada Day contest, very few VE2s were heard. Felicitations aux nouveaux membres du conseil d'administration de l'UMS,President, VE2GDZ. Vice President, VE2GXS. Tresorier, VE2YLB. Secretaire, VE2FUR. Directeurs, VE2s, BDS, LMD and AND. Traffic: VE2BP 51, VE2WH 34, VE2EC 22, VE2JN 14.

ATLANTIC DIVISION

DELAWARE: SM, Harold K. Low, WA3WIY—SEC: KC3TI. DEC: K3PFW and N3FDL. EC: KC3JM, KA3LNK, WA3EWK, WA3PHT, WA3VDJ. STM: KA3GRQ. PIO: WB3DPJ. SGL: AF3R, PSHR K3JL. To all affiliated clubs that have not yet sent their annual reports, please take time to do it now. AWARE meetings 4 times a year. Nanticoke ARC has a new repeater on air 147.300. Brandywine repeater extended coverage with new equipment. AWARE will have exams Sept. 26, Oct. 24, Dec. 12, and FSARC will have one Nov. 21. New members AWARE Sam Dayton, N3BHD, WA3KEF, WA3JMM, W3FEA, KA3FPE. DTN stations 304 traffic 34 in 22 sessions. DEPN stations 45 traffic 16 in 4 sessions. SEN stations 79 traffic 1 in 5 sessions. Traffic: W3QQ 83, WA3WIY 37, WB3DUG 33, KA3GRQ 26, K3JL 23, K3YBW 18, W3PVO 18, W3FEG 10, KC3JM 8.

EASTERN PENNSYLVANIA: SM, Kay Craigie, KC3LM—ASM: WA3PZO, KA3A, KO3B, K3ZFD. SEC: WA3PZO. ACC: KC3QB. SGL: WA3IAO. STM: KB3UD. PIO: W3AMQ. TC: W3FAF. In a growing Amateur Service we need Assistant Technical Coordinators all over EPA. We appreciate the efforts of ATCs WA3DSP, WA3IAC, K3NVI, K3OQF, KT3W, KA3OMQ, KC3EC, W3CPR, and W3FM. To find out about this appointment, contact TC W3FAF at his callbook address. Time to get serious about the PA QSO Party next month! New Novice multipliers make it worth your club's time to recruit and train Novice ops. Your SM is sponsoring the new "top Novice" plaque. There's also a new plaque this year for small/medium size clubs. Send an SASE to Nittany ARC's W3HDH if you don't have contest info by now. Best of freshman luck to KA3FXX, stepping down as prez of Perkiomen Valley to attend Carnegie Mellon. Welcome Scranton/Pocono, Lebanon Valley, and Tioga County clubs back to active ARRL affiliation. SM KC3LM and SEC WA3PZO will speak at this month's Mid-Atlantic ARC meeting. Big York Hamfest on Sept. 26-27. Listen for K3MTK special event station from Philadelphia during this month's Constitution bicentennial celebration. State Government Liaison WA3IAO appeared on 2 Philly radio talk shows last summer to publicize Amateur Radio. Speaking of publicity, remember the Sesame Street song about "the people in your neighborhood"? PIA K3WPI suggests building a series of local newspaper articles on the theme of hams in various occupations, to illustrate our constructive involvement in many walks of life. All repeater groups are urged to contact TPARC frequency coordinators to apply for coordination, if your machine is not in the 1987-88 ARRL Directory at all or if it's listed with a "#" (uncoordinated) symbol. The address is Box 36, Croydon, PA 19020-0903. Please enclose an SASE. KB3UD has been appointed an Official Bulletin Station; his packet BBS not only lists W1AW bulletins but also forwards our EPA bulletins to your local board. Amateurs interested in traffic are invited to check into our Section nets:

EPAEPTN	3917.5	Daily 6 PM	WA3EHD, Mgr.
EPA	3610	Daily 7 & 10 PM	AA3B, Mgr.
PTTN	3610	Daily 6:30 PM	WB3EPU, Mgr.

Also we encourage you to support your local ARES and traffic nets. NTS net reports and individual traffic reports should be mailed or radiogrammed directly to STM KB3UD by the 5th of each month. Reports from ARES DECs should be sent to SEC WA3PZO rather than to the STM. Traffic (May): N3AZW 463, N3COY 194, N3DRM 137, W3PIX 109, N3CD 95, KD3AO 71, KA3DLY 62, KU3R 61, K3WPI 51, KB3FW 45, KB3UD 44, W3KAG 37, WA3CKA 33, W3JKX 29, W3DP 25, W3FAF 24, KY3M 19, K3TX 16, KO3M 14, W3CL 11, W3ADE 10, W3AQN 10, W3VA 7. Nets (May, QNI/QTC/Sessions): EPAEPTN 470/131/31, PTTN 212/71/31, 3RN PBBS: K3RLI 67, KB3UD 61, AG3F 58, KB3L 5, WA7SSO 2.

MARYLAND-DC: SM, John A. Barolet, KJ3E— Four PM Eastern Time, September 4, 1987 is the deadline for nomination of the next Maryland-DC Section Manager; nominations must be received at ARRL HQ by that date. Have you nominated your candidate for SM yet? See July or August QST Happenings Column for instructions. KJ3E is not a candidate for reelection. Reminder: If there are no candidates for election to SM, ARRL officials will appoint the next SM. KC3Y, manager of the Maryland Slow Net (MSN), has been awarded an ARRL Certificate of Merit for outstanding leadership of that organization for the past two and one-half years, supported by the Anne Arundel Radio Club. MSN is the place to learn traffic handling. It meets on 3717 kHz every evening of the year at 1930 local time. Assistant Technical Coordinators NF3X and N3CDR are building the ATC organizational activity in Maryland-DC. If you are interested in helping fellow radio amateurs solve their technical problems, or are interested in speaking about your favorite technical achievements at club meetings, get in touch with NF3X, N3CDR, KK3F, W3VVN, N3EGE or KJ3E for information and help in becoming an ATC. Many radio amateurs already do this work without benefit of ARRL recognition, but why not join the MDC ATC gang? A sad, troubling thing happened this year for the second year in succession: Half of the many Field Day messages I received were not in standard ARRL format, and of course the 100 points credit is not granted for those incorrectly formatted. Unfortunately, perhaps 95% of licensed radio amateurs cannot create a proper formal third-party message, the kind of message necessary in a disaster situation, the kind of message the public would expect a "ham operator" to generate and send in that situation. Please, take time now to LEARN how to do so. If you need instructions ask me or your nearest traffic-handling friend. Don't be part of the problem at the next disaster! APPOINTMENTS: None, but 22 inactive ARRL MDC Field Organization members had their appointments cancelled in June. WITH THE NETS: Net/Mgr QND/QTC/QNI: MDD/W3FA 60/190/468 (MDD Brass: W3QQ/103 W3FA/88 KJ3E/61 KC3Y/57 WA3YLO/54, MEPN/N3EGF 30/131/930, MSN/KC3Y 30/31/247, WRPON/WB3BFK 22/30/182,HOCOARES/K3NNI 2/9/24, SMEN/KJ3E 1/3/4. PSHR:W3FA 116, N3EGF 89, WA3UZI 75, KJ3E 75, KC3Y 72, W3YVQ 65, K3NNI 64, WA3YLO 64 TRAFFIC: W3FA 154, KJ3E 135, N3EGF 105, W3LDD 102, KK3F 72, KC3Y 71, NC3Z 65, WA3YLO 54, WA3UZI 45, N3DE 42, W3YVQ 37, K3ORW 36, K3NNI 30, WB3BFK 20, NB3P 19, W3DQI 18, WB3LQT 17, K2EB 13, WA3GYW 12, W3FZV 11, WA1QAA 11, KX3U 10, W3ZNW 6, KC3DW 2, KC3ZJ 2.

SOUTHERN NEW JERSEY: SM, Richard Baier, WA2HEB—ASM: N2CER. SEC: K2QIJ. STM: WB2UVB. ACC: K2IXE. TC: KA2RAF. PIO: VACANT. SGL: KA2KMU. BM: WB2UVB. OOC: WA2HEB. ATCs N2BQT, K2JF, KA2RJA and WB2MNF. Congratulations to the RCA ARC in Camden for finishing in SECOND PLACE in the 1986 Club Challenge for the '80s competition medium size club category. ACC K2IXE was to present the club with an HT at their July club meeting. The EASTLINK Amateur Radio Information Network can be heard on Wednesday evenings at 7:30 PM local over the following repeaters in our section: 147.15 (+600 kHz) in Mt. Holly, 145.47 (-600 kHz) in Chatsworth, 147.135 (+600) in Buckshutem and on 146.67 (-600) in Trenton. In addition, the Pleasantville repeater on 146.985 (-600) carries a delay of the broadcast at the conclusion of their net around 8 PM. EASTLINK carries information concerning VE tests in the SNJ/EPA area, special event operations, club meeting notices, training classes and other features. In addition, the WESTLINK tape is also transmitted. If you or your group has something that you want to spread around, here is the place to do it. For further info, please contact K2QIJ. Until next month, 73. Traffic: WB2ZJF 327, N2CER 48, WA2HEB 9.

WESTERN NEW YORK: SM, William W. Thompson, W2MTA—Appointments: (DEC) WA2AIV-Western, KB2KW-Southern, WB2NAO-Northern, (EC) KA2CMQ-St. Lawrence, WA2DHB-Livingston, W2EWD-Tioga, WB2KIO-Wayne, WA2OVT-Chemung, WA2SEF-Hamilton, W2TFL-Delaware, KB2VS-Genesee, (ORS) KC3BQ Section Packet Node Station. Thanks to K2LKH in Ontario County for past services as Emergency Coordinator as he steps down. PSHR: N2ABA, N3DPF, N2EIA, N2EVG, WA2FJJ, W2FR, NN2H, W2MTA, KU2N, WB2OWO, WB2RBA, ND2S, KA2TVX, KA2UBD, NE2W, KA2ZNZ. June BPL: N3DPF. Club Officers: Squaw Island ARC: K2BWK, KA2UDH, KA2UOD, WA2VUB. Black River Valley ARC: KA2GWY, WD2ADX, KA2SJG, KA2FOF. Field Day messages received (19): N2AX, K2ECQ, KA2GCL, N2HR, K2IQ, W2LZ, K2MP, W2OFQ, W2PE, KA2QBQ, K2QR, W2RCX, K2SA, W2SB, KC2VB, AI2W, NW2X, W2ZJ, WA2ZXS. At least three others were out there, but SM didn't go find... got tied up at Pleasant Hill this year! The Packet Radio Mobile worked FB!

NETNAME	MODE	QNI-QSP-QND	NETNAME	MODE	QNI-QSP-QND
NYSEMO	SSB	091-004-04	BLUE LINE	FM	200-025-22
NYSR	CW	012-003-04	JCRAC Net	FM	390-011-28
NYS/M*	CW	280-201-30	NYS/E*	CW	396-244-30
WDN/M*	FM	303-078-30	WDN/E*	FM	448-135-30
MVTN	CW	010-045-09	BRVS NET	FM	282-008-30
NYPON*	SSB	549-254-30	LCARES	FM	037-000-04
Empire SS	CW	243-061-29	VHF THIN	FM	041-000-05
NYSPTEN	SSB	388-035-30	CNYTN*	FM	245-218-30
OCTEN/E*	FM	509-107-30	OCTEN/L*	FM	212-103-30
Q NET	FM	422-002-30	WDN/L*	FM	441-114-30
STAR Net*	FM	350-092-30	NYS/L*	CW	341-340-30

*NTS nets. CNYTN (May)244-052-31. Numerous other ARES nets meet in several other counties, their reports are solicited. HAMFEST CALENDAR: HAM-O-RAMA Sept. 12, Elmira Sept. 26, Syracuse Oct. 17. With the appointment of KC3BQ as a Section Packet Node Station, the Western New York Section has two SPNSs, located in Western District (Buffalo, W2ICZ), and in Central District (KC3BQ, Skaneateles). This starts to approach optimal coverage for WNY...one or two more SPNSs (Northern and Southern Districts) would seem the optimal position for a reasonable coverage for Packet Radio MODE. Your thoughts on additional Section Packet Node Stations are solicited. Also, Net Managers in WNY request stations sign-up for liaison assignments to carry ARRL format radiogram traffic (i.e. "T" PBBS type traffic) to and from the Section Packet Node Stations to ensure proper and timely integration with the National Traffic System (NTS). Please forward your info to the SM, W2MTA, who is currently acting as STM. Refer to nearby Net Managers for further information...KU2N, KA2UBD, WB2OWO, WB2HLY, WA2PUU, NE3B, N2EIA. Traffic (June): N3DPF 607, KA2UBD 428, N2EIA 366, NE2W 271, W2MTA 265, WB2OWO 247, WA2FJJ 236, NN2H 161, N2ABA 160, W2FR 150, KA2ZNZ 149, WB2QIX 141, KU2N 129, KA2TVX 96, N2DS 90, N2EVG 81, WB2RBA 66, AF2K 54, K2YAI 47, WB2IJH 45, W2UYE 39, KA2QOO 38, NE3B 32, N2FBK 30, N2DYT 22, W2PPS 22, K2QR 20, KA2DBD 17, W2ZOJ 16, KA2TWY 10, WA2OEP 2, KA2QIK 2. (May) KU2N 124.

WESTERN PENNSYLVANIA: SM, Otto L. Schuler, K3SMB—SEC: WA3UFN. STM: WN3VAW. BM: KC3ET. TC: N3EFN. OCC: KX3V. ACC: AK3J. SGL: W3DTW.

NET	QNI	QTC	SESS	kHz	T/D	Man
WPACW	212	96	30	3585	7:00P/D	WA3UNX
WPAPTN	397	57	30	3983	6:00P/D	WA3HLN
KFN	124	41	22	3983	1:30P/D	N3EMD
PFN	161	135	30	3958	5:00P/D	KA3THT
WPA2MTN	245	49	30	146.28/88	8:00P/D	KA3BGC
NWPA2MTN	550	35	29	44.53/45.13	9:00P/D	KA3THT
WPARTTY	8	0	4	3640	9:00P/SU	WA3ZSC

On June 8, 1987, in Butler County, a possible disaster could have occurred in Butler County. A one-inch line was under a liquid Hydrogen tank containing 60,000 gals. The one-inch line was on fire and could have caused a major explosion. The residents nearby were evacuated and emergency services came to the scene. Amateur Radio ops were called to aid by the R.O. About 30 came to assist. Some of the ops handled traffic for the Emergency Management, American Red Cross etc. The amateurs not needed stood by to be used if needed. Beaver Cty EOC, Armstrong Cty EOC, and Allegheny Cty Medic Command stood by to assist if needed. Communications were on 147.30 and 146.88 between counties. WB3LKO R.O. in Butler County had praise for the amateurs who responded to his call. Please note the Breezeshooters Net in the WPA Section is now on 28.460. All classes are invited to check in Monday at 9:00 PM. We have a certificate if you work 10 members, and it is free. The Breezeshooters have members all over the 50 states. Tfc is very low this month, I wonder where everyone is? June Traffic: KQ3T 326, W3OKN 213, N3EMD 109, N3AES 99, N3FM 69, KC3ET 66, WA3UNX 64, W3NGO 59, WA3DBW 54, K3SMB 45, N3CZW 44, KA3OEM 26, KD3AC 19, W3RUL 19, WA3QNT 13, N3EKJ 10, K3LTV 5, KA3EGE 4, W3AHH 4, W3XO BBS 30 pieces.

CENTRAL DIVISION

ILLINOIS: SM, David E Lattan, WD9EBQ—SEC: W9QBH. STM: K9CNP. OOC: W9TT. BM: K9EUI. SGL: W9KPT. PIO: N9EWA. ACC: WB9SFT. TC: N9RF, ASM: AA9D.

Illinois Section Nets

NET	FREQ	TIMES (LOCAL ILLINOIS)
ISN	3905	1800 Daily
ILN	3690	1830 & 2200 Daily
ITN	3705	1900 Daily
CTN	147.69/09	2100 Daily
ILARES	3905	1630 1st & 3rd Sundays

Illinois Independent Nets

IEN	3940	0900 Sunday
ILPN	3915	1630 M-F, 1430 Sunday
NCPN	3915	0700 Monday-Saturday
NCPN	7270	1215 Monday-Saturday

A special thank-you this month to Jim, KA6A for his continuing efforts to keep all of us informed of the Volunteer Exam opportunities throughout the state via his periodic exam list. I have received many comments from clubs regarding how much they value being able to put their hands on all the exam

information from one source. If your group wishes to list exams or get on the mailing list to receive the listing write: Jim Coleman, KA8A, Rt 1, Box 55A, Ivesdale, IL 61851. Clif, WA7MAD reports that the NET/ROM packet system for store-forward handling of NTS traffic between two network nodes is now in operation. Special thanks to WB9MJN, K9VXW, N9DIX, W9IQ, W9THI, and WA9HIC for the work that went into making this system a reality. October is quickly approaching and with it comes the Illinois QSO Party, which the year celebrates its 25th anniversary! The contest will be held from 1800Z 11 October until 0200Z 12 October 1987, and is sponsored by the Radio Amateur Megacycle Society. RAMS promises much fun, special awards, and the re-activation of their club call K9CJU with special bonuses for working the club station. For more information and for a copy of the rules/summary sheet contact Illinois QSO Party Committee Chairman Joe LeKostaj, WB9GOJ, at 91344 Ewing Ave., Evanston, IL 60203. TRAFFIC: KA9FEZ 540, NC9T 170/100, W9EHS 165/116, KJ9L 164/88, W9HLX 153, W9NXG 146, K9CNP 103/103, W9HOT 99, W9LWH 94, WA7MAD 93, WA9VLC 64/92, NN9M 57, KA9CTW/T 45/73, KA9EWN 43, N7DOY 30, WD9DZU 25/89, WB9TVD 22, W9KR 16, K9EHP 12, K9WMP 11, W9VEY/M 9, WA9RUM 9, KA9BBV 6, WD9HOW 5, W9JMJ 2, Total: 2,083

INDIANA: SM, Ron Koczor, K9TUS—ASM: W9UMH. SEC: WB9ZQE. STM: W9JUJ. ACC: K9TUS. PIO: KA9LQM. TC: K9PS. SGL: WA9VQO. BM: KC9TA. OOC: KJ9G. SRC: N9WB. Net Managers: ITN KD9DU, QIN KJ9J, ICN KD9ER, VHF W9PMT, IWN KA9ERC.

Net	Freq	Time Daily UTC	QNI	QTC	QTR	Ses
ITN	3910	1330/2130/2300	2799	371	1906	88
QIN	3656	1430/0000/0300	539	360	1675	28
ICN	3705	2315	128	30	638	29
IWN	3910	1310	1617	—	333	30
IWN	VHF	Bloom/Kokomo				
Hoosier VHF Nets:			4343	197	3905	167

Appointments: O.O./A.A., WA9VLK; Silent Keys: K9VEJ, Valparaiso; W9JZV, Indianapolis. BPL: W9JUJ Orig 0; Rcvd 278; sent 230, Dlvd 1. Mother Nature gave us one great Field Day weekend! Thanks to the 30-some groups which sent me reports . . .including 11 of our SSCs. I hope the emergency service side of the event was not lost on your group. Don't forget the Bloomington Hamfest on Sept 6 and the Laporte Summer hamfest on Sept 13. Congrats to K9DIY and N9DGQ on their appointment to the ARRL Education Force. Teaching new hams the values and responsibilities of our Service is vital to its well-being. The Task Force has a big job ahead of it. The new Indiana Emergency Response Plan is out! ARES appointees and SSC Presidents have the Plan. The Plan pulls together many of the activities which have been underway for some time. The Plan encourages cooperation between ARES, RACES, INCERT and all ham groups serving the public. When the public interest and safety is the issue, there is no room in the ARS for building our little kingdoms! Summer is winding down. Now is the time to start thinking about SET winter storm watch training and antenna repairs. Editors, if you want to receive a copy of my weekly Indiana bulletins for use in your newsletters, drop me a line and I'll add you to the mailing. The weekly bulletins are distributed on the state packet network by N9BAC. Tnx to KD9ER for accepting ASM appointment to help coordinate packet message handling and NTS. His goal is to come up with a statewide system which defines how NTS traffic is to be distributed in Indiana. A simple problem, no? No! Station reports for June: W9JUJ 509, KJ9J 270, K9WWJ 147, KA9FFO 104, NJ9S 97, NR9K 81, KD9ER 62, KA9RNY 59, WB9MDS 52, N9BZZ 46, W9UEM 38, N9HZ 35, W9ZGC 28, WB9IHR 25, K9ZBM 21, W9PMT 20, KA9QMI 20, WD9HII 18, KB9HH 17, K9KTB 16, N9DTG 14, WD9DWD 12, W9BTZ 12.

WISCONSIN: SM, Richard R. Regent, K9GDF—SEC: W9OAK. STM: K9UTQ. ACC: KA9FOZ. BM: WB9JSW. OOC: NC9G. PIO: K9ZZ. SGL: AG9V. TC: K9GDF. The Wisconsin Nets Association will hold its Annual Picnic on September 12th at Shawano County Park (near County HHH, 4 miles north of Highway 29 at Shawano Lake's north shore), with camping, swimming and boating facilities. The picnic festivities are at noon and meeting at 1:00 P.M. with door prizes, refreshments, mini-swapfest and awards later. Bring a friend or your entire family and a few junkbox items to trade. You don't have to be a traffic handler or member, everyone is welcome at the WNA Picnic. September 17th begins the U.S. Constitution 200 year celebration, watch for news of the "We the People" Worked All States Award. September 20th, Tri-County ARC Fall Fest in Janesville at the Blackhawk Tech parking lot, N9TD for details. Wisconsin Rapids exams September 26th, contact K9UTQ in advance. Sorry to report Silent Key KW9H. New BBS on KU9L repeater 443.675 MHz. W9CXY will be active again after taking the summer off to relax. The Greater Milwaukee DX Association saves postage by having KS9K combining and bulk mailing member's outgoing QSL cards to ARRL. Thanks to James Romelfanger, K9ZZ, ARRL Public Information Officer for Wisconsin, for his excellent volunteer work in writing and editing the Badger State Smoke Signals, an up-to-the-minute newsletter in newspaper format, packed with Wisconsin Amateur Radio news, special features, photos and fun. If you would like to get a copy of the BSSS, please write to Jim at: 412-1/2 Ash Street, Baraboo, WI 53913.

NET	FREQ	TIME	MGR	QNI/QSP/SESS.
BWN	3984	6 AM	WD9IID	
BEN	3985	NOON	KA9RII	663/173/30
WSBN	3985	5:30 PM	WB9ESM	
WNN	3723	6 PM	N9DGL	170/5/28
WSSN	3645	6:30 PM	N9BDL	150/28/30
WIN-E	3662	7 PM	WB9ICH	210/128/30
WIN-L	3662	10 PM	KC9CJ	
NWTN	34/94	6:30 PM	W9ZZM	395/45/30
WCWTN	31/91	6:00 PM	KD9TT	

Traffic: WB9YPY 1273, W9CBE 295, K9GDF 224, KA9RII 241, W9YCV 183, W9DND 130, K9EP 110, N9BGE 109, N9BDL 103, WB9ICH 82, W9UCL 74, N9BCX 72, K9AKG 68, KA9BHL 64, AG9G 54, KA9KLZ 52, K9UTQ 44, W9IEM 44, WD9DHI 43, K9FHI 35, WB9NRK 29, KA9VIA 28, W9ODV 26, K9JPS 24, K9LGU 14, WD9DNQ 9, W9PVD 9, N9EAX 6, N9PYS 6, W9UW 4, (May) WB9NRK 34, WD9DHI 21.

DAKOTA DIVISION

MINNESOTA: SM, George Frederickson, Jr., KC0T—Hello everyone. Are your ears still ringing with CQ Field Day or is your wrist pounding out QSL in your sleep? For the folks in Minnesota it was beautiful weather, a little rain late Saturday night, but all in all it was the best Field Day weekend, it was perfect, just ask the guys at Fergus Falls, they had a real party there!! I hear there is a rag chewing group on 10 meters around 28.485 at 8:00PM Saturdays in the Mille Lac area. I have to report that Amateur of the Month is N0HSR of the Twin Cities, congratulations Dean. A call sign change to add is N0GCH is now KE0NW, tnx Rich. I am sad to report the passing of KC0WY, Dennis Peterson, of Hoyt Lakes. Our deepest sympathy to family and friends. I'm going to have to sweet talk to get more Ham Radio equipment now. There are four women to convince now, that's right there's another to this family. I'm really hen pecked, it's another girl!! Surprise! 73's

KAØBFP.

NET	FREQ	TIME	QNI/QTC/Sess	Mgr
MSN/RTTY	3620	6:30P	starts in Sept	WAØLUT
MSN/1	3685	6:30P	375/152/30	KAØEPY
MSN/2	3685	10:00P	265/38/30	KDØNH
MSSN	3710	6:00P	230/40/30	KAØSBY
MSPN/N	3860	12:05P	399/238/30	WBØWNJ
MSPN/E	3860	5:30P	719/159/30	KAØBFP
MNAMWXNT	3860	6:15P	starts in Sept	KØOGI
PICO NET	3925	9:00A	2919/307/123	WDØBAC

MN EMERGENCY FREQ 3860 BULLETINS 3685&3860 MN/MSO 3620. Traffic: WBØWNJ 653, WAØTFC 451, KAØEPY 395, WØUCE 213, NØFQD 163, KAØARP 156, KDØCL 114, WØGRW 102, KT9I 78, WØDM 68, NØCLS 64, KAØSBY 64, KDØNH 61, KAØBFP 49, KDØCI 40, KCØT 36, NØJP 34, KEØBQ 30, WDØGUF 27, NTØB 20, KØOGI 19, NØHSR 17, KAØAJF 12, WØKYG 9, KAØCDC 5, NØHWD 1, Total: 2873.

NORTH DAKOTA: SM, Bill Kurtti, NØAFP—The Forx Hamfest will be Oct. 17. The big news this month is the American Lung Association's Trans America Bicycle Trek passing through ND. 200 bikes and riders passed through the state. ND hams: KAØOXN, WØTUP, KØCLD, WBØVHW, KØFJL, and KAØFSM and led by WB8BZH who gave base support for the group. Their support vehicles were amateur radio equipped. Dickinson Club (TRARC) reports several new Novices. WDØDAJ and KAØTOH have been active keeping the repeaters going, and WDØEMY keeps his rigs and pen busy while on the road. TNX for all the Field Day messages from Dickinson, Bismarck, Devils Lake, Minot, and Mayville. A good idea from the Forx Club is using 28.490 as their emergency 10 meter freq. They also have a new SSB "rig"??

NET	FREQ	TIME	SESS/QNI/QTC	MGR
GOOSE RIVER	1990	9:00 A(SUN)	4/87/5	WØCDO
DATA	3883	6:30 P (daily)	KAØFSM	

Traffic: KAØFSM 33.

SOUTH DAKOTA: SM, R.L. Cory, WØYMB—SEC:KAØKPY. STM:KDØYL. ASST SM:NØABE, WAØFPR. Ten messages were received by the SEC and myself from Field Day stations indicating an increase in South Dakota Field Day Activities. Black Hills ARC VE exams for the Wally BYAN Caravan Club International were one General and seven to Technician. A partial list from Sioux Falls: 1 Novice, five Technicians and two Extra. KCØLI set up his Satellite Station as part of the Mobridge Field Day activities and some nice contacts were made. Two new repeaters have come on. WBØJZZ/R Near Pierpont R on 147.72 and T on 147.12 and KØTA/R near White R on 147.66 and T on 146.06. KØTA plans to link this repeater with one at Brandon. New Packet stations please contact NØABE with information. WBØVBW was on 160 Meters Certificate 394 on CW and 369 on SSB. Traffic reported for June by ten stations. 938 Messages handled. Traffic: NØDPF 423, KØERM 173, KØZBJ 121, WØHOJ 55, WØMZI 46, WAØVRE 34, WBØOMF 31, KDØYL 30, WØYMB 18, KAØUEQ 7.

DELTA DIVISION

ARKANSAS: SM, Joel M. Harrison, WB5IGF—ASM:K5UR. SEC: N5BPU. STM: W9OK. ACC: NI5D. SGL: W5LCI. TC: W5FD. OO Coor: NR5Q. BM: W5LL. PIO: K5TML. Repeater Frequency Coor. WB5FDP. We are in need of stations to check in to the Razorback net and serve as a liaison to OZK and to RN5. Our percentage of representation has been very poor over the past several months, and we need to improve. OZK meets on 3591 kHz at 7 PM each night. The most frequent excuse I hear is that people don't have their antennas cut for that frequency on 75. I wonder why the tuner sitting beside the rig is collecting dust! June provided an excellent Field Day for Arkansas. Of the sites I was able to visit, and the reports I received, everyone had an excellent time. K5UR was the Delta Division winner in the January VHF Contest and set a new Division record. Rick also won first place in the US on 160 meters in the CQ WPX SSB DX Contest. Congratulations to Rick on these outstanding operating achievements. Traffic: W5QFU 90, W9OK 45, W5RIT 41, W5UAU 33, W5HDN 6, WB5IGF 8, N5BPU 4, WB5FDP 4.

LOUISIANA: SM, John "Wondy" Wondergem, K5KR—ASM: KB5CX. SEC: N5ADF. ACC: K5DPG. SGL: KD5SL. TC: N5JM. OOC: KE5OK. PACKET: NE5S. Louisiana Packet Radio Society (LAPRS) election: Pres.: Guy-WW5F. VP: Emile-NE5S. SEC/TREAS continuing: Jack- WS5X. Directors: Lake Charles. Jake-WF5L. New Orleans. Sandy-W5TVW. Alexandria. Tom-WB5ASD. Baton Rouge Tom-KA5HVK. LAPRS is coordinating the installation of a 440 MHz heavy traffic link between Baton Rouge and New Orleans. Reports received on several LA Digipeaters having upgraded to NET/ROM capabilities which allows a store and forward function for Packet messages. The ARRL 1987 Field Day in LA appears to be an all time high of participating groups judging from the number of messages received by the Section Manager. The Southwest Louisiana Amateur Repeater Club officers are: Pres.: KA5PFB. VP: KF5WL. TREAS.: WB5HIV. SEC: WA5VDM. Club Net: 7:30 MWF on 146.73. Meetings 4th Tuesday 7 PM at the Parish Civil Defense in Lake Charles. During the past several weekends several members of the club set up demonstrations of Amateur Radio in local shopping centers. The display included a Packet station, 2 meter emergency communications and ARRL supplied informational handouts. The local TV station provided coverage of the club activities during hurricane emergencies.

MISSISSIPPI: SM, Jim Davis, KK5Z—ASM: W5TRD. SEC: WD5IKD. SGL: NC5Y. ACC: K5VXV. PIO: WN5M. BM: AJØX. TC: WB5SXK. OOC: KK5K. STM: N5AMK. VHF/UHF COORD: N5DWU. Congrats to following upgrades: To Tech, KB5BXT, KB5CMC, KB5DLT, KB5DMT. To Gen, KB5WML, N5JGK, N5KGL, and from zero to General, including 20 wpm cert, George Hancock, Sr., Florence, MS. Gud job, Geo. To Adv: N5KRO. FD participants: Tupelo ARC (WJ5R) Miss Coast ARA (K5OS), Hattiesburg ARC (AG5Z) W/18 ARES Mbrs, Don Quixote ARC (N5HGN), Pearl River ARC (KA5SNI) 14 ops w/5 ARES mbrs, Prentis ARC (AJ5P), Laurel ARC (N5DWU) 30 ops w/17 ARES mbrs, Rankin County ARC (KF5IZ) w/14 ARES mbrs. CAND (W5KLV) sessions 30 QTC 580. Rep by Miss station N5AMK. DRN5 Represented 100% by N5AMK. DRN5 (WB5YDD) sessions 60, QTC 543, Miss represented 100% by N5AMK, W5HKW, KT5Z, K5ZFM, KE5EC. MSBN (WJ5P) sessions 30, QNI 1350 QTC 50. MTN (KB5W) sessions 30, QNI 175 QTC 55. MISSSLONET (W5YRX) sessions 21 QNI 76, QTC 16. MISSLOUEMERG Net (WD5O) sessions 4 QNI 99 QTC 2. Gulf Coast HN (W5JHS) sessions 30 QNI 893 QTC 20. Lauderdale Co. ARES (WD5HLD) sessions 5 QNI 101. NE MISS FM Net (N5SM) sessions 24, QNI 169 QTC 4. Traffic: N5AMK, recd 260, sent 194, orig 2, del 1, total 457. W5WZ, recd 19, sent 29, total 48. WQ5H 54, sent 53, orig 2, del 1, total 110. KT5Z, recd 31, sent 37, del 1, total 69. PSHR: 1/30, 2/30, 3/12, 4/12, 5/12, 6/1, 8/5, total 102 pts. ARRL Info Net (KK5Z) sessions 3, QNI 45. Rankin County ARES (KF5IZ) sessions 3, QNI 16. Packet BB (KF5IZ) orig 5, sent 6. (getting better). Remember SET in October.

TENNESSEE: SM, John C. Brown, NO4Q—ASM: WA4GLS. ACC: WA4GLS. OOC: W9FZW. SEC: WA4GZQ. SGL: WA4GZZ. STM: NG4J & TC: W4HHK. We are now about to enter the fall season and it is again time to begin our winter antenna and tower winterization efforts. Your section manager

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had an experience that he has been through before, ie loss of a tower. Turned out that it had nothing to do with winterization at all. Just plain failure of a component, that is, a 5/8 eye bolt. Just so happened that bolt was the anchor of the three tower guys. ARRL equipment insurance does not cover that part of the equipment as I understand. As usual, this thing of amateur radio is always a learning process in its operation. The packet-radio effort in Tennessee is still going along in fine shape and a goodly amount of formal traffic is being passed on the facilities that are available. The same problem is noted on this system as in the past. That is the destination station is not around when they have traffic or they forget to remove it as having been read from the BBS. I know traffic handling is not your bag. It is somewhat like your mail box, you don't know if you have mail unless you check your box (BBS). I have been advised that much good DX has been going and many hard to come by countries contact are made. Just stay in there and bid your time and make that rare DX contact. It was mentioned last month about some of the new nets that have been organized in the new portion of the 10-meter band for the pleasure and benefit of that group of amateurs not able to participate in such in the past, namely the Technicians and Novices. At least on one case the net is managed and run by that class of amateur operators. The assistance of the other class amateurs is sought and requested to provide guidance and instruction. When an amateur upgrades, he or she is asked to give up any position to the Novice and Tech's. The traffic activity for this period is a follows: W9FZW 196, WA4FMR 121, W4DDK 57, KA5KDB 48, W4DDK 41, (last mo) K4WWQ 34, N4OZB 31, W4PFP 23, W4TYV 11, NN4S 9, KE4LS 8, and WA4HKU 6.

GREAT LAKES DIVISION

KENTUCKY: SM, John Themes, WM4T—Congratulations to WA4AVV and WA4AYI for 25 years of ARRL membership. WA4JTE reports that additional QNI is needed into D9RN. WA4SWF has made the first KY QSO to California over a satellite via packet! The recent earthquake in ILL again stresses the need for "jump team" volunteers for emergency work. If interested, contact the SEC (WB4NHO) or myself. I visited BARS in Lexington and they have a FB Club; thanks for the hospitality! N4GNL can use QNI on the 10 Meter SSB net each Weds. at 0000Z on 28.410. Field Day messages from NU4N, KI4B, WA4UXJ, N4KKW, WK4D, and K4HY. KC4WN is a new OO. If you want call-letter plates for 1988, do it now; WA4AGH has the form if you need one. See you at the Louisville Hamfest!

Net	QNI	QTC	SESS	MGR
MKPN	1123	99	30	WD4RWU
KPON	69	14	4	WA4AVV
KNTN	37	64	175	KB4OZ
KYN	297	130	58	K4AVX/KZ8Q

PSHR: KI4QH 82, KA4MTX 82

MICHIGAN: SM, James R. Seeley, WB8MTD—Silent Key, with deep regret: K8KMQ. My heartiest thanks to ASM/SEC George Race for minding the store for me for the past few months during my illness, and for doing such a fine job of preparing the "News" columns. My thanks also for the many expressions of sympathy and good wishes. It all helps! STM WB8SIW announces that WD8EIB has resigned from her post as NM for MITN for personal reasons, primarily work schedule conflicts. She has been replaced by N8AHA, who brings his experience as manager of SEMTN to his new appointment. Thanks to Della for her many months of excellent leadership, and welcome to Jeff, who will be wearing two hats for a while. Field Day has always been one of my very favorite operating activities. This year, recovering from recent surgery, I planned to operate the home station Class E, take my message traffic and generally relax and enjoy, but a lightening bolt (the second in six months) put me out of business. I did get my traffic, though, thanks to the efforts of WD8KQC (QMN NM), WB8BGY and an effective packet link. Judging from the traffic volume and quality and from several after-the-fact QSOs, I have to judge MI FD 1987 a success. Sorry I wasn't there! Nothing lasts forever, but UPN's ongoing record-breaking QNI, each month's report topping that of the same month for the previous year, went on for 3 1/2 years before finally crashing last May. NM WA8DHB writes "Boy, what a net! Fantastic people, net controls. It's really great." Some of us are wondering what she'll do for excitement now that the saga has ended. Newsletter Glitch Dept.: "Vol.I, No. 4" (for example) is fine for those who keep track from the beginning, but the month and year of publication would be nice for the rest of us! Field Appointees: Keep your League membership current if you wish to keep your appointment. Lapses usually are unintentional and understandable, but they generate a lot of paperwork for your leadership and for HQ staff. June NTS summary (Net, QNI, Tfc, Sessions) MITN, 454, 172, 29; QMN 527, 147, 56; MACS, 460, 78, 30; SEMTN, 318, 61, 25; UPN, 995, 55, 34. Tfc.: KE8JG 532 (BPL), KA8CPS 382, WD8KQC 157, K8GXV 76, AF8V 73, W7LVB 72, KB8GT 68, WA8DHB 61, WD8RHU 58, N8CNY 43, W8SCW 39, WB8MTD 38, W8IHX 37, K8UPE 36, W8YIO 34, WB8BGY 32, W8HIN K8OCP WB8YDZ 30, NJ8X 28, KI8Q 21, WB8SYA W8URM 14, WD8MJB 13, N8HWL 9, W8YZ K8ZJU 7, WB8EZ WA8MVH 6, WB8ITT 4.

OHIO: SM, Jeffrey A. Maass, K8ND—ASM: N8AUH. SEC: WD8MPV. STM: KF8J. BM: W8ZM. ACC: KJ3O. TC: KB8MU. OOC: AD8I. SGL: N8CVK.

NET	QNI	QTC	SESS	TIME	FREQ	MGR
BN(E)	215	95	30	1845	3.577	N8EVC
BN(L)	191	107	30	2200	3.577	K8TVG
BNR	210	84	30	1800	3.805	W8EK
BSSN	260	190	59	0945,1900	3.873	K8CZ
ONN	102	27	26	1825	3.708	WD8KBW
OSN				1810	3.577	N8AEH
OSSBN	1817	646	90	1030,1615 & 1830	3.9725	WB8JGW
OSSN	204	102	30	0645 M-F	3.577	KA8GJV
				0800 S-SN	3.577	KA8GJV
OHIO SECTION ARES NET1500 SUN					3.875	WD8MPV

Ohio Hamfests in September: Findlay 9/13; Cleveland 9/20; Cincinnati 9/20; Champaign-Logan (Bellfontaine) 9/26 (?); Twenty- Over-Nine (Youngstown) 9/27. VE exam sessions: Columbus 9/12; Maumee 9/12; Barberton 9/26; Ravenna 9/26; Zanesville 9/26. Contact me for details. A reminder: you should preregister with VE Teams if at all possible! I can provide names and telephone numbers for contacting the VE Teams offering the exams listed in this column. The Mason City Council passed a resolution recognizing and commending the 19 Amateurs who provided communications support for the city during a May 28 telephone outage. Lightning caused the entire Mason exchange to be inoperative for the entire day, and Warren County ARES Emergency Coordinator K8IOW and 18 others jumped in to provide essential city communications, with a command post at City Hall. Congratulations to them!! Trumbull County EC WB8BWY reports that his ARES organization has been busy, operating a booth at the Trumbull County Fair, June 30 to July 5, originating traffic and demonstrating Amateur Radio to the public from 9 AM to 11 PM each of those days! They have also just completed installa-

tion of a 2-meter antenna on top of the Warren General Hospital, and have plans to install HF antennas soon! The Champaign-Logan ARC has been providing communications to a number of parades recently, the most recent ones on May 25 and June 19. They operated Field Day as a class 5A operation, but did not report any parades passing through the site! On the July 9 session of the Central Ohio Traffic Net (COTN), KA8LUE announced that he had just encountered a motorcycle accident involving two persons injured. He made an autopatch call through the CCRA 147.24 MHz repeater, reporting the accident and correcting an erroneous location given by a previous telephoned report. Congratulations to two Ohio ARRL Special Service Clubs, the Triple States RAC and the Mahoning Valley ARA. These two clubs have met the requirements for another year, and have been renewed as SSCs. Is your club special? Contact KJ3O for details. Field Day saw cool (cold?) weather in Ohio, with some rain, some hail, some thunder and lightning, and plenty of QSOs! I operated with the Battelle ARC, using the world's worst CW call sign: W8CQK. Of course, we operated entirely on CW! I received almost all of the FD reports this year via packet radio, even though the digipeaters were completely swamped all weekend. This was my first chance to really sit down and play packet, and it was fascinating! The Amateur Radio stations listed below have helped to uphold our responsibility to the public and have reported handling radiogram traffic during the month of June: WA8EYQ 385, K8TVG 233, WB8JGW 195, N8IBS 192, WD8KFN 189, N8AKS 181, W8BO 167, KD8HB 155, W8ZOL 135, KD8FW 122, W8SKP 116, KA8GJV 110, K8CMR 106, N8GEC 106, K8JDI 106, N8EVC 102, W8EK 97, KD8KU 95, KV8Q 86, WD8OXT 84, WB8KWC 77, N8EFB 75, WD8IKC 70, KE8CV 50, K8EF 47, W8FPA 46, N8FWA 46, WA8SSI 41, K8VOY 40, WA8HGH 39, WD8RIB 38, KA8CGF 36, WD8KBW 35, K8ND 33, WB8DMF 32, W8LDU 31, W8BHL 30, K8FT 30, WB3LHI 29, KD8XL 29, WB8BWY 27, W8JLW 26, W9SWM 25, N8GPU 24, WD8JYE 23, WB8KWD 23, NF8B 22, WA8HED 22, W8RG 21, KB8ANC 20, K8IOW 20, KC8JV 20, WB8YFD 16, KC8YV 16, K8CKY 14, WD8CSP 14, WA8DYS 14, WB8HHZ 14, N8HRW 14, KA8RIX 14, KA8SQM 13, N8AJU 12, NU8H 12, KD8IC 12, KA8TNT 12, KA8DRR 11, N8FBE 11, NC8Q 11, KD8WI 11, WD8JAW 10, NR8C 9, N8CDN 9, N8HBF 9, N8CB 8, WD8CKK 8, KBDXZ 8, N8IIP 8, N8CJS 7, WD8ATN 6, N8FPH 6, N8HIL 6, KC8WH 6, WB8MRL 5, KA8OQF 5, KA8YIT 5, KA8ZOW 5, WD8DKQ 4, WD8PWG 4, KA8SZH 4, W8ZM 4, N8GIO 3, WD8QZM 3, WB8LFM 2, KD8KF 2, WD8MSJ 2, KA8VYT 2, KA8CBO 1, K8EEN 1, NU8I 1. (MAY) KV8Q 104, WA8GCF 9, W8ZM 8.

