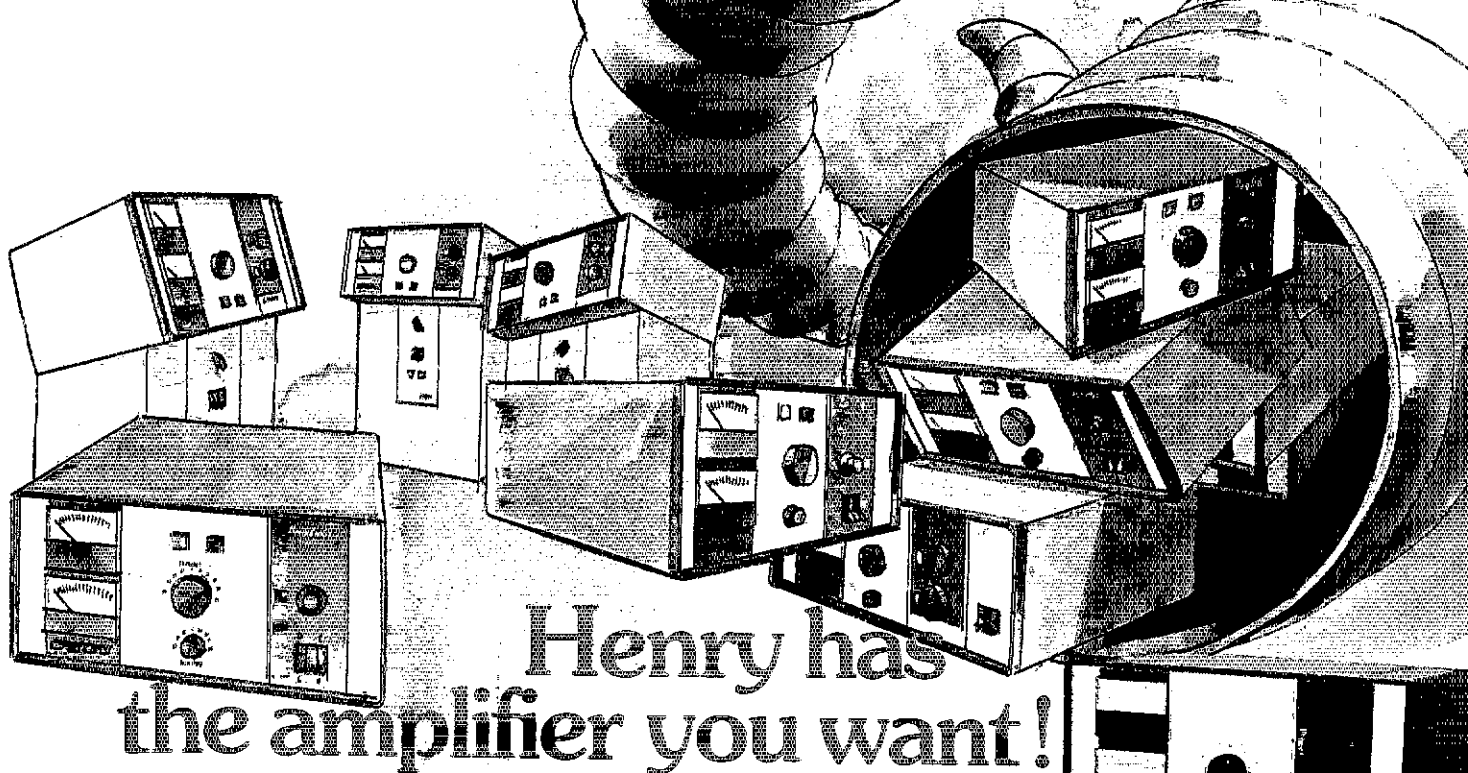


Crystal filters—simply

Page 24



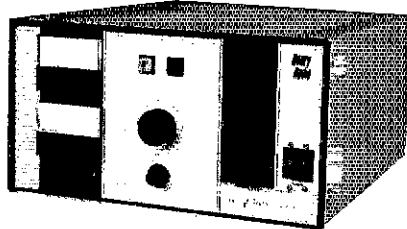
Henry has the amplifier you want!

Take your choice. The world famous 2K Desk Classic, 2K Console Classic and 3K Console Classic HF amplifiers speak for themselves. Now to complete your range of choice, the superb new 3002-A and 2002-A for 146 MHz and the 3004-A and 2004-A for 440 MHz.

Now a veritable cornucopia of superb amplifiers. Just make your choice!

2K Classic...the culmination of more than fifteen years of developing the 2K series into the world famous line that sets the standards for top quality HF linears. A true "workhorse": built to loaf along at full legal power, trouble free, for years of hard service. Operates on all amateur bands, 80 through 15 meters (export models include 10 meter).

2K Classic "X"...We can't think of any way to make this magnificent 2000 watt amplifier better. Rugged...durable...the last amplifier you may ever need to buy.



2KD Classic...a desk model designed to operate at 2000 watts effortlessly, using two Eimac 3-500Z glass envelope triodes, a Pi-L plate circuit and a rotary silver plated tank coil. We challenge

you to find a better desk model for even a thousand dollars more.

3K Classic MkII...uses the superb Eimac 3CX1200A7 tube. More than 13db gain. We believe the 3K to be the finest amateur linear available anywhere...the amplifier of every amateur's dreams.

Henry amateur amplifiers are available from select dealers throughout the U.S. and are being exported to amateurs all over the world. Henry Radio also offers a broad line of commercial FCC type accepted amplifiers for two way FM communications to 500 MHz, as well as special RF power generators for industrial and scientific users. Call or write Ted Shannon or Mary Silva for full information.

2002-A...a bright new rework of our popular 2002 2 meter amplifier. Uses the new Eimac 3CX800A7. The RF chassis uses a $\frac{1}{4}$ wave length strip line design for extremely reliable approach. It provides 2000 watts input for SSB and 1000 watts input for CW. Because this tube is rated at an unheard of 15dB gain, only about 25 watts drive is required for full output.

2004-A The 400 MHz version of 2002-A. Write for full specifications.

3002-A A superb new 2 meter full power amplifier using the 8877 for 1500 watts output. You can't buy a better VHF amplifier.

3004-A Identical to the 3002-A except re-designed for UHF 1000 watts output...430-450 MHz.

We stock these plus many other fine names:

AEA • ARCO • ARRL • ASTRON • B & K • B & W • BIRD • CDE • CONNECT-SYSTEMS • CUSHCRAFT • EIMAC • HAL • HUSTLER • HY-GAIN • ICOM • KENWOOD • LARSEN • NYE • TEMPO • VIBROPLEX • YAESU



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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.

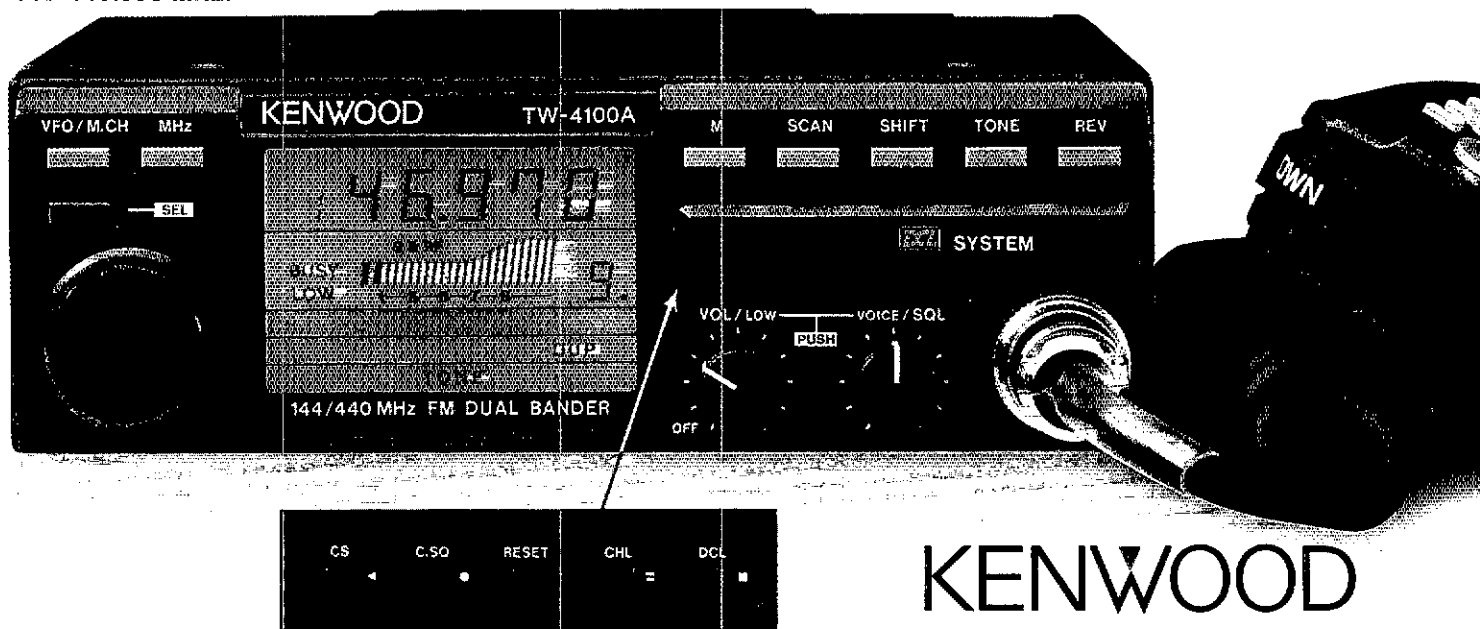


- **New compact size!** Only 5.9" W x 1.97" H x 7.87" D and weighs less than 4 pounds!
- **Proven high performance** Kenwood GaAs FET front end receiver.
- **Easy to operate!** Only 3 knobs and 8 keys on the front panel.
- **Separate antenna ports for VHF and UHF.** Minimizes loss and increases reliability 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

KENWOOD U.S.A. CORPORATION
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

**FIVE Watts
IC-02ATHP
(High Power)
now available!**

ICOM IC-02AT

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.

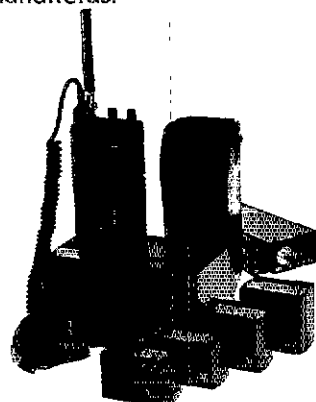
IC-02AT Features. ICOM's versatile IC-02AT handheld has the following outstanding features:

- 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 se-

lection. 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.

IC-2AT
with IC-BP3
battery pack

IC-02ATHP
(High Power)
version
with IC-BP7
battery pack

ICOM
IC-BP7

**Often imitated,
never duplicated.**

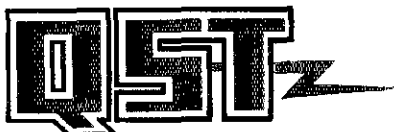


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First in Communications

ICOM America, Inc., 2380-116th Ave. N.E., Bellevue, WA 98004 **Customer Service Hotline (206) 454-7611**
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ICOM CANADA, A Division of ICOM America, Inc., 3071 - #5 Road, Unit 9, Richmond, B.C. V6X 2T4, Canada

All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions. 02AT58



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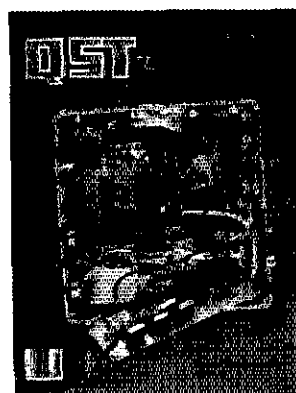
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OUR COVER

Need a crystal filter for your next project? Try a Cohn ladder filter! In the receiver shown here, four crystals + five capacitors = good single-signal CW selectivity at a 4-MHz IF—and the filter needs no adjustment. Interested in putting a Cohn crystal filter to work for you? See page 24. (The receiver? It's a CW job for 10 and 18 MHz, scheduled for appearance the 1988 ARRL Handbook.)



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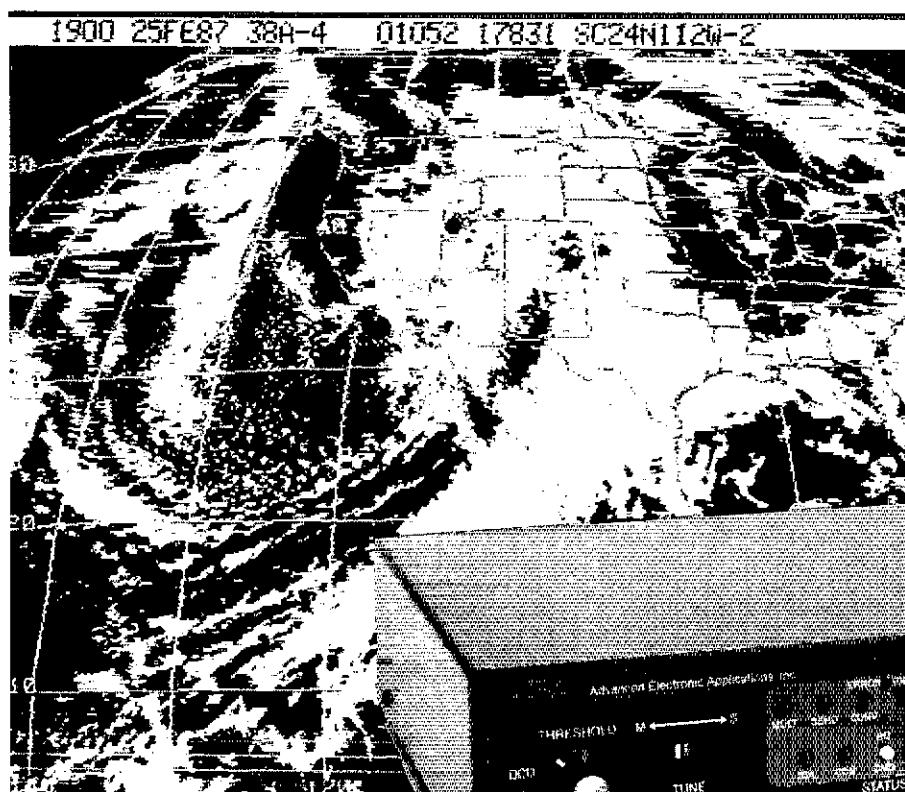
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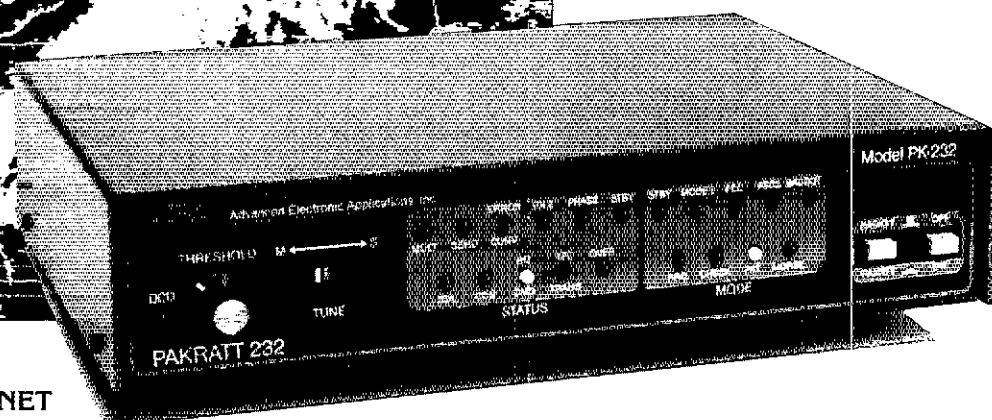
Six Digital Modes - Including Weather FAX



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

\$319⁹⁵
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.

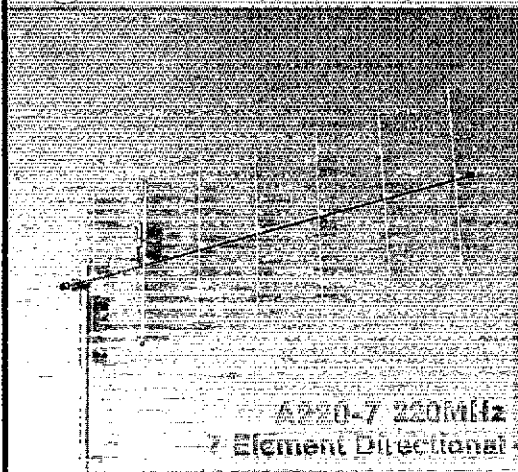


Brings you the Breakthrough

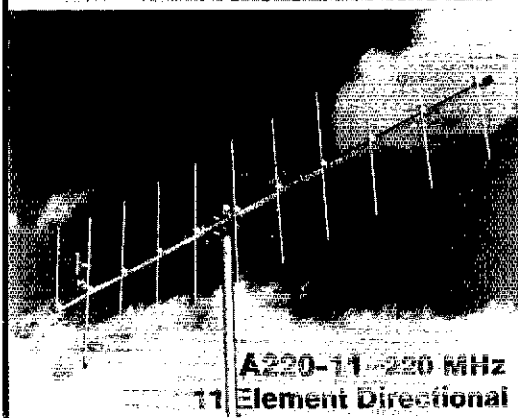
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CUSHCRAFT ENHANCERS FOR THE NEW NOVICE BANDS



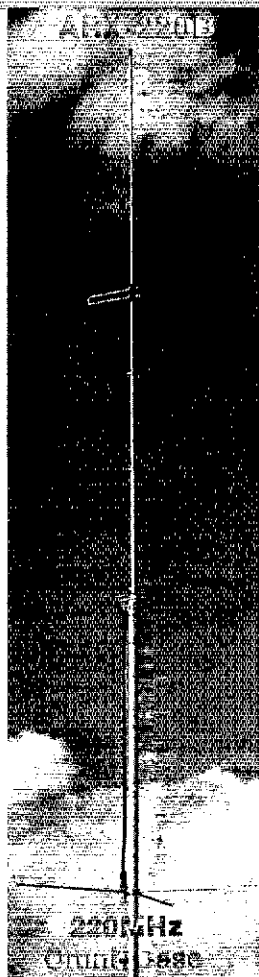
**A220-7 220MHz
7 Element Directional**



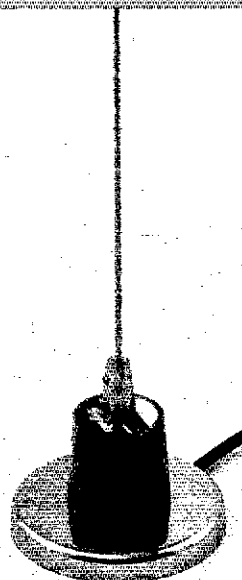
**A220-11 220 MHz
11 Element Directional**

Make the most of your new privileges.

For the best performing station, select Cushcraft fixed, mobile, and portable antennas. They are the popular choice because of their performance, durability, and ease of assembly. More hams choose Cushcraft than any other brand of amateur antennas.