HUDSON DIVISION

EASTERN NEW YORK: SM, Paul S. Vydareny, WB2VUK—ASM & STM: K2ZM. SEC: WA2ZYM. BM: WB2IXR. PIO: KB2TM. TC & OO/RFI: KC2ZO. ATC: WA2VGM. SGL: KB2HQ. Newsletter Editor: WB2NHC. JUNE NET LISTINGS (QNI/QSP): ALBANY COUNTY RACES 63/5 CDN 539/67 ESS 243/61 HVN 339/63 NYPON 549/254 NYS/E 396/244 NYS/L 341/340 NYS/M 294/201 SDN 264/91. CLUB NEWS: Overlook Mtn. ARC conducted exams on June 20th and held June meeting on the 17th. Rip Van Winkle ARS discussed plans for Field Day at the June meeting. Saratoga RACES at their June meeting heard Ed Whitaker K2DLL speak on old radios and had a selection on display. They also discussed Field Day. They will hold their annual picnic on July 25th. WECA discussed Field Day plans. Since many clubs do not meet during the summer months, club news is rather scarce. If your club has any activities during the summer months, please be sure to get that information to me even if you do not put out a newsletter. Any such information will be included in the column. A very special thanks to Mark, WB2EAG, who has stepped down as net manager of HVN and NYS/M. Mark started NYS/M, has been manager and made it what it is today. We all thank him for his efforts and wish him well during his hiatus. Best of luck, Mark. The new net manager for HVN is Andy, N2FTR and for NYS/M, N2EIA. Good luck to both of them. Please give them your support. Let's all support the nets during the summer even when things are slow. I received quite a number of Field Day messages from clubs throughout the section. Good to see so many actively participating. A very safe and enjoyable summer to all! JUNE PSHR: NQ2H WB2VUK WB2EAG KA2MYJ K2ZVI. June Traffic: WB2VUK 240, NQ2H 219, WB2EAG 116, W2WSS 72, K2ZVI 54, KA2MYJ 47, N2FTR 45, K2ZM 37, W2CJO 17, KA2TQW 14, KA2NGJ 12.

NEW YORK CITY-LONG ISLAND: SM, Walter Wenzel, KA2RGI—ASM: K2IZ. ASM/VE: W2NL. ACC: KA2WIJ. SEC: KA2LAD. OOC: NB2T. TC: WA2YNH. STM: K2MT. The following are traffic nets in and around the section:

NET	FREQ	TIME	MGR
NCVMF	146.745/R	1930 M-F	K2MPG
SCVMF	145.370/R	2000 Sun-Friday	KA2JMA
BAVMF	145.350/R	2000 Daily	K2YQK
NYPON	3913 kHz	1700 Daily	KA2UBD
NYS/M	3677 kHz	1000 Daily	WB2EAG
NYS/E	3677 kHz	1900 Daily	KU2N
NYS/L	3677 kHz	2200 Daily	KU2N
ESS*	3590 kHz	1800 Daily	W2WSS

BBS 145.010 PACKET NODE STATION AI2Q. *Independent Net, recognized by NTS, all times are local, please note that AI2Q is the Packet Node Station and that all incoming NTS traffic should be routed through him. LIMARC will continue to conduct examination sessions on second Saturday of the month at the N.Y. Institute of Technology, Rt. 25A, Old Westbury, in Salten Hall, Room 2, applicants are reminded to bring 2 forms of ID, original and a copy of their FCC licenses, check for $4.50 made payable to ARRL/VEC, 2 pens/pencils and a calculator for the math questions. For further information please contact Joe Kolb, W2NL. Grumman ARC also has exams, starting Sept. 2, the exams will be on the first Wed., for further information call Howard, W2QUV at 516-354-6861. Suffolk County ARC is also conducting exams on the 2nd Sat. of the month at the Islip Arts Bldg. Room 106 at Suffolk Community College in Selden, for further information call George, WA2VNV at 516-751-0894, there are many more testing sessions going on, check around with the local clubs, we list these sessions to help you upgrade or get your first license. How would you like to get front row seats for free, see lots of people from all over the world (no, not the U.N.), be able to tell a NYC traffic officer that the parking spot is reserved just for you, and get away with it? If this has caught your attention, contact the Hudson Division Director, Steve Mendelsohn, WA2DHF, and sign up for the 1987 New York City Marathon, you just might get your picture in the paper or even make it on television (Hi Mom!). Traffic (June): N2AKZ 276, K2YQK 184, K2MT 82, KB2BKE 70, W2GKZ 66, NB2D 63, N2GQS 55, N2GPA 45, KA2ZYX 40, K2MPG 34, KB2AKY 19, N2GNO 17, K2TWZ 17, NF2N 15, KA2UIU 14, N2ETO 13, WB2EUF 10, KA2JMA 8.

NORTHERN NEW JERSEY: SM, Robert R. Anderson, K2BJG—ASM: (VE Liaison): N2XJ. ASM (PO Info): NW2L. SEC: N2BMN. STM: KA2F. OO/AAC: KA2BZS. ACC: KY2S. SGL: W2KB. TC: K2BLA. BM: N2CXX. PIO: WB2NQV (PH 735-8550). Appointment endorsements for the next two year term starting 9/87 follow: DEC Hudson county W2KB, and

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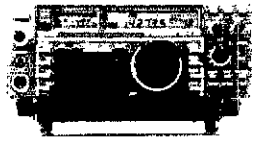

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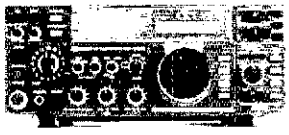

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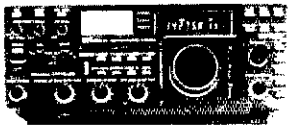
DELUXE



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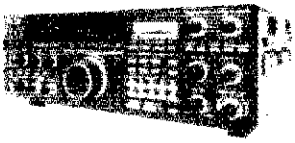

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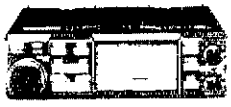

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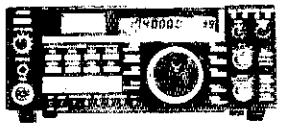

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DEC Morris county WB2VUF, EC KA2OEE, and W2UH. OESs K2GE, KA2OEE, N2FOZ, N2XJ, NE2P, W2KB, W2UH, WA2JVP, WB2HVF, and WB2VUF. ORSs AG2R, K2VX, KC2YG, N2XJ, NJ2Q, W2CC, and WB2QMP. Please note that starting with this issue endorsements are reported in the cover month they are effective. New or recent changes of appointments because of the publication lead time will continue to be reported two months after their effective date. New appointments effective 7/87 are: N2WM replaced KX2O as DEC Sussex county; WB2HVF replaced WA2EXX as DEC Essex county; ORSs WA2EXX and KR2J. The position of DEC Warren county is open. Integration of Packet Radio and NTS in NNJ continues. Increased NTS activity on the WA2SNA-1 PNS is evident with the addition of W2QNL as Packet Liaison Manager. ORSs now performing scheduled Packet Liaison are: WA2EXX, WB2FTX, KC2YG, KA2HNQ, KA2F, KR2J, and W2QNL. Field Day messages to the SM were received from: K2NJ-Cherryville, K2ND-Englewood, K2GSA-Garden State, K2GQ-Irvington Roseland, NO2T-ITT, K2GE-Morris County OEM, NA2R-New Providence, N2GT- Neptune, KC2Q-Ocean Monmouth, NA2J-Old Bridge, NN2T-Ramapo Mtn., K2GE-Raritan Bay, and W2DFC-Sussex. The Ramapo Packet Group has upgraded their WA2SNA-2/3 Digipeaters. They are now operating as a duel channel Network Node (NNJ & NNJ3) using NET/ROM software. Congratulations to the following who were newly licensed or upgraded during June sessions conducted by: NNJ VE Board, and Old Bridge RA: Novice: A Knadle. Technician: KB2BER, KB2DJT, KA2YAC, G Martinoca, and C Teckham. General: KB2ABK, KB2CML, and KB2BQK. Advanced: KA2TMY, and KA2UXL. Extra: KC2HL, and KA2MMO. Traffic: /P Indicates VHF Packet Liaison.

NET	MGR	FREQ	TIME	SESS	SES	QSP	QNI
NJM	WB2ZJF	3695	1000	Dv	30	143	233
NJPN	W2CC	3950	1800	Dv	34	136	380
NJN/E	KA2F	3695	1900	Dv/P	30	119	218
NJN/L	WA2EPI	3695	2200	Dv/P	27	87	126
OBTTN	K2SC	147.12	2000	Dv	Not Received		
TCETN	WD2AHD	146.685	1930	Dv	30	51	176
NJVN/E	WB2FTX	146.895	1930	Dv/P	Not Received		
NJVN/L	WB2ANK	146.49	2230	Dv/P	28	81	188
NJTTTN	WA2EPI	223.88	2100	Dv	22	50	126
NJSN	WB2PKG	3735	1830	Dv	Not Received		

NNJ/PI W2QNL 145.01 24Hr via WA2SNA-1 PBBS SAR/PSHR N2DXP 114/67, N2XJ 284/100, W2RRX 120/108, KA2F 144/126, WB2QMP 156/111, WD2AHD 41/74, K2VX 42/80, WA2EPI 119/107, KA2INE 59/86, W2XD 15, W2CC 26, K2ASPH 13/87 NR2O 42.

MIDWEST DIVISION

IOWA: SM, Wade Walstrom, WØEJ— ASM: WBØAVW. SEC: KDØBG. STM: KCØXL. ACC: NUØP. OOC: WAØQMU. BM: KØIR. TC: KØDAS. Field Day was once again a big success. I received FD reports of operations from WØGN, WØAK, WØMME, KAØSTA, NØDZU, KEØBX, NWØX, WØGQ, NCØO, KDØGH, KØKQJ, and KØKWO and I know of several other operations. This was a fine Iowa showing. Most of these reports were received on the packet network. It is good to see this increasing activity on packet. KAØVPM and his crew from the Burlington area have done it again! Novice exams were again given to George's 6th grade social studies class at James Madison Middle School with 45 passing and anxiously awaiting their licenses and new calls. This is the same group which last year passed 76 new Novices and allowed Iowa to lower the average age of its amateur population and maintain growth in the ranks! New calls are NYØU, KEØOI, NØCF and NØXCI. The Cedar Valley Amateur Radio Club had 17 members assisting with the Fifth Season 8K Run. There were 24 Cedar Rapids ARES members assisting local police with communications during the annual July 4th fireworks display. The Midwest Convention will be at the Adventureland Inn in Des Moines on September 26 and 27. See you there! Traffic: WØSS 301, KØGP 137, KAØADF 101, WØYLS 95, WAJL 49, KAØGSA 35, KCØXL 35, WBØJFF 30, WBØAVW 26, KØBRE 19, WØBH 16, KAØVBA 15. May Traffic: W4JL 52, K4KUU 6.

KANSAS: SM, Robert M. Summers, KØBXF—SEC: WØCHJ. STM: WØOYH. Net Mgr: KSBN/KPN, WØFRC. Net Mgr: QKS, WBØZEN. KS RTTY Mgr: KAØCUF. DECs: WØOAG, WBØYJT, WØEB. SGL: NØBLD. TCC: WBØNQM. BM: KØJDD. ACC: KØBXF. Mgr QKS-SS: WØMYM. Packet Radio is coordinated for KS by ???? and the WX NET by WBØHOZ. Two more Silent Keys: WØRXD and WAØFBY, both of Johnson County. Mike, WAØLBB still on the ailing list. Lots of new Novices being reported about to hit the airwaves. How about a few of you ELMERS showing them the way to QKS-SS 3735 M-W-F 7 PM local time. WØMYM is ready to show them the traffic way of HAM RADIO. Paul, WØFIR, has been real busy of late. Hamfests almost every weekend. Net Activity for May: KSBN QNI 942 QTC 103. KPN 482/14. KMWN 691/651, KWN 652/579. QKS 175/64. QKS-SS 37/13. KAØCUF reporting KS RTTY meeting again on 3605 LSB Sat and Sun at 7:30 AM local time. Late news reporting WØRRL had damage from recent tornado. No word yet from Hams at Beloit from their recent storm that brew 90 MPH. WØFRC 205, KSØU 132, WØFIR 120, WØOYH 105, KØBXF 91, NBØZ 75, WAØHOZ 61, WBØZEN 43, NØGZT 34, KXØI 31, WØMYM 24, NØDJT 18, NØBDG 14, WØPB 10, WØCHJ 7, WØRBO 5.

MISSOURI: SM, Ben Smith, KØPCK—STM: KØSI. SEC: K9OCU. SGL: KDØUD. BM: WBØTEG. ACC/PIO: KT5Y. TC/RFI COODINATOR AND OO COORDINATOR: WBØHHK. The Southside ARC took an active part in Harry's Hay Days. They provided communications for the parade and operated a special event station. Club members taking part in the activities were: WBØTGG, WDØGHN, NØCKT, KBØWZ, WØCLR, NØGMW, KAØSEU, NØEWP and KAØSET. The Branson area has or will soon have two new repeaters on the air. One will be on 147.195 using the call NØDST and the other will be on 224.42. The St. Charles ARC operated a special event station in honor of Lewis and Clark Days. Club members helping were: WAØCKO, KAØCWU, NØECE, NØGOM, NØHDL, KAØMJI, NFØO, KAØUXV, KAØWHR, KAØYPK, WBØVDE, KOØZ, WBØRAB and KAØZDH. On April 13 ARES members in Southwest Missouri under the leadership of DEC, WDØFVX assisted the Red Cross from Taney and Carrol counties with communications as they provided aid to Green Forest, Ark after heavy winds hit that community. Amateurs helping in the operation were: KCØPY, KAØCKE, WDØFJX, NØHQW, WBØSNY, NØFBW and WB5YGX. On June 13 ARES members and other amateurs in the section under the direction of Missouri SEC, K9OCU, participated in a Statewide Earthquake Drill. Using SSB, RTTY and PACKET, communications were provided by local, district, and the state EOC offices. Nets reporting:

NET	SESS	QNI	QTC	DAY	TIME(PM)	FREQ(MHz)	MGR
MON	60	261	209	DLY	7:9:45	3.585	KØSI
MOSSB	30	587	147	DLY	6:00	3.963	KØORB
MEOW	28	303	73	DLY	5:30	3.963	KØDSQ
2AEN	6	99	20	TUE	8:00	147.84/.24	NOØE
TCN	5	67	9	THU	9:00	147.09/.69	KAØILO
MORTT	1	6	8	as needed		3.630	K9OCU
PHD	5	151	7	MON	9:00	146.43	WAØKUH
CMEN	6	114	5	WED	9:00	146.16/.76	KØPCK
RRABN	30	419	4	DLY	8:00	146.19/.79	KAØLLN

CONFERENCE PROCEEDINGS

21st Central States VHF Society Conference held in Arlington, Texas, July 23-26, 1987. 28 papers covering everything from use of TVRO dishes for moonbounce to a solid state amplifier for 5.7 GHz. 166 pages.

6th ARRL Computer Networking Conference held in Redondo Beach, California, August 29, 1987. 29 papers (approximately 150 pages) will appear in the proceedings booklet. Copies will be available at the conference or from ARRL after September 1.

MICROWAVE UPDATE 1987 held in Estes Park, Colorado, September 10-13, 1987. 15 papers (approximately 100 pages) appear in the proceedings booklet. Copies will be available at the conference or from ARRL after September 14.

Proceedings booklets are $10.00 each plus $2.50 per order for postage and handling ($3.50 for UPS.)

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SLAN	5	342	4	MON	8:00	146.31/.91	KØWEX
MOFON	3	30	4	WED	8:15	222.42/4.02	AIØO
CARL	3	12	2	WED	8:30	146.46	WBØWLU
KARES	5	76	1	SAT	9:00AM	146.37/97	KØUAA
LOZBC	26	450	0	MON-SAT	6:00AM	146.13/73	NØHVO
LOZFM	4	79	0	FRI	9:00	146.13/.73	NØHVO
MMARN	4	89	0	SUN	8:00	28.325	NSØS
SARN	5	66	0	TUE	9:00	146.43/7.03	WØENW
ARESN	5	50	0	THU	9:00	147.855/255	NØFQW
CMOYL	5	24	0	MON	8:00	147.285/885	NØHVO

Traffic: WØBMA 450, NQØG 288, WAØYJX 179, NDØN 170, KØSI 156, KØPCK 128, WAØHTN 111, AIØO 96, KCØAS 96, K9OCU 94, KØORB 66, WAØFYA 55, WDØELL 50, WØOUD 46, WBØCJB 29, NØBKE 28, KT5Y 28, KGØL 25, KØUJA 1, WAØKUH 1.

NEBRASKA: SM, Vern Wirka, WBØGQM—STM: Jerry Kohn, WDØEGK. SEC: Michael Ruhrdanz, NØFER. The Lincoln Amateur Radio Club reports a complete packet station is operational at their KØKKV station. This was accomplished with money from the WØWYH Memorial Fund and the donation of a computer from WBØJIM. The Net Manager of the Eastern Nebraska 2 Meter ARES Net, Tim Hopkins, KAØQDX, reports the net continues to meet Monday through Friday evenings at 2100 local on the 146.16-76 MHz repeater. Eastern Nebraska ARES 2 Meter Net Control stations are: Monday-WBØRRK, Tuesday-WAØWRI, Wednesday-NØFYE, Thursday-KAØQDX and Friday-WBØQVB. Traffic and all check-ins are welcome. A new net is operating in the Lincoln area on ten meters, especially for Novices but all check-ins are welcome. Net Control is Nick Sharp, KAØUGF. This net meets on Mondays at 2030 local on 28.400 MHz upper sideband. Recently many of the new Novices had their first traffic handling experiences when KAØKPT relayed messages from Midwest Division Director, Paul Grauer, WØFIR, saying congratulations on their new tickets. Our Section Emergency Coordinator, Michael Ruhrdanz, NØFER, has not been receiving reports from some Emergency Coordinators regarding activities in their area. Please send reports on ARES activity to NØFER. Traffic: KØDKM 307, NOØA 7, WBØGQM 5, WDØCRD 1.

NEW ENGLAND DIVISION

CONNECTICUT: SM, John Ronan, K3ZJJ—STM: K1EIC. SEC: KA1ECL. ACC: KG1M. OOC: NA1I. TC: W1HAD. BM: K3ZJJ. PIO: KX1B. SGL: W1AH.

NET	SESS	QNI	QTC	MGR
CPN	30	274	81	NK1J
CN	54	206	117	K1EIR
WESCON	30	203	134	WB1GXZ
NUTMEG	30	141	63	K1CE
CSN	22	122	28	WB1GXZ
10 M RAG CHEW	7	125	5	KB1XD

Field Day 1987 was an outstanding success with many clubs exceeding their previous point score records! The OSCAR 10 satellite provided "magnificent" communication for the first time on Field Day. While 20 meters faded on Saturday evening, enhanced conditions on 80 meters made up the difference. The Field Day leader in Connecticut was ECARA with a total 8748 points operating 4A from a field location in East Killingly. According to FD Chairman, KB1H ECARA bagged over 2600 contacts and acquired all 1200 bonus points. ECARA utilized a 2 meter link to a computer set-up which used a dupe program home brewed by WA1OEH. ECARA XYLs kept the operators well supplied with cookies, cokes and lasagna. FARA under the guidance of Field Marshall W1NU racked up its best score of 4,510 points operating 2A with 596 CW, 564 SSB, 95 Novice, 64 OSCAR, 10 contacts and 33 Packet contacts plus all 1,000 bonus points. Some 40 FARA members participated using the call of former president, K1BR. Heavy hitters on CW were W9GMS, W1IKB and W1NU— all of whom, incidently, recently received their 3Y1EE Peter I Island cards! SARA earned 2878 points operating 4A from a very wet Roger Baldwin Park, operating as K1GF. Sky, K1GF was the CW "Iron Man" operating with a special home-brew two finger key. The SARA Novice station operated by new graduates from the Novice course was an enthusiastic success generating a 10 meter pile up. Said SARA President, WA1CMF, "It was wonderful to see our new Novices really get into it. You can really see the benefits of Novice Enhancement!" Tri-City ARC operating 2A as N4ME Robert Fitch HS ran up a score of 3800 points operating three Ten Techs and a Novice station. GNARC operated 2A from Cranberry Park with a 10 kW Civil Prep. generator earning 2500 points. BEARS operated 1D from Bethel H.S. with 16 students ranging from 12 to 17 years of age. WARC operated from Veteran's Memorial Park with 35 participating. A number of smaller groups operated Field Day this year: The Ledyard Extras (3 ops) from Patchogue State Park, W1WP in Norwalk (2 ops) Zygo ARC, the Nortield Emergency AR Team, the XON Group operating from Mohawk Mtn., RASON (5 ops), and the Valley ARA operating from the Shelton Rec. Center. Field Day 1987 was unquestionably a success in Connecticut!! Traffic: WB1GXZ 302, N1EDD 203, W1EFW 197, KA1GWE 175, K1EIC 89, KY1F 52, N1DMV 52, W1WP 42, NK1N 41, K1CE 40, KB1ZC 37, W1YOL 34, K1AQE 31, KA1OZC 20, KB1XD 18, N1BOW 17, W1BDN 14, WA1NLD 12, WB2SGI 8, W1CUH 5.

EASTERN MASSACHUSETTS: SM, Luck Hurder, KY1T—ASM: K9HI. SGL: K3HI. OO/AA: KA1KF. SEC: KB1PA. PIO: K1HLZ. BM: KB1AF. STM: KW1U. TC: KA1IU. ACC: KA1KCU. EMASS Hot Line - 437-0111. Westlink 449-2226.

NET	MGR	FREQ	TIME(LOC)/DY	QTC	QNI
EMRI	N1AJJ	3658	1900/2200 DY	201	216
EMRIPN	WA1FCD	3880	1730 DY	109	126
EM2MN	NK1Q	145.23	2000 DY	187	347
NEEPN	K1BZD	3945	0830 SN	6	40
HHTN	NG1A	04/64	2230 DY	232	439
EMRISS	N1CVE	3715	1600/2030 DY	37	75
CITN	KB1AF	745/045	1930 DY	75	242

Affiliated Club Coord. KA1KCU and Asst Division Director WA1IDA are still on the lookout for a number of assistants at the Boston Museum of Science Amateur Radio demo. This year's visitor will have lots of opportunities for hands-on experience of Amateur Radio during the weekend of September 26 and 27. Some of the stations will have multiple operating positions, with a host of activities being available, including ATV, packet, HF, Novice and even an NTS message center. The emphasis will be on getting the public to PARTICIPATE, rather than just taking a look. It's even a more ambitious project than last year's very successful event! Contact Bob Salow WA1IDA at 527-2144 or Ron KA1IDU at 443-3879. Bulletin Manager KB1AF reports that EMASS OBS transmitted 448 bulletins during the month—with K1BOG and W1ZHC topping the list. Net Manager NK1Q (ex-KA1HFO) has been a rather busy sort this month, with NM duties and a high traffic total, as well as being top dog on the prestigious Public Service Honor Roll—FB! 10 year olds KA1PTO, KA1PTQ and KA1PSP related their encouraging adventures in Amateur Radio to the Barnstable Radio Club, and explained to all how 36 of their fellow classmates were able to master the CW and theory. Eastham's 50 3rd graders are eagerly awaiting their turn in the fall, and clubs everywhere in the Section are

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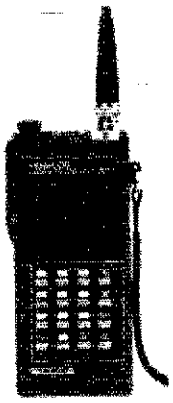

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reporting plans for welcoming the increased numbers of newcomers! Traffic: KW1U 503, NK1Q 385, KN1K 360, KB1AF 321, WA1FCD 267, WA1TBY 188, W1CE 139, WA1KLG 118, N1AJJ 107, K1ABO 105, W1ZHC 98, NK1O 76, K1SEC 62, KA1NOI 59, K1GRP 55, KY1T 34, KA1LIH 32, WA1FNM 24, K1LCQ 24, N1EGN 22, K1BZD 20, KA1EDY 8, WA2KFE 8, WA1SNH 6, K1GGS 5 KA1KCU 3, N1EYV 1. Have you expressed your opinions to your Division Director and Section Manager lately?

MAINE: SM, Cliff Laverty, W1RWG, ASM: Bill Mann, W1KX—SEC: KA8UVQ. STM: AK1W. BM: W1JTH. ACC: KA1FKS. OOC: W1KX. PIO: KY1E. SGL: K1NIT. TC: KQ1L. ASM/P: N1AHH. W1KX reports the appointments of two Official Observers: Len Bodman, K1NBG, and Bob Howe, K1MZB, congratulations. This year 220 bikers participated in the 3-day Bike Trek sponsored by the American Lung Association. Comms were organized by Phil, W1JTH, who states: "This is a Public Service event demonstrating amateur ability to react with other agencies such as the National Guard which provided ambulances and logistic support. We had liaison to their radio system." Participating on Day 1 Bethel to Farmington: W1HTG, KA1GZR, W1WXI, KA1FKS, KA1FTO, N1RP, WN1TXD, KA1LPW, KA1MLF. Day 2 Farmington to Unity: W1JTH, W1TGY, KA1GPQ, KA1JGF, KA1FXI, KA1FXH, N1AII, W1KX, KB1YA, N1RP, ND1A. Day 3 Unity to Rockport: W1JYH, W1TGY, KA1FO, KQ1L, KA1FKS, N1AII, KA1LPW, KA1MLF, KB1YA, N1RP, WN1TXD. The Sandy River ARC provided comms for the Bike-A-Thon sponsored by Sandy River Rehabilitation Center at Farmington on June 7 with KI1B, WB1GBC, KA1JGI, KA1GPQ, W1HTG. Comms were organized and provided by Merrymeeting ARC for Walk America 1987 at Brunswick. One emergency was handled efficiently by N1CSR at the scene and N1DLO riding the C & W ambulance when an elderly walker collapsed at the finish line with a heart attack; he was revived and transported in less than 5 minutes. Amateur Radio saving life. Other MARC members manning checkpoints were KB1AQ, KA1OR, WA1OJB, ND1O, KY1J, KA1ODE, N1CHN, KB1CV, KA1IAQ. The Pine Tree Chapter QCWA elected W1EZR, Pres; W1HTG, VP; W1JTH, Scy/Trea; W1WCI, W1BQL, W1NV elected directors. Traffic: WB1CBP 115, ND1A 68, WA2ERT 45, AK1W 41, W1RWG 40, W1JTH 33, KA1JOJ 8, KA1ODT 7, NB2K 7, WA1YNZ 7, N1BME 6, K1NAN 6. PSHR: WA2ERT, WB1CBP.

NET	SESS.	Checkins	Traffic	MGR
Sea Gull	25	832	123	K1GUP
Pine Tree	30	265	75	ND1A
Aroostook E	5	71	3	WA1YNZ
N1AHH-BBS	No Report			
CMEN	No Report			W1WCI
Me Pub Svc	No Report			KA8UVQ

NEW HAMPSHIRE: SM, Bill Burden, WB1BRE—TC: W1JY, SGL: N1AIX. Summer is upon us and club activity was focused on the annual Field Day exercise and other outside activities. We had our quarterly meeting of the NHARA state association with lots of input on FD plans, club reports, and discussion on the efforts to get ham plates in NH. My log shows that I visited the Concord Brasspounders and discussed the Novice Enh program and new testing procedures. A good exchange on both subjects and after the mtg, I visited AF1T and got a look at his EME station. Dale is an ATC and specializes in VHF-UHF, so take advantage of his expertise if you have a problem. The following Sunday, I visited the CVFMA meeting which was a combination cookout and mtg in Hartland, VT. FD planning was on the agenda and we had a good visit with the gang. Finally FD arrived and Fred K1ACL and I embarked on a two day tour of as many sites as possible. There were 8 FD operations in the state and we visited 5. Apologies to those we did not reach—time ran out. We plan to start with those groups next year. We slogged through the rain and fog to the GBRA and PCARA sites on the seacoast. Their friendly rivalry was in full swing! GSARA had an excellent site in Francestown with several new and potential hams in attendance. NARC in Hollis was running 15A and we stopped for lunch before moving on to the Hilltoppers outstanding site in Mason. We were guided in by W1FJH to visit AF1T and his team. We saw lots of enthusiasm, innovation and the results of good planning and logistics at all the sites—thanks to all who participated in FD87! Congrats to W1EJ who has been appointed to the UHF/VHF Adv Committee. Thanks for your willingness to serve, Tom! W1QWJ received his commemorative pin and plaque for 50 yrs of membership! Dave McLanahan will have an article in Dec. QST. Sorry to report that Ernie Tetu W1MXO is a Silent Key—I had many pleasant chats with Ernie and Irene at NARC meetings. WA1UXA reports that the "6 Meter Syndicate" is alive and well in SNH on 52.525 simplex. TRY THIS- for promoting your club activities, etc. There are MANY scanner listeners on our repeaters. Also many Hams do more listening than talking on the repeaters. Promote club meetings and programs, public service efforts on the repeaters. Talk up Novice Enhancement and the process of getting your license! Invite listeners to come to meetings while you are discussing these subjects with your fellow scanners—see if you can provide them with info on repeater frequencies for their customers. Try it— it really works! Finally, the NH Traffic Handler's picnic will be on Sept. 20. Traffic: GSFM 178, GSPN 148, NHN 89, NHNTN 33, W1PEX 524, BPL, W1FYR 357 BPL, WB1HBB 130, KK1E 92, W1ALE 82, K1TQY 77, WA1FHB 76, NE1J 73, N1NH 72, K1ACL 52, W1TN 46, N1ALM 29, WB1GXM 26, KB1XI 22, KA1LMR 21, KV1S 20, KA1HPO 19, KA1NXT 16, KI1M 14, KA1JOU 9, WA1YZN 8, N1DQA 7, WA1JYV 4.

VERMONT: SM, Frank I. Sultor, W1CTM—ASM: KD1R. STM: AE1T. SEC: W1KRV. PIO: WA1YOY. TC: W1AIM. As Green Mtn. summers are relatively on the short side, picnics abound. SJRC (7-18), Boarder ARC (7-18), VTN (7-25) were all held with a great time had by all. It's nice to attend a group picnic especially after having worked hard on Field Day. SJRC (K1VT) had a super FD with excellent results. Two new areas of participation were Novice/Tech use of the 10-M band and satellite QSO bonus which helped the 16 operators to hopefully a first place finish again this year. Others heard on FD were Twin State ARC BARC and CVARC. FD tends to overshadow the VHF QSO Party, but this year saw an excellent effort. N1CVA & KA1LEX on Mt. Mansfield amassed 140 QSOs from all over the northeast. WB1GQR had good hunting on 6 meters with over 300 QSOs in 39 states. I am happy to inform you that Division Director (K1KI—Tom) has recognized 2 of our own for their special efforts. W1KRV (SEC-Joe) was appointed Division rep to ARRL National Emergency Committee & WB2JSJ (Mitch) has been appointed Division Assistant Director. The battle over 220 MHz freq allocation continues with ARRL leading the opposition. The 19 June ARRL submission to FCC included excellent input from the VT independent coordinating committee. On the operating front, AE1T now has 5BDXCC and WA1JVV has DXCC. K1IK continues his good PR work having hosted a Boy Scout visit to his QTH. W1KRV indicates ARES membership is now 166 strong. Joe's efforts have resulted in providing our section with excellent emergency preparedness capability. Clubs are requested to appoint ECs plus any individuals who would like to join ARES should contact W1KRV. ARRL Field Organization license requirements are being revised to include Novices. Speaking

of Novices, KA1NWH (Scott) was heard on 10 meters recently. On education front, classes are available from the following: BARC (WB2JSJ) CVARC (K1HKI) Twin State ARC (W1LY). W1BD/R was damaged by a nearby lightning strike but has been repaired. Tnx to club funds and WA1ODL/N1BRT. Congratulations to WA2SPL (Joe) who was nominated to become NM of 1RN/c3. It is noted with sadness that KA1FGO (Charles) is now a Silent Key. Next month—BARC hamfest report! Traffic: KT1Q 677, WA2SPL 382, WA1JVV 132, AE1T 77, KD1R-1 28, W1KRV 25, WA1VXW 8, NB1A 5. Nets: CVFMN 4/76/5. TSEN 4/87/5. VTN 30/125/162. GMN 26/383/26. VTPHN 4/66/5. CAR 26/553/4.

WESTERN MASSACHUSETTS: SM, Bill Voedisch, W1UD—OO/RFI; N1CM. PIO/ACC: K1BEL. SEC/SGL: WB1HIH. TC: KA1JJM. STM: KA1EXJ. A job well done goes to the following people: Dick Goodman, WB1HIH, of NOBARC for the excellent article published in the Springfield Republican on Field Day. John Balboni, AC1T, of HCRA for arranging for six minutes of TV coverage on two TV stations. Tom Duffy, K1JHC, of MARA arranged for Field Day coverage by WLMS of the Leominster/Fitchburg area. KA1KPH prepared professional news releases for the news teams covering the Field Day sites. It's great to have the public thoroughly informed of our activities. We have another wide coverage repeater in Worcester County. It's on Mt. Wachusett. It's great, you can wander around with 100 mW of power and contact just about anywhere in Worcester County. Try it on 224.590 MHz. Traffic: KA1IFC 298, KA1EXJ 64, W1KK 49, WB1HIH 41, KA1EKQ 35, W1SJV 32, W1FFK 30, W1ZPB 4, N1FJ 3, W1UD 152.

NORTHWESTERN DIVISION

IDAHO: SM, Don Clower, KA7T—SEC: K7REX. STM: W7GHT. OOC: WB7CYO. ACC: N7BI. PIO: WB7PFQ. Many Idaho clubs held Field Day activities. Magic Valley ARC had a group out at Anderson Campground and had a good time. Clearwater ARC and Eagle Rock ARC also had groups out during Field Day. Ada County ARES group had their station at the Old Penitentiary in Boise. Channel 6 TV station did a very nice story on Field Day and their activities. N7IRM and a group of local hams helped with the Meridian Dairy Day parade and had a ham station set up at the fair grounds to demonstrate amateur radio. The Emmett ARC is trying to reorganize and is looking for new members in their area, please contact Dick, N7DHM, at 365-7268. Traffic: W7GHT 220, N7GHL 122, NW7K 40, K7CXG 14.

CD	3.990	0810 AM M-F	22	743	27
IMN	3635	9 PM	30	348	90
NWTN	146.38/98	7:30 PM	30	969	41
FARM	3.937	8 PM	30	1636	21

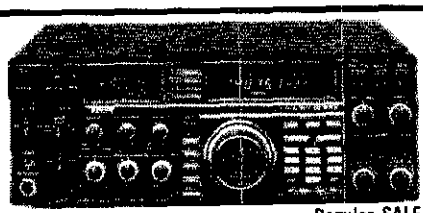
General: I still need an ASM and a TC, if interested please contact me. 73s Don.

MONTANA: SM, Ken Kopp, KØPP—Your ACC and SM attended a Father's Day Picnic at Sidney. Nice folks!! Miles City will host next year. Many of Section's clubs out for FD. Who will hold the AARC's trophy until next year? ARRL bulletins now part of MSN. Participation from Billings and Great Falls areas missing. Join in on 3920 Sun AM at 0930. QCWA Treasure State Chapter membership at 83. Info from W7BC. NN7J DX'ing on low end of 2 meters. GHRC members provided communications for Celebrity Golf Tournament in Bozeman. Traffic: WB7WVD 77(PSHR), WA7TUW 12, N7HKW 4, W7BKB 3.

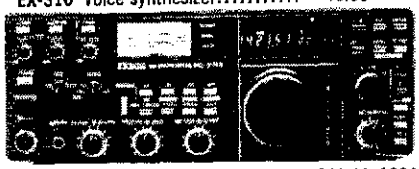
NET	SESS	QNI	QTC	MGR
IMN	30	348	90	WA7GQO
MSN	3	46	0	KØPP
MTN	330	1203	71	KF7R

OREGON: SM, Randy Stimson, KZ7T— ASM: KM7R. STM: W7VSE. SEC: N7CPA. PIO: KC7YN. SGL: KA7KSK. ACC: WB7TWD. RFI: AK7T. OO: N7SG. STC: N7ENI. We now have an active Local Interference Committee in operation called the Lower Columbia Interference Committee (LCIC). If any of you have an interference problem, or are being interfered with, just write a letter, WITH A SIGNATURE and mail it to: Lower Columbia Interference Committee, PO Box 25092, Portland OR 97225. During Field Day, I visited two sites. One was in the parking lot of Portland. This was the Portland Amateur Radio Club. The other site was at Champoeg State Park where the Oregon Tualatin Valley Amateur Radio Club worked their field day. I spent some hours out there working the bands and had a very nice spaghetti dinner. Congratulations to the new officers of the Portland Amateur Radio club. They are President Jim: WB7AAK, Vice President Kurt:KA7ZDD, Secretary Phil: N7FTE, Membership Secretary Walt:WA7SDY Treasurer Joe: W7VBH. Sargeant At Arms Randall: WA7AWJ. Traffic (P = Packet) W7VSE 387, N7ELF 118, KA7EEE 91, N7DRP 76, W7ODG 69, KA7AID 31, WB7SZM 14P, W7LNE 11.

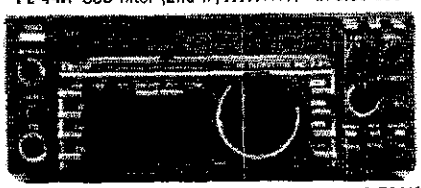
WASHINGTON: SM, Brad Wells, KR7L—SEC: KA7INX. STM: KD7ME. TC: W7BUN. ACC/ASM: KC7PH. BM: N7CAK. OOC: N7DVR. SGL: KD7AC. ASM: KD7G. Plan to attend the Walla Walla Hamfest September 25-27 at Milton-Freewater, Oregon. Admission is free with no charge for the flea-market tables. There will be a hospitality event in Pioneer Park Friday evening. VE testing is available on both Saturday and Sunday morning at 9 AM with walk-ins accepted. A large number of prizes will be given away which include an IC-735, ICOM Micro 2AT, Alpha-Delta 4 position coax switch, and Cushcraft AV5 vertical. This is the last and one of the best Washington hamfests for 1987, so don't miss it. Contact WA7CBX for more info. The Thurston County ARES operated June 16 to assist in the evacuation of some 200 homes in the Johnson Point/Boston Harbor area due to a burning garage filled with toxic chemicals. VE testing is now available in the Kitsap County area on a limited basis. If you're interested in upgrading your license contact N7HTK. Mark your calendar—it's time for the Washington State QSO Party sponsored by the Boeing Employees' ARS. Time: 0100Z September 12 to 0100Z September 14. All bands and modes, both single and multi-op. Exchange is signal report, serial number and county. Contact David Long, N7FNG, 2117 N. 52nd St., Seattle, WA 98103 for more information. This is a fun contest, with lots of action, and a chance to shake out your station just before the 1987-88 contest season. Congrats to N7DIP on receiving an ORS appointment. The OO Program is expanding in this section, but N7DVR needs more Official Observers located in Eastern Washington. If you have a Technician license (or higher) and have been a ham for at least 4 years, you qualify. Lots of Field Day activity in this section and even the weather cooperated—most of the time. Extra point held day messages were received from the Rubber Circle Contest Club (K7SS), Issaquah ARC (KA7TTY), N. Kitsap ARC (KI7T), Mike & Key ARC (K7LED), Island County RC (W7BN), Kennydale Key Clicks (W7JIE), Lower Columbia ARA (W7DG), Walla Walla ARC (W7DP), San Juan County ARES (N7JN), Central Washington ARC (W7GB), K5ER, BEARS, and ARA Bremerton (W7VE). Many thanks to KD7AC and N7CAK for initiating and mailing out the Governor's Proclamation of Amateur Radio Day on June 27. Got an RFI, TVI, or technical problem? These people will help: W7BUN-Puyallup; WA7BPJ-Dayton; N6CHU-Spokane; W7GB-Moses Lake; W7GNR-Olympia; K7RNZ-Bremerton; K7UU-Bellevue; K7WA-Woodenville. Traffic net activity in the first half 1987 is:



HF Equipment	Regular	SALE
IC-761 HF xcvr/SW rcvr/ps/AT	2499.00	2149
SP-20 Ext. speaker w/audio filter	149.00	134.95
FL-101 250 Hz CW filter	69.95	
FL-102 6 kHz AM filter	56.00	
CI-V Computer interface adapter	TBA	
EX-310 Voice synthesizer	46.00	



IC-751A 9-band xcvr/.1-30 MHz rcvr	1649.00	1399
PS-35 Internal power supply	199.00	179.95
FL-32 500 Hz CW filter (1st IF)	66.50	
FL-63 250 Hz CW filter (1st IF)	54.50	
FL-52A 500 Hz CW filter (2nd IF)	108.00	99.95
FL-53A 250 Hz CW filter (2nd IF)	108.00	99.95
FL-33 AM filter	35.25	
FL-70 2.8 kHz wide SSB filter	52.00	
RC-10 External frequency controller	39.25	
IC-745 9-band xcvr w/.1-30 MHz rcvr	1049.00	899.95
PS-35 Internal power supply	199.00	179.95
EX-241 Marker unit	22.50	
EX-242 FM unit	44.00	
EX-243 Electronic keyer unit	56.00	
FL-45 500 Hz CW filter (1st IF)	66.50	
FL-54 270 Hz CW filter (1st IF)	53.00	
FL-52A 500 Hz CW filter (2nd IF)	108.00	99.95
FL-53A 250 Hz CW filter (2nd IF)	108.00	99.95
FL-44A SSB filter (2nd IF)	178.00	159.95



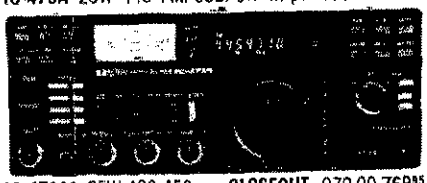
IC-735 HF transceiver/SW rcvr/mic	999.00	799.95
PS-55 External power supply	199.00	179.95
AT-150 Automatic antenna tuner	445.00	349.95
FL-32 500 Hz CW filter	66.50	
EX-243 Electronic keyer unit	56.00	
UT-30 Tone encoder	17.50	

Other Accessories	Regular	SALE
IC-2KL 160-15m solid state amp w/ps	1999.00	1699
PS-15 20A external power supply	169.00	154.95
PS-30 Systems p/s w/cord, 6-pin plug	299.00	269.95
MB Mobile mount, 735/745/751A	24.50	
SP-3 External speaker	61.00	
SP-7 Small external speaker	49.00	
CR-64 High stab. ref. xtal (745/751)	63.00	
PP-1 Speaker/patch	159.25	149.95
SM-6 Desk microphone	44.95	
SM-8 Desk mic - two cables, Scan	78.50	
SM-10 Compressor/graph EQ, 8 pin mic	136.25	124.95
AT-100 100W 8-band auto. antenna tuner	445.00	389.95
AT-500 500W 9-band auto. antenna tuner	559.00	489.95
AH-2 8-band tuner w/mount & whip	625.00	549.95
AH-2A Antenna tuner system, only	495.00	429.95

ICOM

Other Accessories - continued:	Regular	SALE
GC-5 World clock	91.95	89.95

VHF/UHF base multi-modes	Regular	SALE
IC-271A* 25W 2 meters ... CLOSEOUT	859.00	699.95
AG-20* Internal preamplifier	64.00	
IC-271H 100W 2m FM/SSB/CW	1099.00	969.95
AG-25 Mast mounted preamplifier	95.00	
IC-275A 25W 2m FM/SSB/CW w/ps	1199.00	1049
IC-275H 100W 2m FM/SSB/CW	1389.00	1229
IC-475A 25W 440 FM/SSB/CW w/ps	1399.00	1249



IC-471A* 25W 430-450 ... CLOSEOUT	979.00	769.95
AG-1* Mast mounted preamplifier	99.50	
IC-471H* 75W 430-450 ... CLOSEOUT	1399.00	999.95
AG-35* Mast mounted preamplifier	95.00	

*Preamp $9.95 with 271A/471A/471H Purchase

Accessories common to 271A/H and 471A/H	Regular	SALE
PS-25 Internal power supply for (A)	115.00	104.95
PS-35 Internal power supply for (H)	199.00	179.95
SM-6 Desk microphone	44.95	
EX-310 Voice synthesizer	46.00	
TS-32 CommSpec encode/decoder	59.95	
UT-15 Encoder/decoder interface	14.00	
UT-15S UT-15S w/TS-32 installed	92.00	

VHF/UHF mobile multi-modes	Regular	SALE
IC-290H 25W 2m SSB/FM CLOSEOUT	639.00	569.95
IC-490A 10W 430-440 CLOSEOUT	699.00	499.95

VHF/UHF/1.2 GHz FM	Regular	SALE
IC-27A Compact 25W 2m FM w/TTP mic	429.00	369.95
IC-27H Compact 45W 2m FM w/TTP mic	459.00	399.95
IC-37A Compact 25W 220 FM, TTP mic	499.00	439.95
IC-47A Compact 25W 440 FM, TTP mic	549.00	479.95
PS-45 Compact 8A power supply	139.00	129.95
UT-16/EX-388 Voice synthesizer	34.99	
SP-10 Slim-line external speaker	35.99	
IC-28A 25W 2m FM, TTP mic	459.00	399.95
IC-28H 45W 2m FM, TTP mic	489.00	429.95
IC-38A 25W 220 FM, TTP mic	489.00	429.95
IC-48A 25W 440-450 FM, TTP mic	489.00	429.95
HM-14 TTP microphone	55.50	
UT-28 Digital code squelch	37.50	
UT-29 Tone squelch decoder	43.00	
HM-16 Speaker/microphone	34.00	
IC-900 Transceiver controller	589.00	529.95
UT-29A 2m 25W unit	295.00	269.95
IC-3200A 25W 2m/440 FM w/TTP	599.00	529.95
UT-23 Voice synthesizer	34.99	
AH-32 2m/440 Dual Band antenna	37.00	
AHB-32 Trunk-lip mount	34.00	
Larsen PO-K Roof mount	20.00	
Larsen PO-TLM Trunk-lip mount	20.18	
Larsen PO-MM Magnetic mount	19.63	
RP-3010 440 MHz, 10W FM, xtal cont.	1229.00	1089
IC-1200A 10W 1.2 GHz FM Mobile	699.00	629.95
IC-1271A 10W 1.2 GHz SSB/CW Base	1229.00	1069
AG-1200 Mast mounted preamplifier	105.00	
PS-25 Internal power supply	115.00	104.95
EX-310 Voice synthesizer	46.00	
TV-1200 ATV interface unit	129.00	119.95
UT-15S CTCSS encoder/decoder	92.00	
RP-1210 1.2 GHz, 10W FM, 99 ch. synth	1479.00	1289

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Hand-helds	Regular	SALE
IC-2A 2-meters	279.00	249.95
IC-2AT with TTP	299.00	259.95
IC-3AT 220 MHz, TTP	339.00	299.95
IC-4AT 440 MHz, TTP	339.00	299.95
IC-02AT 2-meters	365.00	299.95
IC-02AT/High Power	399.00	339.95
IC-03AT for 220 MHz	449.00	399.95
IC-04AT for 440 MHz	449.00	389.95
IC-u2A 2-meters	299.00	269.95
IC-u2AT with TTP	329.00	289.95
IC-u4AT 440 MHz, TTP	369.00	329.95

Accessories for micros - CALL $

IC-12AT 1W 1.2GHz FM HT/batt/cgr/TTP	459.00	399.95
A-2 5W PEP synth. aircraft HT	499.00	449.95

Accessories for all except micros	Regular
BP-7 425mah/13.2V Nicad Pak - use BC-35	74.25
BP-8 800mah/8.4V Nicad Pak - use BC-35	74.25
BC-35 Drop in desk charger for all batteries	74.50
BC-16U Wall charger for BP7/BP8	20.25
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	47.00
BP-3 Extra Std. 250 mah/8.4V Nicad Pak	37.50
BP-4 Alkaline battery case	15.25
BP-5 425mah/10.8V Nicad Pak - use BC35	58.50
CA-5 5/8-wave telescoping 2m antenna	18.95
FA-2 Extra 2m flexible antenna	11.50
CP-1 Cig. lighter plug/cord for BP3 or Dlx	13.00
CP-10 Battery separation cable w/clip	22.50
DC-1 DC operation pak for standard models	23.25
MB-16D Mobile mtg. bkt for all HTs	24.50
LC-2AT Leather case for standard models	54.50
RB-1 Vinyl waterproof radio bag	34.95
HH-SS Handheld shoulder strap	16.95
HM-9 Speaker microphone	47.00
HS-10 Boom microphone/headset	23.25
HS-10SA Vox unit for HS-10 & Deluxe only	23.25
HS-10SB PTT unit for HS-10	23.25
ML-1 2m 2.3w in/10w out amplifier ... SALE	99.95
SS-32M Commspec 32-tone encoder	29.95

Receivers	Regular	SALE
R-71A 100 kHz-30 MHz, 117V AC	$949.00	799.95
RC-11 Infrared remote controller	67.25	
FL-32 500 Hz CW filter	66.50	
FL-63 250 Hz CW filter (1st IF)	54.50	
FL-44A SSB filter (2nd IF)	178.00	159.95
EX-257 FM unit	42.50	
EX-310 Voice synthesizer	46.00	
CR-64 High stability oscillator xtal	63.00	
SP-3 External speaker	61.00	
CK-70 (EX-299) 12V DC option	12.25	
MB-12 Mobile mount	24.50	
R-7000 25 MHz-2 GHz rcvr .. SPECIAL	1099.00	899.95
RC-12 Infrared remote controller	67.25	
EX-310 Voice synthesizer	46.00	
TV-R7000 ATV unit	131.95	119.95
AH-7000 Radiating antenna	89.95	(3)

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Your mobile and home station equipment are covered from all risks of loss or damage—including fire, lightning, theft, collision and overturn or other accidents and natural hazards. (Loss or damage to antennas, towers or rotators is not covered.) Coverage is also provided for computer software for up to $1,000 AND hardware you have scheduled including related accessories.