**220MHz
Omni-Base**



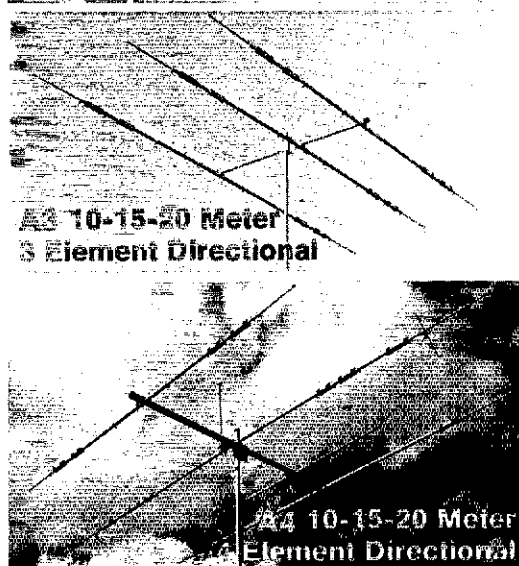
**CS-220
220MHz Mobile**



220MHz Portable



**A10-5CD 10 Meter
5 Element Directional**



**A3 10-15-20 Meter
3 Element Directional**

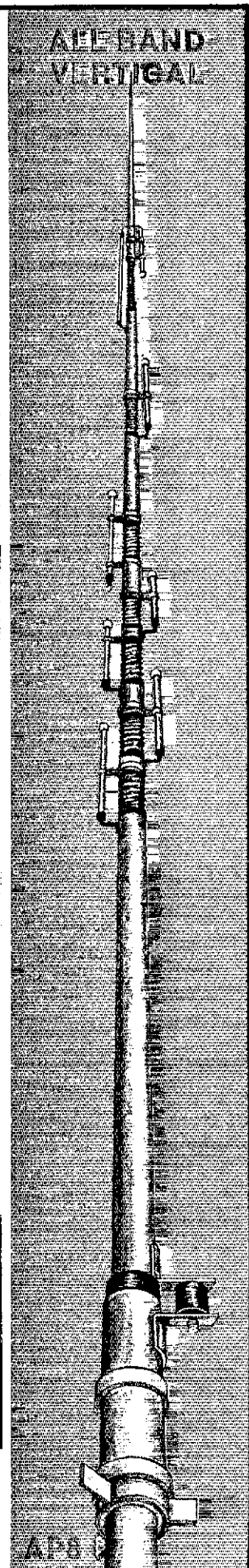
**A4 10-15-20 Meter
4 Element Directional**



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CORPORATION

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**ALL BAND
VERTICAL**



AP-8

KENWOOD

3 Choices
70 W/45 W/25 W

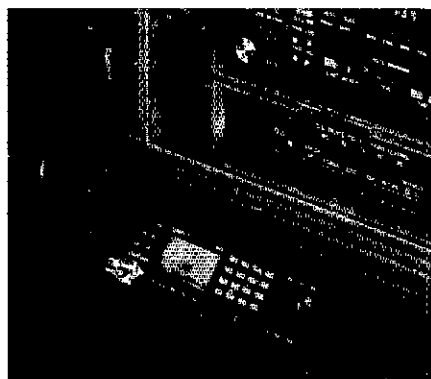
Three Choices for 2m!

TM-2570A/2550A/2530A

Feature-packed 2m FM transceivers

The all-new "25-Series" gives you three RF power choices for 2m FM operation: 70 W, 45 W, and 25 W. Here's what you get:

- Telephone number memory and autodialer (up to 15 seven-digit phone numbers). **A Kenwood exclusive!**
- High performance GaAs FET front end receiver
- 23 channel memory stores offset, frequency, and subtone. Two pairs may be used for odd split operation
- 16-key DTMF pad with audible monitor
- Extended frequency coverage for MARS and CAP (142-149 MHz; 141-151 MHz modifiable)
- Center-stop tuning—a **Kenwood exclusive!**
- New 5-way adjustable mounting system
- Automatic repeater offset selection—**another Kenwood exclusive!**
- Direct keyboard frequency entry
- Front panel programmable 38-tone CTCSS encoder **includes** 97.4 Hz (optional)



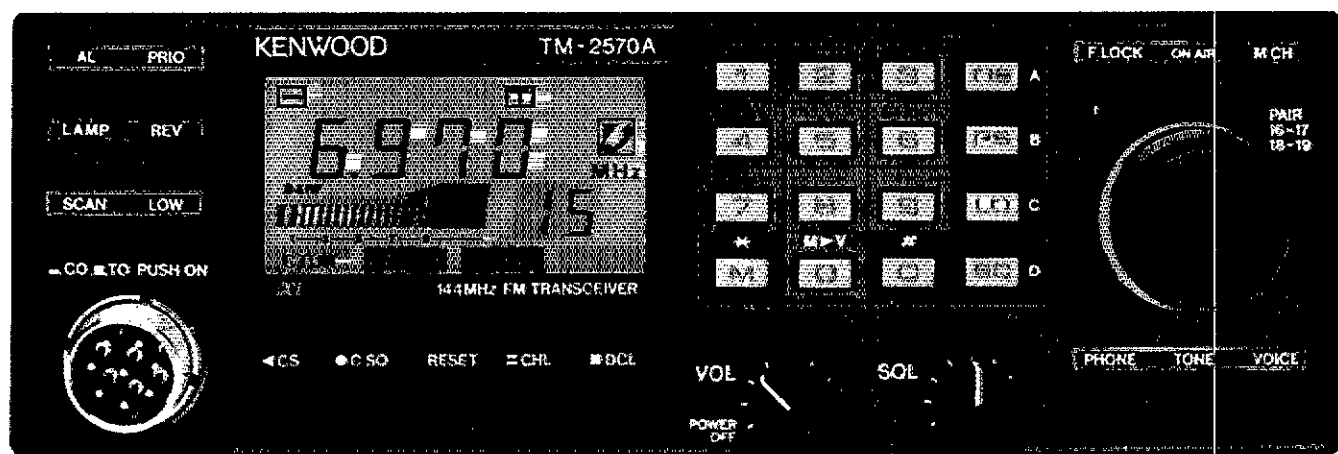
- Big multi-color LCD and back-lit controls for excellent visibility
- The TM-3530A is a 25 watt version covering 220-225 MHz. The first full featured 220 MHz rig!



Introducing... Digital Channel Link

Compatible with Kenwood's DCS (Digital Code Squelch), the DCL system enables your rig to **automatically** QSY to an open channel. Now you can automatically switch over to a simplex channel after repeater contact! Here's how it works:

The DCL system searches for an open channel, remembers it, returns to the original frequency and transmits control information to another DCL-equipped station that switches **both** radios to the open channel. Micro-processor control assures fast and reliable operation. The whole process happens in an instant!



Optional Accessories

- TU-7 38-tone CTCSS encoder
- MU-1 DCL modem unit
- VS-1 voice synthesizer
- PG-2N extra DC cable
- PG-3B DC line noise filter
- MB-10 extra mobile bracket
- CD-10 call sign display
- PS-430 DC power supply for TM-2550A/2530A/3530A
- PS-50 DC power supply for TM-2570A
- MC-60A/MC-80/MC-85 desk mics.
- MC-48B extra DTMF mic. with UP/DWN switch
- MC-43S UP/DWN mic.
- MC-55 (8-pin) mobile mic. with time-out timer
- SP-40 compact mobile speaker
- SP-50B mobile speaker
- SW-200A/SW-200B SWR/power meters
- SW-100A/SW-100B compact SWR/power meters
- SWT-1 2m antenna tuner

Actual size front panel

KENWOOD

KENWOOD U.S.A. CORPORATION
2201 E. Dominguez St., Long Beach, CA 90810
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. Specifications guaranteed on Amateur bands only.

KENWOOD

**YES!
220 MHz**

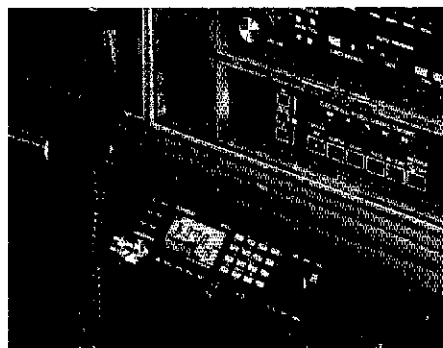
220: Kenwood Style!

TM-3530A

The first comprehensive 220 MHz FM transceiver

TM-3530A—25 watts of 220 MHz FM—Kenwood style! Features include built-in 7-digit telephone number memory, auto dialer, direct frequency entry and big LCD. All this makes the TM-3530A the most sophisticated rig on 220 MHz!

- **First** mobile transceiver with telephone number memory and auto-dialer (up to 15 seven-digit telephone numbers)
- Frequency range 220-225 MHz
- Automatic repeater offset selection—**a Kenwood exclusive!**
- Direct keyboard entry of frequency
- 23-channel memory for offset, frequency and sub-tone



- Big multi-color LCD and back-lit controls for excellent visibility
- Optional front panel programmable 38-tone CTCSS encoder **includes 97.4 Hz**

- Frequency lock switch
- Digital Channel Link (DCL) option
- High performance GaAs FET front end receiver

TH-31BT/31A

Kenwood's advanced technology brings you a new standard in pocket/handheld transceivers!

- 1 watt high, 150 mW low
- Super compact and lightweight (about 8 oz. with PB-21)
- Frequency range 220-224.995 MHz in 5-kHz steps
- BT Series has built-in tone
- Repeater offset:—1.6 MHz, reverse, simplex
- **Supplied accessories:** rubber flex antenna, earphone, wall charger, 180 mAH NiCd battery and wrist strap
- Quick change, locking battery case

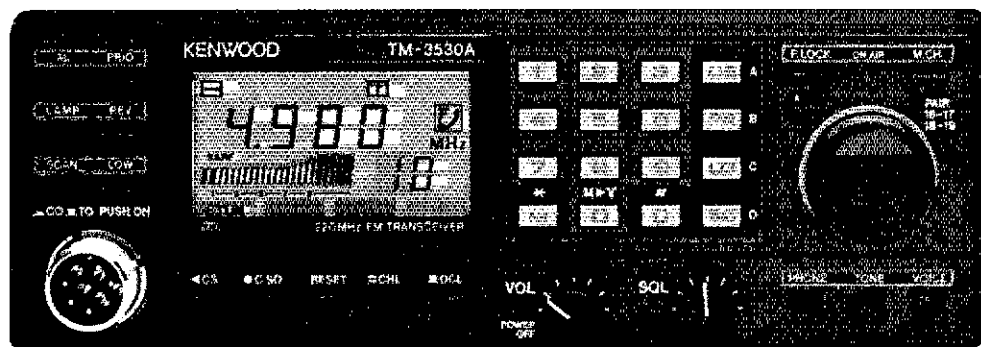
TH-31BT/31A optional accessories:

- **HMC-1** headset with VOX
- **SMC-30** speaker microphone
- **PB-21** NiCd 180 mAH battery
- **PB-21H** NiCd 500 mAH battery
- **DC-21** DC-DC converter for mobile use
- **BT-2** manganese/alkaline battery case
- **EB-2** external C manganese/alkaline battery case
- **SC-8/8T** soft cases with belt hook
- **TU-6** programmable sub-tone unit
- **AJ-3** thread-loc to BNC female adapter
- **BC-6** 2-pack quick charger
- **BC-2** wall charger for PB-21H
- **RA-9A** StubbyDuk antenna
- **BH-3** belt hook

- 16-key DTMF pad, with audible monitor
- Center-stop tuning—**another Kenwood exclusive!**
- **New** 5-way adjustable mounting system
- **Unique** offset microphone connector—relieves stress on microphone cord
- HI/LOW power switch (adjustable LOW power)



TH-31BT with DTMF pad shown. Optional RA-9A attached.



TM-3530A optional accessories:

- **TU-7** 38-tone CTCSS encoder
- **MU-1** DCL modem unit
- **VS-1** voice synthesizer
- **PG-2N** extra DC cable
- **PG-3B** DC line noise filter
- **MB-10** extra mobile bracket
- **CD-10** call sign display
- **PS-430** DC power supply
- **MC-60A/MC-80/MC-85** desk mics.
- **MC-48B** extra DTMF mic. with UP/DOWN switch
- **MC-43S** UP/DOWN mic.
- **MC-55** (8 pin) mobile mic. with time-out timer
- **SP-40** compact mobile speaker
- **SP-50B** mobile speaker
- **SW-200B** SWR/power meter
- **SW-100B** compact SWR/power meter

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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Ontario
Quebec
Saskatchewan

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Western Pennsylvania

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THE AMERICAN RADIO RELAY LEAGUE, INC



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

ARRL is an incorporated association without capital stock chartered under the laws of the State of Connecticut, and is an exempt organization under Section 501(c)(3) of the Internal Revenue Code of 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

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"It Seems to Us ..."

Pacifica, Howard Stern, and Amateur Radio

The FCC made the national news in a big way in mid-April. In a dramatic departure from a lengthy near-silence on the subject of indecent transmissions by its licensees, on April 16 the Commission put broadcasters and amateurs on notice that (1) standards for decency in radio transmissions exist in both services, and (2) henceforth, the standards will be enforced.

Two of the cases dealt with by the FCC involved broadcast stations in Los Angeles (KPFK-FM) and Philadelphia (WYSP-FM). KPFK, licensed to the Pacifica Foundation, Inc, was found to have broadcast material deemed indecent and possibly obscene at an hour, 10:00 PM, when there was a reasonable risk that children may have been in the listening audience. WYSP was found to have broadcast episodes of the Howard Stern weekday morning radio program that "dwelt on sexual and excretory matters in a pandering and titillating fashion that was patently offensive as measured by contemporary community standards for the broadcast medium." No sanctions were imposed on the licensees because prior rulings might have led them to believe that such conduct was not actionable; however, they were given stiff warnings that similar broadcasts in the future would render them liable to more severe sanctions, and the obscenity question was referred to the Justice Department for possible criminal prosecution.

A third case involved an amateur, David Hildebrand, N6BHU. Hildebrand had made transmissions on 2 meters in 1981, in the early evening and via a repeater with wide coverage, that were deemed indecent and therefore in violation of Section 97.119 of the Commission's Rules, which prohibit the transmission of "communications containing obscene, indecent, or profane words, language, or meaning." The following year an Administrative Law Judge suspended Hildebrand's amateur station license and revoked his operator's license following a hearing. However, the FCC Review Board reversed that determination, holding that a 1978 Supreme Court ruling (also involving the Pacifica Foundation) did not explicitly apply to the Amateur Radio Service and that the Commission therefore could not regulate indecent transmissions in our service. The FCC Private Radio Bureau filed an Application for Review with the full Commission, and ARRL sought leave to intervene in support of the Private Radio Bureau's position.

Almost five years later, the Commissioners acted to reverse the finding of the Review Board. In so doing, they noted that Section 97.119 specifically governs indecent transmissions in our service and that licensees should assume that Commission rules will be enforced. The Commission found that the principles applicable to complaints in the broadcasting service are equally applicable to the Amateur Service, owing to the fact that our frequencies are shared by many amateurs, children are actively encouraged to become amateur licensees, and it is not possible to separate adults from children in advance of specific transmissions. In the Commissioners'

view, Hildebrand's violations "in this initial instance" did not warrant revocation or suspension of his licenses, but "further violations may lead to suspension or revocation of his license, in addition to forfeitures." The League's petition to intervene was denied, but our brief opposing the Review Board's decision was accepted as an *amicus curiae* brief.

With release of a Public Notice on April 29, FCC notified its amateur licensees that "violations of the Commission's new standards... will subject them to the full range of sanctions available to the Commission." Here are the standards as they will be applied.

Obscenity: (1) an average person, applying contemporary community standards, must find that the material, as a whole, appeals to the prurient interest; (2) the material must depict or describe, in a patently offensive way, sexual conduct specifically defined by the applicable state law; and (3) the material, taken as a whole, must lack serious literary, artistic, political, or scientific value.

Indecency: language or material that depicts or describes, in terms patently offensive as measured by contemporary community standards for the broadcast medium, sexual or excretory activities or organs.

As to timing, obscenity is actionable whenever it is transmitted; indecency is actionable if transmitted at a time of day when there is a reasonable risk that children may be in the audience. Addressing First Amendment arguments, the Commission stated that "the regulation of indecency by channeling it to hours when there is not a reasonable risk that children may be in the audience is consistent with the First Amendment rights afforded newspapers and magazines." When indecent broadcasts are to be made, advance warnings would be required. No specific time limits were established, but 10:00 PM is not late enough to avoid sanctions.

Is the use of an expletive in itself indecent? According to the Commission, "deliberate and repetitive use of such expletives in a patently offensive manner would be a requisite to a finding of indecency." The context is also important.

Unfortunately, the FCC's action undoubtedly will trigger a lot of on-the-air discussion, at least in some circles, as to what is permitted and what isn't. This may result, at least temporarily, in an increase in precisely the sort of activity that those seeking Commission action had hoped to curtail. For our part, instead of worrying about Commission-imposed standards we hope every amateur will answer to a higher and simpler standard, one best expressed in The Radio Amateur's Code:

The Amateur is Considerate... He never knowingly uses the air in such a manner as to lessen the pleasure of others.

—David Sumner, K1ZZ

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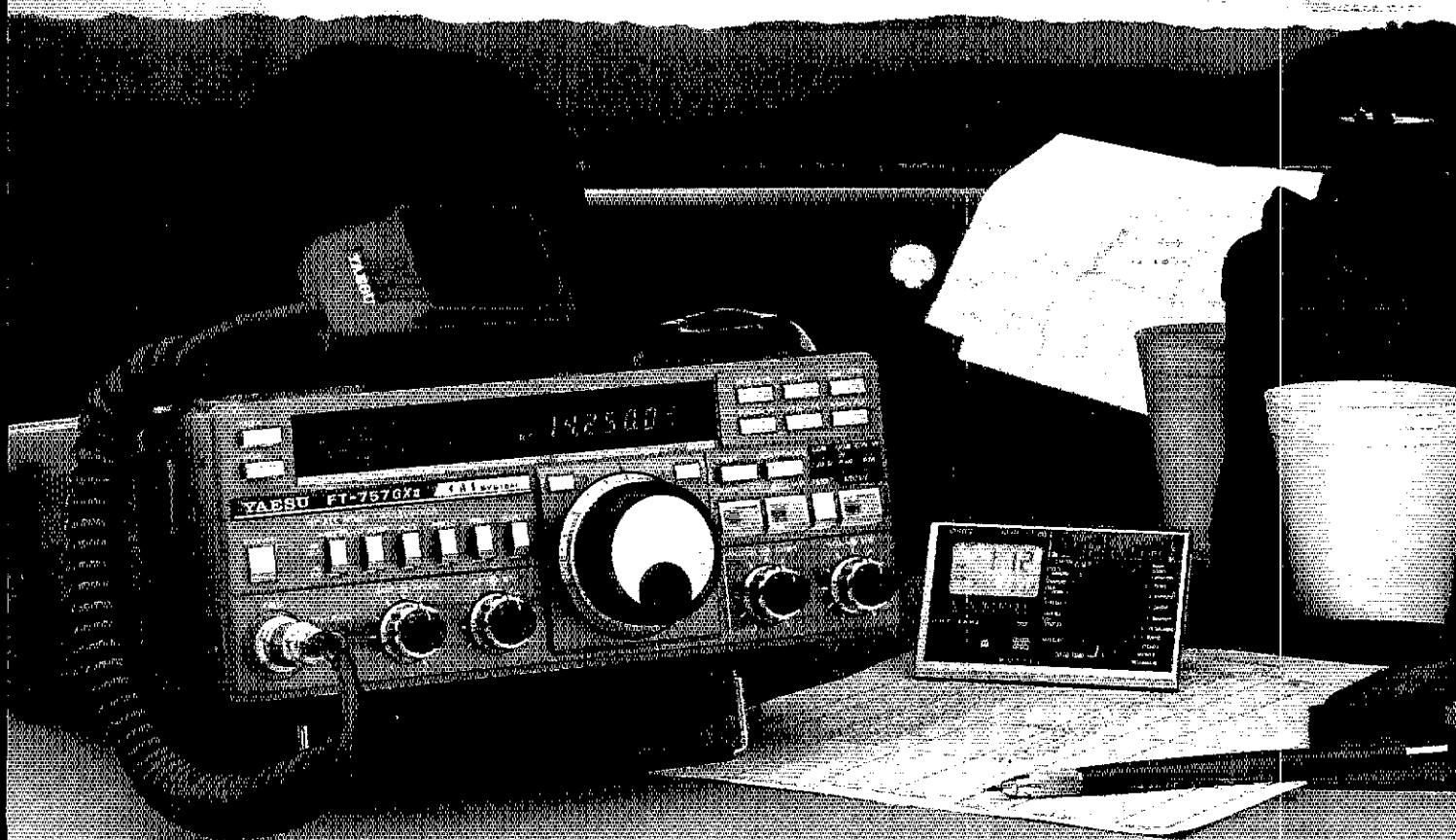
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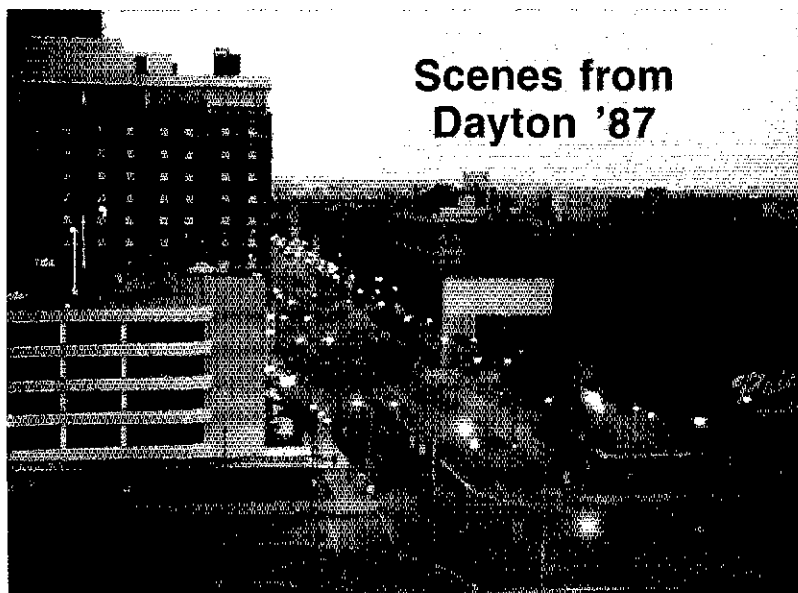
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Scenes from Dayton '87