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If additional property is purchased, it will automatically be protected without any additional premium as long as the added value does not exceed $1,000. At your next policy renewal date, your total insurance coverage would be reviewed and your policy and premium charge adjusted for the additional coverage.

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Exclusions

Loss or damage to radio towers, antennas or rotators is not covered. This program does not insure against the usual and customary exclusions such as loss or damage by mechanical or structural breakdown or failure, dishonest acts, wear and tear, damage occasioned by repairing or tuning.

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1. Name of Applicant: _____
2. Mailing Address: _____

   City _____ State _____ Zip _____
3. Other Locations Where Equipment Is Kept _____

   _____
4. Date of Birth: _____
5. QST Control No. (from QST Label) _____
6. **SCHEDULE OF EQUIPMENT**

   Use this listing to describe all radio equipment in your possession.

Description (Including Manufacturer's Name, Model and Serial Numbers or Other Identification)	Replacement Cost (Value at today's prices)
_____	$ _____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

7. To figure your premium complete the following:
   - Total amount of Replacement Insurance $ _____
   - Total amount of Miscellaneous Items (valued under $50.00 each) $ _____
   - Total amount of Insurance $ _____
   - Annual Premium (based on the rate of $1.25 per $100 of insurance. Minimum premium $20.00) $ _____
   - Add Annual Administration Charge $ 5.00
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ENROLLMENT PERIOD ENDS: NOVEMBER 1, 1987

NAME	QNI	QTC	SESS.	FREQ	TIME
EWTN	426	351	253	146.64	5:30 PM/9:30 PM
NTN	7845	700	181	3970	12:00 NOON
NWSSB	2451	154	141	3945	6:30 PM
PSTS	677	278	359	146.92	5:30 PM/10:30 PM
WARTS	17495	1136	181	3970	6:00 PM
WSN	2887	812	359	3590	6:45 PM/9:45 PM

Don't forget the Sunday Swap & Shop on 3930 at 10:30 AM and the Washington Information Net on 3987 daily at 9:30 AM. Traffic: WB7WOW 202, N6EQZ 126, W7LG 119, WA7CBN 95, W7IGC 82, K7GXZ 73, KE7EO 56, KR7F 56, N7GGJ 52, W7APS 49, W7GB 45, K7SUX 38, KE7PI 24, W7LBK 24, W7IEU 10, WA7PIN 9, K7AJT 6, K7CLL 6, N7DIP 3, KA7PMD 3, KD7ME, KR7L.

PACIFIC DIVISION

NEVADA: SM, Joe Lambert, W8IXD—ASM/SEC: K7HRW. DECs: N7CXD, WB6BPU. TC: K7ICW. ENARS had a great turnout for Field Day with 6 of their 9 members present plus some guests. In So. Nev. the "World Famous Chef," AD7K, lived up to his reputation with great food. FARS had their Field Day in town in order to stir up some public awareness of ham radio and emergency services. I understand TARA's Field Day was equal to their past performance which was great. Anyone interested in Novice Classes in Reno area contact K7HRW. SNARS handled radio communications for the Junior Olympics at Hug High School. Ham get-togethers in Elko are Tues. at 1930 in Commercial Hotel's Banquet Room and Sat. morning at 0930 in the Stockman's. Everyone is welcome to attend. Anyone interested in an ARRL Field Appt. contact SM W8IXD.

PACIFIC: SM, Army Curtis, AH6P—Aloha and hafa adai to all of the Pacific. How did your group do with Field Day? We had a lot of fun here in Hilo and sounds like a lot of other groups in the Section did also. Was interesting that all messages received by the SM this year were via packet. While I greatly enjoy packet myself, I hope we don't forget the other ways to send traffic. Net reports: Hawaii Afternoon Net QNI 177 for April in 23 sessions, QNI 89 in May with 13 sessions. EARC Net QNI 309, QTC 20 in 26 sessions for June. On Maui KH6JWB upgraded from adv to extra, WH6BFT gen to adv and WH6BLW tech to gen. Congrats! The folks on Guam are staying busy with many public service events and were active on Field Day also. KG6JHH now AH6IC in Kailua-Kona. Traffic: KH6S 39, KH6H 37, KH6PP 30, WX4J 9, AH6P 6.

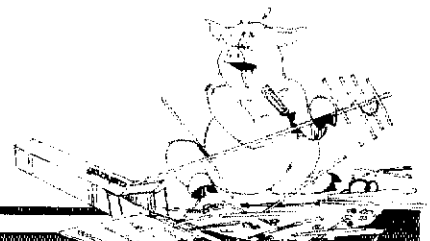
SACRAMENTO VALLEY: SM, Bob Watson, W6IEW—Many thanks to the many people from Amador, Butte, Nevada, Sacramento, Trinitiy and Yolo Counties who expressed support by nominating me as Section Manager again. As the only nominee, I have been declared reelected for another two years starting in October. Thanks also to all of the volunteers who have accepted appointments in the Section and helped make it run smoothly. It is a great pleasure to announce that the top level Section staff is now complete. Art Fingerle, WA6UZR of Elk Grove has volunteered to take on the job of PUBLIC INFORMATION OFFICER. Thanks Art, and good luck. The others filling the top spots are: Jettie Hill, W6RFF the Technical Coordinator and Affiliated Club Coordinator; Al Biegler, WA6WJZ is the Section Traffic Manager; Deane Coats, NR6A heads the emergency activities as Section Emergency Coordinator; Ron Murdock, WB4FIX keeps us informed as Bulletin Manager; John Canaris, WY6O, tries to keep us out of trouble as Official Observer Coordinator; and Jim Pratt, N6IG keeps an eye on the State Legislature as the State Government Liaison. Congratulations to our Placer County Emergency Coordinator, John Winans, formerly KB6HRP and now KI6UF on his upgrade and new call. DON'T FORGET the SECTION NET: First Sunday each month, 8 PM, on 146.085, input up, Yuba/Sutter repeater WD6AXM/R. Net Control - W6IEW or W6RFF. Traffic: N6LUY 189, K6SRF 47, WA6WJZ 62, WA6ZUD 28, WD6BZQ 8, WB6SRQ 4.

SAN FRANCISCO: SM, Bob Smith, NA6T— Glad to see the good turn-out for Field Day, 1987 in the San Francisco Section. There were SEVEN clubs, and various other Groups participating, so SF was available to all. BUT, did SCRA beat REDXA again? Stay tuned, KE6LF, Pete, is the New DEC for Humboldt-Del Norte Counties. He's got some real good ideas for His district, get out and support him AND AMATEUR RADIO. Hope to See you all at the Pacific Division Convention this Year. There will be a CLUB PARTICIPATION PRIZE, maybe your club can win it this year. FWRA is Meeting at the Klondike Restaurant on 5th in Eureka. HARC-FWRA was out in force for the Kinetic Sculpture Race this year with over thirty communications volunteers, congrats to all. SCRA is starting their annual CANNED FOOD DRIVE in JULY, this is a different, but good way to promote AMATEUR RADIO. Don't forget the SCRA Fleamarket in Sebastopol in September. Is your club interested in Supporting CDF-VIP? There is a lot of co-operation and equipment available for those who participate, ask Humboldt Packet Society, and SCRA! Traffic: N6FWG 53.

SAN JOAQUIN VALLEY: SM, Charles McConnell, W6DPD—SEC:WC6U. STM:N6AWH. TC: WA6EXV. ACC: W6DPD. Asst. SMs: W6TRP and K6YK. New appointment: EC N6DTB. Appointments renewed: ASM K6YK, W6TRP: EC WC6U. Emergency Coordinators are STILL needed in Mariposa, Merced, and Mono Counties. Contact W6DPD or WC6U if you can serve. W6PXM is a SILENT KEY. K9YBM has moved back to Indiana. K6SSJ has moved to Madera. WA6KOI and W6ILR are Extra. KB6NSE and N6KTB are Advanced. KB6PQO is General. KB6PMS, KB6PPR, KB6PPU, KB6PPV, KB6PPW, KB6PQM, and KB6SLE are Technicians. WB4AYE has a TS 711A. WB6C has a TH-215A. The ARRL Pacific Division Convention is October 2-4, 1987 at the Le Baron Hotel in San Jose. Registration information should be available now. Traffic: N6MCY 74, WA6YAB 20, W6DPD 8, N6MXG 4.

SANTA CLARA VALLEY: SM, Glenn Thomas, WB6W—SEC: WA6OCV. TC: WA6PWW. STM: N6JLJ. PIO: WB6NLA. ASM: N6JQJ & NS6N. ACC:.W6MKM. BM:(vacant) OOC:(vacant); OOPS! I missed a month, sorry about that! This report covers June and July. Congratulations to Dennis WA6PGP on his graduation with a BSN. . .our division director, Rod KB6ZV, spoke to the SVECS board of directors concerning incorporation. . .a hearty WELL DONE to the Monterey Area ARES for their sterling performance during the Pebble Beach fire. They learned (among other things) the importance of being able to operate WITHOUT a repeater when the fire got theirs. It is particularly disheartening to listen to your repeater literally go up in smoke. . .We welcomed a new DEC in July, Sharon, N6MWD is the new DEC for all of Santa Clara County. . .Field Day was an exciting experience as usual. I received FD messages from the following groups - K6YA, NPEC, WB6ITM, WA2IBM, N6WG (EBay?), K6LY, WB6ZQZ (Sacto?), WB6LRZ, W6YL, W6LMN, WA6TOW, KE6N, K6XS, NR6A, W6UW, and K6QEZ. . .any more to come?. . .don't forget the division convention Pacificon'87 in San Jose on October 2,3,4. It's not too late to register!. . .the Williams Hill ARS Smoked Hamfest on October 11 in King City is a must for those of you in the south part of the section. This will also be the 10th anniversary of the Marble Cone Fire. Contact WB6IZF for more details. . .thanks to all of you who supported the Amateur Radio activities at the Moffett Field Airshow over the July 4

Summon Some Aluminum Conundrums



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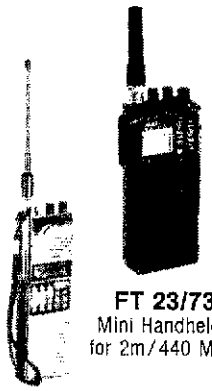

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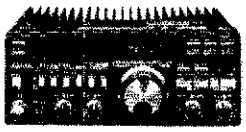

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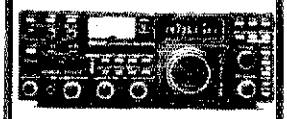

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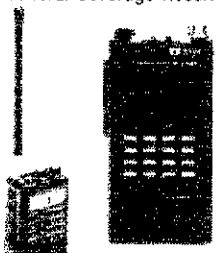

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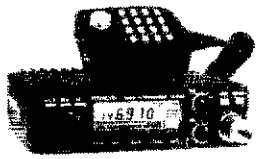

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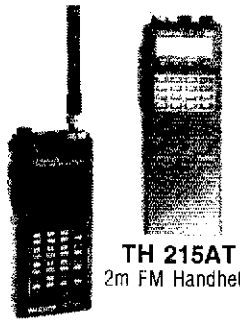

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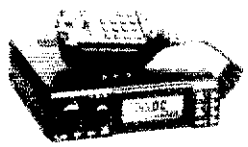

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weekend. This was one of the larger ARES activities as it included the "shadowing" of event officials, an NTS operation, a special event station (K8MF), and a public information booth...also thanks to those of you who participated in the CDF holiday fire patrol over the 4th. Fortunately, it was a very quiet evening. With any luck, the rest of the summer will be as quiet . . . as of this writing, I am looking for a Bulletin Manager and an OO Coordinator. I have some expanded duties in mind for the BM, and we do need an OOC to oversee the OO program. If you are interested, give me a call! de WB8W Traffic: (May) W6YBV 228, W6KZJ 50, KA6SXW 24, N6JLJ 19, KB6IWG 19, W6PRI 10, WA6HAD 6 (Jun.) W6YBV 196, NR7E 92, W6KZJ 39, KA6SXW 12, W6PRI 10, WA6HAD 7, N6JLJ 2.

ROANOKE DIVISION

NORTH CAROLINA: SM, Rae Everhart, K4SWN—SEC: AB4W. STM: K4NLK. BM: K4IWW. ACC: WC4T. PIO: WA4OBR. TC: K4ITL. SGL: KE4ML. Biggest Hamfest of year and 30th Anniversary celebration will be at Shelby Sept 5 & 6. The NTS/ARES luncheon meeting will be at Western Steer Steak House on Hwy 74 & 180 at 12:30 PM Sept 5. Hope to see all there. Congrats to every amateur in section who participated in '86 SET. This Section placed high in top 10. Did you participate? '87 SET will be next month on Oct 17 & 18 and we CAN go to number ONE. Simple rules to follow: PARTICIPATE AND SEND IN REPORT TO YOUR EC AND LEAGUE HQ. W4CQ reported working BV2B via packet radio FD. Congrats!!! FD BIG SUCCESS this year with more stations participating. Many stations used packet radio FD, however, messages sent to SM via packet were much slower than the established traffic nets/modes. Thought this was an interesting observation. Thanks to all who reported and received your bonus points. Congrats to AK1E on Golden DXCC award. Silent Key: K4JBH. Quarterly traffic report—APR/MAY/JUN as follows:

NET	FREQ	NM	QNI	QTC	TFC	QND	SESS.
NCEN	3923	WB4WII	1529	633	500	1835	91
NCMN	3927	WB4HRR	1162	430	348	1312	91
CN	3573	K4IWW	2070	814	766	4250	182
CSN	3715	AA4MP	710	205	162	2146	91
CNCTN	22/82	WA4MNR	2412	395	306	1544	91
PCTN	28/88	NE4J	1025	396	217	1011	91
RARS	04/64	K4ABJ	1033	61	61	1637	91
M2MEN	63/23	KF4MZ	2355	108	101	1999	92*
CFARS	31/91	W4EHF	1702	84	84	1704	91
PETN	72/12	WB4HRR	433	59	49	844	69
THEN	3923	N4LUO	815	111	80	925	91

*One ARES EMERGENCY. Totals: 15,246, 3306, 2674, 19207, 1071. Thanks to all who make the nets possible, taking the traffic and training new amateurs. Traffic: K4NLK 352, NJ4L 241, AA4TE 153, KA4EYF 130, K4IWW 129, WD4HTE 128, AA4ZV 127, AA4MP 111, AB0Y 107, WB4HRR 89, K4SWN 89, WB4WII 78, WB4N 77, NT4K 72, N4MMM 51, AK1E 44, WB4CYN 42, WB4TOP 39, WD4MRD 30, W4EHF 29, WD4EQK 25, AJ5F 25, KI4YV 25, KA4TLC 23, N4LUO 19, N4CJJ 13, WA2EDN 6, WD4RMQ 6, N4UE 5. Totals: 29 SAR's, 2,265 pieces of traffic. KA4TLC reported passing 5 pieces of EMERGENCY TRAFFIC. This is what practice is all about. Everyone keep up the good work. Check your NET DIRECTORY for times of nets in the NC Section. Make your final plans NOW for the SIMULATED EMERGENCY TEST—SET Oct 17 & 18.

SOUTH CAROLINA: SM, Jimmy Walker, WD4HLZ—The last two months, this column has been devoted to information about our two Section SSB nets. We hope that you are already involved in regular participation on one or both of these nets. Insofar as CW is concerned, our Section and the NC Section manage two dual-Section nets which operate for the benefit of both Sections, The Carolinas' Slow Net (CSN) at 10-13 WPM runs on a daily schedule at 3715 kHz at 6 PM. The Carolinas' Net (CN) has two sessions each day at 3573 kHz — the first at 7 PM and the second at session at 10 PM. The early session speed is 20- 22 WPM and the late session runs about 15-18 WPM. If you need to flake off some rust, go for CSN and move on to CN. The pride and joy of SC traffic people are the local nets, generally on VHF and UHF repeaters, and meeting from once per week to a daily basis. Local nets are a good place to learn voice traffic work. Traffic: W4ANK 156, K4ZN 155, KB4BZA 107, KA4LRM 58, WB4UDK 55, KA4YEA 54, WØKT 31, W4DRF 25.

VIRGINIA: SM, Claude Feigley, W3ATQ—STM: KB4WT. SEC: N4EXQ. ACC: NT4S. OOC: W4HU. BM: AB4U. TC: WB4MAE. SGL: W4UMC. PIO: AA4VP.

VTN	1PM	3907	KB4NGO
VSBN	6PM	3947	KI4BR
VSN	6:30PM	3680	N4KSO
VN(EARLY)	7PM	3680	N4GHI
VN(LATE)	10PM	3680	WB4KSG
VLN	10:15PM	3947	KJ4MF
SVEN	7:15PM	146.82	NT4S
STARES	9PM	146.97	KJ4VT

Our SEC, N4EXQ, reports much ARES activity with over 50 amateurs providing the communications for the Special Olympics in Richmond which had 1900 participants. He has appointed AA4VP as DEC for the Southside District replacing K4VWK who requested replacement after many years of outstanding service. As of this date there are 997 registered ARES members in the section. BM, AB4U, says there is increased interest in Bulletin station appointments and has named KD4DM as an OBS. Special Service Club, Shenandoah Valley ARC, has appointed N4MM as their HF Awards Manager. N4MM will validate WAS and 5-Band WAS applications for that area. Those seeking those awards contact N4MM or the SM for details. The Richmond ARC, a Special Service Club, has an Awards Manager who performs the same service in their area. PIO, AA4VP, submitted a mailing to all affiliated clubs concerning procedures for getting good Field Day publicity. He requests that clubs send him a copy of their newsletters. Upcoming VE Exams; Gaithersburg Hamfest, Sept 13, walk-ins permitted—Williamsburg, Sept 19, contact WU4G—Sterling Park ARC, Oct 3, contact Mike Weber—Va. Beach (ARRL State Convention), Oct 4, contact AA4AT—Winchester, Nov 7, contact NC4B. A number of affiliated clubs have failed to submit their 1987 Annual Reports. If you wish to remain on the active list, your report is needed, forms are available from the ACC or the SM. Traffic for the month continued fairly heavy, considering the summer doldrums, with 43 stations reporting a total message count of 5021. By this time, there should have appeared in the "Happenings" section of QST an announcement seeking nominees for the election of Section Manager for the period 1988-89. Since I have served as your SM for 2 two-year terms, I feel that this experience should be passed on to other qualified and dedicated amateurs in the section. Therefore, I am not seeking reelection as your SM. I will be glad to discuss the duties and the work the SM is called upon to perform with any interested parties and can provide the forms required for election filing. Hope to see you all at Virginia Beach, Oct 3 & 4. Traffic: N4GHI 637, K4DOR 528, N4EXQ 428, AA4AT 282, W3ATQ 273, W4JLS 262, KB4WT 260, K4MTX 234, WB4PNY 191, AA4GL 181, K4JST 146, WD4FTK 138, KA4TWI 128, WB4KSG 122, WD4ALY 107, WB4ZNB 107, KI4BR 99, WB4EDB 97, WA4LTO 85,

K4JM 71, K4AXF 70, KJ4MF 70, N4KSO 64, WD4MIS 61, WB4ZTR 45, NT4S 44, WD4OCW 42, KB4NGO 31, K4BGZ 30, NW4O 27, K4GR 25, W4TZC 22, N6ANQ 20, K4MLC 20, WB4UHC 18, NN4J 12, WA4TVS 12, K4VWK 8, NG2H 6, WB4KIT 6, N4FNT 5, KI4W 4, W4YE 3.

WEST VIRGINIA: SM, Karl S. Thompson, K8KT—SEC: K8QEW. STM: N8FXH. SGL: K8BS. ACC: WA8CTO. Rpt Coord: WD8OZT. WA8USO-1 is now linked to K8QEW for ARES-NTS. Link is via KC8JN. Regret to report that W8GPV has become a Silent Key. K8TPF is recovering well at home.

Net	Freq	Time	QNI	QTC	Sess	NM
WVFN	3865	6:00	671	151	30	W8YP
WVMD	7235	11:45	550	30	27	W8FZP
Hillbilly	14290	Noon su	114	16	4	W8YP
WVN	3557	7:00	220	102	30	KZ8Q
WVNN	3730	5:15	121	26	29	WD8LDY
WVRN	3640	6:30	131	12	30	K8LG

Traffic: KA8WNO 268, W9YP 191, KA8TIK 144, K8TPF 141, KZ8Q 134, KE8FI 99, N8FXH 71, K8QEW 64, K8UQY 51, W8FZP 46, W8JWX 43, K8KT 28, WD8LDY 24, NC8G 12, KA8OGF 6.

ROCKY MOUNTAIN DIVISION

COLORADO: SM, Bill Sheffield, KQ0J—ASM: KA0MQA. SEC: WB0TUB. STM: KB0Z. ACC: WB0DUV. OOC: KC0UD. BM: KA0CZW. PIO: N0FOE. SGL: WB0FQB. TC: NC0F. The weather this summer has been most unpredictable with many tornado warnings. Trix to the Severe Weather Net and their coordinator, KC0W, for the many hours spent on this public service communications. Congratulations to AA0P who has been appointed Regional Coordinator of Amsat and to WD0HHU who assumes the position of Amsat Area Coordinator, if you need any info on Amsat or satellites, please let them know. Net/Rcm hit Colorado and this summer saw many of the major digi's installing it before the snow hits our mountain sites. KØGUZ-1 (GWS), WØRRZ-1 (GJT), KQ0J-1 (KRE), WØHJX-1 (FNL) and WB0OCJ-1 (HAS). The annual Barcfest Swapfest will be held on September 13th at the Boulder Nat'l Guard Armory. Hope to see you there. 73, KQ0J. NETS: Col; QNI 875, QTC 34-Inf 77, Time 989, 30 Sess. CWN: QNI 56, QTC 73, Time 297, 22 Sess. CWXN; QTC 2278, Time 2790, 30 Sess. HNN: QNI 1499, QTC 112-Inf 354, Time 1067, 30 Sess. NCTN: QNI 323, QTC 144, Time 406, 32 Sess. SCTN: QNI 260, QTC 25, Time 262, 25 Sess. Traffic: N0BQP 2278, KE0NI 245, KB0Z 105, N0HMR 81, WB0FFV 80, K0HOA 78, N0DZA 55, WB0BLV 32, W0NFW 26.

NEW MEXICO: SM, Joe T. Knight, W5PDY—ASM: K5BIS. SEC: K6YEJ. DEC: WD5HCB. STM: ND5T. NMs; WA5UNO K6LL W5QNR. TC: W8GY. ACC: KA5BEM. Southwest Net (SWN) meets daily on 3583/7083 at 0230 UTC and handled 141 msgs with 221 checkins. New Mexico Roadrunner Net meets daily on 3939 at 0100 UTC and handled 48 msgs with 1143 checkins. New Mexico Breakfast Club meets daily on 3939 and handled 155 msgs with 920 checkins. Yucca 2-mtr Net 78/18 handled 11 msgs with 376 checkins. Caravan Club 2-mtr Net 66/06 handled 0 msgs with 122 checkins. SCAT Net 66/06 handled 6 msgs with 586 checkins. Info Net 13/73 with 86 checkins. FIELD DAY 87 seemed to be a huge success with reports received from the Caravan Club, Gallup Hams, Alamogordo ARC, Northern NM ARC, ABQ DX ASSOC, Pecos Valley ARC and others. Packet and Solar contacts were made along with lots of Novice activity. Lots of new resolutions for next year. Traffic: W5DAD 82.

UTAH: SM: Jim Brown, NA7G—SEC: Rich Fisher, NS7K. STM: John Sampson, W7OCX. Hope you had as much fun at field day as I did— for all of you that were leaders of your FD group, I say thanks. There is a lot of work involved in FD preparation, and a lot of paperwork to do after everyone has gone home. TU to NU7X for our safe and successful outing. 73 de NA7G. Traffic: WA7MEL 67, NS7K 20, NA7G 18, W7OCX 11.

WYOMING: SM, Jim Raisler, N7GVV—ASM: Steve Cochrane, WA7H. SEC: Jim Anderson, W7TVK. Thanks for the fine Field Day support. Received messages from NE WY, Campbell, SHY-WY, Laramie, Casper, Sheridan, Fremont, Sweetwater/Lincoln clubs. A big THANKS to Sheridan club for putting on the Wyoming Hamfest, and to Lys Carey, KØPGM, for filling in for Division Director. Traffic: NN7H 199, W7HNI 18.

NET	kHz	MDT	Ses	QNI	QTC	Mgr
Cowboy	3923	6:45 PM Da.	22	625	8	KC7AR
Pony Express	3923	8 AM Sun.	4	0	0	W7MZW
Wy ARES/RACES	3923	8:30 AM Sun	4	0	0	W7TVK
Sheridan ARES	6.82/6.22 MHz	7 PM Tue.	3	37	0	WA7D
Albany ARES			0	25	0	KD7SW

73 till next month.

SOUTHEASTERN DIVISION

ALABAMA: SM, Joseph Smith, WA4RNP—STM: N4JAW. SGL: KA4WVU. BM: KF4VV. OO/A AUX: AA4BL. TC: N4AU. ATC: WB4BYQ. ACC: WA4RNP. "act" SEC: WA4RNP. Here are the new officers of the Huntsville Amateur Radio Club: President KJ4VQ, Walt Wilson; Vice President AA4DJ, Larry Hill; Secretary/Treasurer WA4YBT, Wallace Wilson. Also The Amateur of the Year of the Huntsville Club is N4KTY, David Reasoner. I have had two Silent Key reports: W4ASW, Harry M. Arnold and WB4OGT, Arthur I. Phillips. Both lived in Birmingham. I hope to see you at the Mobile Hamfest on the 12th and 13th of September. Traffic: CAND reports 580 messages in 30 sessions with DRN5 rep 100% by WA4JDH, W4CKS and NW4X. DRN5 reports 543 messages in 60 sessions with Alabama rep 100% by WA4JDH, W4CKS and W4WJF. RN5 reports 511 messages passed in 60 sessions with Alabama rep 93% by WX4I, W4CKS, W4QAT, WA4ZPZ, WA4LLQ, NW4X and W4PIE. AEND reports 53 messages passed in 30 sessions with other nets rep by WA4JDH, W4CKS, NW4X, AA4YJ, WD5NYL, WX4I and N4DCS. AEND reports 53 messages passed in 30 sessions with RN5 rep by WA4JDH, W4CKS, NW4X, WB4LLQ, WA4ZPZ, W4PIM and W4QAT. AENM reports 72 messages passed in 34 sessions. Brass Pounders League: WA4JDH, KJ4JE. PSHR: WA4JDH, W4CKS, W4PIM and WA4RNP. Totals: WA4JDH 827, W4PIM 203, KJ4JE 190, W4CKS 178, WA4RNP 30, K4WJF 26, W4AOZ 16, WA4TVY 12 and W4DGH 6. 73, Joe.

GEORGIA: SM, Eddy Koscbucki, K4JNL—SEC: NC4E. STM: WB4WOL. ACC: WA4ABY. BM: WB4ZOJ. OOC: NA4I. PIO: WB4DEB. SGL: W4BTZ. TC: WD4PAH. WOW what a HAMFESTIVAL & ARRL NATIONAL CONVENTION. If you didn't attend you missed the best ever. Our hats off to the Atlanta RC who were the sponsors & to all who had anything to do with it. Fantastic PSHR honorees for the month of June are: WB4DVZ, AA4JV, WA4LLE, KF4FG, W4HON, KB4JPN & K4BAI. There are many Official ARRL appointments available to League members. If you think you can help us in some area contact me & I will send you a brochure. Are you a Novice and having technical problems contact me. I have on my staff qualified ATCs who will be glad to help. This goes for any one else with problems. AMATEUR RADIO is growing. We still need a lot more blood in the hobby. Won't you old timers find somebody and take them under your wing and get them interested? Many thanks to all the clubs and groups that send me their monthly newsletters. Two GA

section Hamfests are on tap this month. Augusta on the 20th at the Julian Smith Casino & Gainesville on the 27th at the Holiday Inn. Please support your section clubs and hamfests, the proceeds help keep many of the section's repeaters on the air. Packet has really caught on in the section. By next month I will have compiled a lot of important information for you Packeteers. Net check-ins during the summer takes its toll for various reasons. Now that fall is approaching won't you take time out and join one of the FB nets we have. Field Day is now history but has your club or group sent in your reports? If not please do so now so you can see how you faired. Frank Butler, W4RH, our SE Director informs me that if your club or group is planning a Hamfest in 1988 to get your forms from the following person at ARRL HQ: Mrs. Bernice Dunn, American Radio Relay League, 225 Main Street, Newington, CT 06111. She is the coordinator of HAMFESTS & will be glad to help you in any way that she can . . . 73. Traffic: WA4LLE 74, KF4FG 74, AA4JV 72, WB4WQL 56, K4BAI 36, N4MWR 25, W4HON 22, KA4HHE 15, N4UZ 12, WB4ABE 10, K4EV 5.

NORTHERN FLORIDA: SM, Roy Mackey, N4ADI—SGL: KC4N. ASM/BM: KB4LB. STM: AA4HT. TC: WØRAO. ACC: WD4RIQ. PIO: WA4PUO. SEC: WA4PUP. OOC: K4JJE. We need to thank KB9LT for his efforts as STM the past few months, and we are sorry that he needs to take it a little easy now. Hope he can still be on NTS Nets so we can keep in touch. "Rip" Van Winkle, AA4HT, has agreed to take Cotton's place, and I'm sure he will do a fine job for us as the new STM. Congratulations to all the Northern Florida clubs that worked on Field Day '87. It's always a great exercise in cooperation when so many members are working together to set up and take down all the towers and antennas that are needed when a club goes all out for FD. There were at least six clubs that sent FD messages to me or Rudy, SEC and had the chance to earn an extra 100 points in their FD score. I heard from BEACHES ARS; OARC; LMARS; 5 FLAGS ARA; BRADFORD COUNTY ARES; and GASDEN CO. The 100 points obtained this way is a lot easier than working for a couple of hours to make 100 SSB or 50 CW QSO's. So, if your club didn't do it this year, try to remember next year! The FD exercise isn't only a contest to see how many QSOs you can make, but it is primarily to let us run on emergency power and work from portable stations and temporary antennas to test our ability to function under emergency conditions. The fun of it is the people you work with to make it happen had the feelings of pride and goals met, that make the effort well worth the time and the sleep lost during the 24 hours! 73, Roy, N4ADI. Traffic: WX4H 514, N4PL 468, WA4OXT 347, KB4LB 227, W7YWF 226, AA4HT 216. WA4EYU 120, N4GMU 102, KC4VK 95, N4JAQ 85, WC4D 82, WD4IIO 68, NS4C 68, W4DTV 67, KB9LT 66, KA4YLH 65, W4MGO 56, K4CY 51, N4DY 48, KA4KAH 46, N4JHI 41, WD4IUI 40, NF4O 38, W4GUJ 33, KI4CQ 32, N2AOX 30, W4KDX 25, WD4FJY 23, WA4SXW 21, NO4P 19, N4ADI 19, WA4PUP 18, WD4HBP 17, WB4TZR 11, WB4AWG 10.

SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PFK—SEC: W4SS. STM: K4ZK. TC: KI4T. BM: WD4KBW. PIO: W4WYR. SGL: KC4N. OOC: W4TAH. ACC: K4EUK. WD4KBW reports 80 bulletins received and 177 sent by AA4BN 22, W4DL 22, WA4EIC 95, KA4GUS 11, WD4KBW 18, K4IEK 28, and WA4RLV 60. W4DL in the hospital with gall bladder surgery, but now doing well and home recuperating and on the air. Congrats to AA4HT, Rip, who has been appointed Section Traffic Manager for the Northern Florida Section. Congrats also to WD4KBW who is manager of the Tropical Phone Traffic Net beginning July 1. WD4KBW has also qualified as a member of the Amateur Auxiliary. Field Day groups reporting this year were The Glades ARC, South Florida Hamsters, South Florida DX Assoc., Pinellas County ARC, Tampa ARC, Everglades ARC, Sarasota Field Day group, Lakeland ARS, Harris ARC, ARA of Southwest Florida and WPBARC. AA4CH, President of the Everglades ARC reports that the cooperation and participation of the City of Homestead during Amateur Radio Week was very pleasing. AA4CH also reported that eight Cub Scouts operated 3rd party two meters as part of the Amateur Radio Week activities. Congrats to KB4LPL, Fort Myers, who is the new manager of the Southwest Florida Traffic Net. Many thanks to KI4ZW the outgoing manager for a great job. W4DWN reports he has worked 28 states so far on ten meters. 73 de WA4PFK. Traffic: W3CUL 2921, W3VR 1126, WA4PFK 428, W4NFK 258, K4ZK 229, K4SCL 220, WA4EIC 181, WA9VND 163, WD4KBW 159, WA4RUE 132, WA4RLV 131, WB4WYG 127, AA4BN 106, KA4GUS 101, K4EUK 97, KA4NXF 92, K4IA 90, N4ET 89, KA4FZI 89, W4TAH 76, KJ4WJ 73, KA4YHS 72, KB4KXV 70, N4MML 69, W3TLV 45, WB4AID 43, KI4ZW 36, N4NZI 37, K5IHH 36, KF4RL 36, KA4SIH 35, W4DL 34, K4FQU 29, KB4MON 27, KA9AKY 27, WD4NXK 24, N4ORZ 19, WA1BWV 18, W4SS 16, AA4CH 16, KB4LPL 16, WA4VWJ 15, NX5Q 13, W3IJR 13, W4SVI 12, KB4FO 9, KD4GR 8, N4PFQ 8, W4MPV 7, KA4GDU 7, K9ALX 7, W4NSY 7, WD4CHO 6, WK4F 5, W4MFD 4, K4OVC 3, KB4YJF 2, K4GVI 2, KA8CXQ 2, KB4EWO 2, N4PSV 2, KF4JA 1, W4DWN 1.

WEST INDIES: SM, Jose A. Purcell, Jr., KP4IG—ASM: M. Selousse, WP4ETG. ASM: W. Padilla, KP4JW. PIO: A. Rivera, NP4XM. BM: G. Nieves, KP4EW. TC: R. Sanchez, KP4ARY. SGL: A.L. Valdejuli, WP4CSG. NM-WINC: J.A. Ferrer, NP4WR. NM-WIMS: W. Wegner, KP4DJ. NM-WINE: B. Deniston. The official station of the PRARC, KP4ID, sponsored the Field Day on 6-28 at Bo. Masas in Gurabo. Three operators out of the 7 who participated are ARES members (NP4ZY, KP4KB, WP4GUH). On 6-27 all ARES District EC met in Arecibo to review the action plan in case of an emergency along with government officials. A special thanks to all EC, Join ARES, and be of help to your country. NETS: WINC (146.93 MHz at 6:30 PM), WINS (3710 KHz at 7:00 PM) WINE (1984 KHz at 8:01 PM).

SOUTHWESTERN DIVISION

ARIZONA: SM, Jim Swafford, W7FF—STM: W7EP. NMs: K6LL, K7POF, WB7CAG. Ray, K7OMR has been appointed "Chief Radio Officer" for Pima Co. RACES by the Emergency Services Mgr. Traffic Hound KA7MUL reports he will be on vacation thru 6 Aug. Your SM visited the Az Rptr Ass'n at their June meeting and enjoyed meeting the members. Robin Conde, N7HTX, was honored by the members for her years of devotion to public service. She and her OM are moving to Texas, and will be missed. Good luck, Robin. ARA recently celebrated their twentieth anniv. OPRC will again sponsor the O.K. Corral Expedition in Tombstone Sept. 5-6. Contact WBØKSW or N7HOR. Doris, KC7AQ, a blind amateur presented a talk to GVRC describing amateur radio programs for the visually handicapped. She is an extra class licensee and has found that amateur radio is an excellent medium for the handicapped to be in touch with the world, as well as perform public service work. Good work, Doris! N7FU and K6FM of Coconino ARC recently tested and passed ten new novices. Congrats to them. ARCA will conduct VE exams at Fort Tuthill hamfest July 24-26. Will have results next month. Bernie, WØYOY, always runs a great VE exam there. Byron, K6FI, former SM Santa Barbara Section is re-locating to Tucson in August. Welcome to the AZ Section. The AzPRA reports that they will have a demonstration program, a booth and a hospitality suite at the upcoming SW Division ARRL Convention October 9-11 in Scottsdale. Packeteers and those interested in packet radio, take note. (Tnx, Az Desert Air Waves) The Scottsdale ARC will be holding VE exams Sept. 5th at Scottsdale Sr. Center. Limited walk-ins may be available. Contact KA7UYQ at 952-9596. Your SM received Field Day reports from the following: Mogollon Monsters, KE7GR; Dave, KB7KY; Scottdale ARC, KT7R; Walapai ARC, Kingman; Old Pueblo RC, W7GV; AzARC, W7IO; IBM RC, KØTW. In addition to the emergency preparedness training experienced in FD test, it also offers an excellent opportunity for fun and social contacts among members of the various clubs. 73, and keep those cards and letters coming in! JIM. Traffic: KA7MUL 184, KB7FE 165, W7EP 143, K6LL 136, W7KCM 113, KE7KZ 78, WB7CAG 72, N7ETP 39, K7POF 30, W7KXE 15, K7JKM 11.