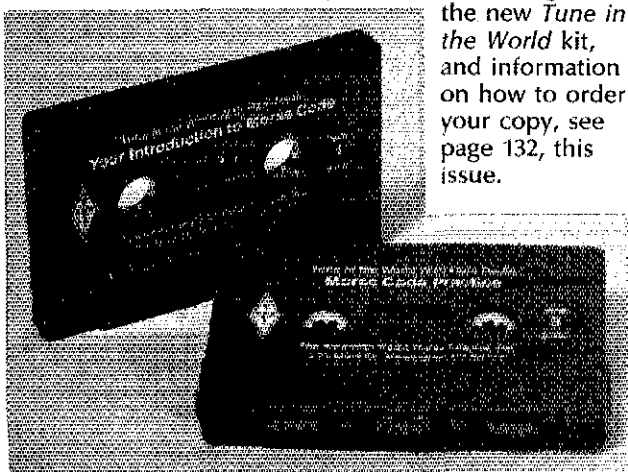


Huge Success: The Dayton HamVention® has a long history of successes, and this year's gathering, April 24-26, carried on that tradition splendidly. Some of the reasons: Attendance was in the 27,000 range, a new record. There were plenty of vendors of new and used equipment, inside and outside the Hara Arena Convention Center, so sales were lively over the entire weekend. There was no shortage of forums—43 in all—from recruitment to regulations to specialized modes. And don't forget the Saturday night banquet, where amateurs honored some of their fellow amateurs (see related item). Here are a few moments from Dayton '87, frozen by the camera lens of Billy Lunt, KR1R.



New Tune in the World Kit: *Tune in the World With Ham Radio* has outdone itself. In the latest (7th) edition of the popular beginners' package, the ARRL uses a tested, new approach to teaching Morse code, and includes two 90-minute practice tapes, giving beginners about three times the instruction provided in past editions. Also, material has been added to the *Tune in the World* book to give prospective Novices the information they need to fulfill successfully the new requirements brought about by Novice Enhancement. For the complete story behind the making of

the new *Tune in the World* kit, and information on how to order your copy, see page 132, this issue.



Mystery Guest: No, this isn't why the W1AW Memorial Station's signal reports are always 599+. Actually, the ears belong to an unexpected guest who dropped by (literally) ARRL HQ. Have any idea who it might be? Turn to page 13 for the answer.

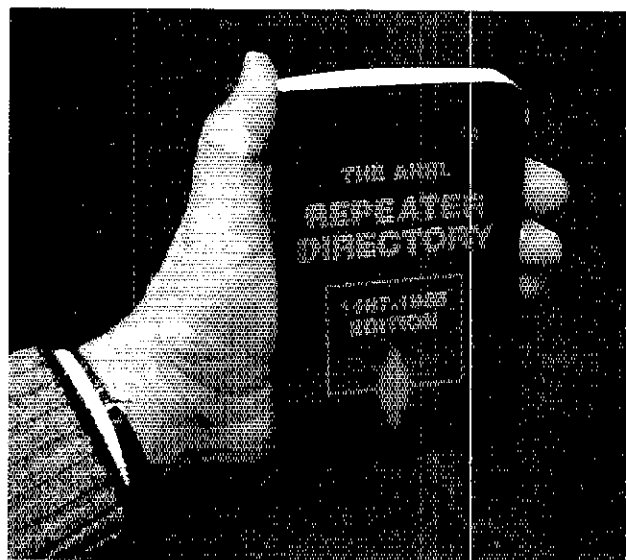


Lights, Camera, Action! By the time you read this, the filming for the new ARRL videotape, *The New World of Amateur Radio*, should be completed. Next comes the seemingly countless hours of scrutinizing miles of raw footage and editing it all down to a 30-minute presentation. The result is expected to be out sometime this fall. The production team for this videotape, headed by Roy Neal, K6DUE, is the same one that gave us other successful video projects, such as *Amateur Radio's Newest Frontier* and *SAREX* (Space Shuttle Amateur Radio Experiment). For this segment, Roy (left) and a film crew came to Newington in late April to interview ARRL Executive Vice President Dave Sumner, K1ZZ. The cameraman is George Barker, NA1F; Producer and Editor Frosty Oden, N6ENV, is not shown.

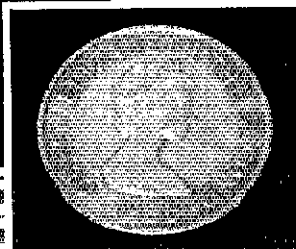
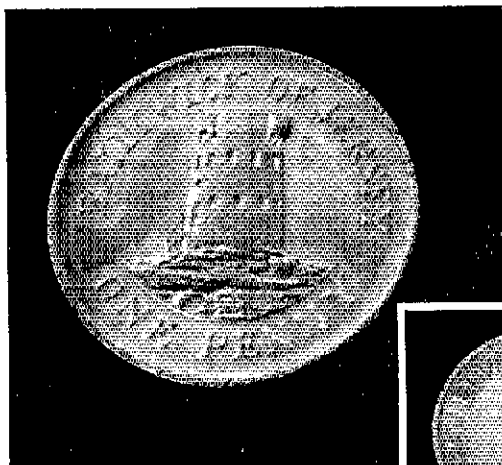
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Who runs the ARRL? You do—by electing Directors and Vice Directors to represent your interests on the ARRL Board. Nominations are now open for those positions in the Atlantic, Dakota, Delta, Great Lakes,

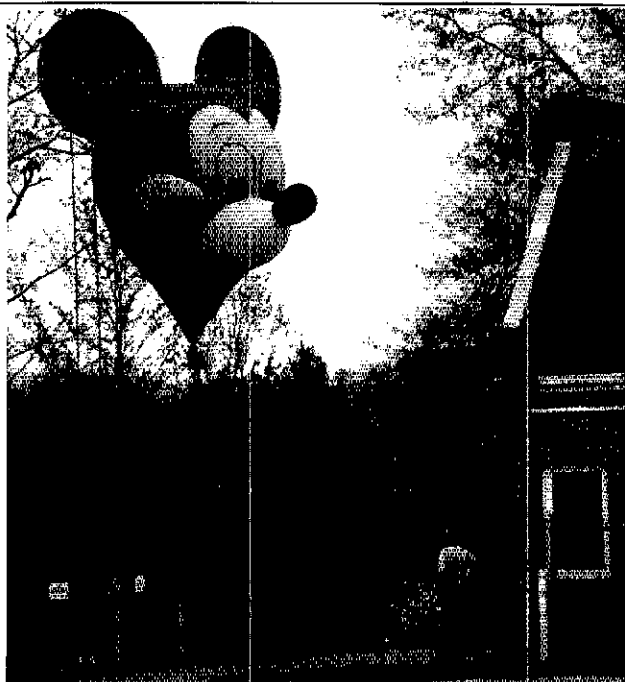
Midwest, Pacific and Southeastern Divisions. The term is for two years, beginning January 1, 1988. See this month's Happenings column for details on how to nominate the candidate of your choice.



Worth Repeating: Don't be fooled by its size. The 1987-1988 ARRL *Repeater Directory* is really quite a handful, boasting over 400 pages of useful information: operating practices, frequency coordinators, band plans, repeater lingo, how to register your repeater and, of course, more than 12,000 repeater listings. Perfect for the traveling ham, the *Directory* fits neatly into a shirt pocket—and at a cost of \$4, easily into your budget! See page 94, this issue, for ordering information.



Pennies from Jersey: This coin is rapidly becoming worth more than its face value. According to a local newspaper on the Channel Island of Jersey, Great Britain, this coin is the only one in the world that depicts an Amateur Radio station. Understandably, it has attracted the attention of more and more radio amateurs who want one as a keepsake. The "tails" side of the coin shows the Le Hocq Tower, at St Clement, Jersey, which is the headquarters and club station of the station of the Jersey Amateur Radio Society, GJ3DVC. By the way, the more-than-200-year-old Tower was featured on the cover of October 1984 QST, which reported on JARS members' and others' participation in the 1984 International DX Contest. Special thanks to Jock Fisher, VK1LF/GJ4MV, for alerting us and supplying a coin (via his niece, Hilary Bradley, of Jersey).

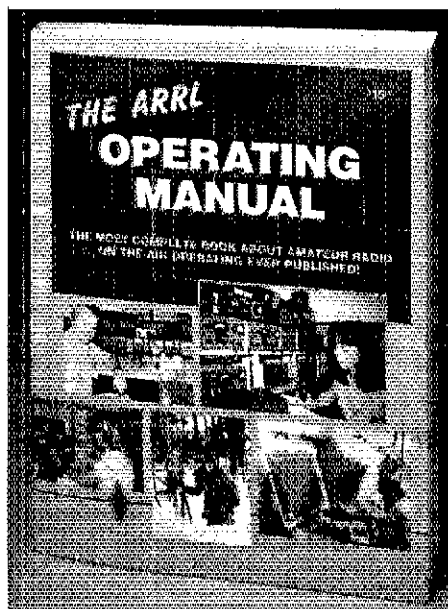


Hello, Mickey! Okay, so the ears were a dead give-away. Mickey Mouse and friends were in town in April and decided to take in some of the sights in their hot-air balloon, much to the delight of many area residents. That's W1AW station op Jeff Bauer, WA1MBK, giving Mickey a personal greeting on behalf of the ARRL. Volunteer Resources Manager Steve Place, WB1EYL, took the photos.

Think Safety This Field Day

It's been said many times before, but it's worth repeating. When you go out on Field Day, make sure you've covered all your bases: power lines, frayed cord, ungrounded equipment and lack of care in repairing gear can all be dangerous—and deadly. Whether this is your first Field Day or your 30th, be careful out there!

Operator's Ultimate Guide: The 1987 ARRL *Operating Manual* has more than three times the information offered in past issues. That translates into about 700 pages of completely updated information and all new chapters. New material includes awards from around the world in full color and how to qualify for every one of them, getting on packet radio, how to manage a DXpedition (in addition to tips on working the new ones from your home station), satellite work, world-wide band plans and frequency allocations, and never-before-available references, such as sunrise/sunset times for every DX country, Great Circle and regional maps, 8 different computer programs for logging and duping your contest QSOs, and long-term propagation paths from the continental US to 17 popular DX locations. No ham shack should be without one. See page 135, this issue, for ordering information.



Dayton Awards Winners

One of the highlights of the Dayton HamVention each April is the presentation of special awards to individuals who have distinguished themselves in the Amateur Radio community. This year's recipients are:

Carole Perry, WB2MGP, of Staten Island, New York—Radio Amateur of the Year. A middle-school teacher, Carole has used Amateur Radio in her classroom for many years.

Henry Oredson, W0RLI, of Westford, Massachusetts—Technical Achievement. Hank developed the software for a mailbox system, known as bulletin boards, to send and receive messages using packet radio.

Arthur Gentry, W6MEP, of Northridge, California—Special Achievement. Art was instrumental in the early research and development of Amateur Radio repeaters.

Congratulations, Carole, Hank and Art!



Ham, ex-Ham Share Inventor of Year Award

William R. Short, N1KE (shown here), of Wellesley, Massachusetts, and a loud-speaker pioneer, Dr Amar G. Bose (ex-W3KMC), have been chosen as recipients of the IPO Inventor of the Year Award for 1987. IPO (Intellectual Property Owners, Inc) is a nonprofit association that represents many individuals and organizations who own patents, trademarks and copyrights. Short and Bose were cited for inventing a compact, high-efficiency loudspeaker system. Short, who holds one US patent and has two pending, is a graduate of the Massachusetts Institute of Technology (MIT), where he received a PhD (1980) in active noise attenuation. He is currently President of the Bose Corporation, a manufacturer of high-fidelity equipment. Bose, founder and current Chairman of the Board for Bose Corporation, is a former professor of electrical engineering at MIT and holds numerous patents.

Trivia Quiz Answer

Last month, we asked you what calls the League's cofounder, Hiram Percy Maxim, held in addition to the well-known W1AW. There were three: 1WH, 1ZM and 1AW.

League Lines

220 Update: On May 21, the ARRL filed with the FCC its comments in Docket 87-14. The text ran to 49 pages, with statistical exhibits totaling another 31 pages. Copies of these comments have been sent to ARRL officials, and are available to members upon request—please send a 9 × 12 envelope with \$1.41 to cover postage.

Over 2000 clubs and individuals have filed comments with the FCC. As of May 27, the comments had filled 16 volumes and the FCC Docket Room was three weeks behind in filing the comments!

PRB-1 Seminar at National Convention: A seminar entitled “Land Use Regulation of Federally Licensed Communications Facilities and the Doctrine of Federal Preemption” will be offered at the ARRL National Convention in Atlanta Saturday, July 11, beginning at 10 AM in room 270 of Exhibit Hall “F.” Open to all convention attendees, the four-hour seminar is primarily aimed at ARRL Volunteer Counsels, attorneys and municipal officials. The panelists include members of the League’s Legal Strategy Committee and an antenna expert from HQ.

Registration for Continuing Legal Education (CLE) credit for attorneys will be handled at the door. The cost for CLE participants and anyone else who wants a copy of the course materials is \$10. Admission is free to convention attendees.

Topics include: negotiation of zoning ordinances and building code provisions; variances for communications facilities; covenants and the limitation of private land use regulation of communications facilities; litigation strategies in representing the communications user; and engineering considerations in land use planning relative to communications facilities.

Amateur Radio milestones—HQ plans to cover them in a book commemorating ARRL’s 75th anniversary, and we need your help to do the job right. HQ is looking for reports of contributions made by Amateur Radio to technology, public service and personal development between 1945 and now—reports confirming Amateur Radio’s strong tradition of living up to its basis and purpose as set forth in Section 97.1 of the FCC rules. What part has Amateur Radio played in technological innovation, refinement, development and research since 1945? What communications milestones have been credited to Amateur Radio in emergency and other public-service work, and for the enhancement of people-to-people communication, including the increasing participation in Amateur Radio by the handicapped? Amateur Radio serves as the springboard for many technical careers, as well as contributing to technological awareness and education—what hams do you know, and know of, who can credit Amateur Radio with getting them started in a technical career? Put on your “cub reporter” hat and *tell us the “what, why, when, how, who, and where”* about each Amateur Radio milestone you’d like to see reported in ARRL’s 75th anniversary book. Now that you’re a reporter, here’s your deadline: *Please send your information to “Milestones,” ARRL HQ, by October 1, 1987.*

The 6th ARRL Amateur Radio Computer Networking Conference will be held on August 29, 1987, from 10 AM to 6 PM, at the TRW Space and Technology cafeteria conference facility in Redondo Beach, California, about 3 miles southeast of the Los Angeles International Airport (LAX). The conference is being hosted by the TRW ARC and the Southern California Digital Communications Council, and will be held in conjunction with the TRW ARC swapmeet which begins at 7 AM. For details, watch *Gateway*, or write Maty Weinberg at ARRL HQ.

Job opening at HQ: HQ is looking to fill the newly created position of Assistant Manager of the Regulatory Information Branch (RIB). This branch is sometimes called the “heartbeat” of HQ (with no apologies to Chevrolet) since its main function is to keep the membership informed of the latest amateur-related news and FCC proposals and rulemakings. The person who fills this position will compile, with the help of the RIB Manager, the biweekly *ARRL Letter* and be familiar with FCC rules to assist with membership inquiries.

This position requires strong editing and writing skills and experience in the many facets of Amateur Radio. A degree in journalism or liberal arts, or equivalent experience, is necessary. The starting salary range is \$16,120-19,344 depending on experience. Contact Phil Sager, WB4FDT, RIB Manager, at HQ for more information.

An opening exists in the Technical Department at HQ for a laboratory engineer. We are looking for a licensed amateur with a BSEE degree, or equivalent experience. The ideal candidate would have an R&D background, modem design experience and an ability to work with experimenters. Annual salary to be determined. Contact Chuck Hutchinson, K8CH.

HQ is also looking for a new Public Service Manager. This position is responsible for the National Traffic System and the Amateur Radio Emergency Service. The Public Service Manager is responsible for the Public Service column in *QST*, contributes to the ARRL *Section Leader* and *Field Forum* newsletters, and oversees the compiling and reporting of all NTS and ARES statistics. The ideal candidate will hold a bachelor’s degree in communications, journalism or liberal arts and have strong writing and oral communications skills, with some experience in the ARRL Field Organization. The starting salary range is from \$18,954-22,750 depending on experience. Contact Rick Palm, K1CE, at HQ for further information.

We’re looking for a bright, assertive individual to fill an exciting new position in our Publication Sales Branch. The successful candidate will need supervisory experience along with two years of marketing education or equivalent in order to supervise our publication sales staff, and market our publications. Amateur Radio background desirable. Salary range for this position \$16,120-22,568. Please submit resume to Debra Jahnke, Circulation Manager, ARRL, 225 Main St, Newington, CT 06111.

What will this year’s well-dressed ARRL QSL Bureau Managers and assistants, A1RS stations, Volunteer Counsels, Volunteer Examiners and Technical Advisors be wearing? Attractive, new official ARRL call sign badges! Thanks to a recent ARRL Board decision, QSL Bureau volunteers will be sporting rust-color badges; A1RS appointees, burgundy; Volunteer Counsels, purple; Volunteer Examiners, tan; and Technical Advisors, brown.

Write HQ for a new badge application and ordering instructions. Please include an SASE.

The Radio Society of Great Britain (RSGB) advises that effective June 1, 1987, British amateurs are authorized to use the entire 50-52 MHz band. Limitations: 100 watts ERP, horizontal polarization and a maximum antenna height of 65 feet.