NET	QNI	QTC	SESS
SWN	221	141	30
ACN (HF)	593	54	30
ACN (VHF)	265	68	30
ATEN	779	73	30

LOS ANGELES: SM, Bob Poole, AJ6F— ASM:K6IYK. SEC:AK6Y. STM:W6INH. SGL:K6KSY. TC:WA2KDL. ACC:KB6AXK. Congratulations to Phineas, W6BF upon his acceptance and subsequent declared election as the succeeding LAX SM. Phineas will assume the post on October 1, 1987. I will be available in the wings to assist and advise him as he becomes familiar with the routine. It has been a pleasure to serve these past two years, but the pressures of work and family have precluded my acceptance of another try for the job. Good luck Phineas and I'm sure the LAX community will be behind you as they were for me. Tom, W6HT, of the SCDXC has beautiful lapel pins signifying the SCDXC for issue to authorized SCDXC members; contact W6HT for details. Chairman Steve Reyes, KB6HZQ of the LAACARC reminds us of the Amateur Radio booth to be held at the Los Angeles County Fair; contact Steve for information as to how you and your club may help out. By the time this is published, the Sixth Computer Networking Conference will have been held at the TRW facility in Redondo Beach in this section; thanks to the men and women of W6TRW for their efforts and interest in making this contribution to the future of amateur radio. The following LAX Section Field Day participants relayed their Reports to the SM via packet radio: W6VLD, N6NKO, W6RO, W6LS, K6AA, W6TRW, N6ZH, W6SD, W6CN, K6ZT and W6QFK; thanks for the reports! Speaking of packet radio, K6IYK now has a complex setup in Chatsworth featuring multi-frequency capabilities with 220 MHz ports for novice packet users; the network grows. Another field day report was received from W6SGJ courtesy of W6BJJ through normal NTS channels. W6LS, our ARRL VE in Burbank reports that at the 6 June exam session there were 15 upgrades out of a field of 19 candidates. The Downey and Monterrey Park Radio Clubs mention that the W6FXN/R features an earthquake net at 2230 hrs local on 145.46 from Buzzard Peak; tune in for an informative session. Just to show what can happen when a coalition of effort occurs, several southland clubs and individuals contributed to a magnificent effort in the ARRL June VHF QSO Party from Mt. Pinos in the Santa Barbara Section; folks from the TRW, Northrop, Cal Tech and Palos Verdes clubs managed an outrageous 750,000+ point score from California. This may be a record for the area as the conditions cooperated with the efforts of the group. N6CA was the callsign from Pinos and managed over 250 grids on 6 meters alone. The Long Beach Chapter of QCWA managed to get W6UPN and W6UPL in the number 1 and 2 positions for the next term of office; smart move! W6KA, the Pasadena Club, reports the Hospital drill at Kaiser in Hollywood was a great success; N6LL, K6MEF, WU6H, KC7O, KA6TYK, WD6CKN and KB6FNW were present for the activity. Westside ARC now has a net each Tuesday at 2000 hrs local; N6NFE is net control. Look for Paul on 146.67(-) for check-in. Going back to May for a moment, I neglected to mention the efforts of those who participated in the WalkAmerica campaign; 27 San Fernando Valley hams assisted by providing communications and packet radio support which included data collection and report generation. The Palos Verdes Club was able to muster the services of N6KV for display of his "Amateur Airstream" trailer for the 4th of July "Country Days" community event at RPV City Hall; hundreds of area residents were treated to this impressive display of modern amateur radio technology. Band conditions improving slowly, however poor traffic totals due to vacations. K6UYK has been away on an extended trip, hope he gets back soon. N7CZF also vacationing. N6LHE has been taking up the slack. Traffic: N6LHE 372, W6INH 205, K6YBV 28, W6NKE 25, N7CZF 23.

ORANGE: SM, Joe H. Brown, W6UBQ—ASM: Riv Co, BOB W6LKN (714 686 3823). ASM: OrCo Ralph WB6JBI (714 776 9272). ASM: SB Co, Tony WB6QHB (714 981 1836). ARES/RACES Activity, April WA6OPS, OrCo Hosp Support Gp says the May drill was the largest to date. Over three days we responded to 29 hospitals in 17 communities, 36 operators, and the critique was productive. On that note, Riv Co Hosp Support had a notice alert. This was initiated by the new CO Med Dir. All Hospitals were manned and on the air within one hour. Contacts were made with County Seat (W6TJ) 2m, 220, 450 and of course HF for Blyth. WA6QMW, John handled the alerting duties in west Riv Co and NR6P took care of the Eastern side. It is a privilege to serve with such dedicated people. Your time and efforts are appreciated. Or Co RACES, the Co of Orange Emergency Management Council has approved the design and issuance of Disaster Service Work I.D. cards in the Comm field. From the SEC Ken, WA6ZEF, plans are being formulated for the state wide earthquake drill 14, 15, and 16 Oct 87. This will be the Simulated Emergency Test for the Orange Section. Last year the Section came in first in six land and some ECs that had activity did not send in reports. The comm system is in place and it works, lets test it and report the results. There will be action for everyone. Tactical traffic during the day and health and welfare in the evening. The weekly district check in totals continue to increase in the districts, an indication of a healthy ARES/RACES comm system. HAMCOM "88" ARRL SW DIV Convention, Sept 2,3 & 4, 1988 is on the way. Where? Disneyland Hotel (Anaheim). OOC Alex, W6RE had a project, a report came in from N6JSX Kuby Pres of the Henry RARC of a signal on the club 223.68 MHz Machine that was originating in the El Tora area. Or Co LIC contacted base officials and with their cooperation the problem was pin pointed to the satisfaction of all concerned. Then, Alex had a stroke. Good Luck and a speedy recovery OM. ACC: Sandy WA6WZN. Rio Hondo ARC puts a ticket in the raffle pot for each club activity or public service event that their members attend. A special raffle with a good prize. Sounds like an idea we could use. From the Buena Park ARC Communicator. The subject of indecent language has been in the news lately. After reading everything I can find on the subject, I'm still not sure what is and isn't allowed. The one sure way is to take no chances. So let's all lean over backward to be certain we are not the ones who will give Amateur Radio a bad name. St. Judes and Fullerton RC upgraded 13 ops during their semi-annual test session, received a "CERTIFICATE OF RECOGNITION" for activities in the FOUNDER'S DAY PARADE from the Fullerton City Council. Coachella Valley

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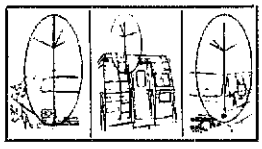

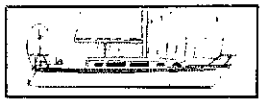

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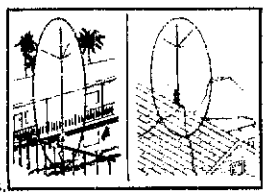

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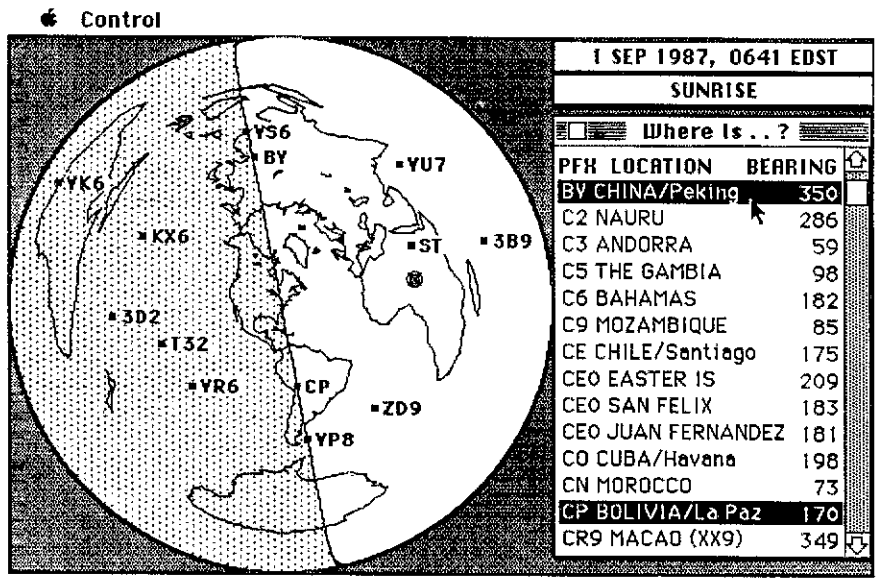

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IF Selectivity: How Wide Are Your Skirts?

One of the most noteworthy operating and performance rating parameters in any transceiver or communications receiver is reflected in its passband filtering and overall IF selectivity. That is, its ability to select or copy one signal while rejecting other adjacent-frequency signals. While this capability is outlined in each unit's published specifications, interpreting that information often creates a rather perplexing situation. This Tech Talk's purpose is to clarify those misunderstandings.

Modern SSB transceivers include several clever and highly efficient design concepts. A unit's factory-installed passband filter, for example, serves the "double duty" of establishing initial receiver selectivity and transmitted SSB signal bandwidth. Additional passband filters and IF circuitry in receiver stages further tailor that overall selectivity and passband response to suit specific operating modes and needs.

A convenient means of visualizing a transceiver's IF selectivity involves plotting its -6db and -60db bandwidths on a frequency response curve. As an initial point of reference, a theoretically perfect passband curve is examplified in Figure 1. Notice its bandwidth at the 6db below maximum output points is 2.4kHz or 2400Hz: the typical range of a voice band SSB channel (300 to 2700Hz). If the center frequency of this filter-equipped section is 9,001.2kHz, its lower and upper rejection frequencies would be 9,000.00 and 9,002.4kHz respectively. Signals near but not precisely within that IF range (such as a station on 9,004 0kHz) would be 60db weaker at the receiver's output (speaker). Conservatively assuming 3db per S unit, we could perfectly copy an S-4 signal on 9,001.2kHz and never hear a 30db over S-9 signal on 9,004 0kHz. Isn't theory nice!

The previously exemplified super selectivity isn't possible in actual practice, as coils and capacitors in IF circuits introduce phase shifts and cause passband skirts to widen at stronger signal points (-40 to -60db range). **The amount of that skirt shaping directly indicates a transceiver's on-the-air selectivity and crowded band performance.** It can be calculated using the formula: 60db width/6db width = Shaping Factor, and proofed by multiplying: 6db width × Shaping Factor = 60db width. Figure 1's widths indicate an ideal 1:1 Shaping Factor.

The universal shaping factor formula can also be used for analyzing and cross-comparing selectivity and performance of various SSB transceivers. The unit depicted in Figure 2, for example, exhibits a narrow 2.1kHz bandwidth at -6db points and a wider 4.2kHz at -60db points. 4.2/2.1 = 2:1 Shaping Factor: good for casual work, but not too attractive for serious DX'ing or contesting. Conversely, the unit exemplified in Figure 3 exhibits a more natural voice SSB bandwidth of 2.4kHz at -6db points with an excellent QRM rejecting 3.8kHz width at -60db points. 3.8/2.4 = 1.58:1 Shaping Factor, steep skirted selectivity and outstanding adjacent channel rejection. **Figure 3's sensitivity figures, incidentally, were sampled from ICOM's IC-761 specifications.**

Passband Tuning and IF Shifting techniques are additional selectivity-optimizing features in modern transceivers. Their performance, however, is quite different in nature. IF Shifting recenters a desired signal within a fixed-width passband while Passband Tuning also varies that width from 2.4kHz to 800Hz for maximum QRM immunity. ICOM's incomparable IC-761 includes both features plus panel selectable wide or narrow SSB filters for use with IF shifting or Passband Tuning: operating flexibility supreme!

The interference sidestepping benefits of Passband Tuning are most pronounced at an IF's -6db points. Additional selectivity is provided by optional CW filters. A standard SSB filter Passband-tuned to 800Hz width at -6db exhibits an approximate 3.8kHz width at 60db. Switching to a 500Hz filter while also considering IF circuit phase lags yields an incredible 1000Hz bandwidth at -60db. That's selectivity!

Precise frequency relations between factory installed IF filters and their mixer's hetrodyne oscillator also influences audio response of transmitted SSB signals. Casual adjustment creates power robbing bassiness or muddy sounding signals. **ICOM's precise factory alignment, however, ensures every unit sparkles with beautiful sounding audio.** Top performance is the name of the game, and ICOM's the consistent winner. Getting on the air with the best truly has its rewards!

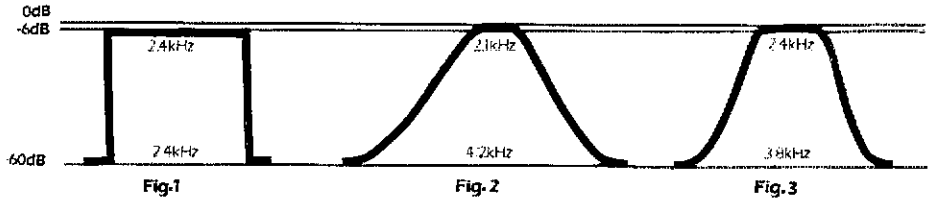

Fig.1 Fig.2 Fig.3

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NEW!

ICOM IC-761
A NEW ERA DAWNS

- **Built-in AC Power Supply**
- **Built-in Automatic Antenna Tuner**
- **SSB, CW, FM, AM, RTTY**
- **Direct Keyboard Entry**
- **160-10m/General Coverage Receiver**
- **Passband Tuning plus IF Shift**
- **QSK up to 60 WPM**

The IC-761 ushers in an exciting new era of amateur radio communications; an era filled with all the DX'ing, contesting, and multi-mode operating pleasures of a fresh new sunspot cycle. The innovative IC-761 includes all of today's most desired features in a single full-size cabinet. This is ham radio at its absolute best!

Work the World. The IC-761 gives you the competitive edge with standard features including a built-in AC power supply, automatic antenna tuner, 32 fully tunable memories, self-referencing SWR bridge, continuously variable RF output power to 100 watts in most modes, plus much, much more!

Superb Design, Uncompromised Quality. A 105dB dynamic range receiver features high RF sensitivity and steep skirted IF selectivity that cuts QRM like a knife. A 100% duty cycle transmitter includes a large heatsink and internal blower. The IC-761 transceiver is backed with a full one-year warranty and ICOM's dedicated customer service with four regional factory service centers. Your operating enjoyment is guaranteed!

All Bands, All Modes Included. Operates all HF bands, plus it includes general coverage reception from 100kHz to 30MHz. A top SSB, CW, FM, AM, and RTTY performer!

Passband Tuning and IF Shift plus tunable IF notch provide maximum operating flexibility on SSB, CW, and RTTY modes. Additional features include multiple front panel filter selection, RF speech processor, dual width and adjustable-level noise blanker, panel selectable low-noise RF preamp, programmable scanning, and all-mode squelch. The IC-761 is today's most advanced and elaborate transceiver!

Direct Frequency Entry Via Front Keyboard or enjoy the velvet-smooth tuning knob with its professional feel and rubberized grip.

Special CW Attractions include a built-in electronic keyer, semi or full break-in operation rated up to 60 WPM, CW narrow filters and adjustable sidetone.

Automatic Antenna Tuner covers 160-10 meters, matches 16-150 ohms and uses high speed circuits to follow rapid band shifts.

Complementing Accessories include the CI-V computer interface adapter, SM-10 graphic equalized mic, and an EX-310 voice synthesizer.

You're The Winner with the new era IC-761. See the biggest and best HF at your local ICOM dealer.

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ARC test session, 9 upgrades. Riv Co ARA, 6 upgrades. The Bishop ARC participated in the Bishop's Mule Days activity and set the "Mule Lovers Ham Network." All went well, now the BARC Mailbox is stuffed daily with certificate and contest station QSL-card requests. Packet Racket. Packet Radio is one of the fastest growing modes of Amateur Radio to come along in years. If you have an interest in taking a look at this mode without committing to buying the gear the Southern California Amateur Radio Computer Club meets on the 4th Sunday of each month at 1:30 PM at Mercury Savings, Lincoln and Valley View in Buena Park. An operating packet station is almost always demonstrated at each meeting with an invitation to newcomers to learn about packet... HANDS ON. During Field Day the Packet bulletin boards and my W6UBQ packet station were a great mode for the SM Msgs, shortly after I came home I had all the traffic. N6MVS 256 Msgs forwarded. STM: ERNIE WA6QCA, PSHR WF6O, WB6QBZ WA6QCA, KA6TNB. BPL: WF6O.

NET	FREQ	SEC	QNI	TFC	TIME	NM
SCN/1	3598	30	265	215	1830	WF6O
SCN/2	3598	30	175	29	2015	WF6O
SCN/V	146.645	30	330	235	2100	WA6QCA

Msg tfc for W6UBQ use BBS KD7XG-1 on 145.05 or W6UBQ System on 145.07 on monitor 24 hrs a day. Don't forget to put the Club ARRL ID number on your ARRL "OST" renewal form. SM W6UBQ Traffic: WF6O 721, KA6HJK 148, WB6QBZ 136, AD8A 129, K6DD 71, WA6QCA 67, K6VCG 66, N6GOT 56, KA6TND 21, W6CPB 20, W6SX 12, W6NTN 10, W5TZR 10, WF6O BPL. Orig 0, Rcvd 385, Sent 328, Del 8, Total 721.

SAN DIEGO: SM, Arthur R. Smith, W6INI—TC: N6JZE. STM: N6GW. Asst STM: N4KRA. SEC: W6INI. PIO: KG6LF. ECs: WD6CSS, K7DOG, N7HAW, W6INI, WK6M, N6NKJ. For technical help, contact any of the following Asst TCs: WA6CFM (PACKET) 222-7267, KG6CM (RTTY/AMTOR) 483-2067, K6DQ (RFI) 435-0639, N6GZI (GENERAL) 297-7758, WB6HHV (DIGITAL) 566-3799, K6JEY (METROLOGY) 287-3798, WB6LLO (SATELLITE) 275-1495, KB5MU (DIGITAL DESIGN) 458-1238, W6RHV (GENERAL) 448-4728. Last call to write U.S. Senators and Congressmen to enlist their assistance in defeating the 220 docket 87-14. The SW Div Conv Oct 9-11, 1987, in Scottsdale, AZ will feature a visit to K7UGA's hamshack. The Ham Radio exhibit at the S.D. County (Del Mar) fair was a hugh success due to leadership of W6IPQ assisted by the clubs of the San Diego County Amateur Radio Council. Don't forget that renewing ARRL membership thru an affiliated club will benefit the club. The S.D. Packet Radio Assn meets on the second Tues, 7 P.M. in M/A- Com Linkabit cafeteria, 3033 Science Park Rd. Talk-in 146.73(-). Upgrade: N6OVB to Gen. ARES CW 4 Sessions, 12 ck-ins. NCTN sessions 29, tfc 99. Traffic: N4KRA 168, N6GW 65.

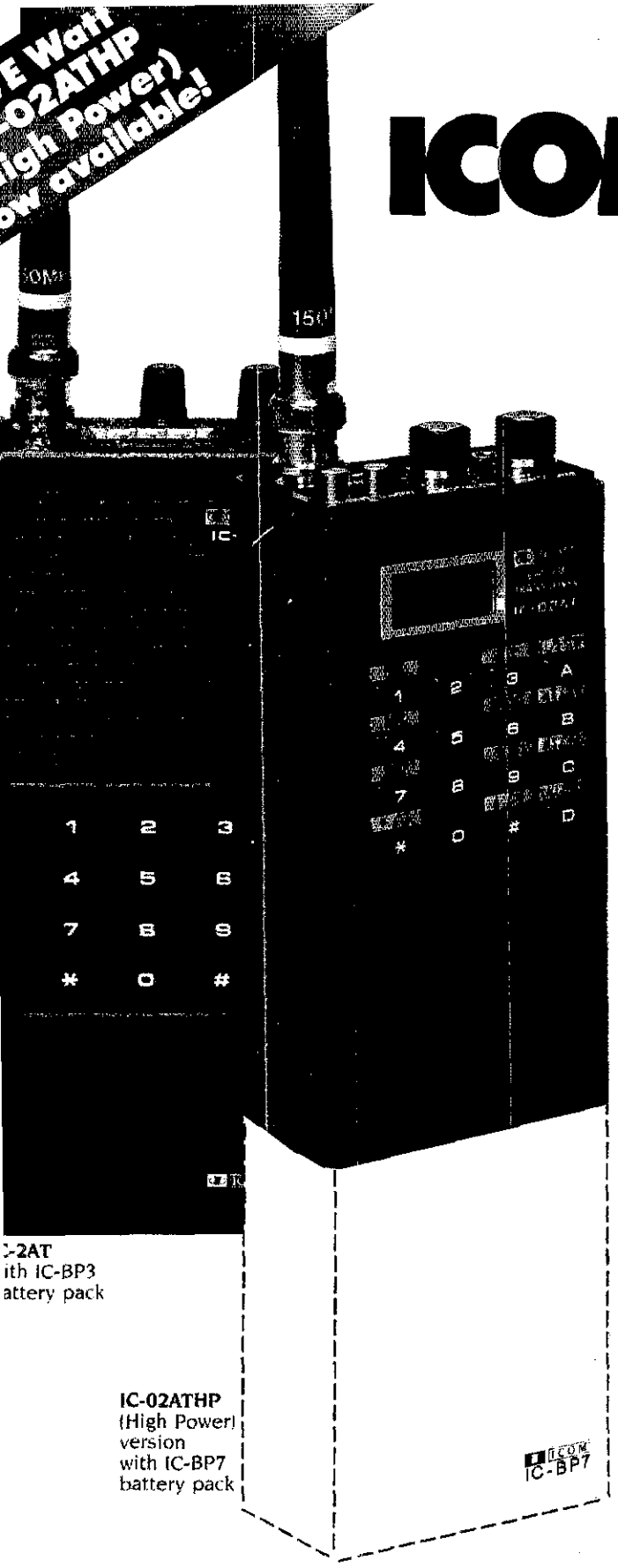
SANTA BARBARA: SM, Thomas I. Geiger, W2KVA—We all wish former SM, K6FI, well in his new Tucson home. I became SM on June 1, but was gone most of June so I'm just getting started. There will be some changes in the way the Section is managed, which I hope will be beneficial for all. The search is on for key members of the Section management team. If you're willing to help, or know someone who is, please contact me. With your help we will make SBAR into a showcase Section. New Appointments: WB6BYU- ASM and ATC. Congrats to Satellite ARC, W6PME (Chair), WA6DKY, KB6FHP, W6WRA, et al, on a great Santa Maria SWAPFEST. Next, the SBARC Hamfest (August 16). If your club is putting on a special event, please let me know at least 3 months in advance for mention in this column. 73 for now.

WEST GULF DIVISION

NORTHERN TEXAS: SM, Phil Clements, K5PC—Asst. SM: K5MXQ. STM: W5VMP. SEC: W5GPO. TC: W5LNL. PIO: N5HGL. BM: W5QXK. OOC: WB5JBP. We are still looking for someone to fill the post on the Section Staff of State Government Liaison. Write, call, or send a radiogram for details on this vital function. A new club has been formed out East TX way...the Longview East Texas ARC. Officers are: WB5DJE/Pres., WM5R/V.P., KC5YM/Sec., N5KGN/Tres., KA5AZK/N.L. Editor, W5UZN/Comm., N5DER/Educ. The club is involved in public service work, and is putting a VE program in place. Lots of Field Day activity, with reports from W5CJP/LCARC, WZ5N/LSRG, KA5TXL/DARC, KB5A/MARS, K5HJ/SWDCARC, KA5SNM/HAOM, N5JU, WD8ACD, W4YQC, and KF5ZI. A work party was active on July 4th to spruce up the Dallas ARC communications/emergency van and get it into top shape and ready to roll. This vehicle plays an important role here in our Section; being automatically dispatched to all communications emergencies in N. TX, and has even covered hurricane emergencies on the Gulf Coast. A very productive and informative session of all West Gulf Division Leadership Officials was called by Director Haynie during Ham-Com '87. A discussion was held on how to disseminate the W1AW bulletins via packet radio bulletin boards so that all nets and clubs can receive them in a more timely manner. A report by Vice Dir. Comstock on the findings of his blue ribbon committee on emergency traffic communications. Again, packet radio was recognized as the mode most effective in handling large volumes of traffic resulting from wide-spread national and international disasters. Much work will be needed to bring this system on line, as many packet ops and traffic handlers will have to join forces in setting up the vast logistics involved. It will not happen overnight, but the resultant increased efficiency will be well worth the effort. The tornado season started late and has lingered long; it is reasonable to assume that the hurricane season may be a long one also. ARES groups should be ready to react in the event the remnants of a storm reach us. PSHR for June: K5MXQ, WD5EEH, W5VMP, WZ5N, K5UPN, WG5S, KA5QYV, KB5ADE. Lots of 220 MHz repeaters are springing up, with lots of formerly inactive and brand-new Novices gearing up to operate on them. It is up to our Net Mgrs. and Emergency Coordinators to cultivate this new pool of operators and repeaters into our public service activities. This is a vast new resource; let's welcome them on board, and get them on line. Traffic: W5TNT 314, KD5RT 226, WV5Z 185, WZ5N 180, N5BT 174, W5VMP 168, W5YQZ 124, K5MXQ 123, W9OYL 106, K5UPN 98, WG5S 97, KB5ADE 95, WD5EEH 67, KC5NG 44, KA5AZK 36, WX5O 27, W5IGV 24, N5IUI 20, KA5QYV 14, N5KRX 5.

OKLAHOMA: SM, Bill Goswick, K5WG—BM: W5AS. OOC: K5WG. PIO: WB5SYT. SEC:W5ZTN. SGL: W5NZS. STM: KV5X. TC: W5QMJ. Congratulations to the following newly elected club officers: Lawton/Fort Sill ARC: Pres.- Frank Phillips, AB5T; Vice Pres.- Okey Hall, KA5QHA; Sec./Treas.- Chuck Crawford, K5BYF. Kay County ARC: Pres.- David Land, KD5FX; Vice Pres.- Mike Morriss, N5JJR; Sec./Treas.- Harry Beattie, WD5DPR. Altus Area ARA: Pres.- Ann Potts, KA5WDY. New CORA Treas. is Mark Kleine, N5HZR. Many Field Day reports were received from clubs in the Section; if you missed this year's activities, start making plans for June 1988. Field Day is definitely an event worth putting on your calendar! Like to sharpen your CW skills and perform a public service at the same time? Join the OLZ traffic net on 3682.5 kHz nightly at 0000 UTC (7:00 PM local). There's a great bunch of operators there and newcomers are always welcome.

ICOM IC-02AT



-2AT
ith IC-BP3
attery pack

IC-02ATHP
(High Power)
version
with IC-BP7
battery pack

Full Size, High Power

If you want a 2-meter handheld with exceptional features, quality built to last, and a wide variety of interchangeable accessories, take a look at the ICOM IC-02AT and IC-2AT handhelds.

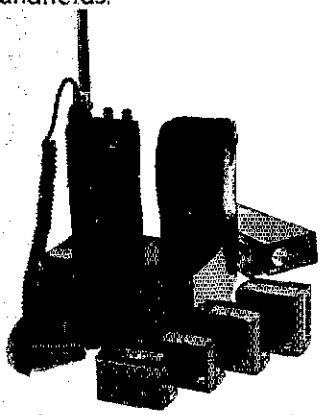
Frequency Coverage. The IC-02AT covers 140.000 through 151.995MHz and the IC-2AT, 141.500 through 149.995MHz...both include frequencies for MARS operation.

IC-02AT Features. ICOM's versatile IC-02AT handheld has the following outstanding features:

- DTMF/direct keyboard entry
  LCD readout
- 3 watts (IC-BP3 battery pack) standard, or 5 watts (IC-BP7 battery pack)
- 10 memories which store duplex offset and PL tone (odd offset can be stored in last 4 memories)
- Frequency dial lock
- Three scanning systems: priority, memory and programmable band scan (selectable increments of 5, 10, 15, 20, or 25kHz)

IC-2AT Features. The IC-2AT is ICOM's most popular handheld on the market. The IC-2AT features a DTMF pad, 1.5 watts output, and thumbwheel frequency selection. The IC-2A is also available and has the same features as the IC-2AT except DTMF.

Accessories. A variety of slide-on battery packs are available for the IC-02AT and IC-2AT, including the new long-life 800mah IC-BP8 which can be used with both handhelds.



Other accessories include the HS-10 boom headset, HS-10SB PTT switchbox, HS-10SA VOX unit (for IC-02AT), and an assortment of battery pack chargers.

The IC-02AT and IC-2AT come standard with an IC-BP3 NiCd battery pack (IC-02ATHP comes with IC-BP7 battery pack), flexible antenna, AC wall charger, belt clip, wrist strap, and ear plug. See the IC-02AT and IC-2AT 2-meter handhelds at your local ICOM dealer.

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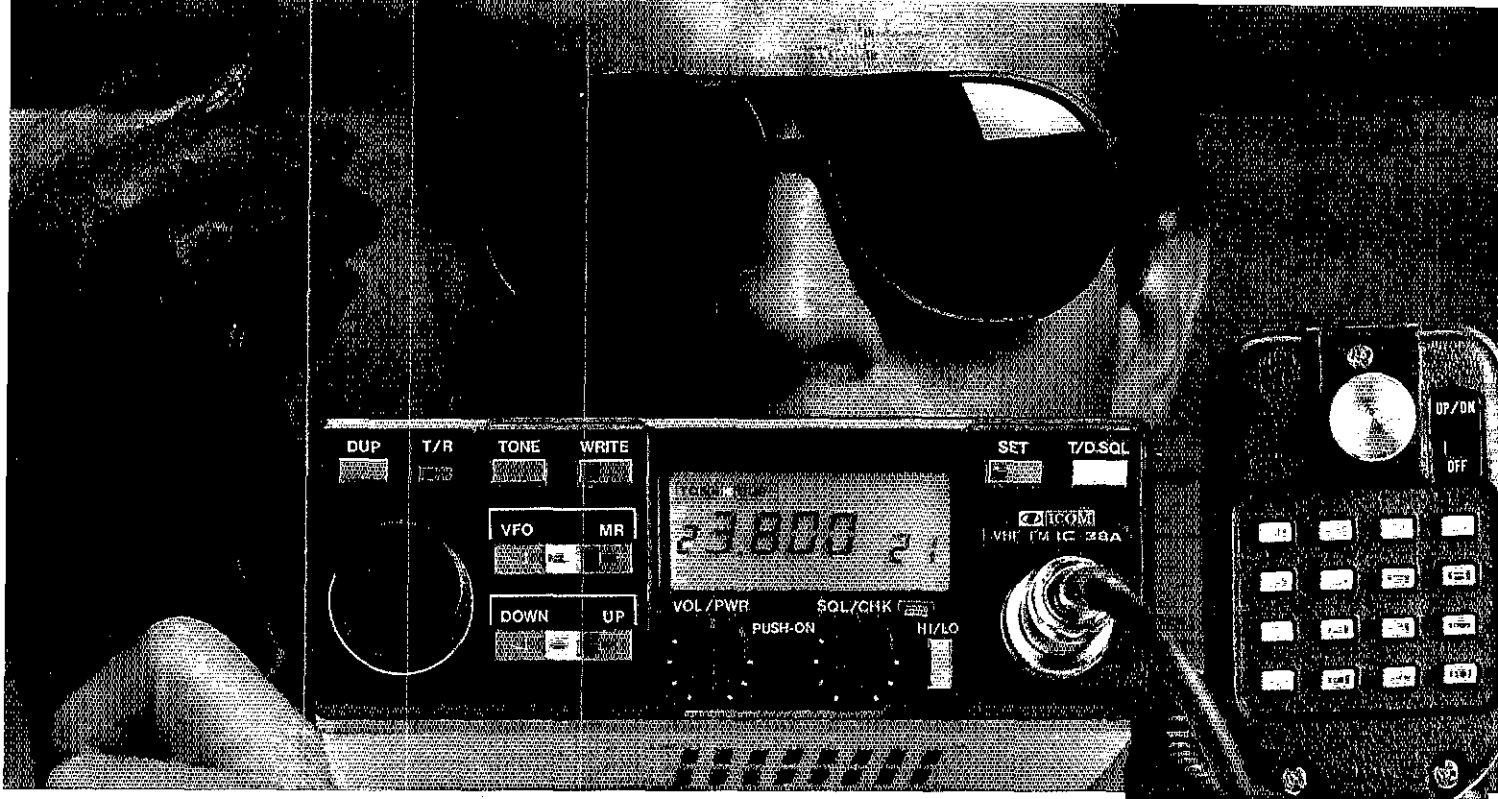
Texoma Hamarama is just around the corner! see you there *October 23-24-25. Traffic:* KV5X 115, WA5OUV 110, N5IKN 91, WB5SRX 78, KF5RD 61, W5RB 56, K5GBN 56, WD5IFB 35, WA5ZOO 31, W5VOR 25, N5FEM 18, W5VLW 17, K5WG 16, K5CAY 11. Public Service Honor Roll: KV5X, WB5SRX.

SOUTH TEXAS: *SM,* Arthur R. Ross, W5KR—ASM: N5TC. SEC: K5DG. STM: K5QEW. PIO: WA5UZB. ACC: WB5YDD. SGL: K5KJN. OOC: WA2VJL. BM: K5CVD. San Antonio ARC reports W5EDZ coordinating hassle about antennas with City *Attorney; looking good. PIA NZ5J sent copies of excellent* coverage given Amateur Radio on communications for Freedom Fiesta Parade planned for July 4, the fantastic achievements of high schooler KA5WLX; also reports *WB4BFC upgraded to EXTRA, Williamson County ARC* planning a "saturation campaign" to get out the word on their September VE session, IBS W5KLV reports 12 ARRL bulletins, 29 satellite bulletins, 4 propagation forecasts, 4 DX bulletins, 4 CRRL bulletins given 145 readings on 9 nets. OOC WA2VJL has been appointed HF awards manager for San Benito ARC; his son, KA5UVY, has the same job for VHF awards. CAND NM W5KLV reports 580 messages passed in 30 June sessions: DRN5 represented 100%; STX stations helping were WB4FQU, NX5V, KD5KQ, N5DFO, WB5EPA, WB5YDD, W5KLV. Bay Area ARC, La Porte held emergency management meeting in June with Police Chief addressing the club; N5JQS worked with Red Cross in helping-hand effort at Saragosa disaster scene. DRN5 NM WB5YDD reports 593 messages passed in 60 June sessions; STX represented 100% by W5CTZ, N5DFO, W5KLV, K5WOB, KD5KQ, K5QEW, WB5EPA, WB5FQU, K5GDX, KE5ZV, W5YQZ, WB5YDD. Kendall ARS newsletter, Boerne, reports N0CCW, W5VEO, KF5BT and WB4KPQ active in packet. Bryan ARC voted W5DPP, W5DJO and W5RAS as honorary members. PIA N5IKW proudly announces Sam Houston ARK, Cleveland, has attained SSC status; club busy assembling scrapbook of activities, needs photos and other items; FD87 had 137 CW contacts, 302 SSB contacts and amassed 1752 points. SHACKnews, San Benito ARC has had favorable reaction to its hurricane and Amateur Radio awareness display which it places for a week at a time in libraries, banks and other places open to the public. PIA N5FIX reports Northwest ARS, Houston, had a big FD87; quite a few Novices made FD contacts THAT VERY FIRST CONTACT; KTRK-TV taped their activity and ran several minutes during newscast, including clips spliced in from Hurricane Alicia and the Mexico City earthquake; several other clubs received good coverage on local radio stations; more than 70 Amateurs attended a special Harris County emergency management meeting called by the County Sheriff; DEC W5CKC outlined Amateur Radio plan of *operation for the group which included Harris County OA and* Department of Public Service (highway patrol) Captain; NARS has 128 members and growing. BM K5CVD really wants interested Amateurs to contact him about an Official Bulletin *Station appointment; help him and ARRL spread the word.* Traffic: W5KLV 350, WD5GKH 287, WB4YDD 216, AJ5K 173, WB5J 131, WB5FQU 125, WB5EPA 75, W5CTZ 71, WA2VJL 49, W5BGE 37, NV5L 15, NZ5J 9, KA5UVY/T 4, AJ5K 165.

WEST TEXAS: *SM,* Amelia Milly Wise, W5OVH—ASM:WF5E. ASM:N5DO,SEC: W5MVJ. PIO: KE5ZW. ACC: K5IS. OOC: KD5FL,TC: K5CU. BM: K5VRF. STM: AE5I. As new SM in the newly formed West Texas Section the appts are being made as rapidly as possible. Anyone who would like to volunteer for any position contact me, esp. ECs,Traffic handlers, OBS. SEC Sandy McKean, W5MVJ, plans to stress importance of Emergency Preparedness with ARES/RACES. From Snyder ARC *upgrades:* KB5DPR to *Tech;* KA5YVM *to Gen; new* Novices KB5DPT and KB5DPS. On May 22, the SKYWARN System of the Midland Weather Service was activated due to severe storm warnings. A tornado hit the town of Saragosa TX. Members of Big Bend Emergency Net set up comm with Saragosa and the rest of the state. Here is a partial list of hams handling traffic and helping search for victims: WB5FBJ, W4LCC, WO5K, WD5CDG, WA5ROE, WB5MPX, K5FD, N5DO, N5JDE, AE5J, N5HYD, KE5NO, K5CFA, W5YCK, KA5STE and many others who were standing by to help. Panhandle ARC established a Ham Radio Explorer Post 110. 16 new Novices came out of recent class EPARC. I look forward to working for and with you in the Section. Traffic: RN5 cycle 4 (Jun.): 511, 100% West Texas Section AE5I, NR5P and NM W5TNT, AE5I 123, W5ERT 13, W5OVH 5.



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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.

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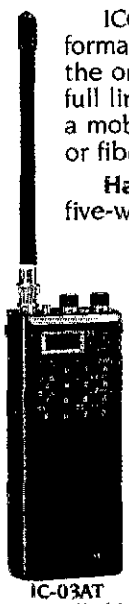
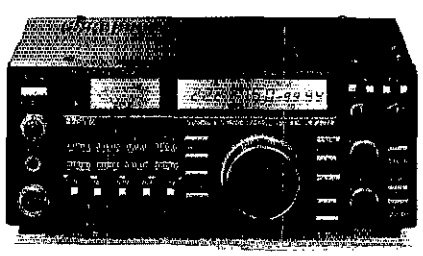
IC-3AT Handheld



IC-03AT Handheld

NEW! IC-375A Transceiver



IC-37A Mobile

IC-38A Mobile

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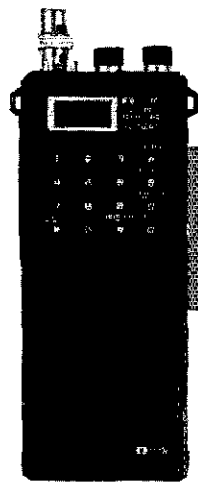

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IC-02AT 2-Meter
Digital Readout
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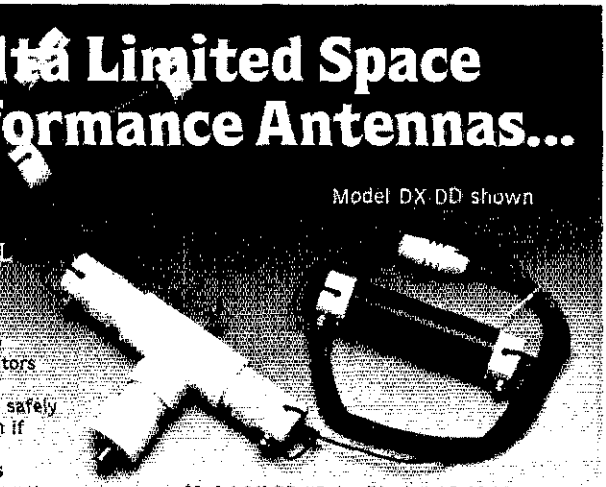

Model DX-DD shown

- No-trap design. Unlike trap antennas, there are no capacitors to break down under high RF voltages, and a tuner may be safely used for multi-band operation if desired.
- Direct 50 ohm feed. Tuners usually not required when operating in resonant bands.
- Full power operation.
- Uses "ISO-RES" inductors.
- Stainless steel hardware.
- Fully assembled.

Model DX-A 160-80-40 Meter Quarter Wave Twin Sloper —
- The premier low frequency DX antenna.
- Combines the tremendous DX firepower of the quarter wave sloper with the wide bandwidth of the half wave dipole.
- One leg is 67', the other 55'. Installs like an inverted-V. Ground return through tower or down-lead . . . . . **$49.95 each**

Model DX-DD "Delta Dipole" 80-40 Meter Electrical Half Wave Dipole —
- Also covers 80-10 meters with a wide range tuner.
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Model DX-SWL Commercial shortwave band sloper —
- Provides world-class reception on AM broadcasts, tropical bands and 60 thru 13 meters.
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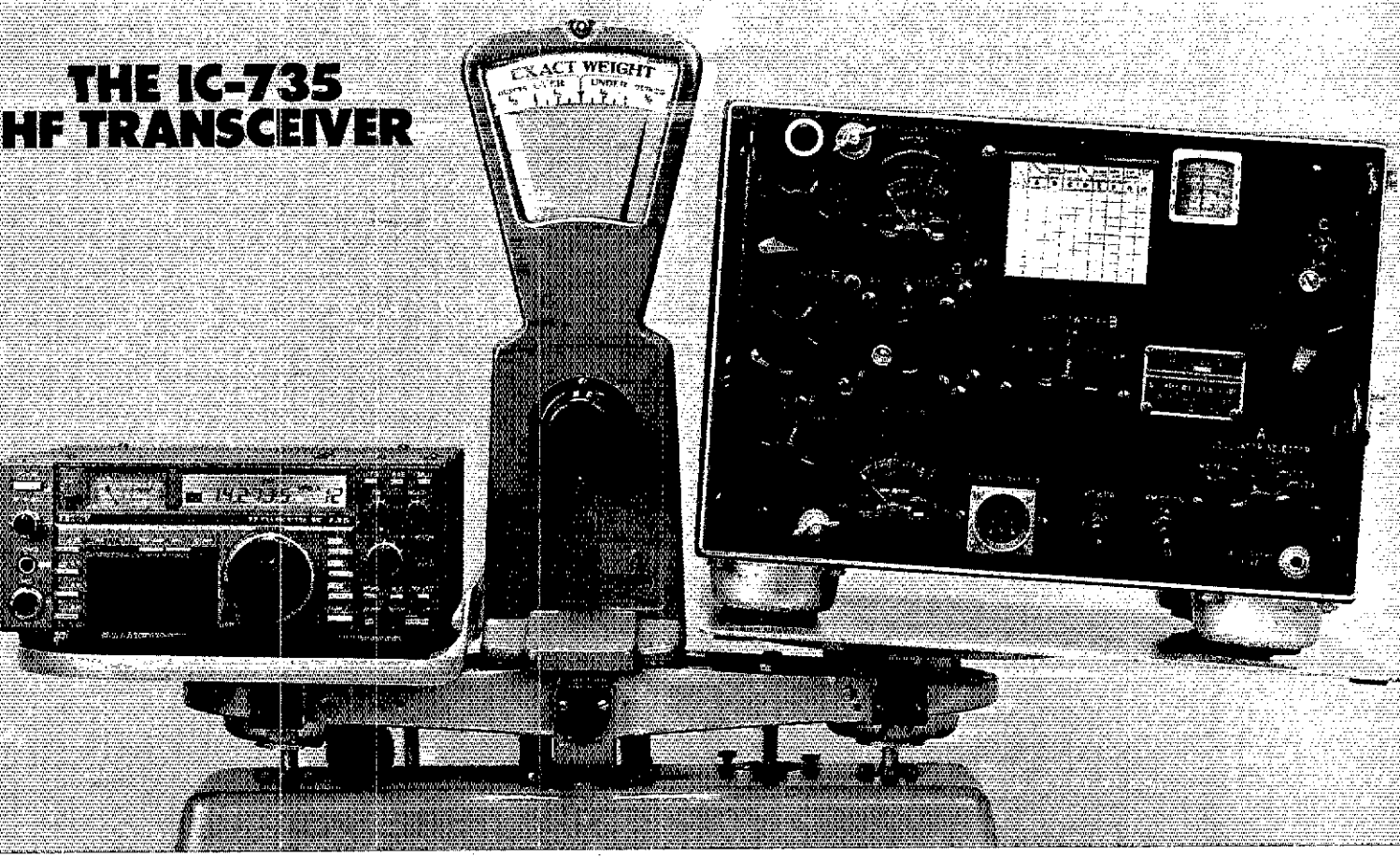
THE IC-735 HF TRANSCEIVER



BUY YOUR HF FOR PERFORMANCE, NOT BY THE POUND

- **All HF Band Transceiver/**
- **General Coverage Receiver**
- **HM-12 Scanning Mic Included**
- **12 Memories/Frequency and Mode**
- **105dB Dynamic Range**
- **All Modes Built-In USB, LSB, AM, FM, CW**

The IC-735 is a heavyweight when you compare features and performance. Other transceivers may weigh more than the advanced IC-735 compact HF transceiver, but inch-for-inch and pound-for-pound, the IC-735 outweighs them all.

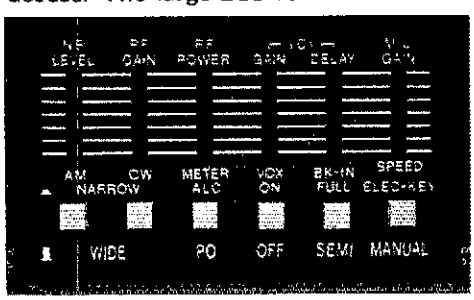
Ultra Compact. Measures only 3.7 inches high by 9.5 inches wide by 9 inches deep and weighs only 11.1 pounds. Without question, the IC-735 is the best HF transceiver for mobile, marine or base station amateur operation.