Some Reflections on Vertical Antennas

By C. J. Michaels, W7XC
12431 N 24th Ave
Phoenix, AZ 85029

Many amateurs have observed that, on a DXpedition, a simple vertical antenna on an ocean beach performs beautifully, while their own vertical "radiates equally poorly in all directions." Here's why.

Does your vertical radiate the way you'd like it to? If your answer is no, the reason may be the ground in your area. A quarter-wave vertical over ideal earth has the radiation pattern shown by the solid line in Fig 1. Over real earth, however, the pattern is modified (because of the lossy nature of some kinds of ground) to look more like the pattern shown by the dotted line in the same diagram. In this case, the low-angle radiation, which is so desirable in a vertical, is not achieved.

Why Is This So?

To understand why the desired low-angle radiation is not realized, examine Fig 2A. Radiation from each antenna segment reaches a point P in space by two paths: one directly from the antenna, the other by reflection from the earth. (Note that P is so far away that the slight difference in

angles is insignificant.) If the earth was a perfectly conducting surface, there would be no phase shift of the vertically polarized wave upon reflection; the two waves would add together with some phase difference because of the different path lengths. This is what changes the radiation pattern of the antenna from what it would be in free space. Now consider a point P that is close to the horizon, as in Fig 2B. The path lengths are almost the same, so the two waves add together, producing a maximum at zero angle of radiation. The arrows on the waves point both ways since the process works similarly for transmitting and receiving.

With real earth, however, the reflected wave undergoes a change in *amplitude and phase* in the reflection process. Indeed, at a low enough angle, the phase of the reflected wave will actually change by approximately 180°, and its magnitude will

then *subtract* from that of the direct wave. At zero angle, it will be equal in amplitude, but 180° out of phase with the direct wave and complete cancellation will result, inhibiting any radiation or reception at that angle.

The Pseudo-Brewster Angle

Most fishermen have noticed that when the sun is low, its light is reflected from the water's surface as glare, obscuring the underwater view. When the sun is high, however, the sunlight penetrates the water and reveals the wily trout. The angle at which this transition takes place is known as the Brewster angle, named for the Scottish physicist, Sir David Brewster (1781-1868).

A similar situation exists in the case of a vertically polarized antenna: The RF energy behaves as the sunlight in the optical system, and the earth under the antenna

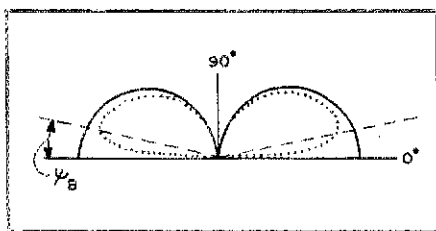


Fig 1—E-field radiation pattern for a quarter-wave vertical. Solid line shows pattern for perfect earth, dotted line for real earth. ψ_B is the pseudo-Brewster angle—where the real earth pattern is 6 dB down from the perfect earth pattern.

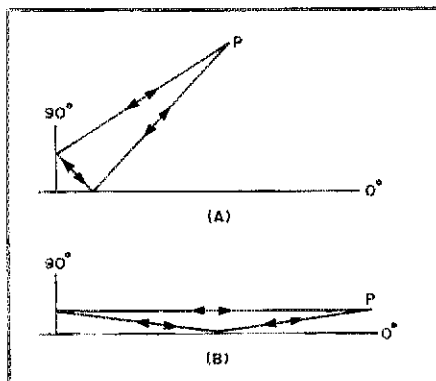


Fig 2—The direct wave and the reflected wave combine at point P to form the pattern (P is very far from the antenna). In A, the two paths differ appreciably in length, while in B the two path lengths are nearly equal.

acts as the water. The pseudo-Brewster angle (PBA, also referred to as ψ_B) is the angle at which the reflected wave is 90° out of phase with respect to the direct wave.¹ Below this angle, the reflected wave is between 90° and 180° out of phase with the direct wave, so some degree of cancellation takes place. The largest amount of cancellation occurs near zero degrees, and steadily less cancellation occurs as the PBA is approached from below.

The factors that determine the PBA for a particular location are not related to the antenna itself, but to the ground around it. The first of these factors is *conductivity*, G , which is a measure of the ability of the soil to conduct electricity. Conductivity is the inverse of resistance. The second factor is the *dielectric constant*, k , which is a unitless quantity that deals with the capacitive effect of the earth. For both of these quantities, the higher the number, the better the soil (for antenna purposes). The third factor in determining the PBA for a given location is the *frequency of operation*.

Vertically polarized radiation at the PBA will be 6 dB down from the perfect-earth pattern. At angles below the PBA, the

reflected wave subtracts from the direct wave, causing the radiation intensity to fall off rapidly. By the same token, above the PBA, the reflected wave adds to the direct wave, and the radiated pattern approaches the perfect-earth pattern. The PBA is shown in Fig 1.

In plotting antenna radiation patterns over real earth, any waves to be reflected by a medium are multiplied by a factor called the reflection coefficient, and then added to the direct wave to get the composite. The reflection coefficient consists of an attenuation factor, A , and a phase angle, ϕ , and is usually expressed as $A \angle \phi$. (ϕ is always a negative angle, since earth acts like a lossy capacitor in this situation.) An equation exists to calculate the reflection coefficient for earth of given conductivity and dielectric constant at any frequency, as a function of wave angle (see Eq 1 in the appendix). Solving the equation for several points to get a good idea of what effect the earth has at a particular location is a long and tedious process unless a computer is used.

Fig 3 shows an example of a curve generated using the solutions to this equation. This example shows the reflection coefficient as a function of wave angle over average earth at 21 MHz. Note that as the phase curve, ϕ , passes through 90° , the attenuation curve, A , passes through a minimum at the same wave angle, ψ . At this angle, the reflected wave is not only very low in amplitude, but is at a phase angle of 90° with respect to the direct wave so that it neither opposes nor aids the direct wave. In the case illustrated in Fig 3, this wave angle is about 15° .

How Does PBA Vary with Earth Quality?

Even with a computer it is quite a task to search for the 90° phase point or the attenuation curve minimum for a wide variety of earth conditions. Fortunately, there is an equation (see Eq 2 in the appendix) that can be used to calculate the PBA directly. I have solved this equation over the 1.8- to 30-MHz range for several typical real-earth conditions. The results are shown in Fig 4. As expected, poorer earths yield higher PBAs. Unfortunately, at the higher frequencies (where we would most like a low angle of radiation for DX work), the PBAs are highest.

Table 1 shows the results of transatlantic tests in which the angle of arrival was determined for each of the listed bands.² For example, at 21 MHz, 50% of the signals from England arrived in New Jersey at an angle of 7° or less, while 99% arrived at an angle of 12° or less. Assuming earth of poor quality ($k = 12$, $G = 2$ mS/m), Fig 4 shows that with a PBA of approximately 17° , virtually all of the signals will fall below the PBA and poor results over this path can be expected. Even with earth of very good quality, less than 50% of the signals will arrive above the PBA (10°).

This is not quite as bad as it may sound, because signals at the PBA will be down only 6 dB with respect to perfect earth. However, on a beach overlooking salt water ($k = 81$, $G = 5000$ mS/m) virtually all signals arriving at this angle are received with little attenuation. Nearly all power radiated down to the horizon will propagate well, and good signals are received by the English station similarly situated. The PBA is the same for both transmitting and receiving.

How Can I Relate This to My Location and Bands?

Table 2 lists the physical descriptions of various kinds of earth with their respective conductivities and dielectric constants.³ Note that, in general, the dielectric constants and conductivities are higher for better earths. This enables the labeling of the earth characteristics as extremely poor, very poor, poor, average, very good, and so on, without the complications which would result from treating the two parameters independently.

Fresh water and salt water are special cases; in spite of high resistivity, the fresh-water PBA is 6.4° , and is just about independent of frequency below 30 MHz. Salt water, because of its extremely high conductivity, has a PBA that never exceeds 1° in this frequency range. The extremely low conductivity listed in the last case on Table 2 results more from the clutter of surrounding buildings and other obstructions than any actual earth characteristic. If you correlate your location with one of the earth descriptions listed and select the quality that best fits it, you can determine the PBA for your earth from Fig 4 (by interpolating it from the areas between the curves if necessary).

How about Horizontal Antennas?

The situation for horizontal antennas is

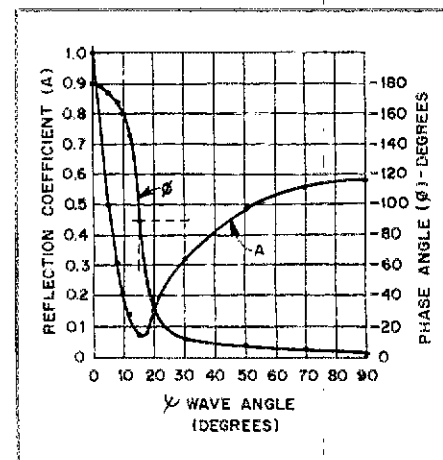


Fig 3—Reflection coefficient for vertically polarized waves. A and ϕ are magnitude and angle for wave angles ψ . This case is for average earth ($k = 13$, $G = 5$ mS/m) at 21 MHz.

¹Notes appear on page 19.

Table 1
Measured Vertical Angles at Which Signals from England Arrived in New Jersey

Frequency (MHz)	Angle Below Which Signals Arrived 99% of the Time (Degrees)	Angle Below Which Signals Arrived 50% of the Time (Degrees)	Angle Above Which Signals Arrived 90% of the Time (Degrees)
7	35	22	10
14	17	11	6
21	12	7	4
28	9	5	3

Table 2
Conductivities and Dielectric Constants for Common Types of Earth

Surface Type	Dielectric Constant	Conductivity (mS/m)	Quality
Fresh water	80	1.0	
Salt water	81	5000.0	
Pastoral, low hills, rich soil (typ Dallas, TX to Lincoln, NE areas)	20	30.3	Very good
Pastoral, low hills, rich soil (typ Ohio and Illinois)	14	10.0	
Flat country, marshy, densely wooded (typ Louisiana near Mississippi River)	12	7.5	
Pastoral, medium hills and forestation, (typ Maryland, Pennsylvania and New York, exclusive of mountains and coastline)	13	6.0	
Pastoral, medium hills and forestation, heavy clay soil (typ central Virginia)	13	5.0	Average
Rocky soil, steep hills, (typ mountainous areas)	12-14	2.0	Poor
Sandy, dry, flat, coastal	10	2.0	
Cities, industrial areas	5	1.0	Very poor
Cities, heavy industrial	3	0.1	Extremely poor

Attenuation increases with progressively poorer earth types. Consider the role that earth attenuation plays in pattern development with respect to dipoles spaced one-half wavelength above ground. Where the out-of-phase reflection from a perfectly conducting surface would normally create a null in the pattern directly above the antenna, a "filling in" of this null occurs because of the ground losses that prevent perfect reflection over a real ground.

Some say that the "actual earth" lies considerably below the physical surface. This is simply not true. If it were, then our antenna spaced one-half wavelength above ground would develop the multiple lobes associated with higher antennas. The earth is right where you see it, and the "image" antenna which is used to calculate the pattern is mathematically located exactly as far below the surface as the actual antenna is above the surface. In calculating the broadside radiation pattern of a horizontal half-wave dipole, the perfect-earth image current (equal to the true antenna current, but 180° out of phase with it) is multiplied by the horizontal reflection coefficient given in Fig 5. (This can be calculated by Eq 3 in the Appendix.) The result is then added to the direct wave to get the composite.

Horizontally polarized antennas develop a null at zero angle of radiation because of out-of-phase reflection canceling the direct wave. As we depart from zero angle, however, there is a slight filling-in effect so that with other than perfect earth, somewhat lower angles of radiation are effected. Therefore, a horizontal antenna may conceivably outperform a vertical for low-angle DX work over some earths at the higher frequencies.

How Deep Do These Effects Go?

In considering earth characteristics, questions about depth of RF current penetration often arise. For instance, if you have a 6-foot layer of soil overlying a highly resis-

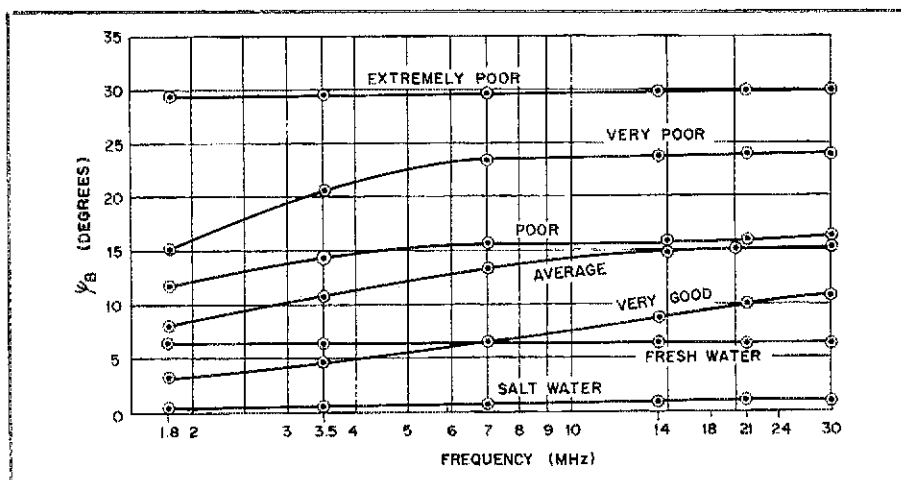


Fig 4—Pseudo-Brewster angle for various qualities of earth over the 1.8- to 30-MHz frequency range. Note that the frequency scale is logarithmic. The curves were calculated with Eq 2 using data from Table 2.

somewhat different from that of verticals. Fig 5 shows the curves for the horizontally polarized reflection coefficient over average earth at 21 MHz. Note that in this case, the

phase angle departure from 0° never gets very large, and the attenuation factor that causes the most loss for high-angle signals approaches unity for low angles.

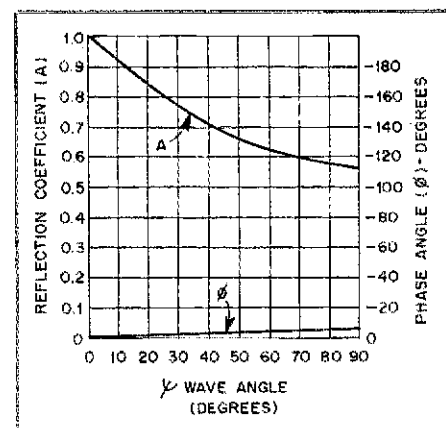


Fig 5—Reflection coefficient for horizontally polarized waves (magnitude A at angle φ), at 21 MHz over average earth ($k = 13$, $G = 5$ mS/m).

tive rock strata, which material dominates? That depends on the operating frequency, the soil and rock dielectric constants, and their respective conductivities. Eq 4 in the appendix can be used to calculate the current density at any depth. By some manipulation of these equations, the depth at which the current density is some fraction of that at the surface can be calculated. I have calculated the depth at which the current density is 37%, ($1/e$), of that at the surface. Fig 6 shows the results of the calculations over the 1.8- to 30-MHz frequency range for various types of earth. For example, substantial RF currents flow down to about 3.3 feet in very good earth. This depth goes to 13 feet in average earth and as far as 40 feet in very poor earth. Thus, if the overlying soil is rich, moist loam, the underlying rock strata is of no concern. However, if the soil is only average, the underlying rock may constitute a major consideration in determining the PBA and the depth to which the RF current will penetrate.

The depth in fresh water is about 156 feet and is nearly independent of frequency in the amateur bands below 30 MHz. In salt water, the depth is about 7 inches at 1.8 MHz and decreases rather steadily to about 2 inches at 30 MHz. Dissolved minerals in moist earth increase its conductivity.

Many amateurs will find the depth of penetration column in Fig 6 hard to believe since they have been told that skin effect confines RF current flow close to the surface of a conductor. While this is true, the earth is so lossy that RF current penetrates it to much greater depths than in most other conductors. The depth of penetration of RF current is a function of frequency as well as earth type. Thus, the only cases in which most of the current flows near the surface are with very highly-conductive surfaces (such as salt water), and at VHF and above.

The relative roles of the dielectric constant and the conductivity in determining the PBA and depth of penetration interested me. In order to investigate this question, I postulated four fictitious earth types using high and low dielectric constants and high and low conductivities. The results over the 1.8- to 30-MHz range indicate that the earth conductivity is the more important parameter over the range most likely to be encountered in real earth. However, as frequency increases, the role of dielectric constant becomes more significant.

What Can I Do about the PBA?

Unfortunately, there is virtually nothing that you can do about your earth conditions—short of moving to an area with better ground. I live in Phoenix, Arizona, in the Sonoran Desert. As one local wag puts it, "Establishing ground here is like trying to work over a pile of broken beer bottles." After a series of tests, I have found that horizontal antennas work best on 10, 15 and 20 meters. I have a horizontal and

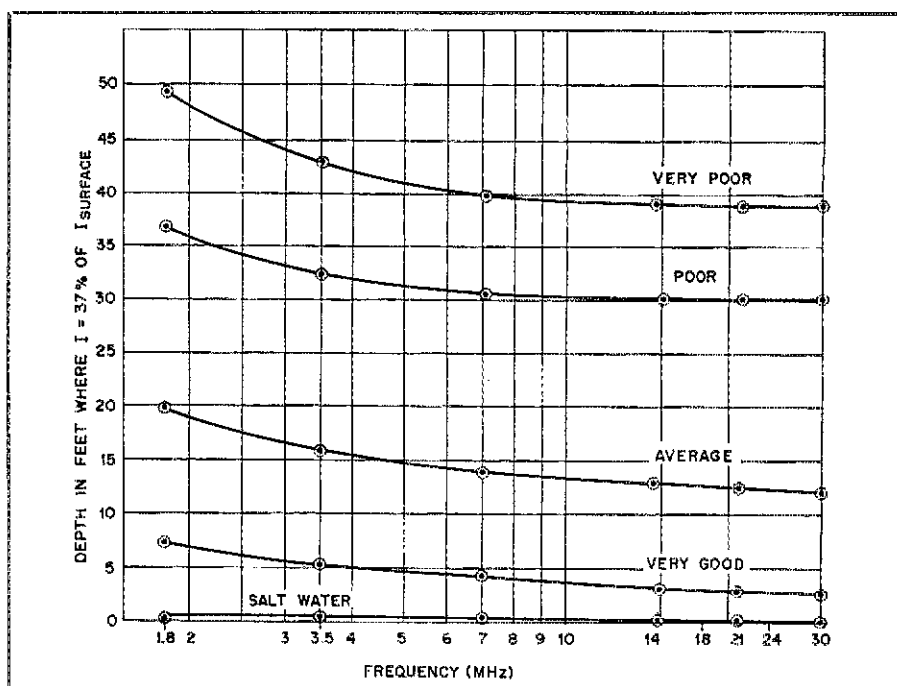


Fig 6—Depths at which the current density is 37% of that at the surface for different qualities of earth over the 1.8- to 30-MHz frequency range. The depth for fresh water (not plotted) is 156 feet and almost independent of frequency below 30 MHz (see text).

a vertical on 40 meters and use verticals exclusively on 80 and 160 meters. My vertical on 40 seldom has any advantage over my horizontal at less than 1500 to 2000 miles (the horizontals are up 24 feet).

A ground radial system is often used to reduce the losses in the near field of a vertical antenna. The radial system does just that—unfortunately, this has little to do with the low-angle radiation characteristics of the antenna, because the area of ground reflection lies quite a bit farther out from the antenna than any practical ground screen or radial system can (often as far as 100 wavelengths). This should not discourage you from installing the best possible ground-radial system for your vertical, however, because by keeping the radiation losses minimal, your vertical will be more efficient and consequently radiate better than it would without any radial system—regardless of the quality of your earth.

As you can see, a vertical may not be your best alternative for HF DXing, and now you know why and how you need to evaluate your particular situation before choosing an antenna for a particular application. The best thing to do is to erect a variety of vertical and horizontal antennas, and choose the best one with which to chase that next DXpedition.

In selecting a location for a vertical, the best sites are marshy areas and those overlooking water, although radiation towards the inland side will not be as good as the over-water path. Small islands are ideal, especially ones that do not rise above the water to any great elevation. Some I have visited which I can recommend are the

Pacific islands of Hull, Gardner, Palmyra, Johnston, Funa Futi and Puka Puka.

APPENDIX

Reflection Coefficient for Vertically Polarized Waves*

$$A \angle \phi = \frac{k' \sin \psi - \sqrt{k' - \cos^2 \psi}}{k' \sin \psi + \sqrt{k' - \cos^2 \psi}} \quad \text{Eq 1}$$

where

$A \angle \phi$ = reflection coefficient
 ψ = wave angle

$$k' = k - j \left(\frac{1.8 \times 10^4 \times G}{f} \right)$$

k = dielectric constant of earth (k for air = 1)

G = conductivity of earth in S/m

f = frequency in MHz

j = complex operator ($\sqrt{-1}$)

Pseudo-Brewster Angle*

$$\psi_B = \arcsin$$

$$\sqrt{\frac{k - 1 + \sqrt{(k^2 + k^2)^2 (k - 1)^2 + k^2 [(k^2 + k^2)^2 - 1]}}{(k^2 + k^2)^2 - 1}} \quad \text{Eq 2}$$

where

ψ_B = pseudo-Brewster Angle

k = dielectric constant of earth

$$x = \frac{1.8 \times 10^4 \times G}{f}$$

G = conductivity of earth in S/m

f = frequency in MHz

Reflection Coefficient for Horizontally Polarized Radiation*

$$\angle \phi = \frac{\sqrt{k' - \cos^2 \psi} - \sin \psi}{\sqrt{k' - \cos^2 \psi} + \sin \psi} \quad \text{Eq 3}$$

where

A/ϕ = reflection coefficient

ψ = wave angle

$$k' = k - j \left(\frac{1.8 \times 10^4 \times G}{f} \right)$$

k = dielectric constant of earth

G = conductivity of earth in S/m

f = frequency in MHz

j = complex operator ($\sqrt{-1}$)

Variation of Earth Current Density with Depth*

$$\frac{\text{Current Density at Depth } D}{\text{Current Density at Surface}} = e^{-\rho D} \quad \text{Eq 4}$$

where

$$\rho = \left[\frac{X \times B}{2} \times \left(\sqrt{1 + \frac{G^2 \times 10^4}{B^2}} - 1 \right) \right]^{1/2}$$

d = depth of penetration in cm

e = natural logarithm base (2.718)

$X = 0.008 \times \pi^2 \times f$

$B = 5.56 \times 10^{-5} \times k \times f$

k = dielectric constant of earth

f = frequency in MHz

G = conductivity of earth in S/m

Notes

*"Pseudo" is used here because the RF effect is similar to the optical effect from which the term gets its name.

²G. Hall, ed., *The ARRL Antenna Book*, 14th ed. (Newington, CT: The American Radio Relay League, Inc., 1982), p. 1-10.

³Adapted from "Standards of Good Engineering Practice Concerning Standard Broadcast Stations," *Federal Register*, July 8, 1939, p. 2862.

⁴This is the depth (often referred to as "skin depth" in the literature), where the current density would be zero if it was distributed uniformly instead of exponentially. (The $1/e$ factor appears in many physical situations. For instance, a capacitor charges to within $1/e$ of full charge within one RC time constant, and so on.) At this depth, since the power loss is proportional to the square of the current, approximately 91% of the total power loss has occurred, as has most of the phase shift, and any current flow below this level is negligible.

⁵F. E. Terman, *Radio Engineers' Handbook*, 1st ed. (New York, NY, London: McGraw-Hill Book Co., 1943), p. 699.

⁶Terman, p. 708.

Charlie Michaels was born in Philadelphia in 1923 and was first licensed as W3IGR in 1939. After graduating from high school in 1941, he joined the US Navy as a radioman and was aboard the USS Swan in Pearl Harbor on December 7 of that year. He later attained the Radioman First Class distinction. Charlie attended the University of Oklahoma, the University of Wisconsin and the University of Pennsylvania, where he earned a BSEE degree in 1948 and did graduate work in physics, electromagnetic radiation, ac networks and feedback theory.

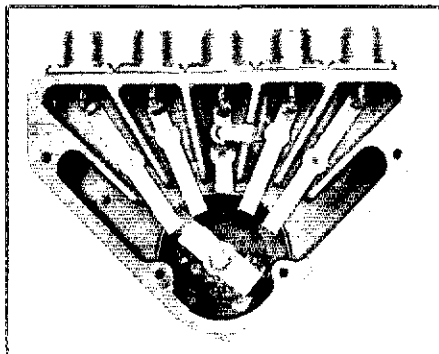
In 1948, Charlie joined the Univac Division of Sperry Rand (then Eckert-Mauchly Computer Corp) as a Computer Design Engineer and was later promoted to Chief Engineer, Systems. Charlie also worked as Director of Engineering for Honeywell Labs in Waltham, Massachusetts, and held positions with GE Computer Operations in Phoenix and Xerox Corp before retiring.

Charlie has been an active amateur since high school and has held the calls W3IGR, K1EUL, W7GHA, W2GFE, W7KWU and now W7XC. Charlie has been an ARRL member since 1943 and is a Life Member. His other hobbies include amateur astronomy, fishing, playing the guitar and organ, and camping in his travel trailer.

New Products

ALPHA DELTA COMMUNICATIONS DELTA-4 FOUR-POSITION COAXIAL CABLE SWITCH

□ The Model Delta-4 switch is a precision 50-ohm coaxial switch using the latest high-technology design (shown in photo with cover removed). It features four active switch positions, two on each side of a common center connector. An internally mounted, replaceable ceramic gas tube Arc-Plug® cartridge pill is provided for lightning surge protection.



When the knob points to the center (COM) position, all antenna circuits are internally disconnected and grounded. When the knob is in any of the four active positions, the unused antenna ports are grounded. The active position circuit is continuously protected by the Arc-Plug pill.

Specifications:

Frequency	SWR	Loss (dB)	Isolation (dB)
30 MHz	Less than 1.1:1	0.1	Greater than 60
150 MHz	Less than 1.3:1	0.15	Greater than 50
450 MHz	Less than 1.4:1	0.5	50

Power rating: 1500 W RF

Impedance: 50 ohms

Connectors: SO-239

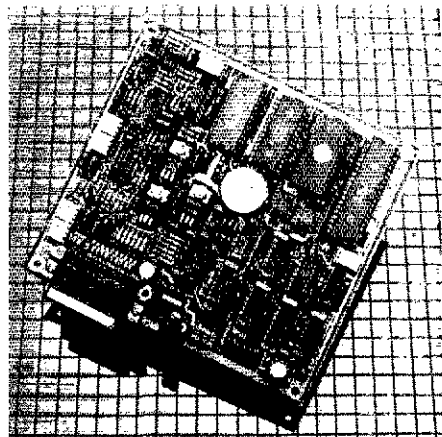
The Delta-4 coaxial switch is available from authorized dealers, or for information, contact Alpha Delta Communications, Inc, PO Box 571, Centerville, OH 45459. Suggested retail price, \$69.95.—Bruce O. Williams, WA6IVC

S-COM INDUSTRIES "5K" REPEATER CONTROLLER

□ The "5K" is a low-cost, compact addition to S-COM's line of repeater controllers. The state-of-the-art CMOS microprocessor design supports both a repeater and a control receiver, and requires only 60 mA at 12 V dc. Applications include control of main-site repeaters, remote receiver links, portable and emergency repeaters.

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The high-quality G10 glass-epoxy PC-board measures 5.5 x 6 inches, with the tallest component only 0.5 inch above the board. Options include full IC socketing, 1.75 x 19-in rackmount cabinet, wall-mount power supply and audio delay module.

For information, contact S-COM Industries, PO Box 8921, Fort Collins, CO 80525. For orders, call toll-free 800-621-8387, ext 244. For technical information, call 303-493-8316. List price, with all connectors and manual, and one-year warranty, is \$179.—Bruce O. Williams, WA6IVC

Strays



I would like to get in touch with...

□ anyone with information on a circuit for the JMR boom mike. Carl Thompson, WA8AAT, 0-12657 8th Ave NW, Grand Rapids, MI 49504.

□ hams interested in foxhunting (direction finding) and exchanging activities and technical information. Mike Brost, WA9FTS, 5127 N Monterey Ave, Norridge, IL 60656.

□ ARRL members in New England who would like to be on the mailing list for the New England Division newsletter. Director Tom Frenaye, K1KI, 23 Pinehurst Rd, Unionville, CT 06085.

□ anyone interested in starting a CW net on the 40-m Novice band to collect states for WAS award. Send SASE to Scott Davis, WB3CZF, 111 Glenwood Rd, Bel Air, MD 21014.

□ radio operators or engineers who served in the 25th Ferrying Squadron, Gore Field, Great Falls, Montana, Sep 1942-Feb 1944. Robert Roberts, Jr, K3ONU, PO Box 781, Easton, MD 21601.

□ hams from US Marine Corps Squadron VMSB 331 who served in the Pacific Feb 1943-Jan 1945. E. J. Smolarek, KA2JNV, 32 Hempstead Rd, Spring Valley, NY 10977.

Improving the K1FO 8874 432-MHz Amplifier

The author of a *QST* classic shares some "how-to" tips on improving his design.

By Steve Powlisken, K1FO

816 Summer Hill Rd
Madison, CT 06443

More than 12 years ago I built a 432-MHz amplifier around the EIMAC 8874 triode. A write-up on this 500-W-output amplifier originally appeared in October 1979 *QST* and in several editions of *The ARRL Handbook*.^{1,2} This article describes a number of changes and improvements I have made to the amplifier over the years. In addition, I will provide some important construction information to help those building copies of the amplifier. You will need a copy of the original *QST* or *ARRL Handbook* article to follow the discussion here.³

Operation with Newer Tubes

The most significant change to the amplifier is necessary because of a revision EIMAC made in the construction of the 8874 starting around 1974, after I had completed my amplifier. Fig 1 shows the original 8874, and Fig 2 shows the newer version. Changes to the grid ring and insulator at the tube base make it easy to distinguish between the two versions.

This physical change had an effect on the electrical characteristics of the 8874: The newer tube has greater input capacitance (20.5 pF nominal versus 19.5 pF), and the output capacitance is lower (6.0 pF versus 7.0 pF). In addition, the new grid ring made for a slightly different seating of the tube in the socket and grid collet I had used in the 432-MHz amplifier. The input and output circuits of my amplifier have enough tuning range to accommodate

either tube. When I first tried a new style 8874 in the amplifier, however, I was in for a surprise.

The latest amateur power regulations (1500-W PEP output) encouraged me to try to squeeze a few more watts out of the amplifier. I had been running it with 2000 V on the plate at 500-mA plate current for 1 kW input and 530 W output. I decided to raise the plate voltage to the 2200 V maximum recommended by EIMAC. At the same time, I decided that after nine years of service I would put a new tube in the amplifier.

Operation with the new tube at 2200 V was a shock! I discovered that there was significant tuning drift—resulting in close to 100-W shift in power output from cold to hot. Also, the tuning point for maximum power output was not even close to the

plate-current dip. Below 1800 V, amplifier operation with the new style tube was much more stable. Power gain with the new tube was also higher than expected. These symptoms indicated an amplifier that was not neutralized.

At 432 MHz, the 8874 is below, but close to, its self-neutralized frequency. This indicated that the simplest way to neutralize the amplifier would be to adjust the grid inductance. I insulated some of the grid-collet contact fingers with Teflon® tape in various patterns until maximum output coincided with plate current dip. Power shift was now less than 20 W at full output. Power gain dropped by about 2 dB, into the expected range. Satisfied with the operation, I broke off the unwanted fingers from the grid ring. The grid collet now has contact fingers in the pattern shown in

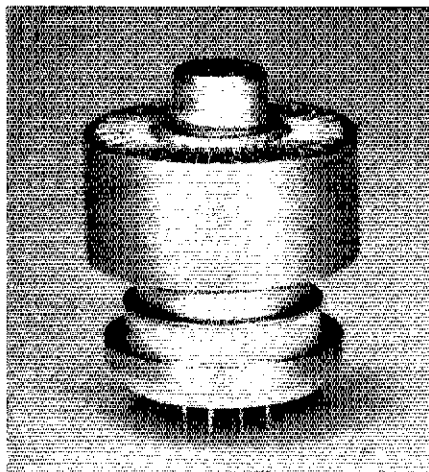
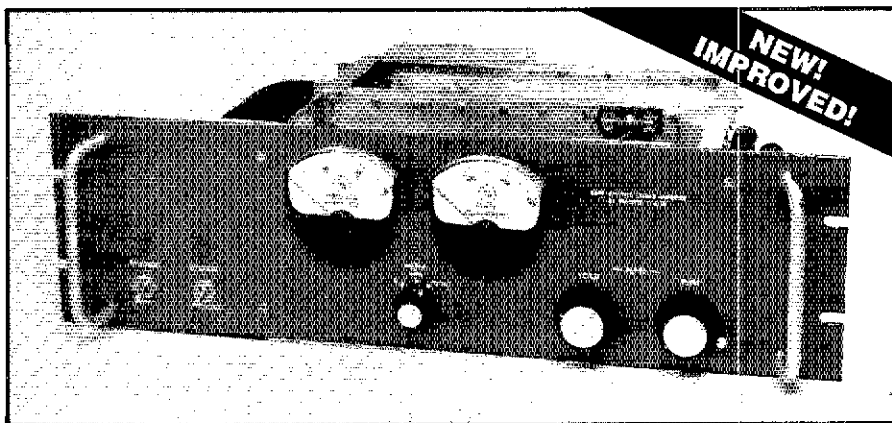


Fig 1—The K1FO 432-MHz amplifier was designed around the original 8874 tube pictured here.

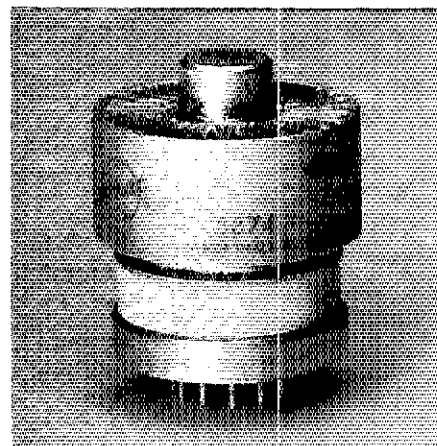


Fig 2—Newer 8874s look similar to tubes of the 4CX250 series. Changes in the physical construction necessitate changes to the 432-MHz amplifier design.

¹Notes appear on page 23.

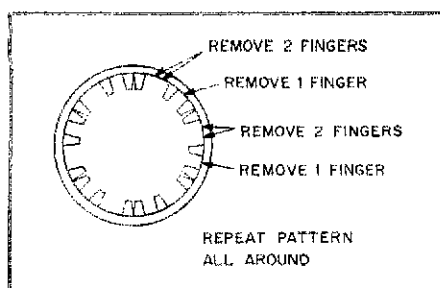


Fig 3—To neutralize the 432-MHz amplifier with a newer style 8874, you must break off fingers from the grid collet in this pattern. See text.

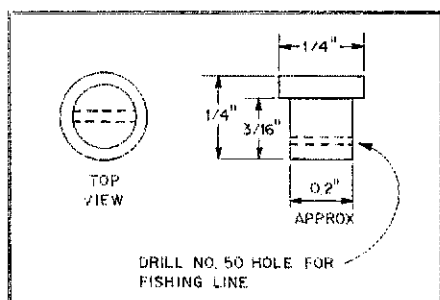


Fig 4—Details of the Teflon button insulator used to attach fishing line to the flapper capacitors.

Fig 3. To modify the collet, first break off every third contact finger. Next, break off one finger from every other remaining pair of fingers. I tried three different new style tubes, and all gave good results with the modified grid collet.

Component Values

Bias Circuit. I experimented with the cathode bias circuitry and decided on a 4.7-V, 10-W Zener diode at D1 (originally 8.2 V) for class AB operation when S4 is in the SSB position. I also changed R2, the D1 load resistor, from 400 ohms to 1000 ohms. This prevents excessive idling plate current. (If R2 is not increased to 1000 ohms, idling plate current will be over 100 mA.)

With these changes, typical amplifier SSB operating conditions at full PEP output are as shown in Table 1. With bias switch S4 set to CW (21 V), the drive power requirement rises to 55 W for 1100 W input and 610 W output.

R10 and R11. Write-ups in *QST* and *The ARRL Handbook* omitted values for R10 and R11. These are simply bleeder resistors for the relay power supply; the values are not critical. About 10 k Ω , 1 W works fine for each.

High-Voltage Metering. Some builders have observed drift in the calibration of the high-voltage metering circuit over time. This results from too much voltage across the three 1-M Ω resistors (R5-R7) used in the original metering circuit. I replaced R5-R7 with six 470-k Ω , 1-W carbon resistors. (Check a number of 470-k Ω resistors and

Table 1

Typical Operating Conditions of the 8874 432-MHz Amplifier

Plate voltage (idling)	2450 V
Idling plate current	55 mA
Bias voltage	4.7 V
Plate voltage (full power)	2200 V
Plate current (full power)	500 mA
Grid current	15 mA
Power input	1100 W
Power output	590 W
Drive Power	36 W
Amplifier gain	12 dB
Apparent efficiency	54 %

select a set of six that have actual values totaling 3 M Ω). There is now very little drift in the high-voltage metering calibration. Because approximately 2 W is dissipated by the metering resistors, it's a good idea to drill some cooling holes in the top and bottom covers of the enclosure that houses them.

Grid Current Metering. Another area of confusion has been R4, the grid-current meter shunt. The calculation of this resistance is based on the resistance of M2. For example, if M2 is a 1-mA meter with 45 ohms internal resistance, a 0.45-ohm shunt would make it read 100 mA full scale. More information on meter shunts can be found in Chapter 25 of *The ARRL Handbook*. Don't be too concerned with the absolute accuracy of the grid-current meter. You'll easily be able to wind a meter shunt that will get you within $\pm 5\%$ —that's fine for this project.

In normal operation, the grid current of various 8874 tubes in my amplifier ranged from 5 mA to 35 mA at 580-W output. Grid current should never exceed 100 mA. If greater values are obtained, the amplifier is grossly mistuned or your tube is bad. Since electron transit-time effects come into play at 432 MHz, it is normal to see slight negative grid currents with light loading on the amplifier.

Construction Details

Loading Capacitor. A new flapper-type loading capacitor (C7) will improve the loading range. The new flapper is made from 0.01-inch-thick beryllium copper. It measures $\frac{1}{2}$ inch wide by 1-5/8 inches long, and its edges are rounded. (The original loading flapper was 11/16 inch wide by 1 1/4 inches long.) Thin material is actually better for the flapper because it is less likely to take a permanent set.

Assembly of the flapper/output connector assembly is straightforward. Using a fine-tooth hobby saw that has a blade thick enough to accommodate the flapper, slot the center pin of RF OUT connector J2. Be careful when sawing the center pin; it is very brittle. Next, mount J2 with its flange on the *outside* of the chassis. Then solder the flapper to the center pin. The

movement of the loading flapper is controlled by a fishing line/tuning rod winch system as described in the original article.