All Amateur Band Coverage. It's a high performer on all the ham bands, plus it includes general coverage reception from 100kHz to 30MHz. May be easily modified for MARS operation.

12 Memories. Frequency and MODE may be easily stored and retrieved in the 12 tunable memories.

Exceptional Receiver. To enhance receiver performance, the IC-735 has a built-in receiver attenuator, preamp, and noise blanker. PLUS it has a 105dB dynamic range and a technologically advanced low-noise phase locked loop for extremely quiet rock-solid reception.

Simplified Front Panel. Controls which require infrequent adjustment are placed behind a unique hatch cover on the front panel of the radio. The hatch cover is designed to protect seldom used controls from being accidentally knocked off line, but also provides easy access. The large LCD readout and conveniently located controls enable easy operation, especially important for the mobile environment.



More Features. FM built-in, HM-12 scanning mic, program scan, mode scan and memory scan. Switchable AGC, automatic SSB selection by band and RF speech processor. Continuously adjustable output power up to 100 watts, 12V operation, 100% duty cycle and deep tunable notch filter.

Options. A new line of accessories are available, including the AH-2 mobile antenna system, AT-150 whisper quiet automatic bandswitching antenna tuner for base station operation and the PS-55 power supply. The IC-735 is also compatible with most of ICOM's existing line of HF accessories.

See the IC-735 performance heavyweight at your local authorized ICOM dealer.

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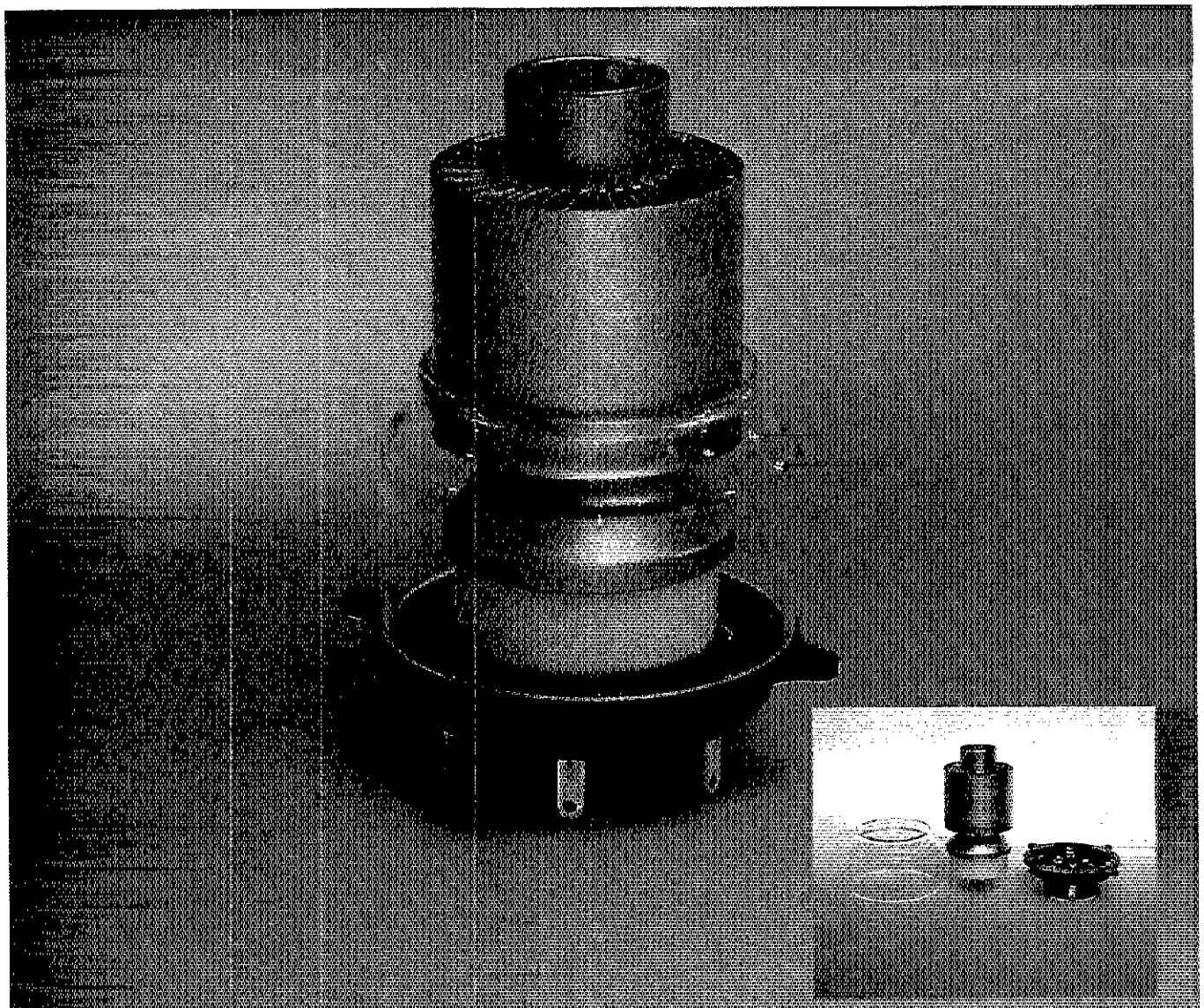
First in Communications

ICOM America, Inc., 2380-116th Ave NE, Bellevue, WA 98004 / 3150 Premier Drive, Suite 126, Irving, TX 75063
ICOM CANADA, A Division of ICOM America, Inc., 3071 – #5 Road, Unit 9, Richmond, B.C. V6X 2T4 Canada



The 3CX1200A7 continues the EIMAC tradition of serving AMATEUR RADIO.

EIMAC was right there to meet Ham requirements of 1500 watts PEP with its 3CX1200A7 tube. Leading manufacturers count on its proven performance and reliability.

Low-cost power for small spaces

The rugged 3CX1200A7 takes size into consideration and, by design, is recommended as a single, low-cost alternative for a pair of EIMAC 3-500 Z tubes for new amplifier designs.

General Specifications

The EIMAC 3CX1200A7 is a high-mu, compact, forced air cooled triode for zero-bias class AB2 amplifiers.

- 2.9" dia. x 6.0" long
- Plate dissipation: 1200 watts
- Glass chimney SK-436 available
- Standard EIMAC SK-410 socket available

More information is available on the new EIMAC 3CX1200A7 tube from Varian EIMAC, or any Electron Device Group worldwide sales organization.

Varian EIMAC
1678 S. Pioneer Road
Salt Lake City, Utah 84104
Telephone: 801 • 972-5000

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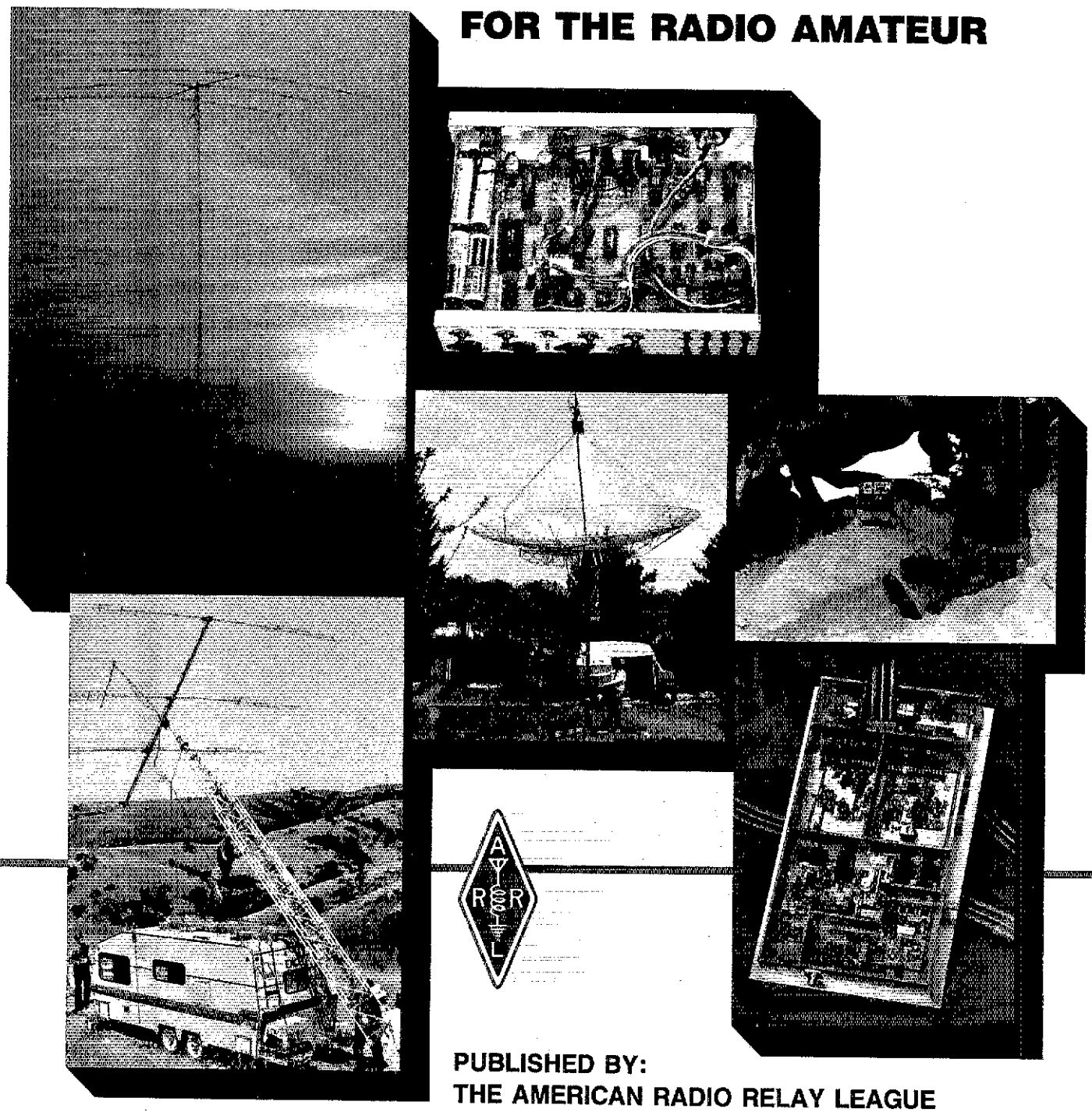
$21.00

THE 1988 ARRL HANDBOOK

FOR THE RADIO AMATEUR



PUBLISHED BY:
THE AMERICAN RADIO RELAY LEAGUE

Late '25 + early 1926. Letter reply devised by FEH as a stop gap for the 6 to 9 mos. before the first Handbook was in print — as a Tech Info Svc "advice" to those asking ideas on building a rig!

Hartford, Conn.

Dear Friend:

We were mighty glad to get your letter asking for information on breaking into the amateur game. A great deal could be said on the subject. There is nothing very difficult about it all, however, and I am going to give you all the information I can right in this letter or tell you where you can find it. Please feel that we are right with you from start to finish. This sheet is mimeographed only because there is so much to say and so many who want to hear the story that it is necessary to get the information in your hands in this way.

Because of a general need, a "Hand Book" is in preparation written to help amateurs who are starting in the game and covering both amateur station construction and operation. Useful information about learning the code, amateur abbreviations, and constructional information of interest to you are included. I am sure you will want a copy when it is out as "being an amateur" and the organization of the American Radio Relay League and its Headquarters departments are discussed in detail. We hope that this "Hand Book" will be in print soon.

FROM 12 PAGES TO OVER 1200!

Sixty-five editions and 5.8 million copies later, we wonder if Ed Handy had any idea what began as twelve mimeographed information sheets would lead to one of the most highly respected publications in the RF design field! But more importantly, the 1988 ARRL Handbook for the Radio Amateur is a *basic resource* for *all* radio amateurs as well as technicians and engineers.

What is new in this edition? As usual, "hot topics" that are changing on a day-to-day basis were given top priority on the revision list. Next, we took a close look at those subject areas of interest to the "enhanced Novice" and updated these as necessary. New construction projects range in complexity from a passive CW audio filter to a synthesized computer-controlled receiving converter for 100 kHz to 20 MHz. Other fun projects added to the new edition include a new deluxe memory keyer, balanced QRP transmatch, DTMF (Touchtone®) decoder and QSK 3-watt 160-meter transverter.

The sixty-fifth edition not only will stand on its own as to content but physically as well. Older editions felt and acted like floppy city telephone directories. Now, all 1988 Handbooks will use the popular and economical hard cover design of the type used to bind *Yagi Antenna Design.*

Unless we become victims of Murphy's Law, we expect the 1988 Handbook to be available at your U.S. or Canadian dealer by mid-to-late October or order directly from ARRL. The price is $21.00 in the U.S. or $23.00 in Canada and Elsewhere.

Here is a description of what is covered in the Handbook:
The first 5 chapters serve as an introduction and cover: basics of Amateur Radio, electrical fundamentals, radio design technique and language, and solid state fundamentals. Vacuum tube principles as they pertain primarily to high power amplifier design are also presented in these introductory chapters. There are 12 chapters devoted primarily to these radio principles: power supplies, audio and video, digital basics, modulation and demodulation RF transmitters, receivers, transceivers, repeaters, power amplifiers, transmission lines and antenna fundamentals. Another 4 chapters cover voice, digital, image and special modulation techniques. The RF spectrum, propagation and space communications are covered in 2 chapters. The construction and maintenance section has 12 chapters of useful projects ranging from power supplies and antennas through digital equipment. You'll find up-to-date component data that the Handbook is famous for. The final 5 chapters cover how to obtain your license, station design and operation, interference, monitoring and direction finding. An abbreviations list, huge index and etching patterns make up the balance of the book.

The American Radio Relay League, Inc., 225 Main St., Newington, CT 06111 USA

KENWOOD

NEW! 45/35 Watt Dual Bander

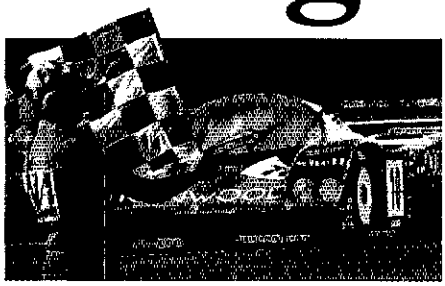
First Again!

TW-4100A

2 m/70 cm FM Dual Bander

A Kenwood original just got better! Kenwood was the first to develop a 2 m/70 cm mobile radio in a single, compact package. Since then, other companies have imitated the concept, but still have not done it the "Kenwood way." The all-new TW-4100A is more compact, more powerful , and packed with more features than ever before! With many new features and accessories, and backed by Kenwood's experience, the all-new Kenwood Dual Bander is light years ahead of the rest!

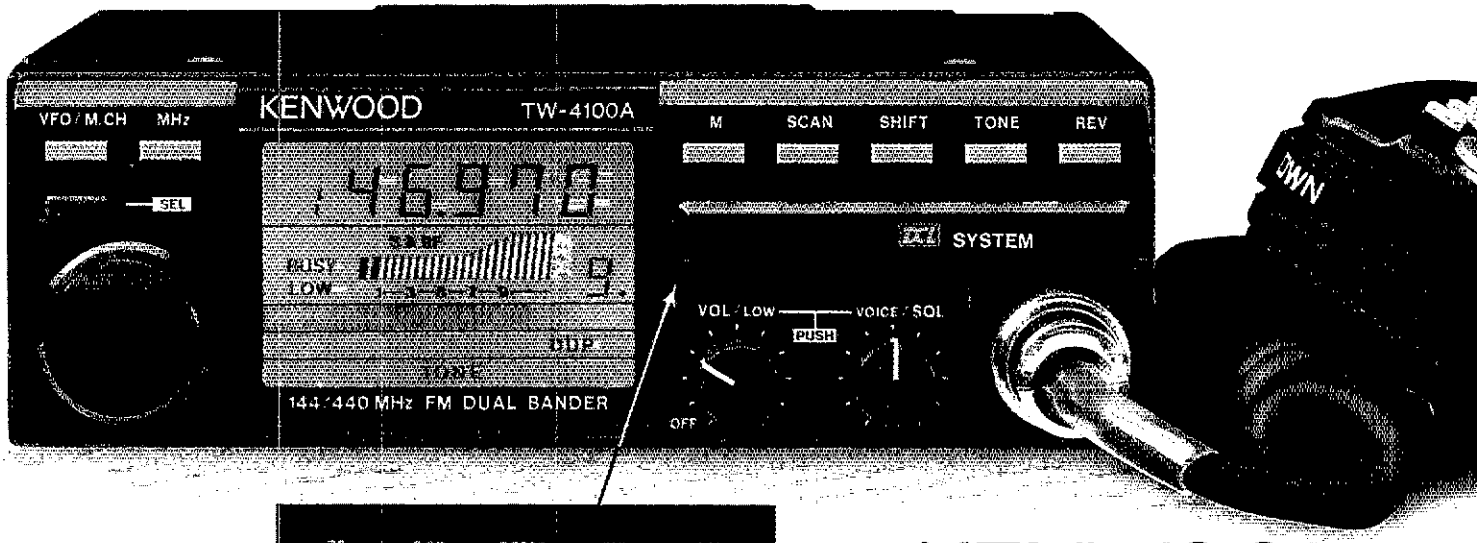
- **Selectable full duplex cross band ("telephone style") operation.** Remote base or cross band repeater function possible (a control operator is needed for remote or repeater operation*).
- **45 watts on 2 m, 35 watts on 70 cm.** 5 watts (adjustable) low.
- **Frequency coverage: 144-149 MHz (allows operation on certain MARS and CAP frequencies) and 440-449.995 MHz.**



- **New compact size!** Only 5.9" W x 1.97" H x 7.87" D and weighs less than 4 pounds!
- **Proven high performance Kenwood GaAs FET front end receiver.**
- **Easy to operate!** Only 3 knobs and 8 keys on the front panel.
- **Separate antenna ports for VHF and UHF.** Minimizes loss and increases reliability and performance!
- **10 memory channels.** Lithium battery backs up memory. Store frequency, offset, subtone. Two channels store the transmit and receive frequencies independently **for odd split or cross band operation.**
- **Front panel-selectable CTCSS tone (when optional TU-7 is installed.)**
- **Non-volatile operating system.** Even after memory back up cell dies, all operating features remain intact! No re-programming or "board-swapping" necessary!
- **Programmable band scan and memory scan with memory channel lock-out.**
- **Large, illuminated LCD display and main knob.** For excellent visibility in direct sunlight or darkness.
- **Selectable frequency step for quick and easy QSY.**
- **Voice synthesizer VS-2 option.**

Optional accessories:

• **PS-50/PS-430** DC power supplies • **MU-1** DCL modem unit • **TU-7** CTCSS encoder • **VS-2** Voice synthesizer • **SW- 100B** SWR/Power/Volt meter 140-450 MHz for mobile use • **SW-200B** SWR/Power meter for base station use 140-450 MHz, 0-200 W in 2 ranges • **SWT-1/SWT-2** 2 m and 70 cm antenna tuner • **SP-40** Compact speaker • **SP-50B** Mobile speaker • **PG-2N** Extra DC cable • **PG-3B** DC noise filter • **MC-60A, MC-80, MC-85** Base station mics. • **MC-55** (8-pin) Mobile microphone • **MA- 4000** Dual band mobile antenna with duplexer (shown)** • **MB-11** Extra mobile mount



- **Digital Channel Link (DCL) option.**

KENWOOD

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2201 E. Dominguez St., Long Beach, CA 90810
P.O. Box 22745, Long Beach, CA 90801-5745

*Please check FCC regulations on repeater operation
**Mag mount is not Kenwood supplied
Minor modification necessary for repeater operation
Specifications and prices subject to change without notice or obligation
Complete service manuals are available for all Kenwood transceivers and most accessories.

KENWOOD

...pacesetter in Amateur Radio

Good for Satellite Digital QSOs

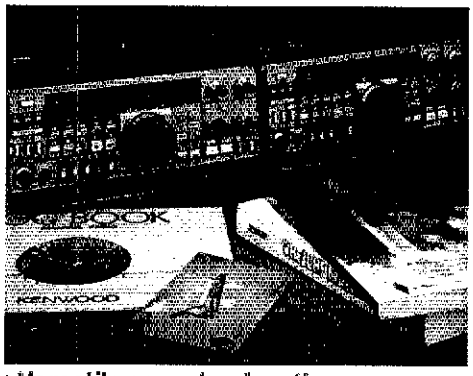
Matching Pair

Look for FUJI and PHASE III-C

TS-711A/811A VHF/UHF all-mode base stations

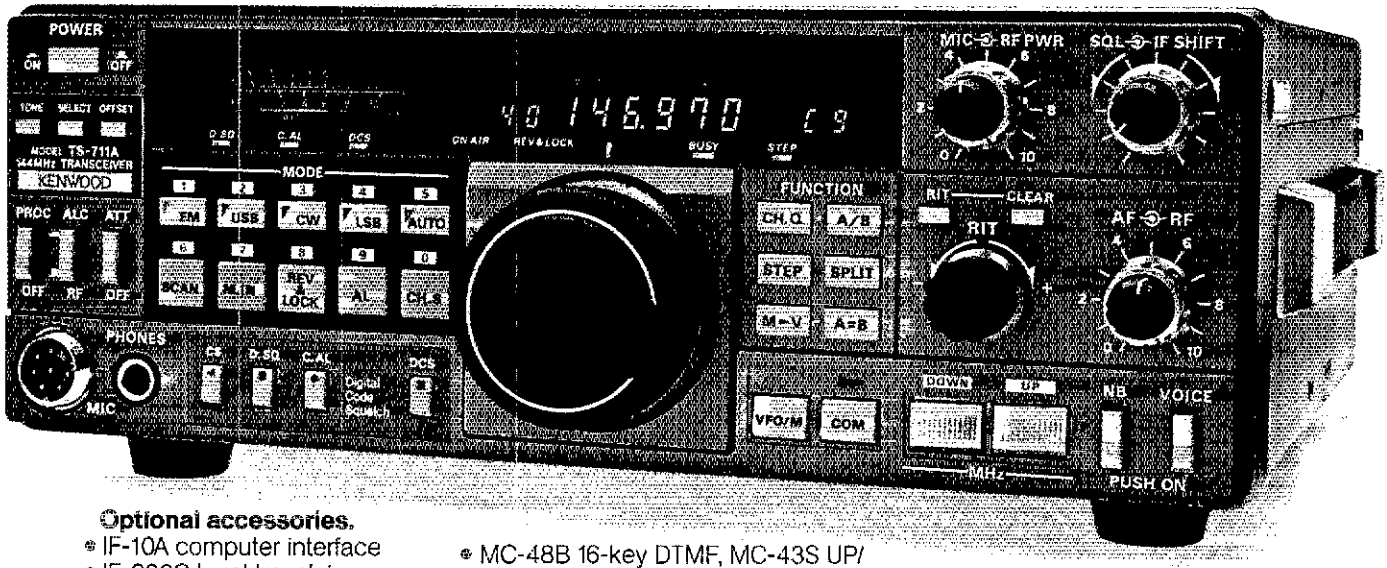
The TS-711A 2 meter and the TS-811A 70 centimeter all mode transceivers are the perfect rigs for your VHF and UHF operations. Both rigs feature Kenwood's new Digital Code Squelch (DCS) signaling system. Together, they form the perfect "matching pair" for satellite operation.

- **Highly stable dual digital VFOs.** The 10 Hz step, dual digital VFOs offer excellent stability through the use of a TCXO (Temperature Compensated Crystal Oscillator).
- **Large fluorescent multi-function display.** Shows frequency, RIT shift, VFO A/B, SPLIT, ALERT, repeater offset, digital code, and memory channel.
- **40 multi-function memories.** Stores frequency, mode, repeater offset, and CTCSS tone. Memories are backed up with a built-in lithium battery.



- **Versatile scanning functions.** Programmable band and memory scan (with channel lock-out). "Center-stop" tuning on FM. An "alert" function lets you listen for activity on your priority channel while listening on another frequency. **A Kenwood exclusive!**
- **RF power output control.** Continuously adjustable from 2 to 25 watts.
- **Automatic mode selection.** You may select the mode manually using the front panel mode keys. Manual mode selection is verified in International Morse Code.
- **All-mode squelch.**
- **High performance noise blanker.**
- **Speech processor.** For maximum efficiency on SSB and FM.
- **IF shift.**
- **"Quick-Step" tuning.** Vary the tuning characteristics from "conventional VFO feel" to a stepping action.
- **Built-in AC power supply.** Operation on 12 volts DC is also possible.
- **Semi break-in CW, with side tone.**
- **VS-1 voice synthesizer (optional)**

More TS-711A/811A information is available from authorized Kenwood dealers.



Optional accessories.

- IF-10A computer interface
- IF-232C level translator
- CD-10 call sign display
- SP-430 external speaker
- VS-1 voice synthesizer
- TU-5 CTCSS tone unit
- MB-430 mobile mount
- MC-60A, MC-80, MC-85 deluxe desk top microphones
- MC-48B 16-key DTMF, MC-43S UP/DOWN mobile hand microphones
- SW-200A/B SWR/power meters: SW-200A 1.8-150 MHz SW-200B 140-450 MHz
- SWT-1 2-m antenna tuner
- SWT-2 70-cm antenna tuner
- PG-2U DC power cable

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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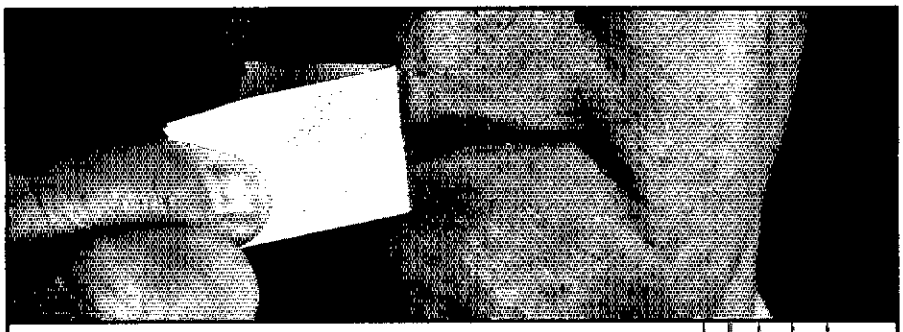

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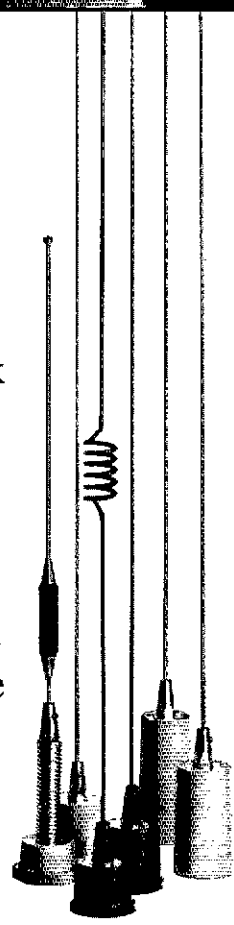
Talk to your Larsen amateur dealer today, and see if Larsen performance doesn't speak for itself.



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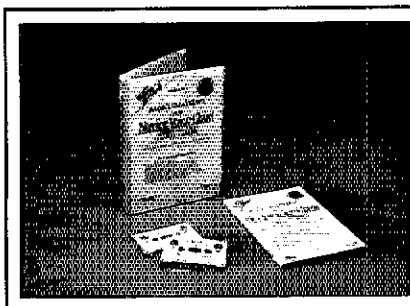

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Prepare for the fantastic world of amateur radio. Study at your leisure. No technical background required. Entry level amateur radio operators can now talk on the ten meter band and FM repeaters. . .even link their ham radio stations to the public telephone system and personal computers. Privileges never before available to the beginner! Complete FCC license preparation course contains everything you need to know to pass both the written and Morse code examination in a very short time. Written in easy-to-understand language. Contains fully illustrated text book, two long-play code learning cassettes, all 302 word-for-word FCC license test questions, answers. . .and much more! You can't miss! Sold with a 10 day money back guarantee. Phone orders accepted. Dealer and classroom instructor discounts available.

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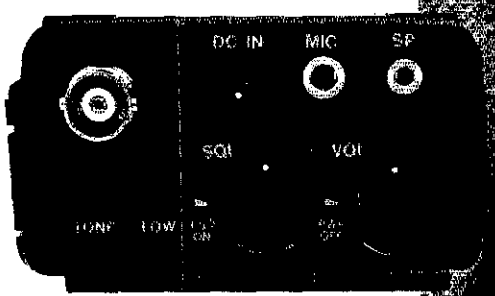
220 MHz TH-315A Coming Soon!

This HT Has it All!

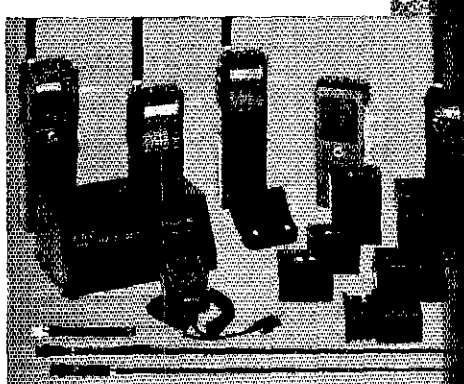
TH-215A/315A/415A

Full-featured Hand-held Transceivers

Kenwood brings you the greatest hand-held transceiver ever! More than just "big rig performance," the new TH-215A for 2 m and TH-415A for 70 cm pack the most features and the best performance in a handy size. And our full line of accessories will let you go from ham-shack to portable to mobile with the greatest of ease!

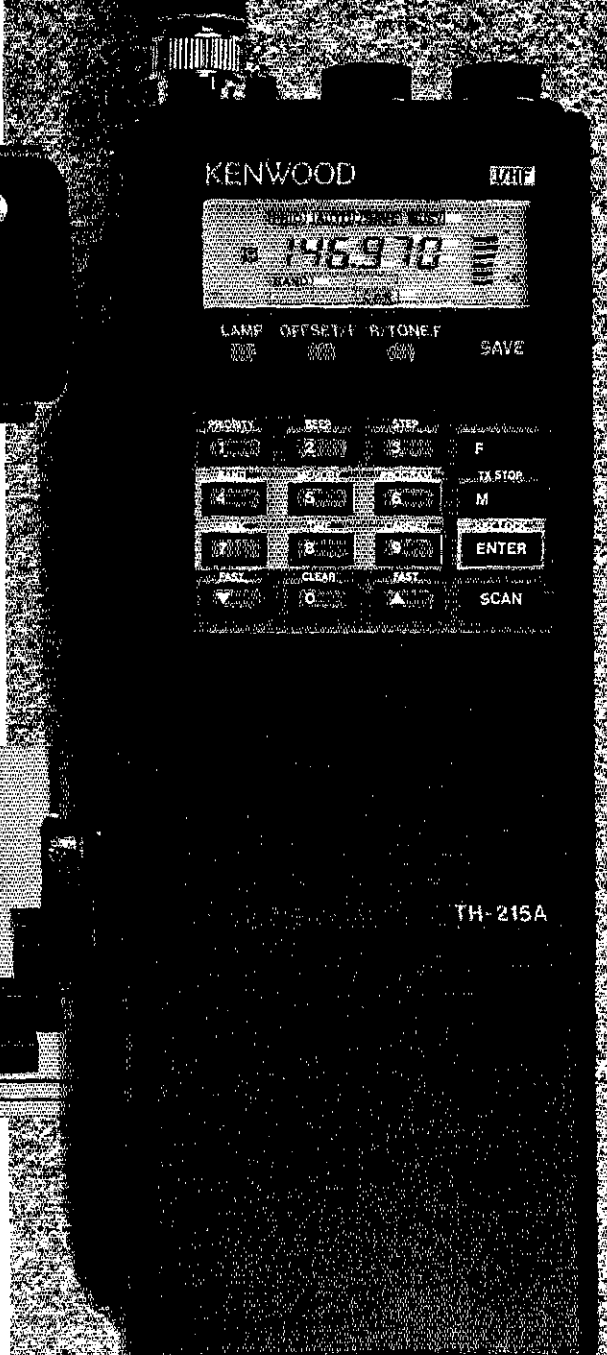


- **Wide receiver frequency range.** Receives from 141-163 MHz. Includes the weather channels! Transmit from 144-148 MHz. Modifiable to cover 141-151 MHz (MARS or CAP permit required).
- **TH-415A covers 440-449.995 MHz.**
- **5, 2.5, or 1.5 W output, depending on the power source.** Supplied battery pack (PB-2) provides 2.5 W output. Optional NiCd packs for extended operation or higher RF output available.
- **CTCSS encoder built-in.** TSU-4 CTCSS **decoder** optional.
- **10 memory channels store any offset, in 100-kHz steps.** Each memory channel can store frequency, frequency step, offset, **reverse switch position,** and CTCSS frequency.
- **Nine types of scanning!** Including new **"seek scan"** and **priority alert.**
- **Intelligent 2-way battery saver circuit extends battery life.** Two battery-saver modes to choose, with power save ratio selection.
- **Easy memory recall.** Simply press the channel number!
- **12 VDC input terminal for direct mobile or base station supply operation.** When 12 volts is applied, RF output is 5 W!
- **New Twist-Lok Positive-Connect™ locking battery case.**
- **Frequency entry by keyboard or UP/DWN keys.**
- **Priority alert function.**
- **Monitor switch to defeat squelch.** Used to check the frequency when CTCSS encode/decode is used or when squelch is on.
- **Large, easy-to-read multi-function LCD display with night light.**
- **Audible beeper to confirm keypad operation.** The beeper has a unique tone for each key. DTMF monitor also included.
- **Supplied accessories:** Belt hook, rubber flex antenna, PB-2 standard NiCd battery pack (for 2.5 W operation), wall charger, dust caps.



Optional Accessories:

• PB-1: 12 V, 800 mAH NiCd pack for 5 W output • PB-2: 8.4 V, 500 mAH NiCd pack (2.5 W output) • PB-3: 7.2 V, 800 mAH NiCd pack (1.5 W output) • 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 • LH-4, 5 leather cases • MB-4 mobile bracket • BH-5 swivel mount • PG-2V DC cable • PG-3C cigarette lighter cord with filter



TH-215A shown

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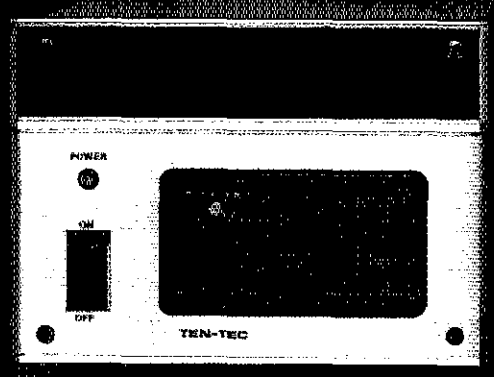
Complete service manuals are available for all Kenwood transceivers and most accessories. Specifications and prices are subject to change without notice or obligation

America's Best Kept Secret!



MODEL 250 POWER SUPPLY

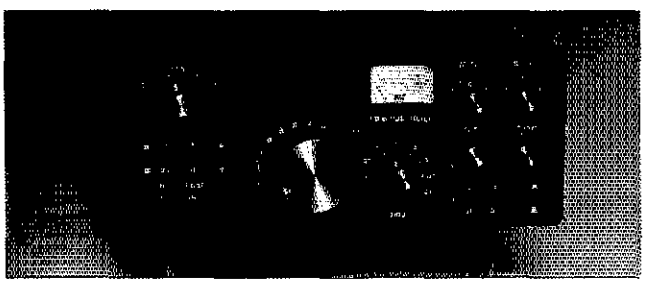
MODEL 561 CORSAIR II

CORSAIR II HF TRANSCEIVER, Model 561
Receiver performance that only a permeability tuned oscillator can deliver . . . superb signal to noise ratio, outstanding adjacent signal rejection. Three, frequency tuning rates using dual range offset tuning. QSK with a changeover time of 30 ms or less for superior CW or AMTOR operation. Twelve position band switch for operation on all nine HF bands, from 1.8 to 30 Mhz, plus 40 Khz overshoot on band edges.

RECEIVER
Sensitivity: 0.25 µV for 10 dB S/N ratio.
Selectivity: 16 pole crystal ladder filter, 2.4 kHz bandwidth. 1.6:1 shape factor at 6/60 dB. Three position, mode independent, switch selects standard 2.4 kHz, optional 1.8 kHz, 500 Hz or 200 Hz filters.
Notch filter: Greater than 50 dB notch, adjustable from 200 Hz to 3.5 kHz.
Audio Bandpass filter: 8 pole, active filter centered at 750 Hz variable from filtered to flat response.
Passband tuning (PBT): Tunes 2nd IF frequency 3 kHz.
Noise Blanker: Switchable on/off with adjustable threshold and blanking
Offset tuning: Dual range, tune RX, TX or TRX.
PLUS: Built-in antenna pre-amp, spot button, selectable AGC fast, slow and off and much more.

TRANSMITTER
RF Output: Broadband, solid state, self tuning with 85-100 watts, all bands.
Built-in lambic keyer. Speed adjustable 8-50 WPM with 40 character programmable memory.
Multi-meter: Reads Ic, Power out, SWR, speech processing level.
Built-in speech processor, with level control, standard.
Variable ALC, adjust power output continuously from 100% to 25% and retain full ALC action.
PLUS: Rear panel connectors for station control, AFSK, QSK, phone patch, auxiliary antenna, PTT, standard CW key, and more.
POWER REQUIRED: 13.8 VDC, Base or mobile at 20 A.
Size: HWD 5.25" x 15.25" x 15".

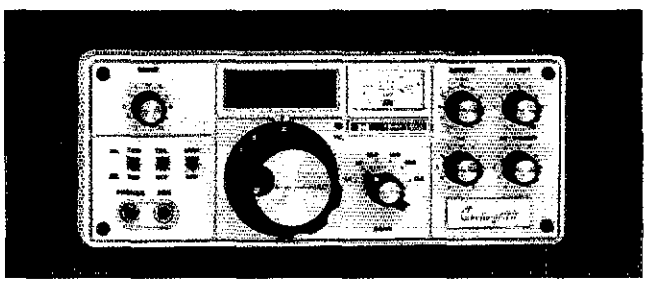
REMOTE VFO, Model 263
Uses the same PTO design as the CORSAIR. Adds complete TX/RX



ARGOSY II, SSB/CW HF TRANSCEIVER, MODEL 525D
A unique combination of small size, simplicity and low cost. Great for mobile, portable and base station use. Operates 80, 40, 30, 20, 15 and 10 meters, in 500 kHz segments, plus 40 kHz overshoot at band edges. 100 watts input with solid state, no tune, final. 12 to 14 VDC at 500 mA, RX, 9A TX. Optional RX filters, 250 Hz, 500 Hz or 1.8 kHz. RX sensitivity .3uV for 10dB S + N/N typical. Offset tuning range, 6 kHz. Variable notch filter, greater than 50 dB rejection, 200 Hz to 3.5 kHz. Optional noise blanker. Famous Ten-Tec QSK CW, of course.

Clutter-free front panel allows single-hand operation without even looking at the rig, even with fat fingers. Isn't that different! Weighs in at a mere 8 pounds! HWD 4"x9.5"x12".

Model 225 115/230 VAC 9A power supply
Model 222 Mobile Mount, w/quick release
Model 223A Noise blanker (plug-in).



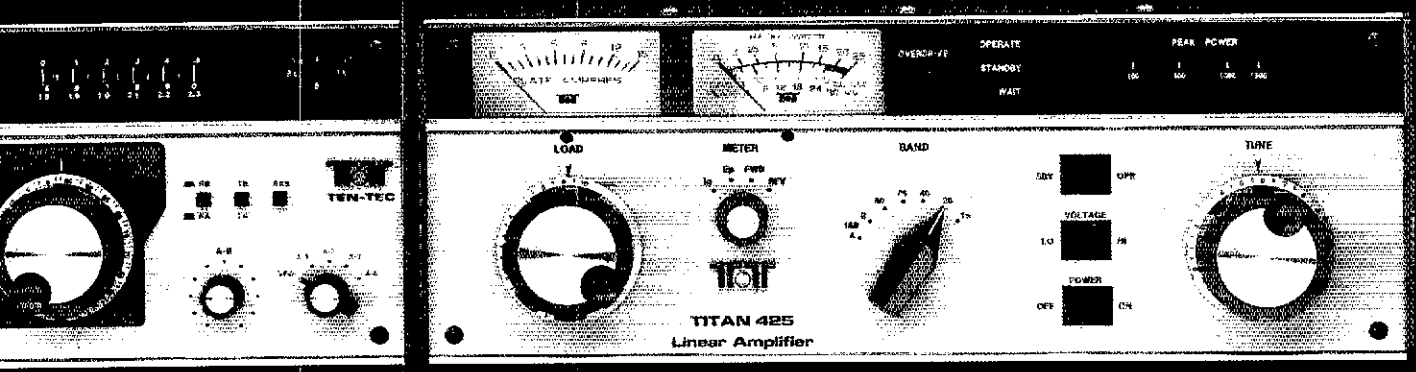
CENTURY/22, CW Transceiver, Model 579
Put the fun back into hamming. This is a top notch, 50 watt, CW transceiver. Features found in only the best rigs are included. Full break-in QSK, excellent RX selectivity on CW (also tunes LSB/USB) and 100% solid state circuitry. Broadband "no tune" RF amp. Operates 80, 40, 30, 20, 15 and the lower 500 KHz of 10 meters. Power required, 12 to 14 VDC at 6A. Size HWD 4" x 10" x 10.5". Weight 6 lbs. Great for portable, mobile or base station operation.
POWER SUPPLY for Century/22. Model 979 115VAC
979E 230VAC

THE ULTIMATE HF MOBILE ANTENNA SYSTEM

HF mobile is a world of compromise! Give yourself a chance. Choose the finest, environmentally protected, antenna system. Loaded to the best height for radiation efficiency, and to clear most overhead obstacles. Upper SS whip is vertically adjustable for "no tears" tuning. Lowest wind resistance too, less whipping and de-tuning. Standard ⅜" x 24 base fitting screws into all standard mounts. Typical height 78" or less.

Our outstanding SSB performance equals our CW and DIGITAL reputation!

MADE IN USA



MODEL 263G REMOTE VFO — MODEL 425 TITAN

frequency control. Front panel switch selects, CORSAIR transceive, 263 transceive, CORSAIR TX/263 RX, 263 TX/CORSAIR RX. You can also listen to both frequencies simultaneously. A balance control is provided for priority adjustment. Also makes provision for Xtal control. Connects to CORSAIR with cables provided. Size is HWD 5.25" x 7.5" x 12".

MATCHING SPEAKER/POWER SUPPLY Model 960

A highly regulated and filtered, 22 amp. supply. Includes protective circuit breaker and primary power fuse. Can use either 115 or 230 VAC, 50/60 Hz. Size is HWD 5.25" x 7.5" x 12".

TITAN HF LINEAR AMPLIFIER

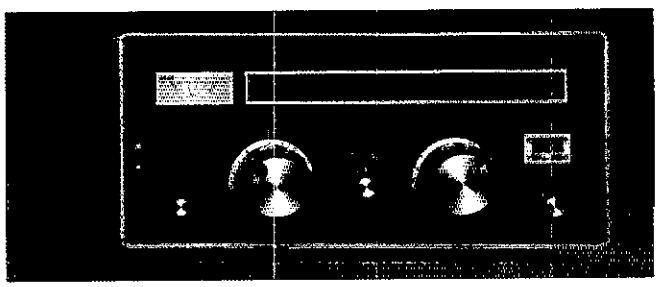
"BOOM BOX" EXTRAORDINAIRE! Remoted power supply makes possible, this compact, desk top linear amplifier. Puts out a solid 1500 watts SSB and CW, 1000 watts continuous power on RTTY, AMTOR or SSTV. Lightning fast QSK for "break-in" CW and super AMTOR performance.