Tuning Lines. Another popular question concerns the fishing lines used to control the movement of the tuning (C6) and loading (C7) flapper capacitors. I highly recommend braided Dacron® fishing line. You will probably have to go to a sporting goods store or bait and tackle shop to obtain this material. Most discount department stores only carry monofilament fishing line made from nylon or nylon derivatives. Nylon stretches considerably under tension. Because nylon is a poor dielectric at UHF, nylon lines may heat, soften and stretch—possibly to the breaking point—in the presence of the high RF fields in this amplifier. Several builders who complained of tuning drift had installed nylon fishing line. If you have trouble finding Dacron line, one source is Berkley & Co, Spirit Lake, IA 51360. The line I used is called Specialist® Fly Line Backing and is 18 pound test strength.

The tuning lines are connected to the flapper plates through Teflon insulators. You can make a simple button insulator (Fig 4) by putting a piece of 1/4-inch-diameter Teflon into a drill and turning it down with a file. Size it for a press fit into the flapper capacitors. Then drill a small hole through it for the fishing line. This arrangement also provides bumper insulators to keep the flappers from contacting the plate line in case tuning lines break or come untied.

The fishing lines attach to the flapper plates and then pass through the plate compartment chassis to reach the tuning rods that control their movement. To protect the lines from abrasion where they pass through the chassis, I made bushings by removing the center pins from Teflon feedthrough posts. My bushings are a press fit in a no. 28 hole. Although the exact hole size will depend on the feedthrough posts you use, the holes in the chassis must be kept small to maintain the integrity of the shielding.

Safety Choke. I added an RF choke made from 5 turns of no. 16 wire, 1/4-inch ID, from the center pin of the RF OUT connector (J2) to ground. This choke prevents damage to your feed line and relays should an arc occur between the plate line and loading flapper.

Anode Bypass Capacitor. The size of the plates for the anode bypass capacitor (C8) was omitted from the original write-up. The actual dimensions of the capacitor plates are not critical as long as the plates are large enough to give adequate capacitance. I used two 3- \times 4 1/2-inch plates for C8 in my amplifier. They form a sandwich with the chassis in the middle as shown in Fig 5. Be sure that your plates are flat, the corners are rounded, and that they are polished to a smooth finish. The plate choke (RFC4) that goes between the anode bypass capacitor and the plate

stripline should be mounted perpendicular to the plate stripline to minimize stray RF coupling, and not in the position shown in the photographs accompanying the original article.

Standard Chassis. The anode compartment described in the original article was custom made from sheet aluminum and angle stock. For those wishing to simplify construction even further, it should be possible to squeeze the plate circuit for the 8874 amplifier into a standard $5 \times 9\frac{1}{2} \times 3$ -inch chassis (such as a Bud AC-421 or equivalent). (I have not tried this myself.) Component placement would be similar to that in my homemade chassis. Mount the tube socket 1-5/8 inches from one end. Locate the hole for the RF OUT connector (J2) 7 inches from the end of the chassis closest to the tube socket. Plate tuning capacitor C6 will have to be cut down; a good starting point is 2 inches wide by $1\frac{1}{2}$ inches long. If you need to reduce the plate capacitance further, it may be best to make the flapper narrower because a very short capacitor may put too much tension on the tuning line. Again, if you decide to build the amplifier in a standard chassis, please understand that I will be of limited help to you since I have not built one in that configuration.

Socket and Grid Collet. I have received many questions about the tube socket and grid collet arrangement. The socket is a Johnson 124-311-100 or Eimac SK-1900. The first order of business is removal of the socket contacts for pins 4, 7 and 11. The grid should be grounded only through the grid collet.

Two different collet arrangements work equally well. Method 1: Punch a $1\frac{1}{4}$ -inch hole in the chassis for the socket. Then drill the mounting holes, using the socket as a guide. Position the socket holes as shown in the original write-up. Countersink the chassis for no. 6-32 screws, and then mount the socket to the chassis using three flathead no. 6-32 screws. Next, drill eight equally spaced no. 33 holes in the Eimac 882931 grid collet flange. Place the collet on the 8874 tube. Then plug the tube and collet into the socket. Finally, mark and drill eight no. 33 holes in the amplifier chassis to match those in the collet. Then mount the collet to the chassis using eight no. 4-40 screws.

An alternate method (simpler, but more expensive) is to use an Eimac 720359 collet assembly. This assembly consists of an 882931 collet soldered to a $1/16$ -inch-thick brass ring. This whole assembly is silverplated and has three studs to accommodate the mounting flange on the SK-1900 socket. The 720359 assembly is mounted to the chassis using four no. 6-32 screws that pass through predrilled holes in the brass ring.

If you use the 720359 collet assembly, you must file a clearance hole so that the socket mounts directly to the collet. The 3CX800A7 144-MHz amplifier described a

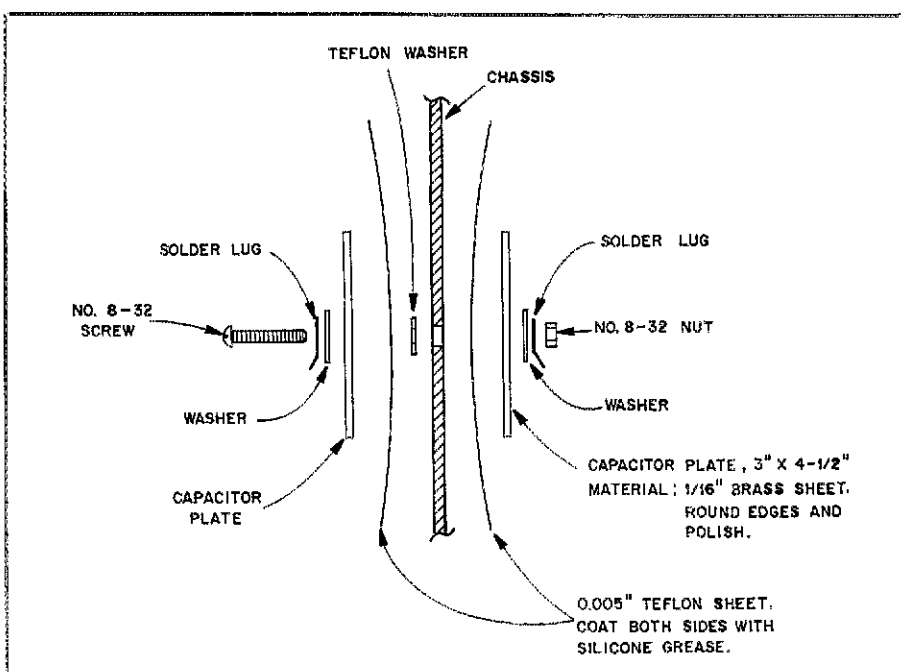


Fig 5—Details of the anode bypass capacitor. See text.

few years ago in *QST* and in recent *ARRL Handbooks* shows a suitable cutting pattern.^{4,5} If the socket does not mount directly to the collet, the 8874 will sit too low and may contact the bottom of the collet ring. This will negate the neutralization procedure described earlier.

Cathode Circuit. The largest number of questions that I have received concern the cathode circuit. Once you have removed the three unused grid contacts from the 8874 socket as described previously, you will see that the remaining six cathode pins and two heater pins form a symmetrical pattern. Bend the six cathode-pin solder lugs over at a 90-degree angle toward the center of the socket. Make the bend above the dimple that holds the contacts in the socket and near where the hole in the lug starts. Next, tin the six cathode lugs and the short side of cathode line W1. Then simply solder the short side of the cathode line to the six

cathode lugs. Cathode choke RFC1, L1 and L2 solder to the top of the cathode line. See Fig 6.

With the circuit built in this way, the input SWR can be tuned better than 1.2:1. If you cannot obtain a good input SWR, check to see if C1 or C2 is at its minimum or maximum. If so, you can try a larger or smaller capacitor as required, or try squeezing or stretching L1 or L2.

Hookup and Operation

Tube Ratings. There seems to be some confusion about the maximum ratings of the 8874 tube. The 8874 is rated at 2200 V and 350 mA plate current, continuous duty. For intermittent SSB and keyed CW service, peak plate current may be 500 mA. For tuneup, the plate current may be run up to 500 mA as long as transmit time is under 30 seconds. A recommended cool-down time between 500-mA tune-up

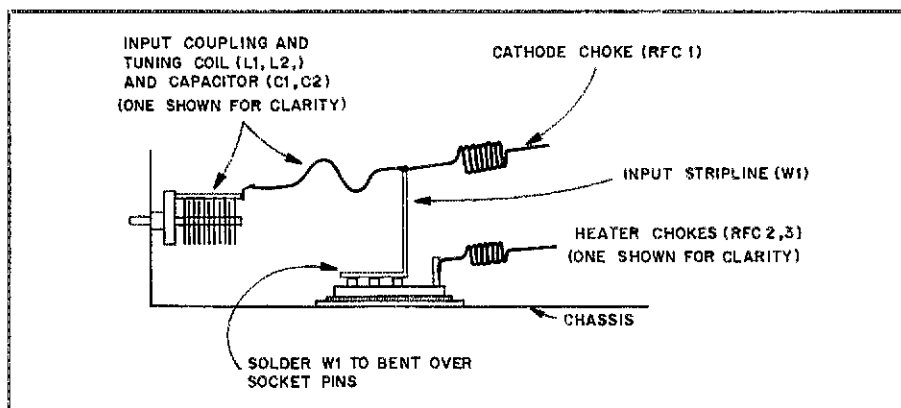


Fig 6—Construction details for the cathode circuit. See text.

sessions is 60 seconds. Keep 500-mA key down times to a minimum for best tube life. Although the minimum specified heater warmup time is 60 seconds, I recommend for best tube life that warmup time be 90 to 120 seconds. For SSB and CW service, the tube heater should be kept at 6.3 V during standby and reduced to 6.0 V during transmit. For continuous-duty modes, such as FM and ATV, the maximum plate current should be no more than 350 mA. The heater should still be maintained at 6.3 V during standby periods, but reduced to 5.7 V during transmit periods.

Cables. At this power level and operating frequency, it's essential that you use proper coaxial cable and connectors. One builder of the 8874 amplifier traced power-output fluctuations and poor efficiency to a bad cable between amplifier and wattmeter. RG-8 and similar cables are rated to handle only 320 W continuous power at 432 MHz. Such cables will get quite warm if subjected to 600 W of RF at 432 MHz!

Foam dielectric cables in the RG-8 size are also marginal. Although they may have lower loss when new, their attenuation increases with age. In addition, foam-dielectric RG-8 cables generally have significantly less shield coverage than mil-spec RG-213. This inadequate shielding further reduces the power handling capability of the cable. I am also wary of using Belden 9913. Although its claimed and measured loss is significantly lower than RG-8 (2.9 dB versus RG-8's 5.0 dB per 100 feet at 432 MHz), its power rating is no higher than RG-8 cables. (I suspect that 9913's thin film shield cannot handle significant currents at 432 MHz. If this is the case, the inner foil shield would try to carry all the current. The outer braid probably does not have a significant effect on the cable's performance at 432 MHz.)

Use coaxial cable rated for high-power 432-MHz operation for all runs between the amplifier output and the antenna. For runs inside the station, you can use 1/2-inch-diameter, corrugated-jacket Hardline such as Andrew Corp Heliwave™ or Cablewave Systems Cellflex. Andrew Corp also markets 1/2- and 3/8-inch Superflex cables (part nos. FSJ4-50B and FSJ2-50, respectively), which are especially good when tight bends are required. These cables cost more than RG-8, but they are designed for high-power UHF operation and have 100% shield coverage. Before you start blaming the amplifier for tuning drift, be sure that your cables, relays and antenna feeds can all handle high power at 432 MHz.

Power Measurements. If you intend to do any efficiency measurements, be sure your wattmeter is mounted at the amplifier. Even short lengths of cable have appreciable loss at 432 MHz. Keep the significance of wattmeter accuracy in mind. A Bird Model 43 is specified to be accurate within 5% of full scale, provided source

Table 2

Comparison of Bird Model 43 Wattmeter Elements

Element	Reading
500D	500 W
1000D	460 W
1000E	580 W

and load impedances are near 50 ohms. In practice, this means if you measure the output of the amplifier at, say, 550 W on your Bird 43 with a 1000-W element, the actual power output could be anywhere between 500 and 600 W—provided that the element is within specification. If your load is not 50 ohms resistive, the power reading could have even greater errors.

I recently compared my Bird 500D (500 W, 200-500 MHz), 1000D (1000 W, 200-500 MHz) and 1000E (1000 W, 400-1000 MHz) elements. They all gave different readings, as shown in Table 2. Want to improve your amplifier efficiency? Change your wattmeter element! Please note that all but one of the Bird elements gave readings within specified accuracy. The efficiency figures quoted in this article are based on measurements made with a Hewlett-Packard HP 432 power meter. The HP 432's RF sample is obtained through a -30 dB coupler in combination with precision attenuators. According to the HP 432, the correct power reading at the level used in compiling Table 2 is 480 W.

I hope that these additional notes on the 8874 432 MHz amplifier clear up many of the questions that those building the amplifier may have. If you decide to build the project, you can be confident that it will work well. More than 50 successful builders can't be wrong!

Notes

¹S. Powlishe, "A Grounded-Grid Kilowatt Amplifier for 432 MHz," *QST*, Oct 1979, pp 11-14.

²The amplifier write-up appeared in *The ARRL Handbook* in Chapter 7 of the 1981, 1982, 1983 and 1984 editions, and Chapter 32 of the 1985 and 1986 editions.

³If you can't locate a copy of the *QST* or *ARRL Handbook* write-up of this project, photocopies of the 1986 *ARRL Handbook* version are available from the ARRL Technical Department secretary for a no. 10 SASE and \$4. Please refer to this article in your request.

⁴D. Meacham, "A High-Power 2-Meter Amplifier Using the New 3CX800A7," *QST*, Apr 1984, pp 11-15.

⁵The 2-meter 3CX800A7 amplifier write-up appears in Chapter 31 of the 1985, 1986 and 1987 editions of *The ARRL Handbook*.

First licensed as WA1FFO in 1965, Steve Powlishe has been a VHF/UHF devotee since 1969. He is actively involved in the design and construction of VHF/UHF equipment, as well as in weak-signal DXing. Among his operating achievements are 144-MHz WAS, 432-MHz WAC and 432-MHz VUCC, as well as several national first-place single-operator finishes in VHF contests. Virtually all of Steve's current operating is done on 432-MHz EME and tropo. Most of his off-the-air time is devoted to the design, construction and analysis of long Yagi antennas and arrays. Much of his antenna work has been done with computer analysis, and he is particularly interested in correlating real-world measurements with computer models. Steve holds a BSEE from Worcester Polytechnic Institute and is currently employed by Hewlett-Packard as a sales representative for their technical computer line.

New Products

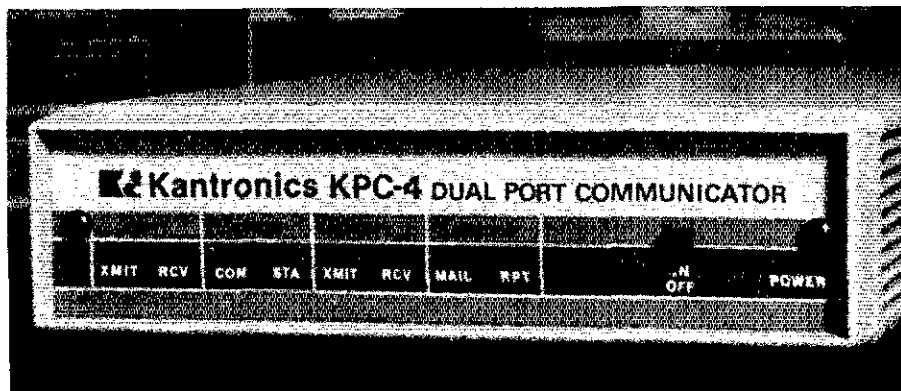
KANTRONICS KPC-4 DUAL COMMUNICATOR

□ Kantronics' KPC-4 Dual-Port Communicator features two fully functional VHF packet-radio ports, digipeating on each port, VHF gateway between ports and an RS-232-C computer port. Digipeating and gateway operations occur simultaneously while you're

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The RS-232-C/TTL terminal interfacing provides universal compatibility with all computers, including Commodore™ and IBM® PC compatibles. Stream switching provides for access to both radio ports, each of which supports the AX.25 protocol. The unit also contains the Personal Packet Mailbox™ feature that is optional on all other Kantronics Packet Communicators.

For more information, contact Kantronics Inc, 1202 E 23rd St, Lawrence, KS 66046, tel 913-842-7745. Suggested retail price: \$329. —Bruce O. Williams, WA6IVC



Designing and Building Simple Crystal Filters

A simple and inexpensive crystal filter that performs well makes receiver and transmitter projects much more fun. Build one yourself at a fraction of the cost of a commercial unit.

By Wes Hayward, W7ZOI
7700 SW Danielle Ave
Beaverton, OR 97005

I am encouraged by the large number of radio amateurs who want to build their own rigs. The ready availability of good-quality semiconductors helps in this pursuit. Other components are sometimes harder to find, at least at an affordable price. One example is the crystal filter—the heart of any superheterodyne receiver or transmitter.

Inexpensive crystals are readily available. They should be characterized and matched for frequency prior to use in a typical crystal filter. Methods for building the needed test equipment and performing the measurements have been presented before.¹ These methods are, unfortunately, somewhat complicated for the casual experimenter who may hesitate to construct special test equipment when just one filter is to be built. What experimenters really need is an empirical filter design method, one that lends itself to casual "tweaking." Such a method is described in this article.

The Cohn Filter

In the course of computer studies of both crystal and LC filters, I've noted that a circuit called the "Cohn," or "Min-loss" filter, lends itself to particularly simple designs.² This filter configuration derives its name from its originator, and differs from the more familiar Butterworth and Chebyshev circuits. The Butterworth band-pass filter is built for optimum flatness at the filter center. The Chebyshev design allows equal passband ripples, and is designed for the best stopband attenuation (steepest skirt response). The Cohn filter is a compromise: It is optimized to exhibit minimum insertion loss when built with practical resonators, while preserving a good shape factor. The Cohn filter, in LC form, is not new to the radio amateur.^{3,4} It is not limited to LC resonators, however. It works great with crystals!

The Cohn filter, crystal or otherwise, is a rather simple circuit. This becomes more apparent when we view the filter using coupled-resonator methods.⁵ All normalized coupling coefficients are equal. Moreover, the normalized end-section loaded-Q factor is the reciprocal of the coupling coefficient. The practical simplification becomes apparent if we examine the generalized crystal filter circuit shown in Fig 1. All capacitors in the circuit are of equal value! The shunt capacitors are coupling elements while the series capacitors in the filter end sections are included to properly tune the circuit.

Practical Cohn Crystal Filters

An empirical method that the amateur

may use for crystal filter design is described easily in a step-by-step procedure.

1) Obtain a collection of substantially identical crystals. The crystals are first matched in frequency. The same oscillator should be used to measure all crystal frequencies. The error (frequency difference) should be less than 10% of the *desired bandwidth* of the filter. For example, a filter with a 1-kHz bandwidth should use crystals matched to within 100 Hz or better.

2) Pick a capacitance value to be used in the filter. The capacitance (C) value determines the filter bandwidth. Larger C values yield narrower bandwidth and higher insertion loss.