RF DECK

Drive power: 80 watts typical.
Four LED status indicators, including "overdrive" warning.
Hi/Lo plate voltage switch.
Metering: Full time plate current meter. Multi-meter, selectable for plate voltage, grid current, power out or reflected power.
Vernier drive, tune and load controls.
Peak power indicator: Ultra quick 10 element LED bar-graph display.
Amplifier tubes: Two Eimac® 3CX800A7, ceramic, external anode, air cooled triodes in grounded grid circuit. Plate dissipation, 1600 watts.
Frequency coverage: 160, 80, 40, 20 and 15 meter bands plus 18 and 24 MHz standard, 10 meter kit supplied upon proof of authority to transmit.
Size and weight: HWD 5.25" x 15.25" x 15". 17 lbs.

POWER SUPPLY (Supplied with TITAN)

Primary power: 220-250 VAC @ 20 amps, maximum.
Conservatively designed for cool operation under full load using a Ten-Tec, tape wound, Hypersil® transformer.
Hi/Lo blower speed switch.
Size and weight: HWD 8.25" x 13.4" x 10.25". 45 lbs.
UPS shippable.



1.5KW ANTENNA TUNER, Model 229B

Designed to match your 50 ohm, un-balanced coaxial, transmitter output to virtually any un-balanced antenna. General coverage from 1.8 to 30 MHz. Handles all the power the law allows.

- Reversible "L" network circuit for best match and bandwidth, at either hi or lo, antenna impedance.
- Avoids false load indication.
- Ceramic insulators and coil forms throughout. Silver plated switch contacts and roller inductor coil.
- Built-in SWR bridge.
- System by-pass switch.
- 4 Position antenna select switch.
- HWD 5.5"x13"x11", 9 lbs.
- For balanced feedline order accessory balun. Model 3229

The term of the TEN-TEC WARRANTY IS ONE YEAR...as always!

...America's Best Kept Secret!

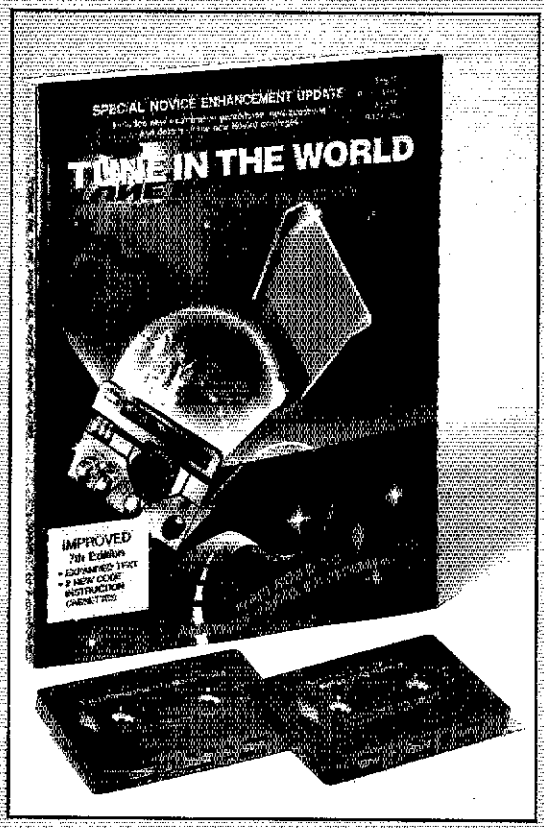
TEN-TEC

Highway 411 East
Sevierville, Tennessee 37862
615/453-7172

TUNE IN THE WORLD WITH HAM RADIO

YOUR ROAD TO HAM RADIO EXCITEMENT

Tune in the World with Ham Radio has put the fun back into learning what Amateur Radio is all about. Enhanced Novice class privileges have brought the fun back into operating. Now beginners with their Novice licenses no longer have to spend all of their time on the air using only Morse code. Novices can now use voice communications on 10-meters and use VHF and UHF repeaters. The new privileges include the use of digital communications so that home computers can be linked through packet radio networks.

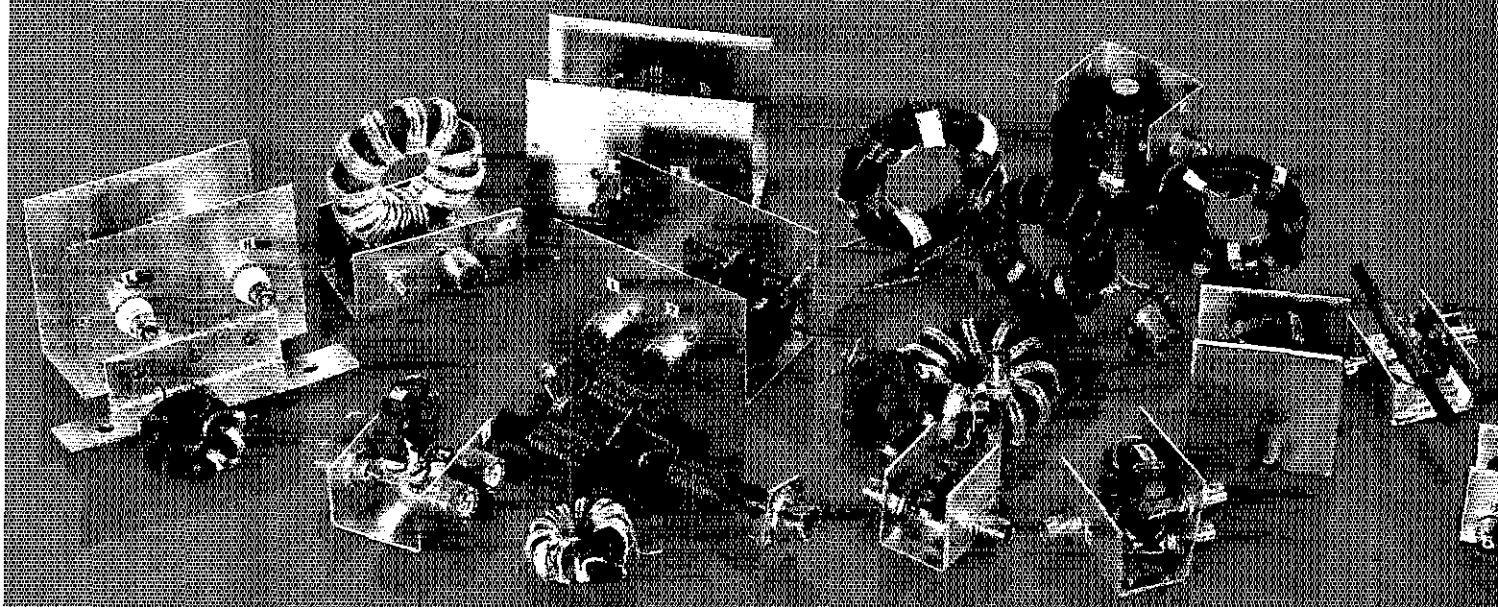


Imagine being able to personally communicate with an astronaut as the Space Shuttle circles the globe. Perhaps you would like to become a friend over the airwaves with someone on a remote island in the South Pacific or on an ice-flow in the Arctic. There are hams everywhere!

The FCC requires that Novices know something about their new privileges and that's where the expanded *Tune in the World with Ham Radio* text comes in. You'll find what you need to know explained in clear, concise bite-sized chunks of information. You'll find all 300 possible questions on the Novice exam with their distractors and answer key. Besides improving the text, we've added almost three times the code practice material to the package in the form of two C-90 tape cassettes. One tape teaches the code, the other provides practice. They are recorded in stereo so you can switch off the voice portion for even more practice. These new tapes make learning the code a snap!

The *Tune in the World with Ham Radio* package including the text and both tapes is available for $15. The text alone is $12 and the set of tapes is $10. Add $3.50 for shipping and handling.

TRANSMISSION LINE TRANSFORMERS



A new ARRL Publication by Dr. Jerry Sevick, W2FMI

Despite the popularity of transmission line transformers in both commercial and amateur applications, little practical design information has been published concerning these devices. The lack of data was made abundantly clear to Jerry Sevick, W2FMI when he began designing matching transformers for the short vertical antennas that are the subject of his classic series of articles that appeared in *QST*. In order to fill in the gaps of available knowledge, Jerry decided to study the subject of transmission line transformers in depth and the results of his findings are contained in this new ARRL publication!

Transmission Line Transformers covers types of windings, core materials, fractional-ratio windings, efficiencies, multiwinding and series transformers, baluns, and limitations at high impedance levels. There is also a chapter on practical test equipment. This book is must reading for everyone interested in antenna and transmission line theory. Copyright 1987, 128 pages $10 hardcover only.

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Analyses of 4:1 Impedance Transformer
A Simple Analysis
The Ruthroff Analysis

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Low Frequency Analysis of the 4:1 Unbalanced-to-Unbalanced Transformer
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Rod Parameters

Chapter 3 High Frequency Characterization
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Chapter 10 Simple Test Equipment
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Signal Generators
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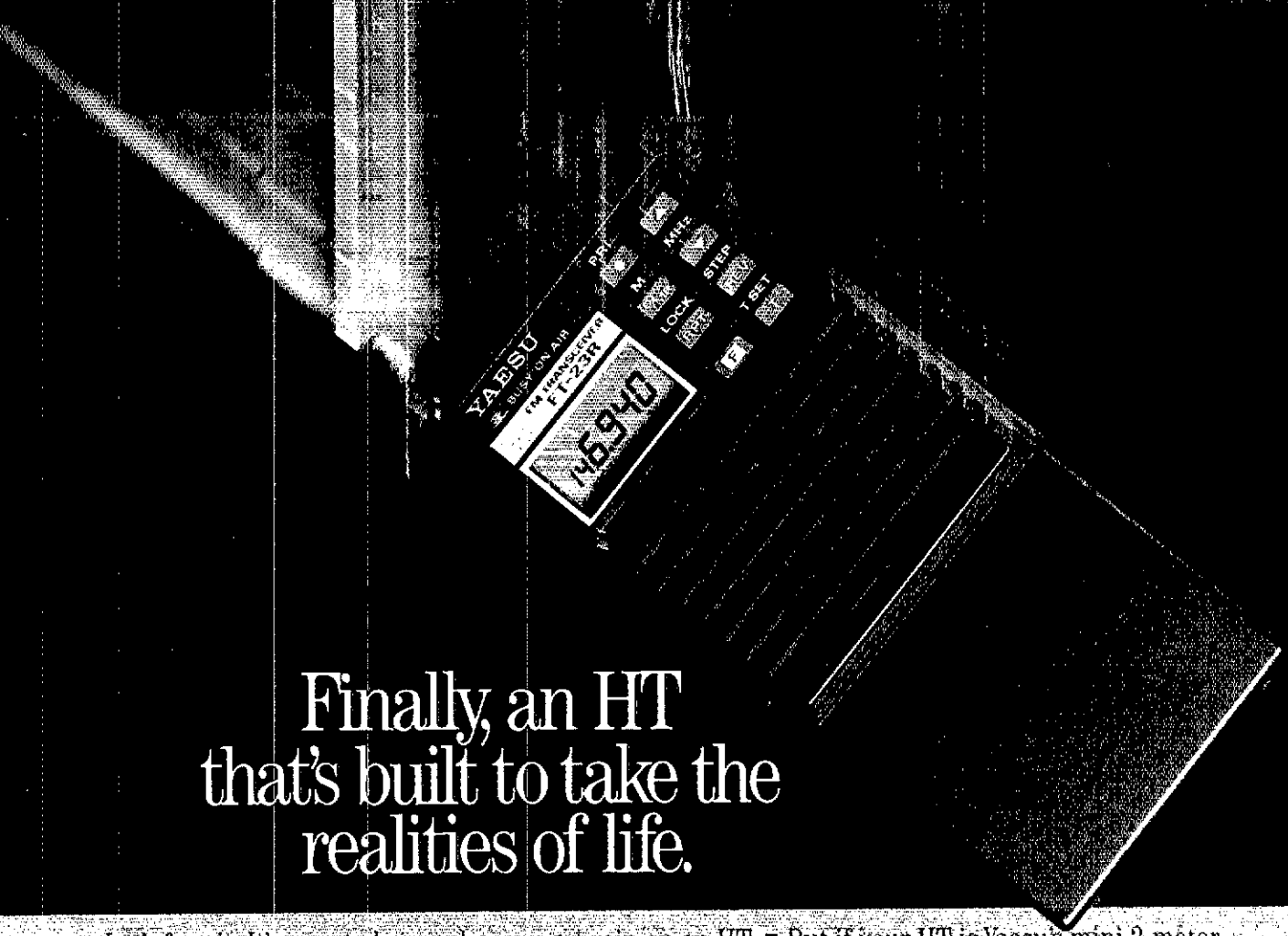
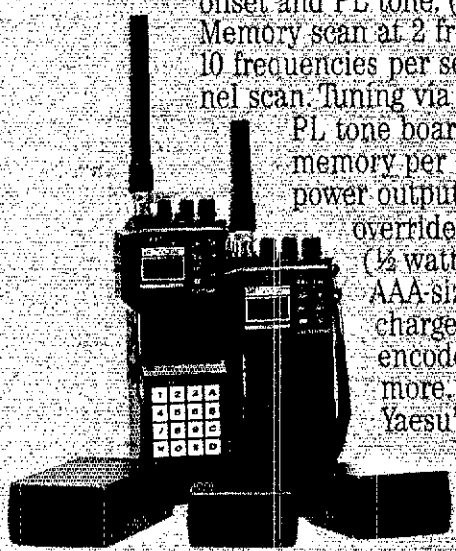


Finally, an HT that's built to take the realities of life.

Let's face it. It's easy to bump, drop, or get rain on an HT. ■ But if your HT is Yaesu's mini 2-meter FT-23R or 440-MHz FT-73R, such mishaps are a lot less worrisome. ■ They're built to last, with rugged aluminum-alloy cases that prove themselves reliable in a one-meter drop test onto solid concrete. Plus, their moisture-resistant seals really help keep the rain out.

Built for the realities of operating. Despite their miniature size, both radios have all the operating capabilities of larger microprocessor-controlled HTs. Yet operating them couldn't be easier. Consider: ■ You get a 7.2-volt, 2-watt battery pack. (Optionally, a 12-volt, 5-watt pack, or 7.2-volt miniature 2-watt pack.) 10 memories that store frequency, offset and PL tone. (7 memories can store odd splits.) Memory scan at 2 frequencies per second. Band scan at 10 frequencies per second. Tx offset storage. Priority channel scan. Tuning via tuning knob, or up/down buttons.

Radios above shown actual size.

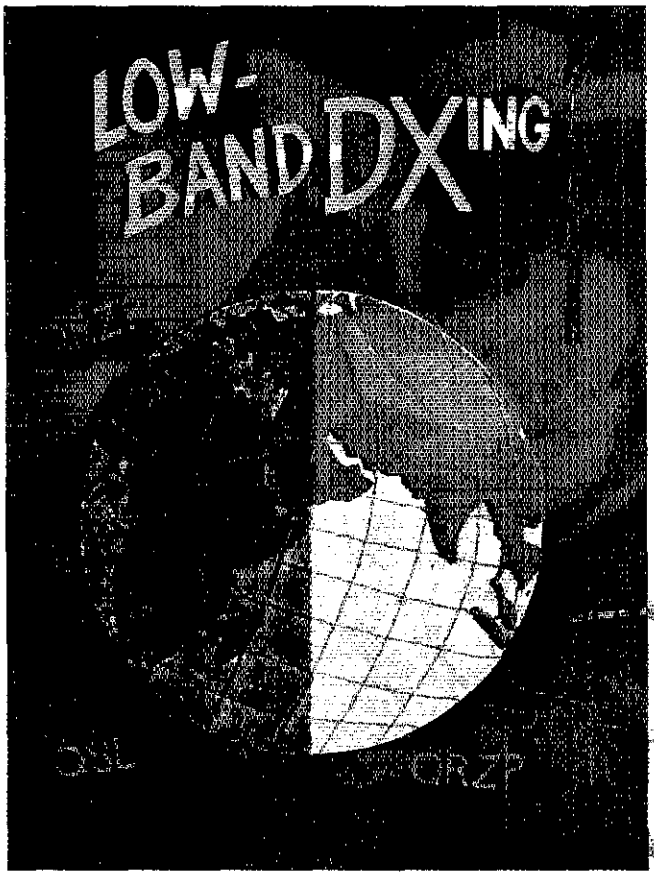


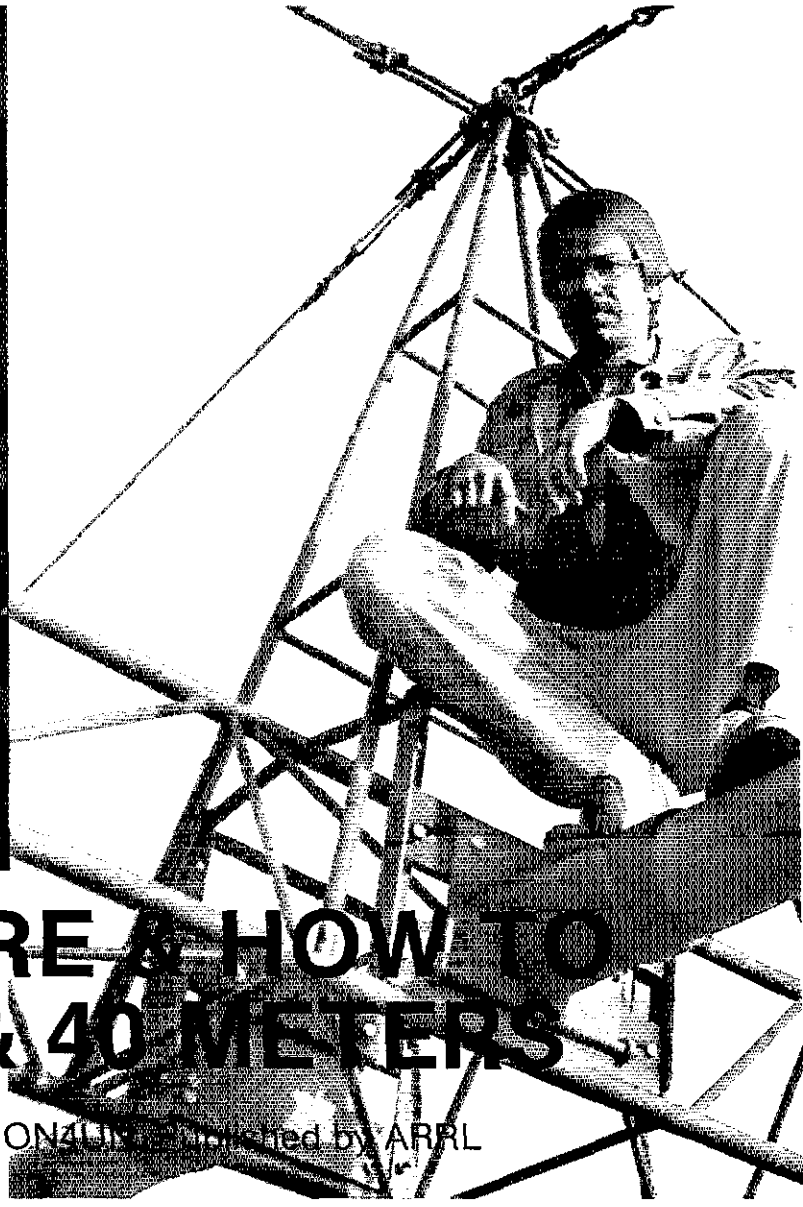
PL tone board (optional). PL display. External PL selection. Independent PL memory per channel. PL encode *and* decode. Expanded Rx coverage.* LCD power output and "S"-meter display. Battery saver circuit. Push-button squelch override. Eight-key control pad. Keypad lock. High/low power switch (½ watt on low power.) ■ Options available: 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 much more. ■ So get the intelligent mini HT that's built for life's realities. Yaesu's 2-meter FT-23R, or 440-MHz FT-73R.

YAESU

Yaesu USA 17210 Edwards Road, Cerritos, CA 90701 (213) 404-2700. **Repair Service:** (213) 404-4884. **Parts:** (213) 404-4847.
Yaesu Cincinnati Service Center 9070 Gold Park Drive, Hamilton, OH 45011 (513) 874-3100.

*Modification required. Prices and specifications subject to change without notice. PL is a registered trademark of Motorola, Inc.





WHEN, WHERE & HOW TO ON 160, 80 & 40 METERS

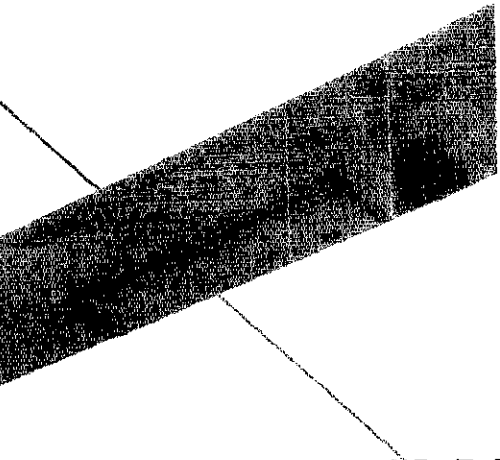
Written by John Devoldere, ON4UN; published by ARRL

It's the first really brisk day of autumn, and the trees have begun to shed their leaves. It's been crisp and clear for the past couple of days and there is not hint of rain in the forecast, so there should be no QRN. Propagation bulletins are predicting low absorption. It's going to be a great night for Low Band DXing!

This is an over-simplification. Radio amateurs know practically by instinct that 160, 80 and 40 meters "open up at night." But anyone in the Eastern U.S. who has worked Western Australia on 40-meters in the middle of the afternoon or West Coast amateurs who work into the Middle East on 80 meters just after daybreak know that, depending on the time of year, these bands have many secret hiding places for their DX-treasurers! Now, John Devoldere, ON4UN, has put together a treasure map in the form of a 210-page book published by ARRL where he completely explores the 160, 80, and 40-meter bands.

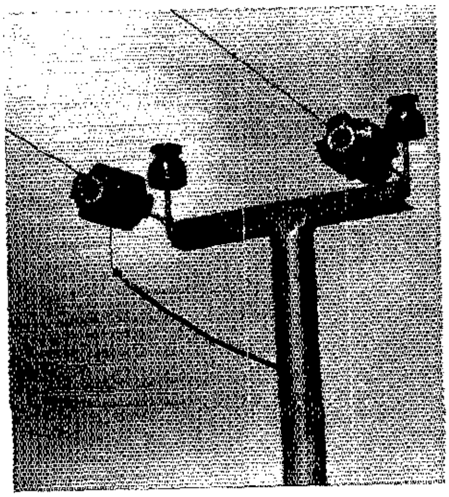
John draws on his vast knowledge and years of experience, as well as that contained in over 500 references which are listed in their own chapter. A large portion of the book is devoted to the design and building of efficient antennas for these frequencies. Receiver, transmitter and transceiver characteristics are also covered. The propagation chapter is the key to understanding when to work DX. The operating chapter tells where to find DX and gives tips on maximizing the effectiveness of your station for low band work. There is also a chapter of interesting and useful BASIC programs. But you don't have to keyboard these programs; there is inexpensive software that can be purchased separately which is available for use on many popular personal computers. (See next page.)

This new ARRL publication is copyright 1987. It is available in softcover only for $10 plus $2.50 ($3.50 for UPS) shipping and handling from ARRL.



WORK DX

Top to bottom: Just some of the antennas described: the full-sized 3-element 80 meter array at I5NPH, dwarfs the 20 meter beam. OH1RY checks the driven element of his 80 meter Yagi before it's hoisted up the tower. While the use of impressive hardware is often the case on the low bands; the simple and classic Beverage shown below helps with receiving.



```
                         GRAYLINE PROGRAM                               by  ON4UN
---------------------------------------------------------------------------------
YOUR LATITUDE IS 47 DEG. NORTH          YOUR LONGITUDE IS  122  DEG. WEST
TIME OF YEAR (MONTH/DAY) =  11 / 7
YOUR SUNRISE IS AT 14.53 UTC            YOUR SUNSET IS AT 00.44 UTC
GRAY LINE WIDTH IS  66  MINUTES.        MINIMUM TARGET DISTANCE IS  14000  KM.
---------------------------------------------------------------------------------
PREFIX   COUNTRY               CITY                 KM.    START    END   MIN/TARG
------   -------               ----                 ---    -----    ---   --------
FH8X     KERGUELEN ISL.                            19136   14.26   14.41      20
FH       MAYOTTE                                   16019   14.52   15.12      20
FR       REUNION ISL.                              17113   14.26   14.41      20
FR       EUROPA ISL.                               16637   15.23   15.32      20
FR       GLORIOSO                                  15931   14.42   15.02      20
FR       JUAN DE NOVA                              16390   15.07   15.27      20
FR       TROMELIN                                  16524   14.26   14.39      20
T5       SOMALI                MOGADISHU           14416   14.34   14.54      20
VK0      HEARD ISL.                                18714   14.26   14.40      23

PREFIX   COUNTRY                    CITY              SUNRISE    SUNSET
------   -------                    ----              -------    ------
EA8      BALEARIC ISL.              PALMA              04.27      19.20
EA8      CANARY ISL.                STA. CRUZ          06.12      20.06
EA9      CUETA & MELILLA            MELILLA            05.02      19.30
EI       IRELAND                    DUBLIN             04.03      20.55
EL       LIBERIA                    MONROVIA           06.33      19.02
EP       IRAN                       TEHERAN            01.23      15.64
ET       ETHIOPIA                   ADDIS-ABEBA        03.10      15.48
F        FRANCE                     PARIS              03.53      19.57
F        FRANCE                     MARSEILLE          04.03      19.22
F        FRANCE                     BORDEAUX           04.21      19.52

STATION COORDINATES:  34.2  DEG NORTH,  118.1  DEG WEST.
PREFIX   COUNTRY                    CITY         DIR    (KM) DIST. (MILES)
                                                 ---    --------------
()          ABU AIL                               23     14269      8868
1A          ORDER OF MALTA          ROME          34     10160      6314
1S1         SPRATLEY                             302     12909      8022
3A          MONACO                                36      9738      6052
3B6-7       AGALEGA & ST. BRANDON                 12     17301     10752
3B8         MAURITIUS                             16     18395     11432

                       COIL CALCULATION                               by ON4UN
---------------------------------------------------------------------------------
THIS PROGRAM CALCULATES THE COIL PARAMETERS GIVEN A REQUIRED INDUCTANCE OR THE
COIL INDUCTANCE GIVEN THE COIL PARAMETERS FOR BOTH AIR WOUND AND TOROIDAL IN-
DUCTANCES.
---------------------------------------------------------------------------------
ALL DIMENSIONS ARE IN INCHES
---------------------------------------------------------------------------------
AIR WOUND COIL OR TOROIDAL CORE? (A/T) >

COMPUTE INDUCTANCE (I) OR COIL PARAMETERS (C) >


RQD. INDUCTANCE (uH)> ? 3.4
COIL DIAMETER IN INCHES > ? 3
COIL LENGTH IN INCHES  > 4

                    REQUIRED NUMBER OF TURNS =  9
```

Low Band DXing Software

by John Devoldere, ON4UN

This inexpensive software will save you plenty of time. DXers will find these programs useful: grayline, great circle, and sunrise/sunset time listings. Of particular interest are the types of problems you can solve that have to do with antennas and transmission lines: mutual impedance, element driving impedance, voltage or impedance along with feedlines, feedline transformer, shunt or series input L network iteration and design, shunt or series impedance network, Pi or T line stretcher, feedline T junction/parallel impedances, SWR iteration and calculation, stub matching, horizontal antenna wave angle, vertical antenna design program, top loaded vertical design program, vertical array pattern calculation, element taper, coil calculation, RC/RL circuit transformation and obtaining precise resistance and capacitance values.

When ordering specify format; these versions are available for $20: **MS-DOS** for IBM and IBM compatables, **DOS 3.3** for Apple 2C or 2E, **CP/M** for Kaypro or Xerox, **CB-128 CP/M** for the Commodore C-128. The **MacIntosh** version is $25. Please add $2.50, ($3.50 for UPS) shipping and handling.

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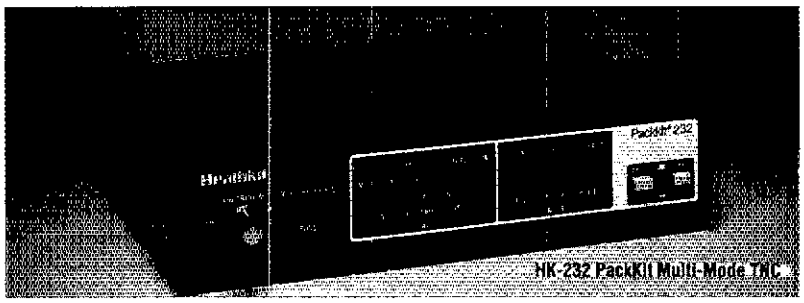
NEWINGTON, CT 06111

COMMITMENT

We continue our commitment to provide only the best Amateur Radio gear with the NEW Heathkit® SB-1000 and HK-232 kits.

SB-1000 Linear Amplifier



HK-232 PackKit Multi-Mode TNC

Our commitment to Amateur Radio means the Heathkit line is always expanding to meet the demands of even the most veteran ham. Our introduction of the SB-1000 Linear Amplifier and HK-232 PackKit Multi-Mode Terminal Node Controller Kits gives you two more value-packed amateur products to build and use.

The Heathkit SB-1000 Linear Amplifier Kit continues our commitment to produce the most popular linear amplifiers in the industry. Designed to operate at a full 1000 watts PEP output on SSB, 850 watts on CW or 500 watts for 30 minutes continuous on RTTY, this amp covers all bands from 160 to 15 meters including WARC bands. The SB-1000 uses a single 3-500Z tube in a high efficiency circuit for unparalleled performance at the price. Its high silicon E-I core transformer takes up less room and runs cooler. And it features a quiet computer-style fan, a stiff full-wave power supply with computer grade capaciters, adjustable ALC, and plate and load controls with smooth vernier tuning. And the SB-1000 is yours for only **$739.95.**

Consider the Heathkit HK-232 TNC. This versatile unit works on CW, RTTY, ASCII, AMTOR, both HF and VHF Packet, and now even WeFAX. You can work Packet in both HF (300 baud) and VHF (1200 baud or up to 9600 baud with external modem). Operate Morse from 5 WPM to speeds you never dreamed of, or print Weather Facsimile pictures on an Epson compatible printer. Connects to your computer through a standard RS-232 port. Connects to both your HF and VHF radios' PPT line, microphone input and speaker output. The same connections for Packet work on all other modes. Includes bar graph display to make HF tuning a breeze. Operates on 12 VDC at 750 mA with 10% ripple or less. The HK-232 is priced at only **$279.95.**

Because you build these kits, there aren't any surprises inside. And at Heath we are just as committed to you after the sale. All Heathkit products are backed by our highly respected manuals and even our technical consultation service.

Simply call Toll-Free: 1-800-253-0570 and ask for operator 19 to order your kits today.

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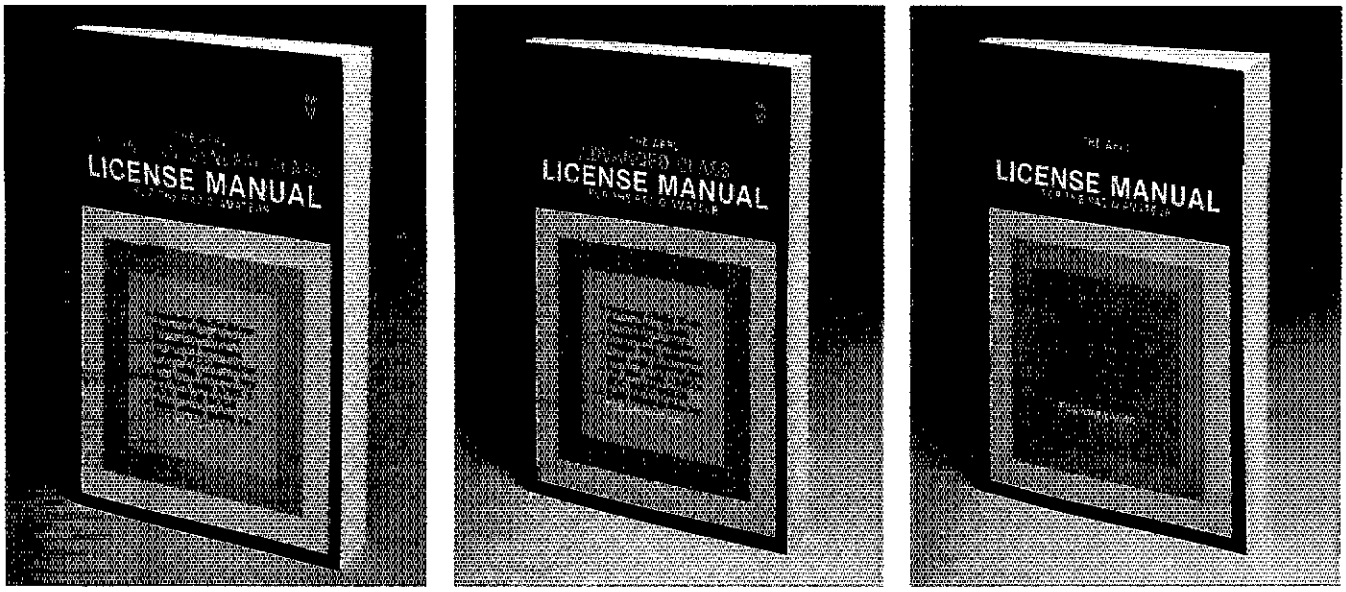
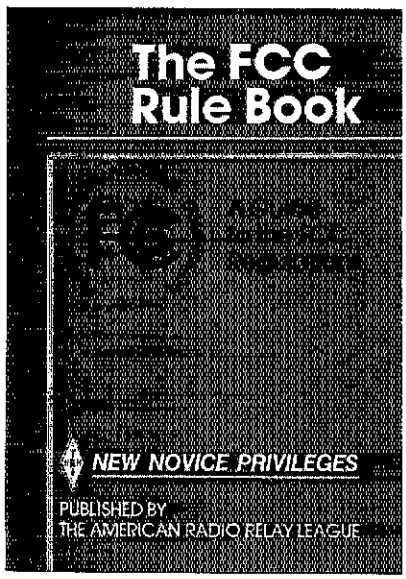


The popular **ARRL License Manual Series.** The current editions are based on examination questions pools that will be in use at least until January 30, 1988. The new 3rd Edition of *The ARRL Technician/General Class License Manual* separates the study material for the Element 3A (Technician) and Element 3B (General) exams for easy study. The current 2nd Editions of the *Advanced and Extra Class License Manuals* are just the "ticket" for upgrading.

PASSING POWER!

The new 7th Edition of *The FCC Rule Book* is just off the press and has been updated to cover all of the changes in the regulations brought about by Novice Enhancement. It continues in the popular "Washington Mailbox" style of rule interpretations by the FCC besides containing Amateur Radio regulations. We have upgraded *Tune in the World with Ham Radio* to cover material on the new 30-question Novice exam and have almost tripled the amount of code instruction and practice on two 90-minute cassettes. We've had to go back on press to print additional copies of *Morse Code, The Essential Language.* This book provides a history of code operation and shows how useful it is.



Tune in the World with Ham Radio
With book and cassettes ..... **#0380 $15**
Book only ..... **#0399 $12**
Set of 2 C-90 Cassettes ..... **#0398 $10**

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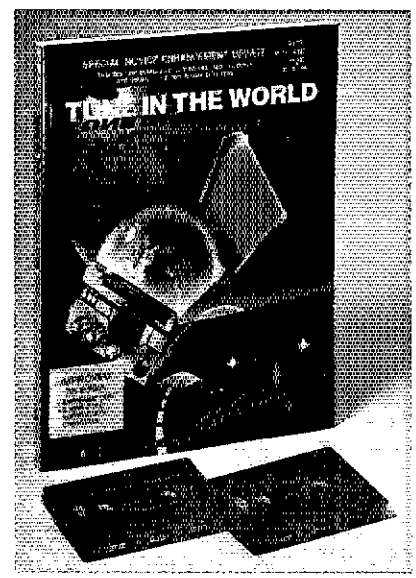
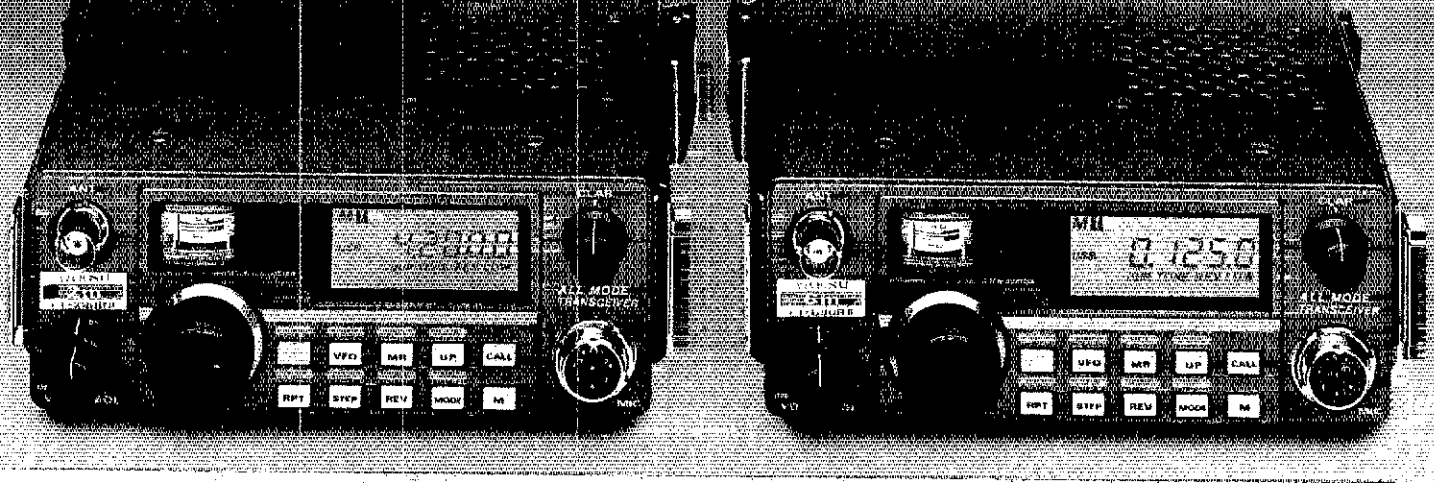
Morse Code the Essential Language **#0356 $ 5**
Code Kit ..... **#5501 $ 8**
Morse University TM Tune-in book and cartridge for C-64 computer ..... **#0259 $40**

C-60 Code Practice Cassettes
30 min. each at 5 and 7½ WPM* ... **#1030 $ 5**
30 min. each at 10 and 13 WPM* .. **#1040 $ 5**
30 min. each at 15 and 20 WPM* .. **#2050 $ 5**
*Same tapes included in *Code Kit*

Orders must include $2.50 shipping for book rate or $3.50 for UPS.

The American Radio Relay League, Inc.
225 Main Street
Newington, CT 06111





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Yaesu's 2-meter FT-290R and 6-meter FT-690R Mark II Series are the perfect all-mode traveling companions.

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You get around fast on SSB, CW and FM with ten memories; dual VFOs, LCD display, automatic storage of repeater shift into memory register, offset tuning during receive or transmit for satellite operation, relative power output/S-meter, and optional CTCSS unit.

And everything fits into a lightweight-yet-rugged case, measuring just 2¼ x 6½ x 8¼ inches.

The FT-290R and FT-690R Mark II are perfect for emergency use, camping trips, talking around town, and DX work.

Plus each is priced to maximize your ham budget's mileage.

So discover Yaesu's 2-meter FT-290R Mark II and 6-meter FT-690R Mark II all-mode transceivers today. They're just a quick trip away at your nearest Yaesu dealer.