3) Vary the end terminations to obtain a shape that is free of passband ripple while

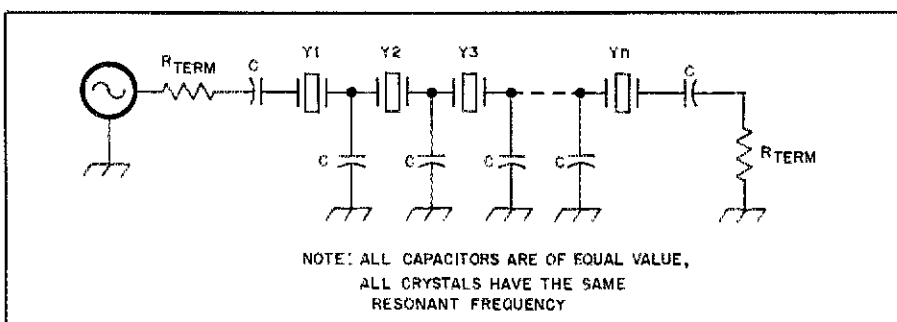


Fig 1—Generalized crystal filter suitable for empirical construction.

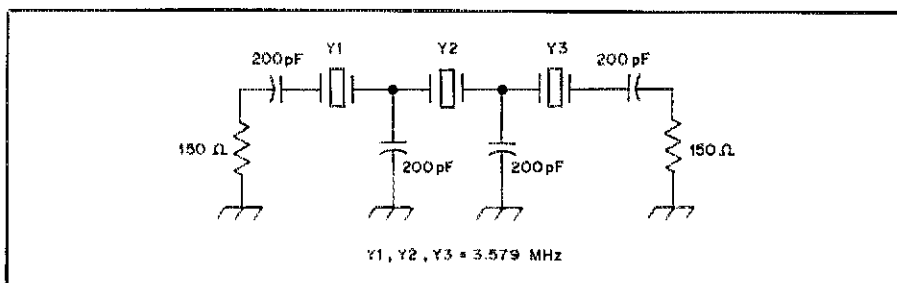


Fig 2—A simple CW filter using three crystals.

¹Notes appear on page 29.

providing sufficient stopband attenuation.

This empiric procedure is illustrated in the following examples. I've cheated a bit—I used a personal computer to simulate the filter, and generate the data presented, but I've obtained similar results with filters I have built. The experimental results agree well with the computer models. All examples shown are based on a collection of crystals from my junk box. They are inexpensive 3.579-MHz TV color-burst crystals. The average motional inductance for these crystals is 117 mH, with a (rather poor) typical Q of 50,000. The parallel capacitance is about 4 pF.

A Three-Crystal Cohn Filter

A simple and practical filter for a beginner's first CW superheterodyne receiver is shown in Fig 2. Three crystals are used. The capacitors are 200-pF units, a standard value. Experimentation (done here with the computer) shows that a good filter shape is obtained with an end termination of 150 ohms. Fig 3 shows the frequency response of this filter. The -3 dB bandwidth is 403 Hz, and the insertion loss is 3.8 dB. The loss will be lower with better (higher Q) crystals. The impedance match is shown in the figure as a series of dots. This is the return loss normalized to the source impedance—150 ohms for the filter shown.

If different crystals are used, the same bandwidth can still be obtained, within limits. The coupling capacitors and end terminations will then be different, however. Insertion loss will also differ.

Decreasing the value of the capacitors increases the bandwidth. Some practical values are shown in Table 1, again the result of tweaking with the computer. This will provide some guidance in experimentation.

Fig 4 illustrates the effect of altering the terminating resistance. Fig 4A shows the result of 75-ohm terminations, lower than the desired 150-ohm value. The filter shows some passband ripple and a higher insertion loss. The effect of a 300-ohm termination is shown in Fig 4B, where the peak shape becomes more rounded, with degradation of skirt response. While the poorer frequency domain shape is generally less desirable, the filter with the higher termination has a significantly improved group delay; this filter would be preferred for high-speed data applications.

A Six-Crystal Cohn Filter

The three-pole filter mentioned above is practical. It does not, however, offer skirts that are as steep as we would like for many demanding applications. Improved skirt selectivity in a filter is obtained by using more crystals. The computer can be used to generate another table like that shown for the three-crystal filter. Alternatively, the results of Table 1 can be used as a starting point for experimentation. The

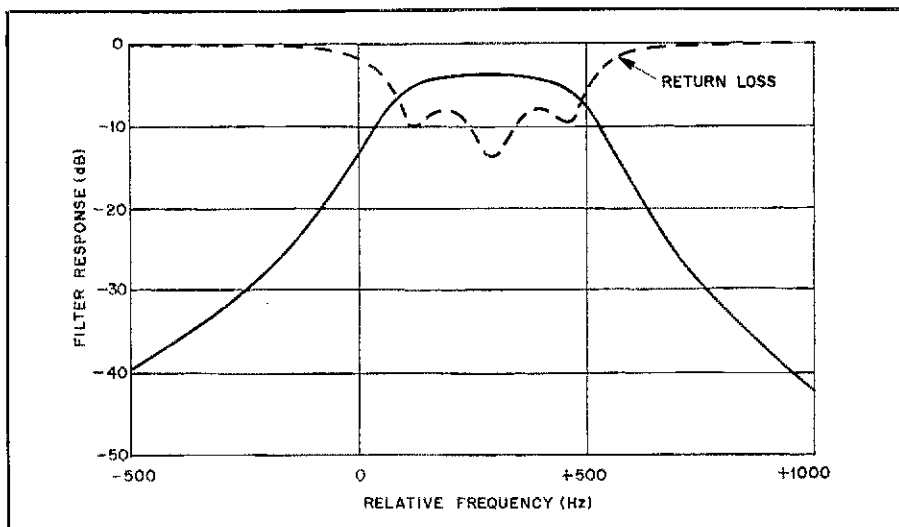


Fig 3—Frequency response of the filter of Fig 2. The dots show the input return loss, indicating the quality of the impedance match.

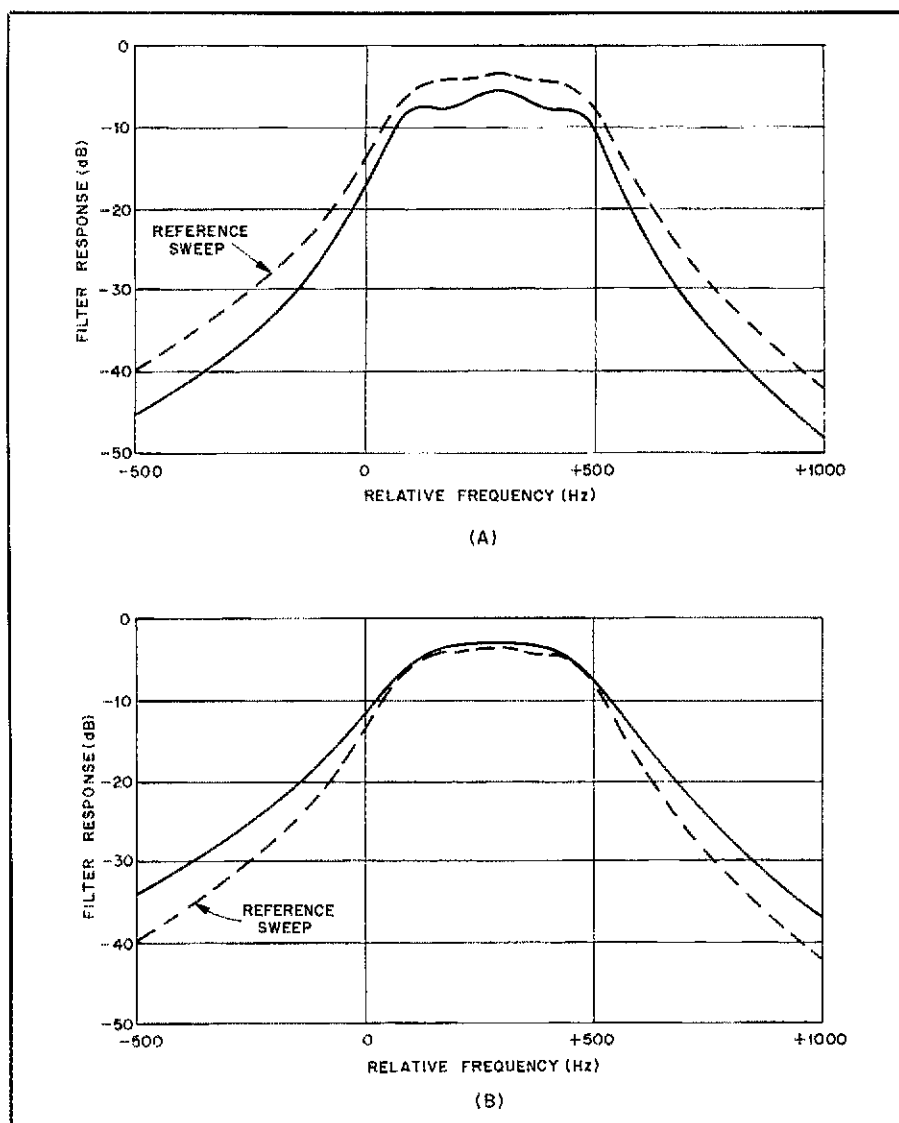


Fig 4—Frequency response of the filter of Fig 2 with changes in the end terminations. Curve A shows response with 150-ohm terminations; curve B shows the response using 300-ohm resistors. See the text for considerations of which is "better."

ARRL Lab Experiments with the Cohn Filter

ARRL Lab staff members were intrigued by the material on Cohn filters presented by Wes Hayward, W7ZOI. We built four CW filters and one SSB filter, following Wes's instructions. Tests confirmed the computer models developed by Wes. This was no surprise!

CW Filters

Four different batches of crystals were used for the CW filters. The crystal sources were identifiable, and the relative quality of each batch was determined. Four filters were constructed (Fig A). With the exception of the crystals used in each filter, the filters were identical. The filter schematic is shown in Fig B. The capacitors are 300-pF, 5%-tolerance silver-mica types. The 500-ohm terminations (variable resistors) at the ends of the filter were used to "trim" the filter for the best shape and response characteristics during testing. An HP-8540 spectrum analyzer was used to generate the filter response curves shown in photos C through G.

The units used in filter no. 1 are TV color-burst crystals (3.579545 MHz). They were purchased originally from Radio Shack (about \$1.60 each) for another project. There were only five of these crystals in the batch, so frequency matching (within 50 Hz) was not as close as with some of the other crystal batches.

The crystals used in filter no. 2 were selected from an assortment of ten 4.000-MHz microprocessor units purchased from JAN Crystals.¹ These crystals were frequency matched within 40 Hz. The crystals cost approximately \$3 each.

Filter no. 3 uses crystals selected on the basis of frequency matching from a large batch (over 30) of 4.000-MHz microprocessor crystals on hand in the ARRL Lab (matched within 30 Hz). These crystals can be characterized as "grab bag" quality, and similar units are available from various dealers at a cost of less than \$1 each.

We bought the crystals used in filter no. 4 from International Crystal Co.² They can be characterized as high-quality, moderate-cost units. Their guaranteed frequency tolerance is 0.001% of 4.000000 MHz, matching was within 6 Hz, and cost is approximately \$10 each.

SSB Filter

A four-crystal, 12-MHz SSB filter was built using 160-pF, 10%-

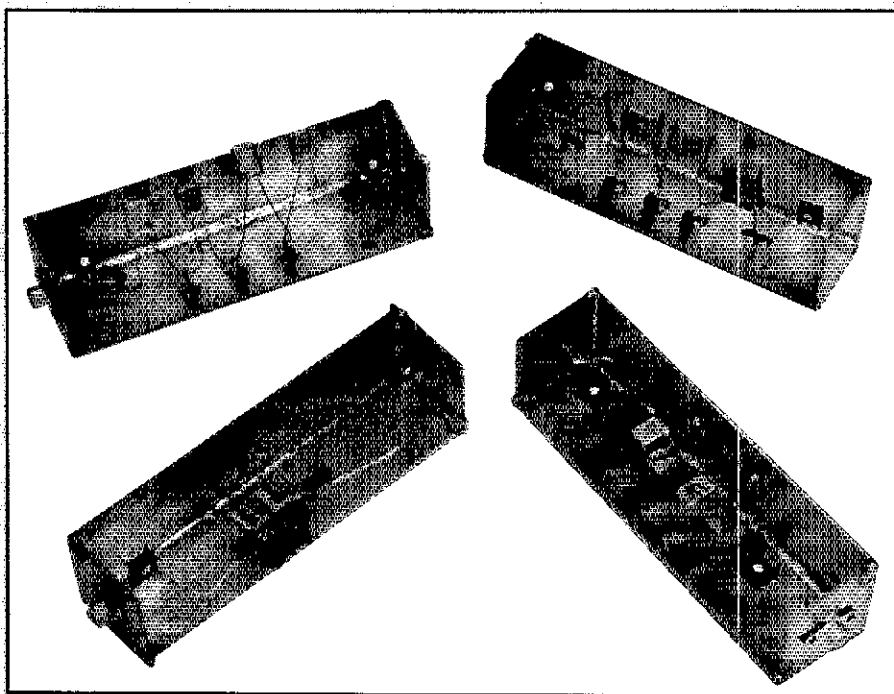


Fig A—Four CW crystal filters were built in this configuration. The PC-board mounting surfaces provide a ground plane. Capacitors are soldered directly to the ground plane, and the crystals are connected using the capacitors as standoffs. Phono jacks are used for input and output connectors. The only variables in the construction of the filters are the crystal characteristics and the length of the crystal leads. The SSB filter is not shown.

tolerance silver-mica capacitors. An 8:5 transformer is used for impedance matching. The crystals are microprocessor types purchased from Jameco Electronics³ at a cost of approximately \$1 each. Of 12 crystals purchased, only 10 were suitable for filter use. The filter response is shown in photo G.

Test Results

Photos C through F show the response curves of the four CW filters. Photo G shows the response curve for the 12-MHz SSB filter. Insertion loss is quantified only for

CW filter no. 4 because series resistors were used to adjust the terminating impedance of filter nos. 1 through 3. These resistors introduce losses. In practice, each filter would be coupled to its associated circuitry through matching transformers, not resistors.

Filter no. 1 exhibits an extremely sharp response, with a bandwidth of approximately 240 Hz at the -3 dB points; it may be too sharp for good CW copy. Changing the 300-pF capacitors in this filter to a lower value will broaden the response.

Filter no. 2 is not quite as sharp as filter no. 1, and exhibits a peak ripple effect. The response asymmetry can be corrected by trimming the filter

³Jameco Electronics, 1355 Shoreway Rd., Belmont, CA 94002, tel 415-592-8097.

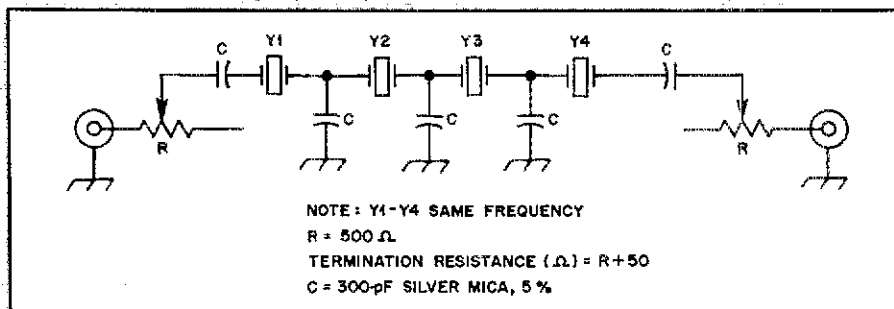


Fig B—Schematic diagram of the crystal filters. Capacitors are all of equal value. Terminating resistors are variable 500-ohm units. Crystals are all of equal nominal frequency with minor (up to 50-Hz) variation.

¹JAN Crystals, 2400 Crystal Dr., PO Box 06017, Fort Myers, FL 33906-6017, tel 813-936-2397.

²International Crystal Manufacturing Co., Inc., PO Box 26330, 701 W Sheridan, Oklahoma City, OK 73126-0330, tel 405-236-3741.

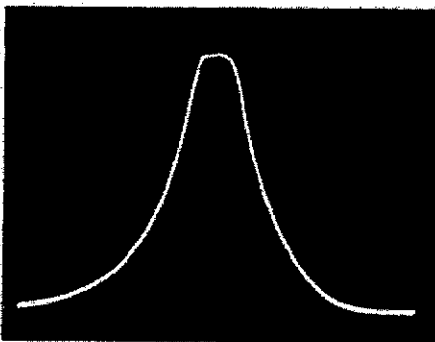


Fig C—Spectral photo showing the response of filter no. 1. Horizontal divisions are each 200 Hz; vertical divisions are each 10 dB. Sampling bandwidth is 100 Hz. The center frequency is 3.579 MHz.

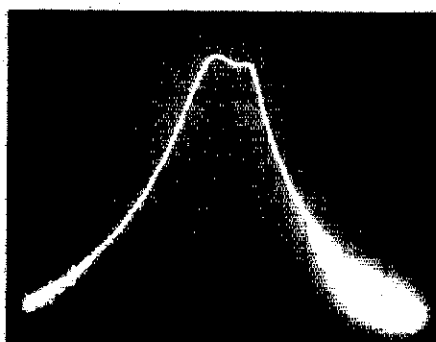


Fig D—Spectral photo showing the response of filter no. 2. Horizontal divisions are each 200 Hz; vertical divisions are each 10 dB. Sampling bandwidth is 100 Hz. The center frequency is 4.000 MHz.

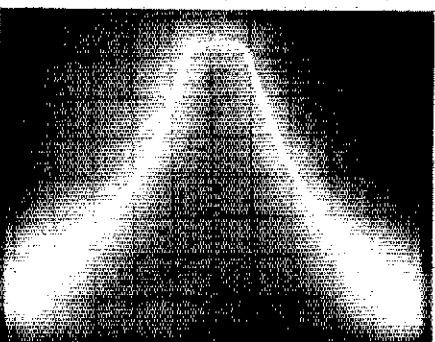


Fig E—Spectral photo showing the response of filter no. 3. Horizontal divisions are each 10 Hz; vertical divisions are each 10 dB. Sampling bandwidth is 100 Hz. The center frequency is 4.000 MHz.

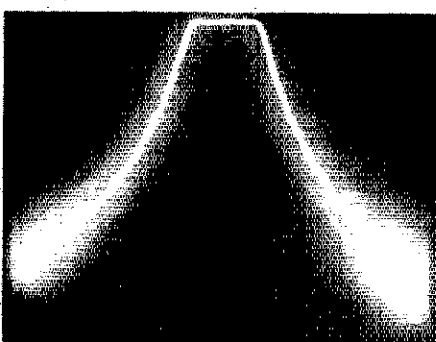


Fig F—Spectral photo showing the response of filter no. 4. Horizontal divisions are each 10 Hz; vertical divisions are each 10 dB. Sampling bandwidth is 100 Hz. The center frequency is 4.000 MHz.

with the termination resistors, but insertion loss increases significantly. For CW use, however, this filter is probably more than adequate.

Filter no. 3 shows a bandwidth of approximately 350 Hz at the -3 dB points. It is symmetric and shows low ripple. This is a very good CW filter.

Filter no. 4 is a good example of what can be accomplished with high-quality crystals and proper terminations. This filter is used in a CW receiver designed by Dave Newkirk, AK7M (see cover of this issue). The input and output impedances of this filter are 200 ohms. To match the 50-ohm impedance of the test setup, 4:1 transformers were used. Filter insertion loss is 2 dB, with an ultimate rejection of over 90 dB.

The SSB filter shows a -3 dB bandwidth of approximately 2.1 kHz. There is no discernible ripple, and the insertion loss is 4.4 dB.