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Repair Service: (213) 404-4884 Parts: (213) 404-4847

Yaesu Cincinnati Service Center 9070 Gold Park Drive, Hamilton, OH 45011 (513) 874-3100

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AEA
PKT-1 Packet unit $369 w
AMPLICA
CSR-300 Sat/18" drive $349 m
ASTATIC
10-DA/G-stand Desk mic $ 39 m
T-UG8-D-104 Desk mic 49 m
ASTRON
VS-20M 16A ps $ 99 v
B & W
361 Keyer $ 29 m
FL-10/1500 Low pass filt 19 m
CES
510-SA Sptx autopatch $229 v
COLLINS
312B-5 PTO console $289 m
516F-2 AC supply 149 mv
75S-3 Ham Rcvr 269 m
PM-2 AC supply 119 m
SM-2 Desk mic 39 m
DMI
PA-1300 Preamp $ 59 m
DAIWA
CN-720 Wattmeter $ 99 f
DENTRON
GLA-1000B Linear $249 v
MT-3000A Ant tuner 199 v
DRAKE
CPS-1 Conv ps $ 19 m
AC-3 AC supply 49 m
AC-4 AC supply 69 mfv
FL-500 500 Hz filter 35 m
FL-6000 6 KHz filter 35 m
MN-2000 Ant tuner 149 v
MS-4 Speaker 19 mv
PS-7 Power supply 149 me
PS-75 Power supply 89 f
R-4B Ham Rcvr 179 m
R-4C Ham Rcvr 249 m
R-7 SW receiver 699 w
RP-70D Rcvr protector 49 m
SPR-4 SWL receiver 149 m
T-4XB Transmitter 169 v
T-4XC Transmitter 219 mv
TR-4 Xcvr 199 m
TR-4CW Xcvr 289 m
TR-7 service manual 25 m
Theta 7000E Terminal 249 m
WH-7 Wattmeter 69 m

ESC
Synthacoder; IC-22S $ 29 m
ETO
374A Linear 1695 mf
76PA Linear 1495 m
FANSAT
3500 Sat receiver $ 89 m

HAL
ARQ-1000 Error terminal $469 m
CRI-100 Interface 119 m
CRI-200 Interface 139 m
DS-3000KSR V2 Terminal 299 m
ST-6000 Demodulator 399 m

HEIL
SS-2 Speaker $ 49 v
HENRY
2KD-Classic Amp AIR $849 m

ICOM
AT-100 100w auto tuner $249 c
AT-150 Auto ant tuner 279 v
AT-500 500w auto tuner 329 mwc
BP-3 Battery 29 m
HS-10SB Switchbox 19 m
IC-120 1.2 GHz FM Xcvr 389 m
IC-211 2m Xcvr 299 m
IC-251A 2m Xcvr 369 v
IC-25A 2m Xcvr (red) 169 m
IC-271A/PS-25 2m Xcvr 689 m
IC-271A/PS-25/AG-20 729 m
IC-271H 2m Xcvr 769 f
IC-290H 2m Xcvr 389 m
IC-451A 430 Xcvr 469 v
IC-701 w/ps Xcvr 399 m
IC-730 Xcvr 469 m
IC-745/FL-53/FL-54 729 c
IC-751 Xcvr 799 m
PS-15 Power supply 99 wc
PS-20 Power supply 159 mwf
PS-30 Power supply 179 w
R-70 SW Rcvr/CW filter 399 m
R-71A SW receiver 629 mwc
R-71A/CW filter 659 m
SM-2 Desk mic 25 m
SM-6 Desk mic 25 m
SM-10 Desk mic 69 m
KDK
FM-240 2m FM Xcvr $249 m
FM-2033 2m FM Xcvr 199 m
FM-7033 440 FM Xcvr 199 m

KENWOOD
AT-230 Antenna tuner $159 mw
AT-250 Auto ant tuner 249 wt
BO-9 System base 29 c
BO-9A System base 39 m
DG-5 Dig display 99 m
FC-10 Freq control 39 f
MC-50 Desk mic 29 m
MC-60A Desk mic 55 c
PS-30 Power supply 109 f
PS-430 Power supply 119 w
R-600 SW receiver 229 m
R-1000 SW receiver 269 w
R-2000/CW filt SW Rcvr 389 m
SP-230 Speaker 49 m
SP-430 Speaker 39 w
ST-2 Desk cgr; 2600A 69 e
TM-211A 2m FM Xcvr 279 m
TR-9130/TTP 2m Xcvr 389 m
TR-9500 430 Xcvr 399 mf
TS-180S/DFC Xcvr 399 f
TS-430S/FM Xcvr 629 we
TS-520 Xcvr 369 e
TS-530SP Xcvr 629 e
TS-530SP/2cw/ssb filts 699 v
TS-600 6m Xcvr 369 f
TS-700A 2m Xcvr 269 w
TS-820S Xcvr 469 m
TS-820S/CW filter 499 mc
TS-830S Xcvr 699 c
TS-940S/SO-1/AM filter 1699 m
VFO-120 Remote VFO 99 m
VFO-180 Remote VFO 59 f
VFO-230 Remote VFO 229 v
VFO-520 Remote VFO 99 mv
VOX-3 VOX unit 29 f

MFJ
752 Tunable SSB filter $ 69 e
949B Ant tuner 89 m
MIRAGE
C-22A 220 amp $ 99 m
NYE
MB-IV-02 Ant tuner $299 m
OKI-DATA
182 Parallel printer $189 m
OMEGA-T
Noise bridge $ 29 m
REGENCY
720 Aircraft scanner $ 49 v
HX-2000 Pocket scanner 199 m
RF ENGINEERING
RFE-100 Dig disp; 4-line $ 89 m
ROBOT
800 High Terminal $199 v
80D Low Terminal 199 m
800C High Terminal 249 e
800C Low Terminal 249 e
SHURE
444 Desk mic $ 39 m
SONY
ICF-2001 SW receiver $149 m
ICF-2010 SW receiver 249 m
SPECTRONICS
DD-1K Dig disp; Kenwood $ 69 m
TEMPO
AC One AC supply $ 69 m
TEN-TEC
215 Desk mic $ 25 f
217 500 Hz filter 29 mv
225 Power supply 99 m
247 Ant tuner 59 m
260 Power supply 129 m
280 Power supply 99 m
283 Remote VFO 129 m
444 Linear 999 f
525D Argosy II Xcvr 429 m
560 Corsair Xcvr 679 v
561 Corsair II Xcvr 949 f
570 Century/21 Xcvr 189 m
579 Century/22 Xcvr 279 m
580 Delta Xcvr 369 m
700C Hand mic 19 m
979 Power supply 69 m
1140 Circuit breaker 9 f
603/KR-1B Keyer 39 f

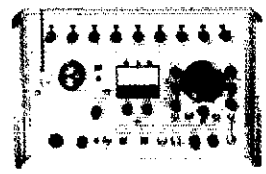
TOKYO HIGH POWER
HC-2000 Ant tuner $289 wv

TURNER
Plus 3 Desk mic $ 35 m
USI
1400C 14" color monitor $119 m
WSE
Docking booster; FT-208R $ 99 m
YAESU
CPU-2500RK 2m FM $189 v
FC-707 Ant tuner 89 m
FC-757AT Auto tuner 269 w
FP-301 Power supply 99 m
FP-757GX Power supply 99 m
FP-757HD Power supply 179 m
FT-101 Xcvr 379 m
FT-101B Xcvr 389 m
FT-101E/CW filt Xcvr 449 m
FT-101EE Xcvr 399 w
FT-101F Xcvr 449 v
FT-101F/CW filter 479 m
FT-270RH 2m FM Xcvr 279 m
FT-2700RH 2m/440 Xcvr 369 m
FT-480R 2m Xcvr 299 m
FT-625RD 6m Xcvr 449 f
FT-726R Sat Xcvr 599 m
FT-726R/6m module 729 m
FT-726R/430/sat modules 799 w
FT-726R/6m/430/cw filt 899 m
FT-726R/6m/430/sat mods 899 m
FT-ONE Xcvr 1199 m
FT-ONE/tm/ram/4 filters 1269 f
FT-ONE Lot 10 Xcvr 1699 e
FTV-700 Xvtr/6m module 199 m
FV-101B Remote VFO 99 m
FV-107 Remote VFO 89 m
FV-700DM Remote VFO 89 m
MD-188 Desk mic 59 m
NC-24 Multi-charger 199 m
YC-601 Dig display 99 m
YD-844A Desk mic 25 mv
YO-901P Scope/pan 349 w

7-19-87

USED GEAR INFORMATION

(1) This list was prepared from an inventory taken on the date shown. The letters after the prices indicate in which store the equipment was located at that time. The quantities vary. In some cases there are several of an item; others, only one. Due to the lead and distribution time of this publication, some of the items may have already been sold by the time you see this ad. However, due to the number of trades we are involved in each day, some items are in stock that are not listed. **(2)** We reserve the right to sell certain power supplies and accessories only with matching transmitters or transceivers, depending on our stock situation. **(3)** Sometimes used gear is serviced **after** we receive your order. Please allow for a few days delay in shipping your order. **(4)** No trades on used gear. **(5)** Used gear policies do not apply to any New Equipment specials, Closeouts, etc.



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FM-10CS signal generator with RFM-10A, FIM-3 and ODM-1 options..... **$3495**
OAM-1 AM module FM-10C .. 195
Purchased new, and used exclusively in our service department. Good condx, operational, manual.

New Equipment Closeouts

(Most are available at the Milwaukee Store only)

AEA
KT-2 Keyer/Trainer 79.95
BT-1 Basic Trainer 49.95
Isopole 220Jr base antenna 29.95
AMPLICA
85° LNA 59
100° LNA 29
CTS
Computermate workcenter 149.95
COLLINS
AC-2808 Blower kit for 380 249.95
ENCOMM
ST-200ET 1.5w 2m FM HT 189.95
ST-400ET 1.5w 440 FM HT 269.95
With ST-200ET or 400ET purchase extra battery, soft case, speaker mic & mobile chgr only $10 extra.
HAL
CT-2100 CW/RTTY Terminal 299.95
KB-2100 keyboard 149.95
ICOM
IC-290H 25w 2m SSB/FM 569.95
IC-490A 10w 430-440 multi 499.95
IC-271A 25w 2m multi 699.95
IC-471A 25w 430-450 multi 769.95
IC-471H 75w 430-450 multi 999.95
Matching receive preamp $9.95 with 271A/471A/471H purchase
KENWOOD
TH-21AT 2m HT/TTP 199.95*
TH-41AT 440 MHz HT/TTP 199.95*
***Includes FREE Extra Battery Pack**
TU-6 tone board only $4.95 with the purchase of a TH-41AT.
TR-3600A 440 FM HT 319.95
Extra PB-26 Battery FREE with the purchase of a TR-3600A
TW-4000A 25w 2m/440 FM 499.95
TU4C programmable encoder $1.00 with the purchase of TW-4000A
1M-201B 45w 2m FM xcvr 299.95
TM-411A 25W 440 MHz xcvr 299.95
VFO-180 Remote VFO 69.95
DF-180 Digital freq. control 59.95
MIDLAND
18-950 220 5/8 trk/roof ant 14.95
REGENCY
ACT-R-92AP Aircraft scanner 49.95
TOSHIBA
V-9035 Portable Beta VCR 369.95
USI
PI-2 12" green scrn monitor 89.95
YAESU
FT-203R/TTP 2m HT 199.95
FV-107 Remote VFO 69.95
ZENITH
A-8477 TV Hi-pass filter 9.95

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w = **Wickliffe, OH** 44092; 28940 Euclid Ave	(216) 585-7388	1-800-321-3594	1-800-362-0290
f = **Orlando, FL** 32803; 621 Commonwealth Ave	(305) 894-3238	1-800-327-1917	1-800-432-9424
c = **Clearwater, FL** 34625; 1898 Drew St	(813) 461-4267		
v = **Las Vegas, NV** 89106; 1072 N. Rancho Dr	(702) 647-3114	1-800-634-6227	
e = **Chicago, IL** Erickson Communications (assocate)	(312) 631-5181		

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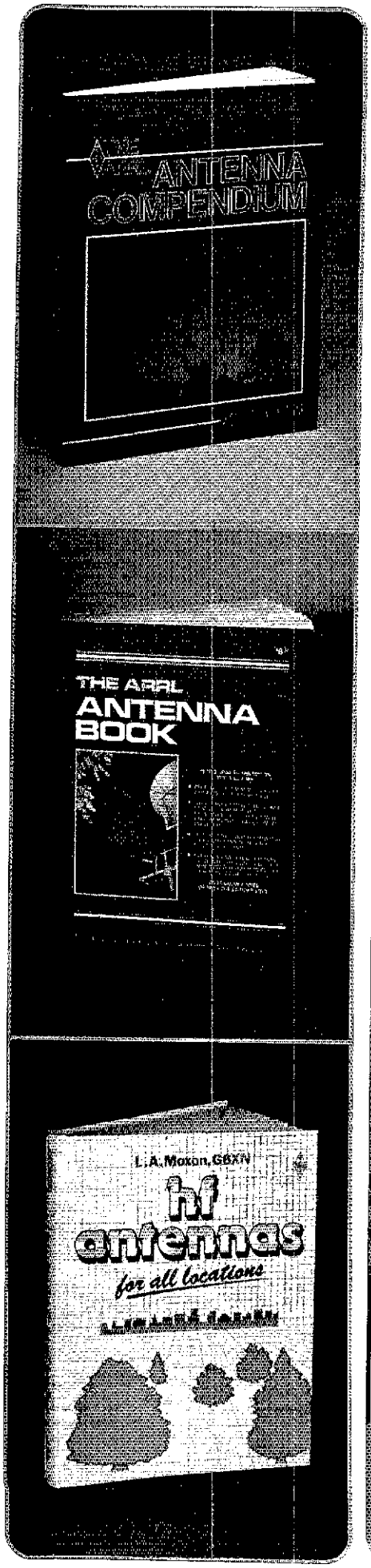

ANTENNA BOOKS !

Because of space limitations in ***QST,*** we don't have room to run all of the good antenna articles that are submitted. The solution to this problem? ***THE ARRL ANTENNA COMPENDIUM!*** You'll find 178 pages packed with new material on quads, loops, log periodic arrays, other beam antennas, multiband antennas, verticals, reduced size antennas, plus such interesting topics as: Mr. Smith's "Other" Chart and Broadband Rigs; Available Power, SWR and Loading; Baluns: What They Do and How They Do It; The Horizontal Dipole Over Lossy Ground; and Antenna Polarization. Copyright 1985. Paperbound: **$10.00** in the U.S., **$11.00** elsewhere.

THE ARRL ANTENNA BOOK The best and most highly regarded antenna information available. The 14th Edition contains 328 pages of propagation, transmission line and antenna fundamentals. You can update your present antenna system with practical construction details of antennas for all amateur bands - 160 meters through microwaves. There are also antennas described for mobile and restricted space use. Tells how to use the Smith chart for making antenna calculations and covers test equipment for antenna and transmission line measurements. Over 600,000 copies of previous editions sold. Copyright 1982. Paperbound: **$8.00** in the US., **$8.50** elsewhere.

HF ANTENNAS FOR ALL LOCATIONS by L.A. Moxon, G6XN. An RSGB publication. Contains 264 pages of practical antenna information. This book is concerned primarily with small wire arrays, although construction information is also given on a small number of aluminum antennas. Chapters include: Taking a New Look at hf Antennas; Waves and Fields; Gains and Losses; Feeding the Antenna; Close-spaced beams; Arrays, Long Wires, and Ground Reflections; Multiband Antennas, Bandwidth; Antenna Design for Reception; the Antenna and its Environment; Single-element Antennas; Horizontal Beams; Vertical Beams; Large Arrays; Invisible Antennas; Mobile and Portable Antennas; What Kind of Antenna: Making the Antenna Work; Antenna Construction and Erection. Copyright 1982, 1st Edition, Paperbound **$12.00**

Add $2.50 ($3.50 for UPS) shipping and handling charge.

THE AMERICAN RADIO RELAY LEAGUE, INC.
225 MAIN STREET
NEWINGTON, CT 06111

The New 688-page ARRL Operating Manual is HOT...

On July 8, 1986, a railroad tanker carrying toxic phosporous derailed and caught fire near Miamisburg, Ohio. The success of the Monsanto Amateur Radio Association's emergency plan in helping local authorities deal with this potential disaster is documented in November 1986 *QST*. The photograph above which was taken over the scene by Mike Carter, WD8BSI, shows what could happen in your backyard! Would you be ready for such a situation? The Emergency Communications chapter by Richard Regent, K9GDF, in the new *ARRL Operating Manual* tells how to prepare for such an eventuality. Emergency Communications and efficient message handling go hand-in-hand. Maria Evans, KT5Y, tells all about this subject and how you can become a part of the National Traffic System in the expanded Traffic Handling chapter.

Over forty percent of the radio amateurs licensed today were at one time or still are shortwave listeners. With modern transceivers, it's possible to hear what is going on outside our ham-bands. David Newkirk, AR7M, adds his enthusiasm for this closely related hobby in the SWL chapter. On a related subject, Paul Rinaldo, W4RI, tells us about the characteristics of the Amateur Radio Spectrum and how our bands are assigned.

Most hams are interested in just getting on the air and talking to someone. Even so, ham radio is a lot more than talking into a microphone or pounding a telegraph key. Carol Smith, AJ2I, and Bill Jennings, K1WJ, have prepared a chapter on Basic Operating. It is just what the newcomer needs in order to get started, and it's good review for some of us who have been away from ham radio for a while. Almost everyone can qualify for the Rag Chewer's Club Certificate, but do you realize that there are hundreds of Amateur Radio awards from throughout the world? Well you can see dozens of these awards in *full color* along with their requirements in the Awards chapter by Bob Halprin, K1XA.

Clarke Greene, K1JX, tells all about competitive operating. Clarke has won almost every major contest, HF, VHF/UHF, from home and away, using full power and QRP. Now he tells how it's done!

Almost everyone seems to be interested in digital communications these days. Stan Horzepa, WA1LOU, covers Packet Radio in detail; while Larry Wolfgang, WA3VIL, covers RTTY and other digital modes in a separate chapter. If you find SSTV or ATV of interest, Bruce Brown, WA9GVK, has put together a fantastic chapter on Image Communications.

If you still need to work the countries represented by the QSLs below, you're not alone; but you can pickup some good tips on working DX from well-known DXer and author Bob Locher, W9KNI. DX-peditioner Carl Henson, WB4ZNH, gives advice on how to operate from the "rare ones" without catching malaria or worse! You can find out when to work DX at anytime during the sunspot cycle by referring to the propagation tables which were newly incorporated in this edition. You'll also find sunrise-sunset tables for working DXCC countries around the world, and there is a great chapter on Antenna Orientation by *ARRL Antenna Book* editor Jerry Hall, K1TD.

Besides "packet," WA1LOU tells what is new in the area of FM and Repeater operation. This chapter is "must" reading for Novices who want to use repeaters for the first time or for those who want to upgrade their existing repeater operations. There is a lot doing these days on weak signal VHF/UHF work and Mike Owen, W9IP, shows how it's done from moonbounce to meteor scatter. Will you be ready for the OSCAR launch that may take place later this year? Dick Jansson, WD4FAB, captures us with his satellite operating techniques.

You'll also find numerous handy tables and charts in the third edition of *The ARRL Operating Manual*. It is edited by Robert J. Halprin, K1XA, Deputy Manager of Membership Communications at ARRL HQ. The new edition is available at your dealer or from ARRL for $15. (Please add $2.50, $3.50 for UPS for shipping and handling.)

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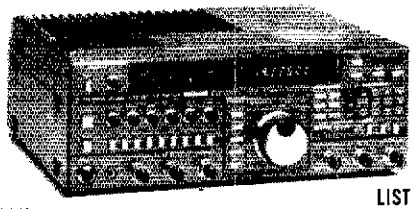
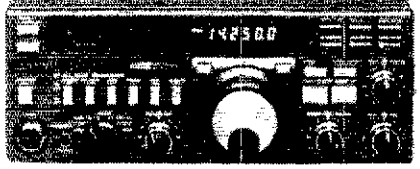


	LIST
FT-767GX* 160-10m xcvr/.1-29.99 MHz Rcvr	$1895.00
2M/767* 2m module	179.95

***Call for Special Deal!**

6M/767 6m module	179.95
430/767 430-440 module	219.95
440/767 440-450 module	219.95
FT-ONE Xcvr/Rcvr/4 filters/RAM/FM	2859.00
KY-ONE Keyer unit	50.00
DC-ONE DC cable	15.00

FT-980 9-band CAT Xcvr/SW Rcvr	$1795.00
SP-980 Speaker with audio filter	99.95
SP-980P Speaker/patch	99.95
FC-757AT Automatic ant. tuner w/memory	359.00
FAS-1-4R Remote antenna selector	79.95
E-980 Interface cable; FT-980/757AT	46.50
XF-8.9HC 600 Hz CW filter (1st IF)	50.00
XF455.8MCN 300 Hz CW filter (2nd IF)	59.95
KY-ONE Keyer unit	50.00
FIF-65 Computer interface; Apple IIe	69.95
FIF-80 Interface; NEC PC-8001	119.95
FIF-232C for VIC-20/TI/most RS-232	79.95
FRB-1 External relay box	20.00
GC-980 General coverage kit	14.95

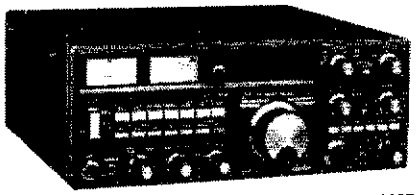


FT-757GX 9-band Xcvr/SW Rcvr/mic	$995.00
FT-757GX MkII 9-band Xcvr/SW Rcvr/mic	1079.95
FP-757HD Heavy duty supply with fan	249.00
FP-757GX Compact power supply	235.00
FP-700 Power supply	209.95
FRB-757 External relay box	10.00
FC-757AT Automatic ant. tuner w/memory	359.00
FAS-1-4R Remote antenna selector	79.95
MMB-20 Mobile mount	25.95
FIF-65A Interface; Apple IIe	59.95
FIF-232C for VIC-20/TI/most RS-232	79.95
GX Turbo/F01 Software; Apple II	59.95
GX Turbo/C01 Software; C64/128	89.95
GX Turbo/V01 Software; VIC-20	89.95
FTV-700 Transverter w/no module	175.00
2M/FTV 2m module only	189.00
6M/FTV 6m module only	139.00
70 cm/FTV 430 module only	255.00

Misc. accessories	LIST
SP-102 Speaker with audio filter	$ 99.95
SP-102P Speaker/patch	99.95
MD-1B8 Desk microphone	99.95
MH-1B8 Mobile microphone	24.95
YS-60 1.8-60 MHz 2kw PEP wattmeter	$ 84.95
YS-500 140-520 MHz 200w wattmeter	69.95
YH-55 Lo-Z headphones	21.95
YH-77 Lightweight headphones	21.95
FF-501DX Low pass filter	34.95

Call TOLL FREE for DISCOUNT PRICES

All items are shown with the Manufacturer's Suggested LIST Prices. On Major items and some accessories, we can offer a Substantial Savings.



VHF/UHF equipment	LIST
FT-726R VHF/UHF Xcvr w/2m, 1TP mic	$1095.00
HF/726 10-12-15m unit	289.95
6M/726 6m unit	269.95
430/726 430-440 MHz unit (OSCAR)	329.95
440/726 440-450 MHz unit (FM band)	329.95
SU-726 Satellite duplex module	129.95
XF-455MC 600 Hz CW filter	69.95
DC-726 DC cable for FT-726R	10.05
FTE-36 Tone board for FT-726R	58.00
AD-2 50w 2m/440 duplexer	34.95
FT-290R MKII 25w 2m FM/SSB xcvr	579.95
FT-690R MKII 10w 6m FM/SSB xcvr	569.95
FBA-8 Holder for C-cell Nicads	26.95
NC-26B Wall Charger for FBA-8	16.95
CSC-19 Soft case	10.00
MH-10F Speaker/Microphone	27.95
MH-10E Hand Microphone	21.95
FTS-7 Encoder/decoder	49.95
FT-270RH 45w 2m FM Xcvr w/1TP mic	439.95
FT-2700RH 25w 2m/440 FM w/1TP mic	599.95
FTS-8 Encoder/decoder	49.95
FVS-1 Voice synthesizer	31.95
AD-2 50w 2m/440 duplexer	34.95
FT-770RH 25w 440 FM xcvr w/1TP mic	479.95

FTS-8 Encoder/decoder • **FREE** with the purchase of a **FT-270RH** or **FT-770RH**

HOURS • Mon. thru Fri. 9-5:30; Sat. 9-3

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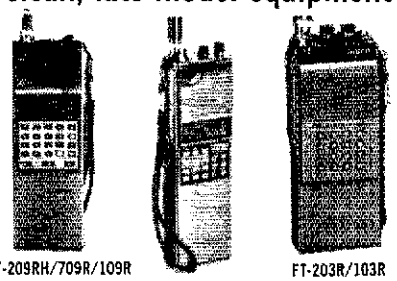
WATS lines are for Quotes & Ordering only, use Regular line for info & service department.



FT-209RH/709R/109R FT-727R FT-203R/103R

Handhelds	LIST
FT-209RH 5w 2m FM HT/1TP/batt/cgr	$359.95
FT-109RH 220 FM HT/1TP/batt/cgr	379.95
FT-709R 4w 440 FM HT/1TP/batt/cgr	359.95
FT-727R 5w 2m/440 HT/1TP **New CPU!**	499.95
FT-23R 2.5w 2m compact HT	269.95
FT-23R/TTP 2.5w 2m compact HT w/1TP	299.95
FT-73R 2w 440 compact HT	279.95
FT-73R/TTP 2w 440 compact HT w/1TP	314.95

2.5W FM Handheld Closeout

FT-203R/1TP 2m w/batt/cgr/1TP ... $199.95

Acc. for 09-series/03-series/FT-727R	LIST
FBA-5 Alkaline battery holder	14.95
FNB-3 425ma 10.8v batt (comes w/03 series)	49.95
FNB-4 500ma 12v batt (comes w/09-series)	59.95
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FRG-9600 FRG-8800

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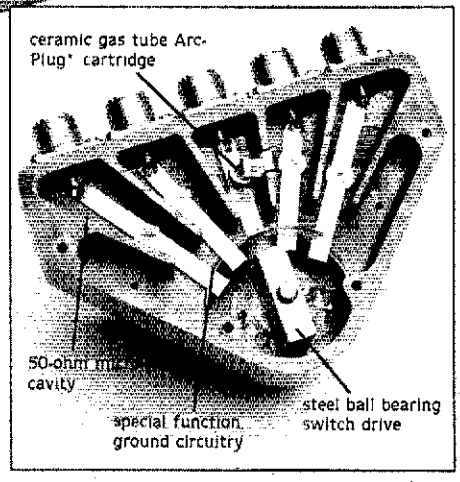

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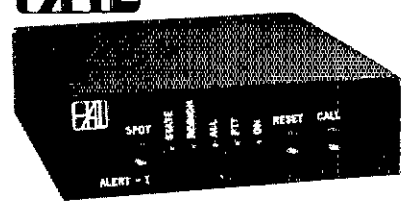

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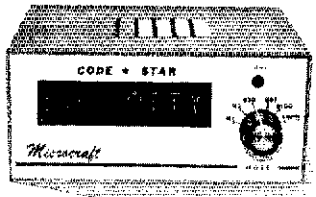

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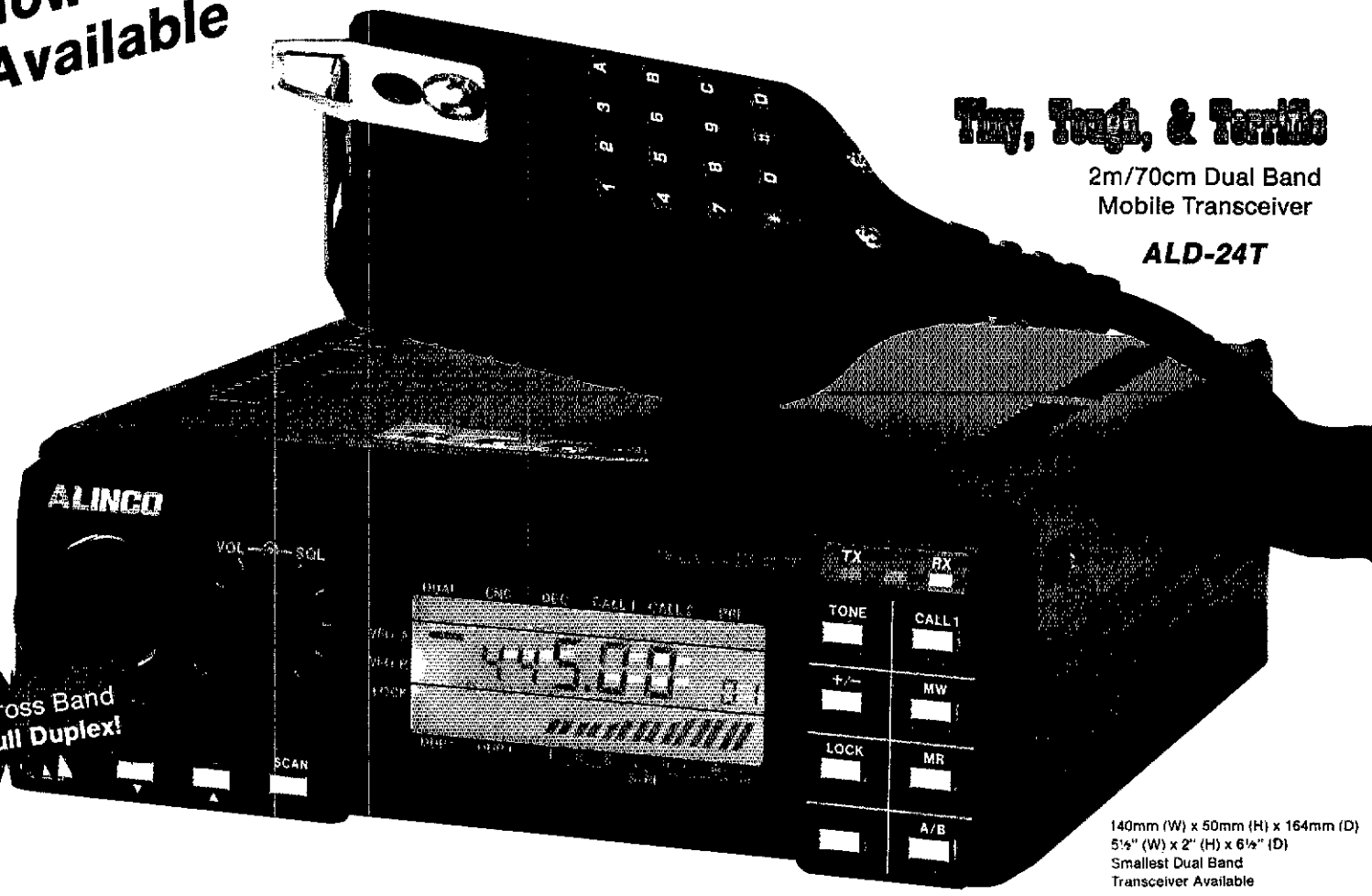

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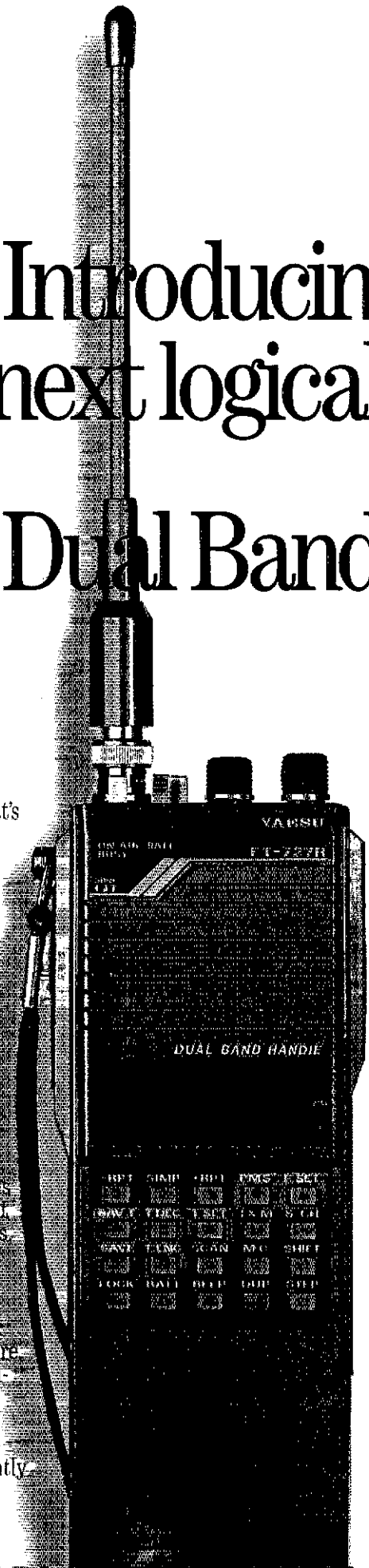

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IMRA - International Mission Radio Association helps missionaries by supplying equipment and running a net for them daily except Sunday, 14.280 MHz, 1:00-3:00 PM Eastern Time. Rev. Thomas Sable, S.J., University of Scranton, Scranton, PA 18510

THE Veteran Wireless Operators Association, a non-profit organization of communications people founded in 1925, invites your inquiries and application for membership. Write VWOA, Ed F. Pleuler, Jr., Secretary, 46 Murdock Street, Fords, NJ 08863.

HAVE A-M capability? Join S.P.A.M. (Society for Promotion A-M) Membership is free. Write: F.A. Dunlap (S.P.A.M.), 14113 Stoneshire, Houston, TX 77060 (S.A.S.E. please).

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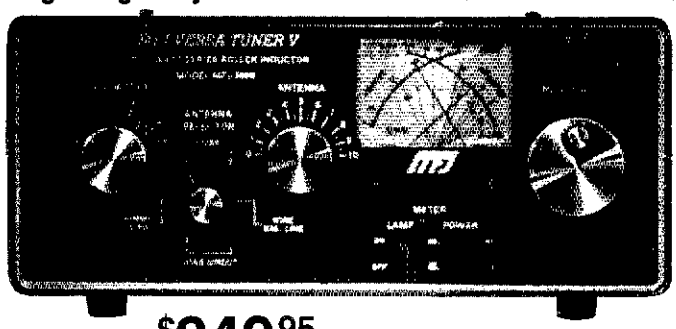

Meet "Versa Tuner V". It has all the features you asked for, including the new smaller size to match new smaller rigs-only 10¾"Wx4½"Hx14 7/8"D.

Matches coax, balanced lines, random wires—1.8 to 30 MHz. 3 KW PEP—the power rating you won't outgrow (250pf-6KV caps).

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MFJ989B **$349.95**

Lighted Cross-needle Meter reads SWR, forward and reflected power all in one glance. Has 300 and 3,000 watt ranges. Meter light requires 12 VDC.

6 position antenna switch (2 coax lines, through tuner or direct, random/balanced line or dummy load). SO-239 connectors, ceramic feed-throughs, binding post grounds.

Deluxe aluminum low-profile cabinet with sub-chassis for RFI protection, black finish, black front panel with raised letters, tilt bail.

MFJ's Fastest Selling TUNER

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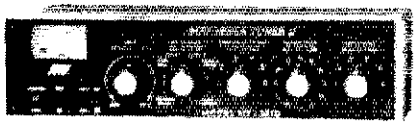


MFJ's fastest selling tuner packs in plenty of new features. New styling! Brushed aluminum front. All metal cabinet. **New SWR/Wattmeter!** More accurate. Switch selectable 300/30 watt ranges. Read forward/reflected power.

New antenna switch! Front panel mounted. Select 2 coax lines, direct or through tuner, random wire/balanced line or tuner bypass for dummy load.

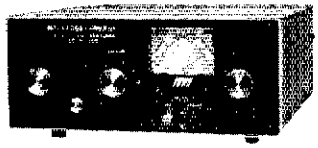
New airwound inductor! Larger more efficient 12 position airwound inductor gives lower losses and more watts out. Run up to 300 RF power output.

Matches everything from 1.8 to 30 MHz! dipoles, inverted vee, random wires, verticals, mobile whips, beams, balanced and coax lines.

Built-in 4:1 balun for balanced lines. 1000 V capacitor spacing. Black. 11 x 3 x 7 inches. Works with all solid state or tube rigs. Easy to use anywhere.

MFJ's 1.5 KW VERSA TUNER III

MFJ-962B **$229.95**



Run up to 1.5 kw PEP and match any feedline continuously from 1.8 to 30 MHz: coax, balanced line or random wire.

Lighted Cross-needle Meter reads SWR, forward and reflected power in one glance. Has 300 and 3,000 watt ranges. 6 position antenna switch handles 2 coax lines, wire and balanced lines. 4:1 balun. 250 pf, 6 kv variable capacitors. 12 position ceramic inductor switch. New smaller size matches new rigs: 10¾ × 4½ × 14⅞ inches. Flip stand for easy viewing. Requires 12V for light.

MFJ's Best VERSA TUNER

MFJ-949C **$149.95**

MFJ's best 300 watt tuner is now even better! The MFJ-949C all-in-one Deluxe Versa Tuner II gives you a tuner, cross-needle SWR/Wattmeter, dummy load, antenna switch and balun in a new compact cabinet. You get quality conveniences and a clutter-free shack at a super price.

A new cross-needle SWR/Wattmeter gives you SWR, forward and reflected power—all at a single glance. SWR is automatically computed with no controls to set. Has 30 and 300 watt scale on easy-to-read 2 color lighted meter (needs 12 V).

A handsome new black brushed aluminum cabinet matches all the new rigs. Its compact size (10 x 3 x 7 inches) takes only a little room.

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A 300 watt 50 ohm dummy load gives you quick tune ups and a versatile six position antenna switch lets you select 2 coax lines (direct or thru tuner), random wire or balanced line and dummy load.

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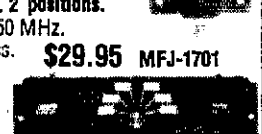
MFJ-1702 **$19.95**

MFJ-1702. $19.95. 2 positions. 60 dB isolation at 450 MHz. Less than .2 dB loss. SWR below 1:1.2.

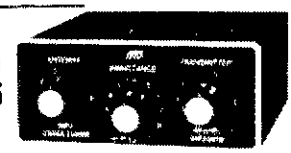
$29.95 MFJ-1701

MFJ-1701, $29.95. 6 positions. White markable surface for antenna positions.



MFJ's Smallest VERSA TUNER

MFJ-901B **$59.95**



MFJ's smallest 200 watt Versa Tuner matches coax, random wires and balanced lines continuously from 1.8 thru 30 MHz. Works with all solid state and tube rigs. Very popular for use between transceiver and final amplifier for proper matching. Efficient airwound inductor gives more watts out. 4:1 balun for balanced lines. 5 x 2 x 6 inches. Rugged black all aluminum cabinet.

MFJ's Random Wire TUNER

MFJ-1601B **$39.95**

MFJ's ultra compact 200 watt random wire tuner lets you operate all bands anywhere with any transceiver using a random wire. Great for apartment, motel, camping operation. Tunes 1.8-30 MHz. 2 x 3 x 4 inches.

MFJ's Mobile TUNER

MFJ-945C **$79.95**

Designed for mobile operation! Small, compact. Takes just a tiny bit of room in your car. SWR/dual range wattmeter makes tuning fast and easy. Careful placement of controls and meter makes antenna tuning safer while in motion.

Extends your antenna bandwidth so you can operate anywhere in a band with low SWR. **No need to go outside and readjust your mobile whip.** Low SWR also gives you maximum power out of your solid state rig—runs cooler for longer life.

Handles up to 300 watts PEP RF output. Has efficient airwound inductor, 1000 volt capacitor spacing and rugged aluminum cabinet. 8x2x6 inches. Mobile mounting bracket available for $5.00.

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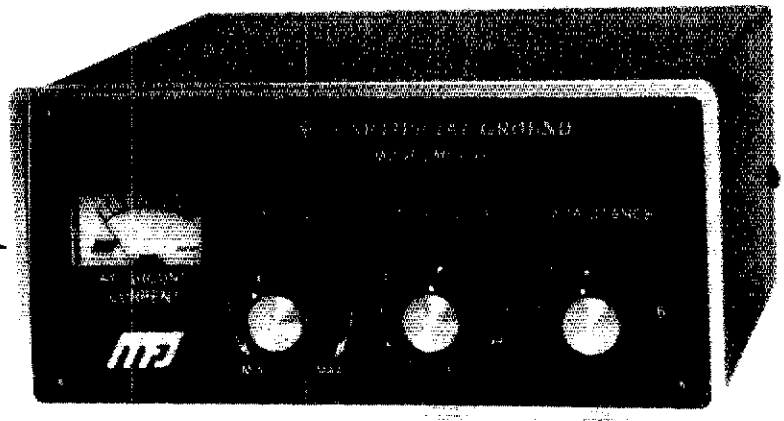
MFJ-931 creates artificial RF ground with random wire *also*, electrically places far away ground *directly* at your rig



MFJ-931
$79.95

- **Creates artificial RF ground with random length wire**
- **Electrically places a far away ground directly at your rig**
- **RF ammeter makes tuning for maximum RF ground current easy**
- **Eliminates "RF bites", RF feedback, TVI/RFI and other problems due to inadequate RF ground**
- **Improves radiation pattern distorted by poor RF ground**

Don't we all sometimes have problems getting a good RF ground?

Unpleasant problems. Problems like RF "hot spots" that "bite" our lips or fingers when we transmit; like RF feedback that causes our rigs to quit working on certain bands; like excessive RF coupling to AC lines that causes everything to quit working; like our neighbors screaming about TVI and RFI; like our computers computing jiberish; or like being unable to talk across town because of extreme ground losses or radiation pattern distortion.

"Hey, my rig is on the second floor. There's no way I can get a good ground," you're thinking, or "I already have an excellent ground but the long ground connection wire causes reactance and acts like a high impedance circuit, isolating my rig from true RF ground."

What to do

Use the new MFJ-931 to create an artificial RF ground! It resonates a random length of wire thrown along the floor and produces a tuned counterpoise. This artificial ground effectively places your rig near actual earth ground potential even if your rig is on the second floor or higher with no earth ground possible.

Also, the MFJ-931 electrically places a far away RF ground directly at your rig -- no matter how far away it is. The MFJ-931 reduces the electrical length of the ground connection wire to virtually zero by tuning out its reactance.

How it works

The MFJ-931 connects between the ground connection of your transmitter or antenna tuner and a random length of wire thrown along the floor. Two knobs are adjusted for maximum RF ground current using its built-in RF ammeter. This resonates the random wire, converts it into a tuned counterpoise and presents an effective low impedance near ground potential to your rig, thus creating an artificial RF ground.

To electrically place a far away ground directly at your radio equipment simply connect the MFJ-931 between your rig and the connecting ground wire and adjust its two knobs for maximum RF current using its RF ammeter. This tunes out the reactance of the connecting wire, reduces the electrical ground lead length to virtually zero and electrically places your far away ground directly at your rig.

Get an effective RF ground

Get an effective RF ground. Eliminate "RF bites". RF feedback TVI, RFI and many other annoying problems due to inadequate RF ground, *and* -- at the same time --improve your radiation and radiation pattern for more DX.

The MFJ-931 covers 1.8 to 30 MHz and has a built-in RF ammeter for indicating RF ground current. It's ruggedly built in an all aluminum cabinet with a brushed aluminum front panel and measures 7½x3½x7 inches. It comes with a one year unconditional guarantee.

It's available only from MFJ. MFJ-931, $79.95.

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THANK YOU for attending the Butler, PA Hamfest Sept. 13, 1987. K3HJH 412-283-9403.

SEE ASTRONAUT Tony England, WØORE; Mike Stone, WB8QCD, Spec Comm Magazines; and Jim Grubbs, an authority on Packet Radio at the Peoria Area Amateur Radio Club's Superfest '87, September 19-20 at Exposition Gardens, Peoria, IL. Admission is only $4. There'll be commercial exhibits; speeches by England, Stone and Grubbs; license exams; a flea market; and food and drink. Free bus transportation to the Northwoods Mall. Saturday night banquet at Wildlife Prairie Park. Reservations *are necessary.* Full camping facilities available at Expo. Gate opens at 6AM; commercial buildings at 9AM. Talk-in on 146.16/146.76, call WØUVI. For more information, write: Superfest '87, PAARC, P.O. Box 3461, Peoria, IL, 61614, or call 309-674-5656.

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MICROPHONES AND related memorabilia used in radio/TV broadcasting prior to 1960 wanted. Cash paid: trade terms available. Write: James Steele, 160 West 77th Street, New York, NY 10024-6942.

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WANTED: HAMMARLUND HX-50A transmitter. Phil, KG6KB, 120 Cedar Lane, Santa Barbara, CA 93108. 805-962-8957.

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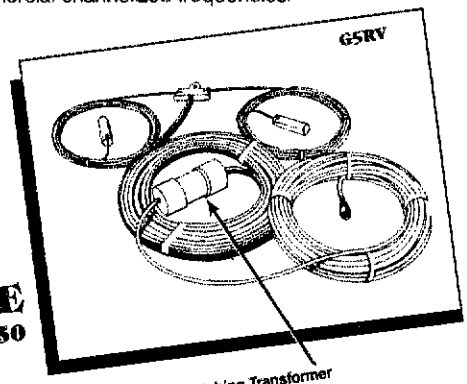

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SPECIFICATIONS LK-500ZC
Frequency Range: 160 Meters 1.8-2.2 MHz, 80 meters 3.5-4.5 MHz, 40 meters 7.0-7.5 MHz, 30 meters 10.1 to 10.15 MHz, 20 meters 14.0-14.9 MHz, 17 meters 18.0-19.2 MHz, 15 meters 21.0-21.5 MHz, Export models: 12 meters 24.8-24.9 MHz, 10 meters 28.0-29.7 MHz.
Drive Power: 100W Nominal for 1500 Watt SSB PEP output, 125W Nominal for 1500 Watt CW output.
RF Output SSB 1.5 KW PEP continuous, CW 1.2 KW Average continuous, RTTY, SSTV 1 KW Average 1.5 KW PEP.
Plate Voltage: RTTY/AM/SSTV/CW/SSB 3.2 KV DC
Harmonic Suppression: -50 dB minimum.
Intermodulation Distortion Products: -33 dB down minimum.
Circuit Type: Class AB_2 grounded grid. Type of Emission: SSB, CW, RTTY, AM, SSTV
Duty Cycle: Amateur continuous duty in all modes at specified output.
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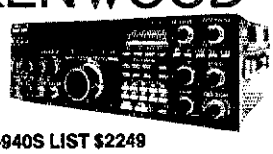

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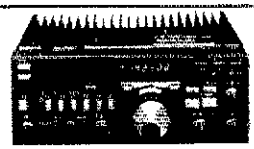

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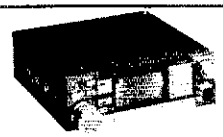

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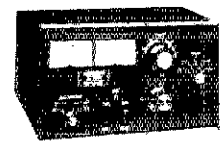

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The Satellite Experimenter's Handbook by Martin Davidoff, K2UBC. 208 pages, copyright 1985.

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Solid State Design for the Radio Amateur. First published in 1977; just reprinted by popular demand

#0402 ..... $12

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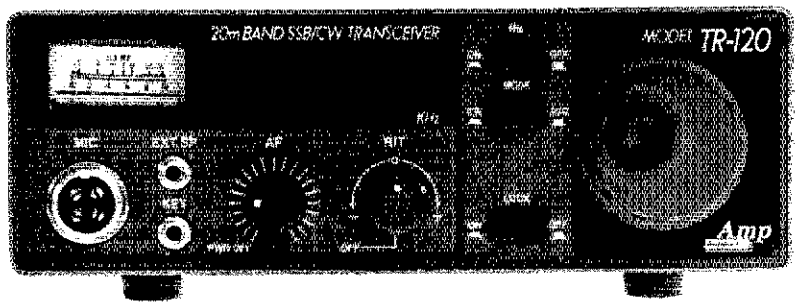

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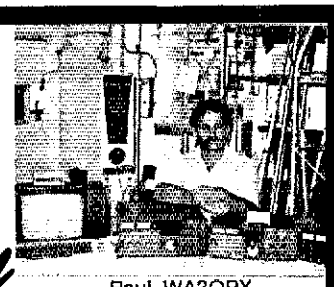

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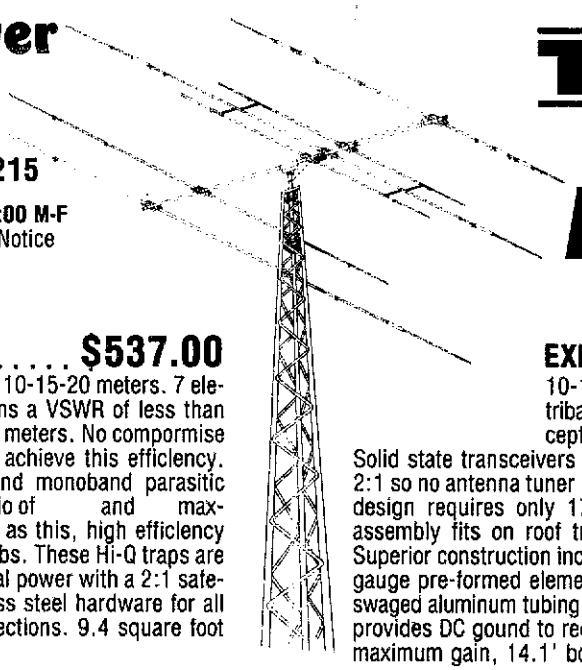

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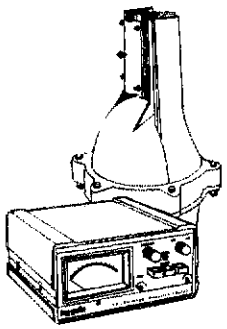
TH7DXS **$537.00**
7 element, broadband, triband beam, 10-15-20 meters. 7 element system on a 24' boom maintains a VSWR of less than 2:1 on all bands, including ALL of ten meters. No compormise on gain performance was needed to achieve this efficlency. A unique combination of trapped and monoband parasitic elements produces a front-to back ratio of and maximum gain. In a parasitic array such as this, high efficlency traps are used rather than parallel stubs. These Hi-Q traps are capable of handling the maximum legal power with a 2:1 safety margin. The TH7DXS uses stainless steel hardware for all electrical and most mechanical connections. 9.4 square foot surface area.

EXP14 ..... **$365.00**
10-15-20 Meter broadband 4 band tribander beam. A unique para-sleeve concept optimizes edge-to-edge bandwidth. Solid state transceivers load to full output with VSWR below 2:1 so no antenna tuner is needed. The revolutionary compact design requires only 17'3" turning radius and the entire assembly fits on roof tripod, mast or medium duty tower. Superior construction includes stainless steel hardware, heavy gauge pre-formed element and mast brackets and thick wall swaged aluminum tubing. A BN86 is included and a Beta Match provides DC gound to reduce lightning hazard and static. maximum gain, 14.1' boom length, 7.5 sq. ft. surface area.

TH3JRS **$221.00**
3-element 10-15-20 meter triband beam. Hy-gain's Tunderbird Junior offers top performance with a compact design that makes it ideal where space is a limiting factor. Featuring seperate and matched air dielectric Hy-Q traps for each band, it feeds with 52 ohms coax, delivers maximum F/B ratio without compromise. Has a VSWR of less than 1.5:1 at resonance on all bands. All hardware and clamps are stainless steel. Maxlmum power, 300 watts CW and 600 watts PEP output. maximum gain, 12' foot boom diameter, 3.4 surface area.

V2S **$51.00**
VHF Vertical, 138-175 MHz. A 2-meter vertical, gain derived from the famous extended double zepp antenna design. The radiating elements are two collinear 5/8 waves fed in phase. Two sets of ¼ wave radials properly decouple the lower radiator from the mast. 9.3' longest element, .67 square foot surface area.

204BAS **$300.00**
HF Monobanders famous Long John. 20 meter, four elements on a 26' boom. Feeds with 52 ohm coax and is Beta Matched for gain. The 204BAS has tiltable cast aluminum boom-to-mast clamp, heavy gauge machined-formed element-to-boom brackets and stainless steel hardware and clamps. 7.3 sq ft surface area.



T2X **$309.00**
Capable of handling antennas with 20 sq ft wind loads. Electric locking wedge braking, North of South center scale, illuminated directional indicator. Mounting hardware: clamp plate, stainless U-bolts, requires 8 cond. cable.

HAM IV **$259.00**
15 sq ft wind load area, electric locking wedge brake, North or South center scale, illuminated directional indicator. Mounting hardware: clamp plate, stainless U-bolts, requires 8 conductor cable.

18AVT/WBS **$123.00**
HF multiband vertical for 80-10 meters. Five band capability with automatic band switching is accomplished through the use of three improved Hy-Q traps featuring large diameter coils for a more favorable L/C ratio. 2:1 or lower SWR at band edges on 40-10 meters. Approx. 40 kHz band width below 2:1 VSWR on 80 meters. Includes all stainless steel hardware and SO239 connector. 25 foot overall length.

CD45 II **$182.00**
8.5 sq ft wind load. North or South center scale, illuminated directional indicator, disk brake. Mounting hardware: plated mast clamps, stainless steel U-bolts, requires 8 conductor cable.

AR40 ..... **$130.00**
For large FM-TV and compact antenna arrays up to 3 sq ft wind load. Automatic positions sensor, fully automatic control. Disc brake, mounting hardware: plated mast clamps, stainless U-bolts, requires 5 conductor cable. (Control box not pictured)

HF TRIBAND ANTENNAS

TH5MK2S	Thunderbird, 5 elements	**$461.00**
TH2MKS	Thunderbird, 2 element	**$202.00**
TH6DXX	Conversion kit to TH7DXS	**$180.00**
QK710	30/40 M Conv. EXP14	**$91.00**

HF MONOBAND ANTENNAS

105BAS	Long John, 5 element 10 meter	**$156.00**
155BAS	Long John 5 element 15 meter	**$240.00**
205BAS	Long John 5 element 20 meter	**$408.00**
7-1S	Discoverer dipole 30/40 meter	**$129.00**
7-2S	Discoverer 2 element 40 meter	**$379.00**
7-3S	Director Kit, converts 7-2S to a 3 element beam	**$238.00**
BN86	ferrite balun for 10-80 meters	**$23.00**

HF MULTIBAND VERTICALS

18HTS	Hy-Tower 10-80 meters	**$502.00**
14RMQ	roof mt kit for 12AVQ, 14AVQ & 18AVT/WB	**$42.00**
18VS	Base loaded 10-80 meters	**$35.00**
12AVQS	Trap vertical 10-20 meters	**$56.00**
14AVQ/WBS	Trap vertical 10-40 meters	**$76.00**

HF MULTIBAND DOUBLETS

18TD	Portable tape dipole 10-80 mtr.	**$139.00**
2BDQ	Trap doublet 40-80 meters	**$71.00**
5BDQS	Trap doublet 10-80 meters	**$149.00**

VHF OSCAR LINK ANTENNAS

218S	Complete Oscar Link system	**$231.00**
215S	70cm, 435 MHz antenna	**$89.00**

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23BS	2 meter 3 element beam	**$24.50**
25BS	2 meter 5 element beam	**$29.50**
28BS	2 meter 8 element beam	**$42.00**
214BS	2 meter 14 element beam	**$50.00**
64BS	6 meter 4 element beam	**$76.00**
V-3S	Colinear gain vertical 220MHz	**$51.00**
V-4S	Colinear gain vertical 430-470MHz	**$61.00**
GPG2A	Base, 2 mtr ground plane	**$28.00**

VHF & UHF MOBILES

HR-144-GRI	fiberglass 2 mtr,	**$72.00**
HB-144-GRI	HyBander 2 mtr,	**$59.00**
HB-144-MAG	HyBander, 2 meter	**$22.50**

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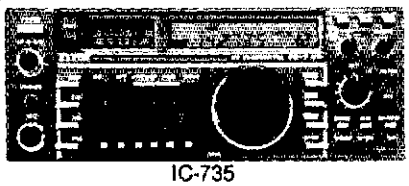

IC-735

HF Equipment	List	Juns
IC-761 New Top Of Line	$2499	Call $
IC-735 Gen. Cvg Xcvr	999.00	Call $
IC-745 Gen. Cvg Xcvr	1049.00	Call $
IC-751A Gen. Cvg. Xcvr	1649.00	Call $
Receivers		
IC-R7000 25-1300 + MHz Rcvr	1099.00	Call $
IC-R71A 100 kHz-30 MHz Rcvr	949.00	Call $
VHF		
IC-275A All Mode Base w/PS	1199.00	Call $
IC-275H All Mode Base 100w	TBA	Call $
IC-271A All Mode Base 25w	859.00	Call $
IC-27A FM Mobile 25w	429.00	Call $
IC-27H FM Mobile 45w	459.00	Call $
IC-28A FM Mobile 25w	429.00	Call $
IC-28H FM Mobile 45w	459.00	Call $
IC-38A FM Mobile 25w	459.00	Call $
IC-2AT FM HT	299.00	Call $
IC-02AT FM HT	399.00	Call $
IC-μ2AT Micro HT	329.00	Call $
UHF		
IC-475A All Mode 25w	TBA	Call $
IC-471A All Mode Base 25w	979.00	Call $
IC-47A FM Mobile 25w	549.00	Call $
IC-48A FM Mobile 25w	459.00	Call $
IC-4AT FM HT	339.00	Call $
IC-04AT FM HT	449.00	Call $
IC-μ4AT 440 FM HT	TBA	Call $
IC-3200A FM 2m/70cm 25w	599.00	Call $
220 MHZ		
IC-375A All-Mode, 25w, Base Sta.	TBA	Call $
IC-38A 25w FM Xcvr	459.00	Call $
IC-37A FM Mobile 25w	499.00	Call $
IC-3AT FM HT	339.00	Call $
IC-03AT Deluxe HT	449.00	Call $
1.2 GHz		
IC-1271A All Mode 10w	1229.00	Call $
IC-120 1w, FM, Xcvr	579.00	Call $
IC-12AT Deluxe 1w HT	459.00	Call $

TS-440S/AT

HF Equipment	List	Juns
TS-940S/AT Gen. Cvg Xcvr	$2249.95	Call $
TS-940S Gen. Cvg Xcvr	2049.95	Call $
TS-930S/AT Gen. Cvg Xcvr	1849.95	Call $
TS-830S Xcvr	1099.95	Call $
TS-430S Gen. Cvg Xcvr	859.95	Call $
TS-440S/AT Gen. Cvg Xcvr	1199.95	Call $
TS-440S Gen. Cvg Xcvr	999.95	Call $
TL-922A HF Amp	1499.95	Call $
Receivers		
R-5000 100 kHz-30 MHz	899.95	Call $
R-2000 150 kHz-30 MHz	649.95	Call $
VHF		
TS-711A All Mode Base 25w	899.95	Call $
TR-751A All Mode Mobile 25w	599.95	Call $
TM-221A Compact FM 45w	399.95	Call $
TM-2530A FM Mobile 25w	429.95	Call $
TM-2550A FM Mobile 45w	469.95	Call $
TM-2570A FM Mobile 70w	559.95	Call $
TH21-BT FM, HT	259.95	Call $
TH-205 AT, NEW 2m HT	259.95	Call $
TH-215A, 2m HT Has It All	349.95	Call $
UHF		
TS-811A All Mode Base 25w	1049.95	Call $
TR-851A 25w SSB/FM	699.95	Call $
TR-9500 10w All Mode	649.95	Call $
TM-421A Compact FM 35w	419.95	Call $
TM-411A FM Mobile 25w	449.95	Call $
TH-415A 2.5w 440 HT	359.95	Call $
TH-41BT FM, HT	269.95	Call $
TW-4100A, 2m/70cm FM	649.00	Call $
TR-50 1w 1.2GHz FM	549.95	Call $
220 MHZ		
TM-3530A FM 220 MHz 25w	449.95	Call $
TH-31BT FM, 220 MHz HT	269.95	Call $

FT 757GX

HF Equipment	List	Juns
FT-ONE Gen. Cvg Xcvr	$2859.00	Call $
FT-980 9 Band Xcvr	1795.00	Call $
FT-757 GX II Gen. Cvg. Xcvr	1079.95	Call $
FT-767 4 Band New	1895.00	Call $
Receivers		
FRG-8800 150 kHz - 30 MHz	599.95	Call $
FRG-9600 60-905 MHz	679.95	Call $
VHF		
FT-211RH FM Mobile 45w	459.95	Call $
FT-270RH FM Mobile 45w	439.95	Call $
FT-290R All Mode Portable	579.95	Call $
FT-23 R/TT Mini HT	299.95	Call $
FT-209RH FM Handheld 5w	359.95	Call $
UHF		
FT-711RH FM Mobile 35w	TBA	Call $
FT-730R 10w 440 FM	399.95	Call $
FT-770RH FM Mobile 25w	479.95	Call $
FT-73 R/TT Mini HT	314.95	Call $
FT-703R/TTP 440 HT	299.95	Call $
FT-709RH FM HT 4w	359.95	Call $
VHF/UHF Full Duplex		
FT-726R All Mode Xcvr	1095.95	Call $
HF/726 Module for 10,12,15M	289.95	Call $
430/726 430-440 MHz	329.95	Call $
440/726 440-450 MHz	329.95	Call $
SU-726 Sate Duplex	129.95	Call $
FT-690R MKII, 6m, All Mode, port.	569.95	Call $
Dual Bander		
FT-2700RH FM 2m/70 cm 25w	599.95	Call $
FT-727R 2m/70 cm HT	479.95	Call $
220 MHZ		
FT-109 RH New HT	379.95	Call $
Repeaters		
FTR-2410 2m Repeaters	1249.95	Call $
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ATV APPLICATIONS: See the shack, home video tapes, computer video, Space Shuttle, weather radar and other public service events. Many areas have ATV Repeaters; see ARRL Repeater Directory & 1986 Handbook chapters 20 and 7.

CALL (818) 447-4565 or write for our catalog. Give your amateur call if also interested in our transmitting equipment. We have all your ATV needs: antennas, coax, downconverters, transmitters, etc., 70, 33, & 23 CM.

*Includes UPS surface shipping in cont. USA

WANTED: COLLINS KWM-2, KWM-2A. Must be mint, no modifications. Also MP-1 Supply, PM-2, 351D-2 Mount, CP-1, 180S-1 Tuner, CC-2 Case, 312B-5 Control, 62S-1. Write: Robert Bunar, 26 Sheridan Street, Brockton, MA 02402.

WANTED: IC-451A (430-440 MHz) in top condition. David Meacham, W6EMD, 206 Frances Lane, Redwood City, CA 94062, 415-369-2633 home, 415-592-1221 work.

HAM LICENSES SUPEREASY. Cut exam preps 50%. All classes. Free catalog. SASE. Bahr, 2549-G5 Temple, Palmbay, FL 32905.

DEAD BATTERY PACK ??? Ni-Cad cells / inserts / packs. AA/AAA $1.50 (W/tabs $1.65). 1/2AA 1.2V/250mAH $1.85. 2/3AF 1.2V/450mAH $2.40, many others. ICOM BP3 insert $14.95. Yaesu FNB-2 clone $22.95. OR: Mail your pack to us for a Rebuild-Quote. If you don't accept-we return, no charge! In PA add 6% Add $2 S&H/order. Cunard Associates, R.D. 6 Box 104, Bedford, PA 15522.

WANTED: HEATH SA5010 Keyer, Pete Hughes, Rt. 1, Box 110A, Pampa, TX 79065.

CRYSTALS-BUILD SOMETHING: Homebrew, it's satisfying fun. Low power 160M AM phone, 30M QRP, it's easier with crystals. Do it. Inexpensive FT-243's made to order. All bands, FT-243's 160 - 2M. FT-243 General, Novice 4001 - 8700 kilocycles $2.50, minimum five $1.95 each. 30M fundamentals 10,100 - 10,150 .01% $2.95, five $2.45. 80M $2.95, five $2.50. 160M $3.95, five $2.95. Overtones, including 12M, 10,000 to 25,000 $4.95. Sockets 75 cents. Airmail 30 cents per crystal. "Crystals Since 1933" - W6LPS. Stamp or long SASE. 1700 - 60,000 kilocycles, listings-circuits. Special - 307A-RK-75 unused 20-25 watt pentodes - $4.95 - $1.75 postage. C- W Crytals, Marshfield, MO 65706.

FOR SALE: Hot Air Balloons. Daedalus AX4-1 with wicker basket (damaged) and Raven S50A with aluminum gondola, trailer and inflator. $7000 firm or will consider trade for ham gear. Fred H. Wujek, KA9WVK, 1216 Ninth Street, LaSalle, IL 61301, 805-223- 8316.

WANTED - DX Engr. Sp. Procs. LC1-KWM NA2Z.

CLIPPERTON-L, 10 meters, four extra new tubes, $600. Ten-Tec 544, 252M, 242, NB, CW, $600. Vic-20, C2N, more $75. All delivered. NY4O, 901-584-4020.

QST 1954-1985 (in binders) $200. Ham Radio Issue 1-1985 $100, Hammarlund HQ180A $150, Bearcat DX-1000 $200, Heath DX-60B $50, Hufco Frequency Counter (200 MHz) $50, Gonset 913 500 Watt 50 MHz Linear $75, GLB PK-1 Packet Board $25, Drake TR-7 - AUX7, AM-SSB- CW Filters, WRCC, Noise Blanker, Speaker, Antenna Tuner, Power Supply $800, Henry 1 to 30 Watt FM Linear $50, Microwave 144/28 Transceiver $125. W0EYA, 217-787-3534.

REPLACE RUSTED antenna bolts with Stainless Steel. Small quantities, free catalog. Elwick, Dept. 647, 230 Woods Lane, Somerdale, NJ 08083.

COLLINS 30S-1. Rare RE model, high serial and MCN numbers. Spare final, manual. Like new, $1695. W0UDZ, 320 Roxbury, Colorado Springs, CO 80906, 303-576-8844.

SELLING: COMPLETE mint station Kenwood, Heathkit, Etc. Call W1GKK, 413-663-7668.

DRAKE TR-7, PS-7, SP75, WARC Mod. W2UN, 4385 West Lake, Canandaigua, NY 14424, 716-394-1815.

KENWOOD TS-430S transceiver plus FM board and PS-430 Power Supply, Jan. 1986 $620. Phone 716-282-6682 after 7PM EDST, W2KKT.

WANTED: Yaesu FV-102DM External VFO also FC-102 Antenna Coupler - W0PSH, Larry Lennon, 10725 Dahlia Street, Coon Rapids, MN 55433 612-421-8702.

KENWOOD TS-830S. Like new. Purchased as backup rig. Minimum use. Manual, cover, original carton. $575 includes UPS shipment. Tom Gehman, N6NF, 12585 Skyline Blvd. Woodside, CA 94062. 415-851-0553.

FOR SALE: Heath HW-9, 8 bands, p/s, wattmeter, $159. Hamtronics transmitting converter 10 to 2, $40, 10 meter-to-432, $60. Dick Smith UHF Wattmeter, $25. 605-336-8097 or Callbook. WB7DRU.

DRAKE MN-2000 tuner with instruction manual. $150. W7THY 602- 938-4785.

KENWOOD TS-830, SP-230, mike and all manuals $600. Sony ICF-2001 $120. Paul Adler, KW1L, 203-259-9376.

TS-430S with FM, F/T Filters; AT-250 auto tuner, SP-430 speaker, MC-60A and MC-42S mics, mobile ant for 10, 15, 20, 40. Full docs, including service manual, extra power cable. Sell all as package. $1000. KM2H 518-371-6690.

CRG SUPERCHOKES: SF30A, 160-10M, 30 Amp continuous bifilar filament choke, $18. Add $2.50/order shipping & handling. CRG, 28 Camelia Road, NE, Rome GA 30161. 404-232-4618. K4DPK.

SEND PERFECT CW with your computer. Name, QTH, etc. sent with single keyboard stroke. Much more. $15 for Commodore 64/128 "COMKEY" program. Information included to build interface or $17 for homemade. Nothing else needed. Money back guarantee. Write for free details. Fritz Reuning, K4OAQ, 120 Elk Road, Bristol, TN 37620.

KENWOOD TS-660, w/CW & AM Filters, PS-20 Power Supply, $550. Two matched 100W solid state amps, HF & 6M, $295. Azdens: Matched pair PCS-4000 2M; PCS-4800 10M, $350. Davis CTR Counter, 700MHz, $95. Drake WV-4 Wattmeter, $60; Yaesu YO-301 Monitor Scope, $125; KLM 2M beam, 11 el., $50; KLM 6M beam, 5 el., $95; B&W 425 Low Pass, $20; B&W 427 Low Pass, $20; KLM 30-140 2M amp, $125; Cushcraft 6M Squalo, $15. All excellent. N3LC, 703-788-9797, 7-10 evenings & weekends.

ROSS' $$$$ New Specials (September only): Kenwood TS-440S $839.90, TS-430S $719.90, TR-2600A $259.90, TW-4100A $549.90, ICOM IC-735 $799.90, IC-28A $334.90, IC-45A $279.90, Yaesu FT- 23RTT $256.90, FT-727R $414.90, Hustler 3-TBA, 3-element $210, 6- BTV $119.90, all LTO, phone or send SASE for pricing on popular items. Over 8772 ham-related items in stock for immediate shipment. Mention ad. Prices cash, FOB Preston. We close at 2:00 Saturdays and Mondays. Ross Distributing Company, 78 South State, Preston, ID 83263. 208-852-0830, P.O. Box 234.

WEST COAST Swap Sheets: Special Introductory Offer. SASE: WD6AFC Bill, 4076 N. Hammel, Fresno, CA 93727.

ROHN TOWERS - Wholesale direct to you. 34% discount from the Rohn Dealer Price. All products available. Write or call for catalogue and price list. Hill Radio, 2503 G.E. Road, Bloomington, IL 61702-1405. 309-663-2141.

WANTED: HEATHKIT SB-500 2-meter transverter and HP-23A Power Supply. K5JWK, 6302 Robin Forest, San Antonio, TX 78239.

ROSS' $$$$ USED September Specials: Kenwood TR-2400 $159.90, KPS-7 $39.90, PS-20 $49.90, Yaesu FTV-901W 2M, 6M, 70cM $409.90, SP-901P $44.90, FC-901 $169.90, AEA PK-64 $129.90, PM-1 $69.90, MBATEXT-64 $49.90. Phone or send SASE for Used Items List. Over 8,777 New Ham items in stock. Mention Ad. Prices cash, FOB Preston. We close at 2:00 Saturdays and Mondays. Ross Distributing Company, 78 South State, Preston ID 83263. 208-852-0830. P.O. Box 234.

MORSE KEYBOARD: For more information contact DGM Electronics, 901 Elmwood Avenue, Beloit WI 53511, 608-362-0410.

AZDEN REPAIRS - Quality service by former factory technician. Fast turnover. Southern Technologies, 10715 SW 190 Street #9, Miami, FL 33157, 305-238-3327.

TEKTRONIX SCOPE: Model 453 Solid State, dual trace, portable, excellent condition. 50MHz $475. Dave, W1DWZ, 617-378-3619.

AZDEN HT NICAD PACKS $34.95. Southern Technologies Amateur Radio, Inc. 10715 SW 190 Street #9, Miami, FL 33157. 305-238-3327.

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ANTENNA/TOWER SALE!

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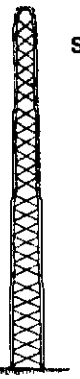
CRANKUP SALE!

All Models Shipped Factory Direct—Freight Paid*!

Check these features:
- All steel construction
- Hot dip galvanized after fabrication
- Complete with base and rotor plate
- Totally self-supporting—no guys needed

Model	Height	Load	Sale Price
HG37SS	37 ft	9 sq ft	$CALL
HG52SS	52 ft	9 sq ft	$CALL
HG54HD	54 ft	16 sq ft	$CALL
HG70HD	70 ft	16 sq ft	$CALL

Masts—Thrust Bearings—Other Accessories Available —Call! Prices Shown Are Your Total Delivered Price In Continental U.S.A.!



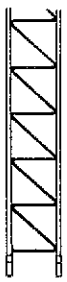
ROHN
Self Supporting Towers On SALE!
FREIGHT PREPAID

- All Steel Construction—Rugged
- Galvanized Finish—Long Life
- Totally Free Standing—No Guy Wires
- America's Best Tower Buy—Compare Save $
- Complete With Base and Rotor Plate
- In Stock Now—Fast Delivery

Model	Height	Ant Load*	Weight	Delivered Price*
HBX40	40 ft	10 sq ft	228	$359
HBX48	48 ft	10 sq ft	303	$459
HBX56	56 ft	10 sq ft	385	$539
HDBX40	40 ft	18 sq ft	281	$429
HDBX48	48 ft	18 sq ft	363	$529

*Your Total Delivered Price Anywhere In Continental 48 States. Antenna Load Based on 70 MPH Wind.

ROHN
Guyed Tower Packages

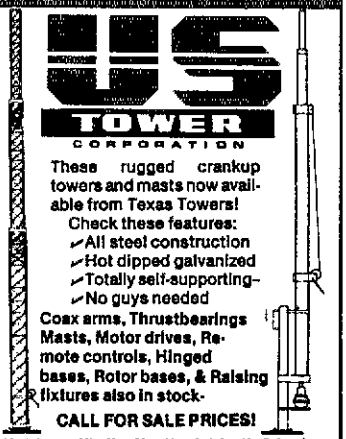


- World Famous Rohn Quality and Dependability
- Rugged high wind survival-provides safe installation
- Multi purpose towers satisfy a wide range of needs
- Complete packages include: guy hardware, turnbuckles, guy assemblies, w/torq bars, concrete base, rotor plate and top section per manufacturers specs.

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 25G	Model 45G	Model 55G
50'	$ 629	$1119	$1469
60'	689	1259	1669
70'	749	1379	1829
80'	909	1539	2019
90'	979	1809	2189
100'	1059	1969	2369
110'	1259	2099	2769
120'	1329	2259	2959

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, Thrustbearings 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	$ 549
MA550 mast	22'	50'	10 sq ft	999
TX438	22'	38'	18 sq ft	829
TX455	22'	55'	18 sq ft	1249
TX472	23'	72'	18 sq ft	2050
HDX555	22'	55'	30 sq ft	1879
HDX572	23'	72'	30 sq ft	3229

Note - US Towers Shipped Freight Collect From Visalia, CA Factory

*Note-towers rated at 50 mph to EIA specifications

RG-213U

$.29/ft $279/1000 ft
Up to 600 ft via UPS

- RG-213/U—95% Bare Copper Shield
- Mil-Spec Non-contaminating Jacket for longer life than RG8 cables
- Our RG-213/U uses virgin materials.
- Guaranteed Highest Quality!

RG-8X

$.19/ft $179/1000 ft

- RG8X—95% Bare Copper Shield
- Low Loss
- Non-contaminating Vinyl Jacket Foam Dielectric

9086 $.39/ft $379/1000 ft

- Same specs as Belden 9913
- Lower loss than RG8U
- 100% shielded-braid & foil

HARDLINE/HELIAX®

Lowest Loss for VHF/UHF!

½" Alum. w/poly Jacket	$.79/ft.
½" LDF4-50 Andrew Heliax®	$1.79/ft
⅞" LDF5-50 Andrew Heliax®	$3.99/ft

select connectors below.
Heliax® is a Registered Trademark of the Andrew Corp.

Coaxial Cable Loss Characteristics (DB/100 ft)

Cable Type	Imped.	10MHz	30MHz	150MHz	450MHz
RG-213/U	50	.6	.9	2.3	5.2
RG8X	52	.8	1.2	3.5	5.8
9086	50	.4	.64	1.7	3.1
½" Alum	50	.3	.5	1.2	2.2
½" Heliax	50	.2	.4	.9	1.6
⅞" Heliax	50	.1	.2	.5	.9

HARDLINE & HELIAX® CONNECTORS

Cable Type	UHF FML	UHF MALE	N FML	N MALE
½" Alum	$19	$19	$19	$25
½" Heliax®	$25	$25	$25	$25
⅞" Heliax®	$49	$49	$49	$49

COAX CONNECTORS

Amphenol Silver PL259	$1.25
UG21B N Male	$2.95
9086/9913 N Male Connector	$4.95

ANTENNA WIRE & ACCESSORIES

Stranded Copper 14ga	$.10/ft.
¼ mile 18ga copper-clad steel wire	$30
Dog bone end insulator	$.79 ea.

Van Gorden

1:1 Balun $11 Center Insulator $6
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
G5RV all band antenna $49.95

ALPHA DELTA

DX-A 160-80-40 Sloper	$49

CUSHCRAFT

A3 3-el Tribander	$229
A4 4-el Tribander Beam	$299
A743 & A744, 30/40 mtr KIT for the A3 & A4 ea	$79
AP8 80-10 mtr Vertical	$139
AV5 80-10mtr Vertical	$109
D40 40mtr Dipole	$159
40-2CD 2-el 40 mtr Beam	$299
A50-5 5-el 6 mtr Beam	$85
215 WB NEW 15-el 2 mtr Beam	$85
230 WB NEW 30-el 2 mtr Beam	$229
4218 XL 18-el 2 mtr Beam	$105
3219 19-el 2 mtr Beam	$99
220B 17-el 220MHz Beam	$99
424B 24-el 432MHz Beam	$85
ARX2B 2 mtr Vertical	$39

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CALL FOR SPECIAL PRICES!

Discoverer 2-el 40-mtr Beam	
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23BS 3-el 2 mtr Beam	
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28BS 8-el 2 mtr Beam	
214BS 14-el 2-mtr Beam	
2BDQ 80/40 mtr Trap Dipole	
5BDQ 80-10 mtr Trap Dipole	
BN86 80-10 mtr KW Balun W/Coax Seal	

HUSTLER

6BTV 80-10 mtr Vert $129 5BTV 80-10 mtr Vert $109
4BTV 40-10 mtr Vert $89 G7-144 2-mtr Base $119
G6-144B 2-mtr Base $89

Mobile Resonators	10m	15m	20m	40m	75m
400W Standard	$16	$17	$19	$22	$26
2KW Super	$20	$22	$25	$29	$39

Bumper Mounts - Springs - Folding Masts in Stock!

BUTTERNUT ELECTRONICS CO

HF6V 80-10m Vertical $129 Delivered
- Full Legal Power
- Highest Q Tuning Circuits

HF2V 80-40m Vertical $129 Delivered
- Full Legal Power
- Automatic Band Switching

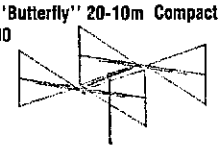
Accessories:

RMK II Roof Mtg. Kit	$49
STR II Stub-Tuned Radials	$29
TBR160 160m Coil Kit	$49
30m Add-on Kit	$29
20m Add-on Kit	$39
17/12m Add-on Kit	$27

HF6V HF2V

FREE UPS on ACCESSORIES when purchased w/antenna

HF4B "Butterfly" 20-10m Compact Beam $199.00



- Unique Design Reduces Size
- Turns w/TV Rotor
- Boom Length 6 Feet
- No Lossy Traps
- 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	$589.95

ROTORS

Daiwa MR 750 PE (16.1 sq ft rating)	$289
Additional Motor Units	$89
Alliance HD73 (10.7 sq ft rating)	$119.95
Alliance U110 (3 sq ft rating)	$49
Telex CD 45II (8.5 sq ft rating)	$Call
Telex HAM 4 (15 sq ft rating)	$Call
Telex Tailtwister (20 sq ft rating)	$Call
Telex HDR300 Heavy Duty (25 sq ft rating)	$Call
Kenpro KR500 Heavy Duty Elevator Rotator	$189
Kenpro KR5400 AZ/EL Rotor Package	$319

ROTOR CABLE

Standard 8 cond cables $ 19/ft (vinyl jacket 2-#18 & 6-#22 ga)
Heavy Duty 8 Cond cable $.36/ft (vinyl jacket 2-#16 & 6-#18 ga)

ROHN GUYED TOWER SECTIONS

10 FT. STACKED SECTIONS

20G	$45.00	45G	$116.00
25G	$52.00	55G	$160.00

ALL ACCESSORIES IN STOCK—CALL

ROHN FOLDOVER TOWERS

Model	Height	Ant. Load*	Price
FK2548	48 ft.	15.4 sq. ft.	$ 999.
FK2558	58 ft.	13.3 sq. ft.	1049.
FK2568	68 ft.	11.7 sq. ft.	1099.
FK4544	44 ft.	34.8 sq. ft.	1319.
FK4554	54 ft.	29.1 sq. ft.	1399.
FK4564	64 ft.	28.4 sq. ft.	1499.

25G Double Guy Kit $249.
45G Double Guy Kit $269.

*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 × 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
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3/8EJ (3/8" Eye & Jaw Turnbuckle)	$7.95
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1/4 "Preformed Guy Grip	$2.99
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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)	$.29/ft
HPTG4000 Guy Cable (4000 lb rating)	$.49/ft
HPTG6700 Guy Cable (6700 lb rating)	$.69/ft
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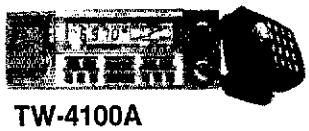

TW-4100A

- 2m/70cm FM Dual Band Transceiver
- 45W on 2m, 35W on 70cm
- Frequencies: 142-149 MHz 440-449.995 MHz
- Selectable Full Duplex Cross Band Operation

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TM-221A

- 2m FM Mobile Transceiver
- 45W Output w/HiLo Switch
- 14 Multi-Function Memories
- TM-421A Available For 440 MHz

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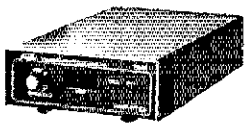
TH-215A

"FULL FEATURED 2m HT"

- 141-163 MHz Receive
- 144-148 MHz Transmit
- 2.5w Output (5w Optional)
- 10 Memories
- Built-In CTCSS Encoder
- Nine Types of Scanning

AEA



PK-64A/HFM

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SPECIAL! SAVE $100.00

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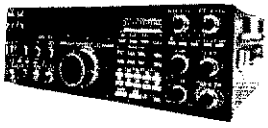

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- Solid-State Lightweight
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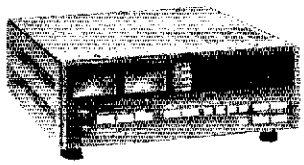

FL-7000

- Solid State Amp for 160-15M
- Built-In Power Supply
- Automatic Tuner
- 1200W PEP Input

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Power Supply

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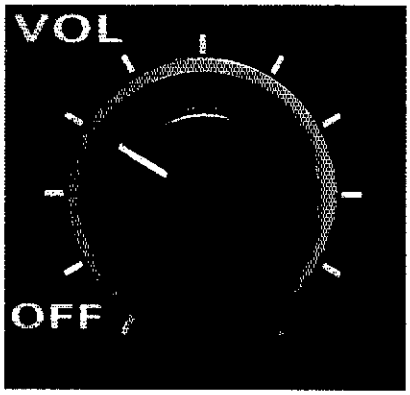
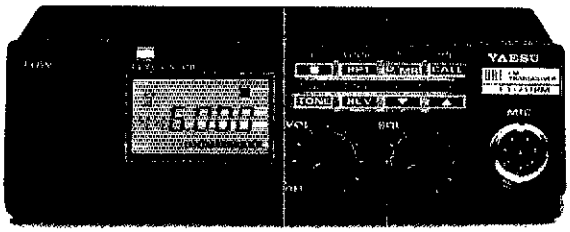
One of the most complex operating controls of our high-performance mobiles.



You don't have to sacrifice performance to gain simplicity in your mobile operation.

Yaesu's 2-meter FT-211RH and 440-MHz FT-711RH give you all the performance you look for in a sophisticated, microprocessor-controlled mobile.

With controls that couldn't be more straightforward and easy to learn. Which means no



operating complexities to interfere with your driving.

In fact, if you own our handheld FT-23R, you've already learned how to use our FT-211RH and FT-711RH. Because all three radios are based on the very same technology.

To begin with, you get an autodialer mic with 10 lithium backed memories, each capable of storing any key sequence up to 22 digits long.

Plus you get: 45 watts output (35 watts on 440 MHz). LCD readout. 10 memories that store frequency, offset and PL tone. (7 memories can store odd splits.) Scan all memories or selected memories at 2 frequencies per second. Band scan at 10 frequencies per second. Tx offset storage. Priority channel scan. Tuning 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. Eight-key control pad. Keypad lock. High/low power switch (low power: 5 watts VHF, 3 watts UHF).

What's more, each radio is perfect for overhead mounting. Just remove a few screws and flip the control panel 180°.

Discover the 2-meter FT-211RH and 440-MHz FT-711RH at your nearest Yaesu dealer today. If you can turn a knob and push a button, you'll have high-performance mobile operation mastered.

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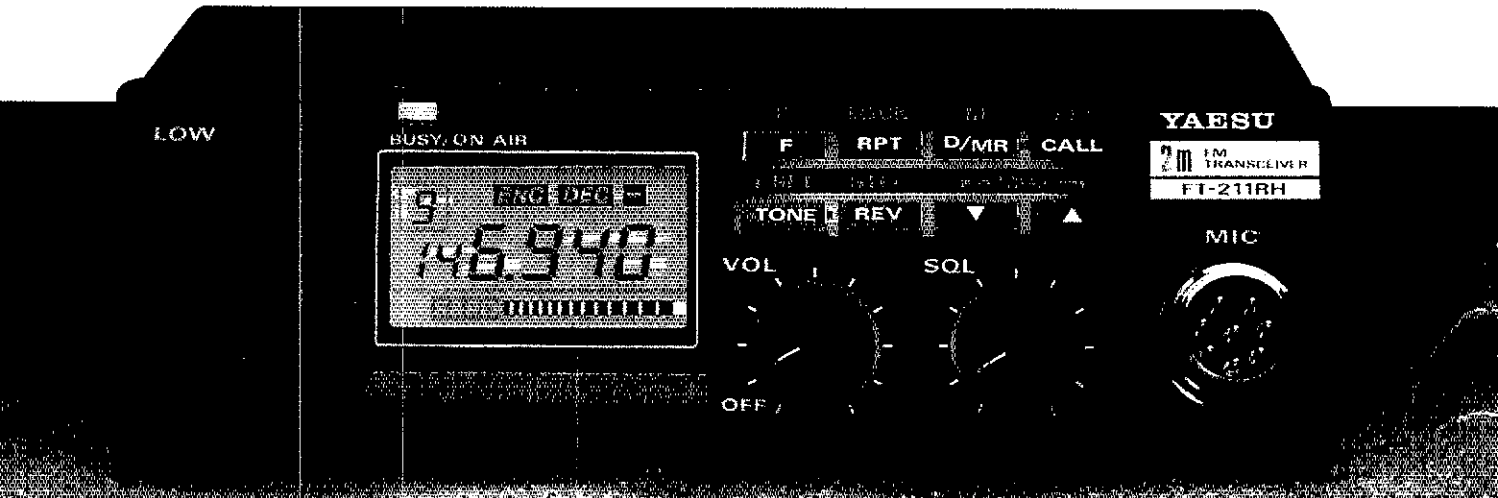

Yaesu USA 17210 Edwards Road, Cerritos, CA 90701 (213) 404-2700. Repair Service: (213) 404-4884. Parts: (213) 404-4847.
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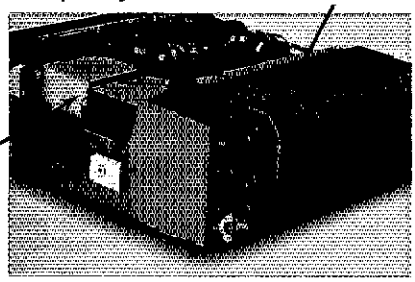
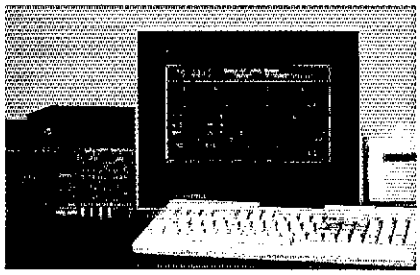
TS-440S Compact high performance HF transceiver with general coverage receiver

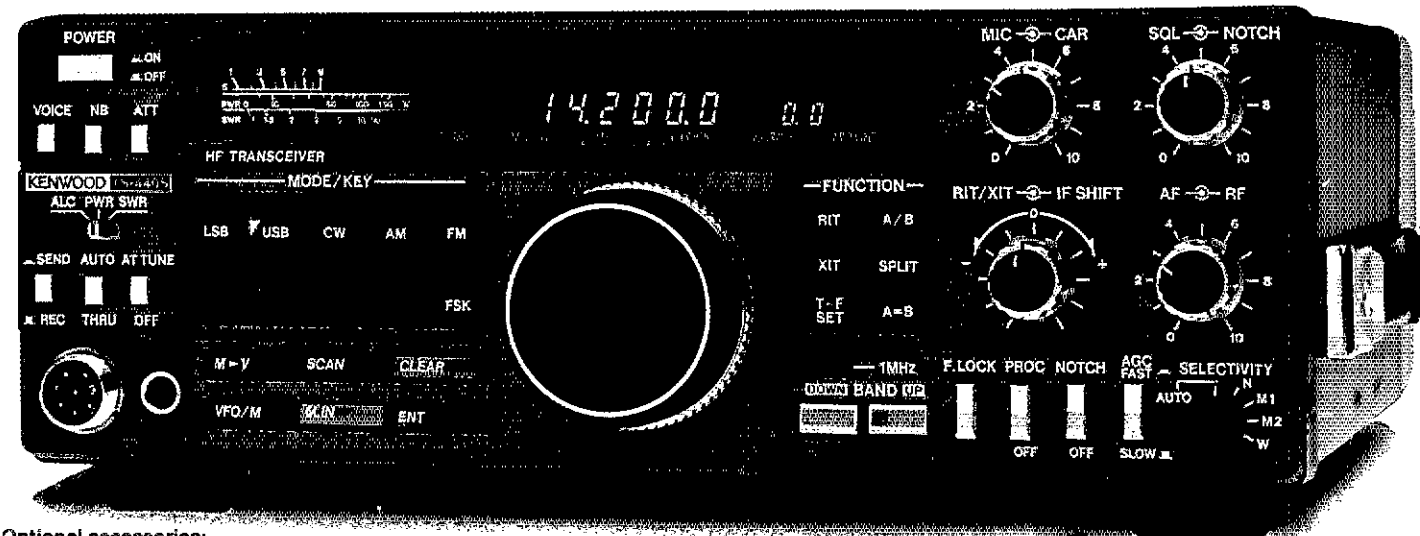
Kenwood's advanced digital know-how brings Amateurs world-wide "big-rig" performance in a compact package. We call it "Digital DX-citement"—that special feeling you get every time you turn the power on!

- **Covers All Amateur bands**
  General coverage receiver tunes from 100 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. (500 Hz bandwidth on 20 m)
- **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)**
  Subtone is memorized when TU-8 is installed.
- **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**



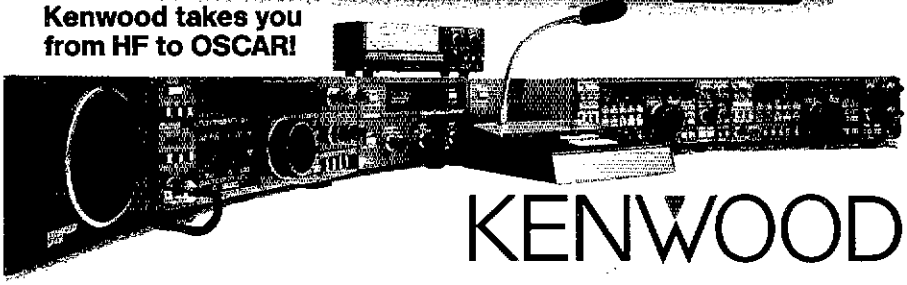


- **5 IF filter functions**
- **Dual SSB IF filtering**
  A built-in SSB filter is standard. When an optional SSB filter (YK-88S or YK-88SN) is installed, **dual** filtering is provided.
- **VOX, full or semi break-in CW**
- **AMTOR compatible**



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!



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P.O. Box 22745, Long Beach, CA 90801-5745

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