Conclusions

The empiric approach to designing Cohn filters for CW or SSB use is a viable alternative to purchasing commercial filters. The relatively high component cost for the best filter design tested (CW filter no. 4) still

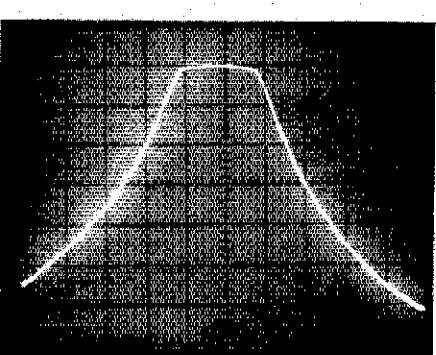


Fig G—Spectral photo showing the response of the SSB filter. Horizontal divisions are each 1 kHz; vertical divisions are each 10 dB. Sampling bandwidth is 100 Hz. The center frequency is 12.000 MHz.

results in an advantage of over 50% when compared to the price of commercial equivalents. All of the filters tested are adequate for most home-brew projects. They are fun to build, and result in appreciable savings.—Bruce O. Williams, WA6IVC, ARRL Staff

Table 1

Cohn Three-Crystal Filter

Bandwidth (Hz @ -3 dB)	C (pF)	R _{end} (Ohms)
	(k = 1000)	
380	200	150
600	130	238
1.0k	70	431
1.8k	30	1.5k
2.5k	17	3.3k

computer was used in the "construction" of a filter with six crystals. The circuit, again a narrow CW filter, is shown in Fig 5. The 200-pF capacitors used in the earlier filter are retained. The frequency response of this six-crystal filter is shown in Fig 6, where the "reference sweep" is the response of the previous three-element filter. The new filter has a -3 dB bandwidth of 354 Hz, but much steeper skirts than the three-element filter.

A Simple SSB Filter

Table 1 shows a number of simple three-pole filter configurations. Bandwidth is increased for a given set of crystals merely by decreasing the capacitance value. The frequency domain response for a three-pole SSB filter with 30-pF capacitors is shown in Fig 7. The "reference sweep" is the response of the earlier three-pole CW filter with 200-pF capacitors. The skirt response of the SSB three-crystal filter is certainly less than spectacular. More crystals will improve this response significantly. This simple three-pole filter is still practical for some applications, however, such as a portable VHF SSB transceiver.

Experimental Methods

The computer-based "experiments" have proved to be useful. There are generally no surprises. I've "built" filters on the computer using more than a dozen crystals. Some of the more practical designs have been transferred to hardware for receiver applications. Many of these designs operate at different frequencies, some using 4.433-MHz European TV color-burst crystals. These crystals are harder to obtain, but their frequency is more compatible with the existing HF ham bands, avoiding the spurious responses that can sometimes occur with a 3.579-MHz IF.

Almost all of my test equipment is built for an input and/or output impedance of 50 ohms. The test equipment is still easily used for filter experiments. Extra resistance is merely added at the filter input and output to bring the level up to that desired. This is illustrated in Fig 8. Ferrite transformers may also be built to transform impedance levels, but they cannot be changed as quickly as resistors.

It is often convenient to experiment with a filter that is contained within a receiver or transmitter. An example is shown in the

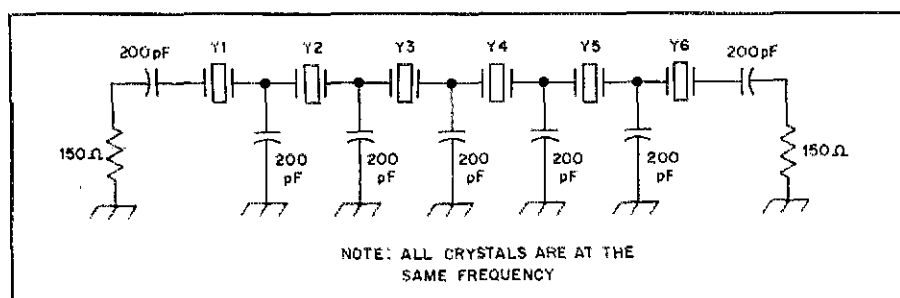


Fig 5—Circuit of a Cohn filter using six crystals.

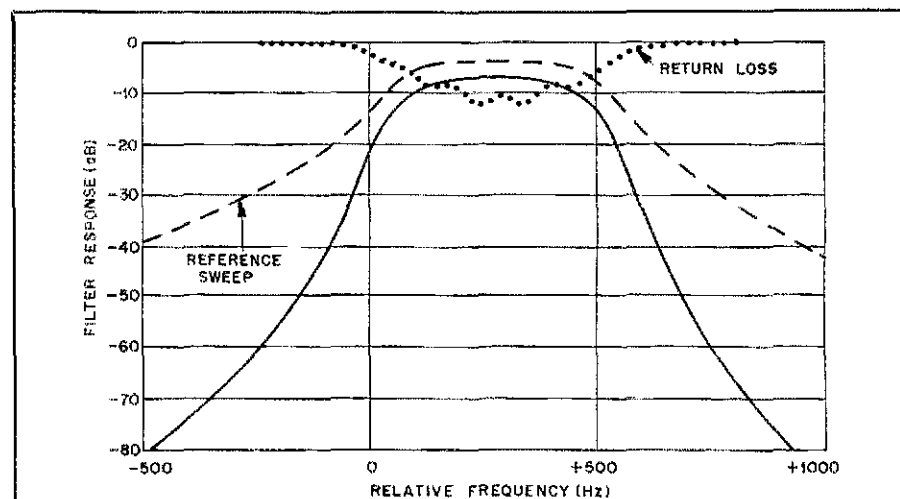


Fig 6—Frequency response of the six-crystal filter. The reference sweep is the response of the three-crystal filter of Fig 2.

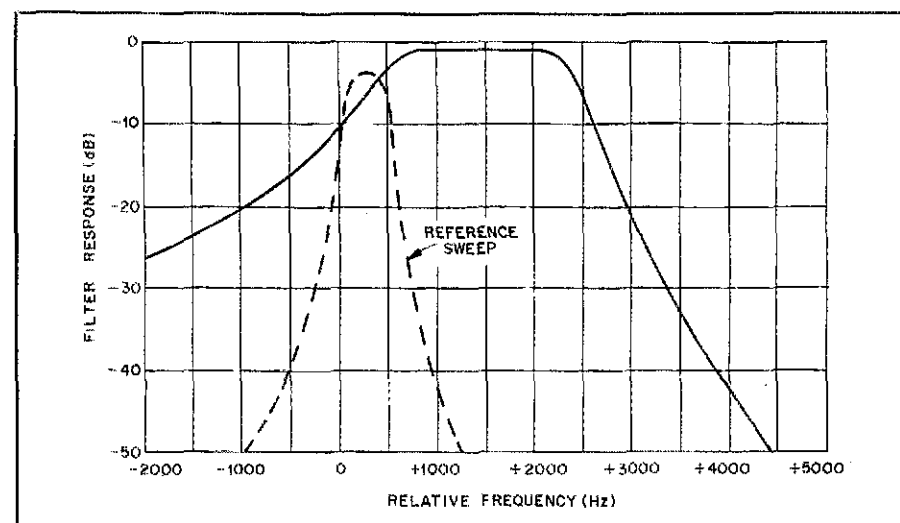
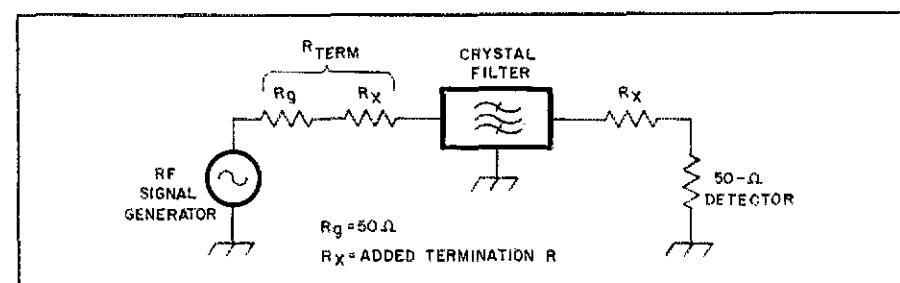


Fig 7—Frequency response of a simple three-pole SSB filter. The circuit is that of Fig 2 with all capacitors changed to 30 pF and terminations of 1500 ohms.



partial schematic of Fig 9A. Q1 is a dual-gate MOSFET mixer. The drain resistor determines the input loading impedance for the filter. An identical resistor terminates the filter output. An NPN amplifier, Q2, buffers the output—insurance that the following stages will not alter the crystal filter termination. Fig 9B is a modified form of the same filter. Tuned circuits have been inserted to present higher impedances to the transistors, affording more gain. The output amplifier is changed to a JFET. This modified circuit is better suited to higher impedance filters, as might be encountered with an SSB transmitter or receiver. Once the circuit containing the filter is built, filter response may be measured by tuning the receiver through a steady carrier while observing the output of a later stage with an oscilloscope or RF voltmeter.

It's often difficult to build a filter while also building a receiver. If problems occur, it is hard to tell if they are related to the filter or to the rest of the circuitry. Uncertainty is removed if receiver construction begins with a simpler, single-crystal filter. This allows you to get the receiver working before pursuing the better filter. I don't encourage you to retain the single-crystal filter as a final option. The enhanced performance afforded by additional crystals is more than ample justification for the minimal added effort and expense.

Other Crystals

The examples presented have used readily available color-burst crystals. There is nothing special about them. Indeed, they often represent the poorest possible quality for a crystal, and their frequency (3.579 MHz) can cause compatibility problems in many of the ham bands. They are, however, both available and cheap.

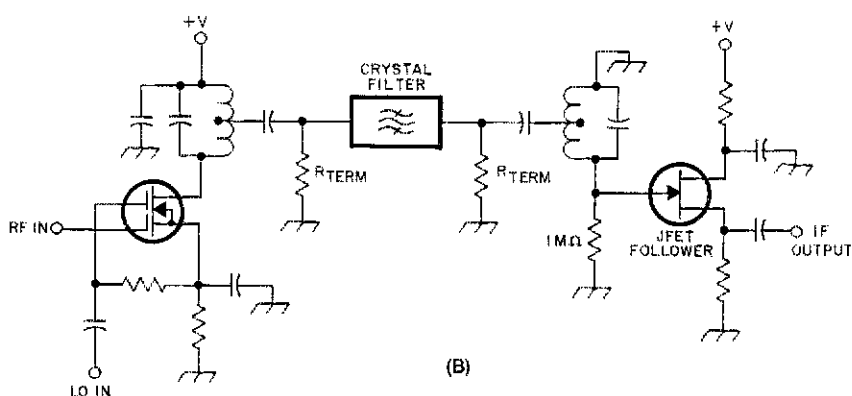
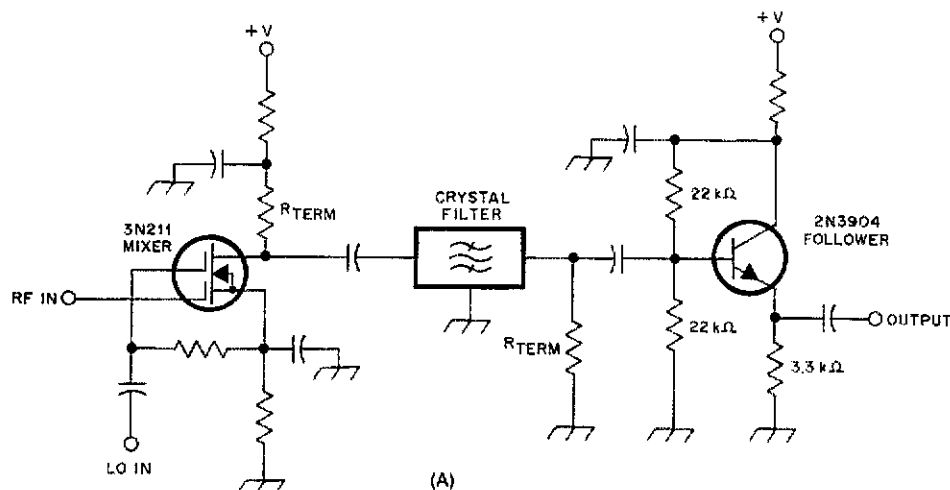
Many parts distributors list crystals for microprocessor applications in their catalogs. The only experience I have had with these crystals was with two 4-MHz crystals.⁶ The average Q was 150,000, motional inductance was 148 mH and the two crystals differed in frequency by 105 Hz. Further data on other crystal types would be of great use to the amateur community. Anyone out there with data to share? [See the sidebar to this article.—Ed.]

Traditional intuition might suggest that narrow-bandwidth filters are more difficult to design and build than those with wider bandwidth. Just the opposite is true; CW filters are easier to build than SSB or AM filters. This is fortunate, for it seems that much of the present home-brew activity is aimed at CW rigs.

Narrow-bandwidth CW filters are easily built with the lower frequency crystals, such

← Fig 8—External resistors may be added to an experimental filter to allow use of 50-ohm instrumentation for circuit evaluation.

Fig 9—Partial schematics of receivers showing how terminations may be altered to achieve the proper filter shapes.



piece of equipment. Unfortunately, this may not be practical—the cost for a set of crystals can be high when the crystal characteristics must be well specified and closely matched.

Before you attempt any custom filter design and construction, spend some time experimenting with the more readily available, and certainly less expensive crystals I have used. I'm sure you'll enjoy the experience.

Notes


¹W. Hayward, "A Unified Approach to the Design of Crystal Ladder Filters," *QST*, May 1982, pp 21-27.

²S. Cohn, "Dissipation Loss in Multiple Coupled Resonators," *Proceedings IRE*, Aug 1959.

³W. Sabin, "The Solid-State Receiver," *QST*, Jul 1970, p 35.

⁴D. DeMaw, "His Eminence—The Receiver," *QST*, Jun and Jul 1976.

⁵A. I. Zverev, *Handbook of Filter Synthesis* (New York: John Wiley and Sons, 1967).

⁶Mouser Electronics, 11511 Woodside Ave, Lakeside, CA 92040, part no. ME332-1040. 

as those at 3.579 MHz. While an SSB filter can be built at 3.579 MHz, probably higher terminating impedances will be required. The termination value drops with increasing frequency, making wider bandwidth filters more easily realized at higher frequencies. I often build equipment with a 10-MHz IF because crystals with excellent Q are readily available for this frequency.

Typical parameters for these crystals are: motional inductance = 20 mH, parallel C = 3 pF and Q = 200,000. These characteristics result in practical CW filters with terminating impedances as low as 50 ohms, and SSB filters with 200- to 500-ohm loads.

You can, of course, order high-quality crystals for any desired frequency. It is then possible to fit a new filter into an existing

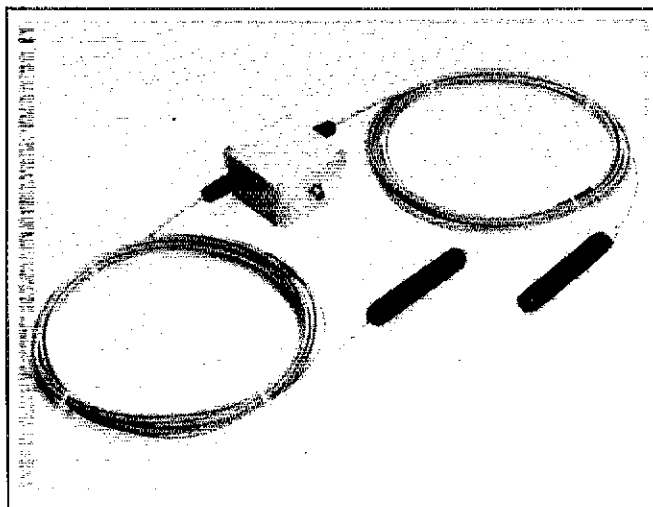
New Products

SNYDER FULL-BAND™ WIDE BAND ANTENNAS

□ Snyder Full-Band antennas for the 160, 75/80 and 40-meter amateur bands are designed to allow maximum use of modern broad-frequency transceivers and "no-tune" power amplifiers rated up to 1 kW input, continuous. Based on a patented technique that compensates radiator reactance over a wide frequency range, these antennas eliminate the need for antenna tuners and special radiator networks.

The three models, FB-160X, FB-75/80X and FB-40X, are redesigned and improved versions of the wide-band dipole models previously marketed by Snyder Communications Corp. They are constructed of high-quality, high-insulation-resistance space-age plastics and corrosion-resistant nonferrous metals to provide low weight, low wind drag and weather endurance for years. They include optimized feed modules for near-earth installations.

Snyder Full-Band antennas are available from stock. Exclusive distributor: Poyntek Associates, PO Box 741, Placentia, CA 92670, tel 714-993-7525. Price class: FB-160X, \$344; FB-75/80X, \$229; FB-40X, \$180.—Bruce O. Williams, WA6IVC



Low-Cost QRP Power Boosters

If you're working QRP, a signal gain of 10 to 13 dB can mean the difference between being copied and having your signal lost in the mud. Here's a way to get that added gain inexpensively!

By Doug DeMaw, W1FB

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Are there times when you need another S unit or two during your QRP DX adventures? No doubt you have anguished more than once over your need for a signal power increase of a few more decibels when the noise level was high, or when band conditions weren't up to par. Those few extra decibels may have converted the signal report from, perhaps, R3 to R5. At such times, it is nice to have a small amplifier that can be switched on to give your QRP signal some added authority! In this article, we will examine some options for building RF power amplifiers that are not expensive, and using parts that are not difficult to obtain.

Power Blocks from Small-Signal Transistors

Matched small-signal transistors, such as the generic 2N2222A, may be connected in parallel to form a single RF power-amplifier block with respectable clout. This concept has long been practiced by Motorola and other semiconductor manufacturers, whereby a number of small transistors are formed on a common chip of silicon, in parallel, then housed in a single power-transistor package. These power transistors are called "ballasted" or BET (balanced-emitter transistor) devices.

Ballasted or BET transistors have low-ohmic value resistors in the emitter leads of the individual small transistors. A resistance value of 1 ohm is typical at each emitter within the composite transistor. These resistors are formed on the silicon chip along with the transistors. The low-value resistors in the emitter leads prevent *thermal runaway*—a phenomenon caused by excessive junction heating which, once started, escalates until the transistor junction is burned out. High SWR values can cause excessive junction heating and destructive thermal runaway. When this occurs, one or more of the combined transistors may, because of gain characteristics that are higher than those of the remaining devices, tend to hog the current and burn out. When individual emitter resistors are used with parallel transistors,

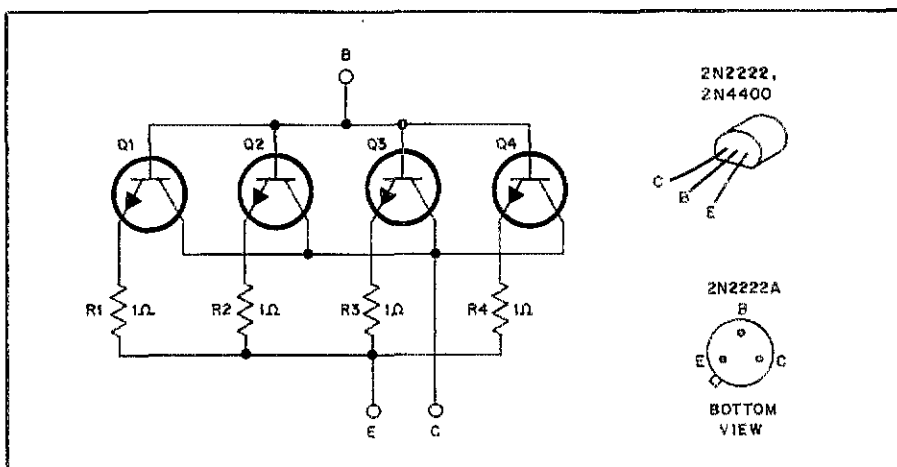


Fig 1—Representative circuit showing four 2N4400 or 2N2222A transistors connected in parallel for RF-power use. R1-R4, inclusive, serve as equalizing resistors to provide a ballasted power block. Four 2N4400s, when used as shown here, are capable of delivering 1.5 W of RF output power in class-C service (50% duty cycle).

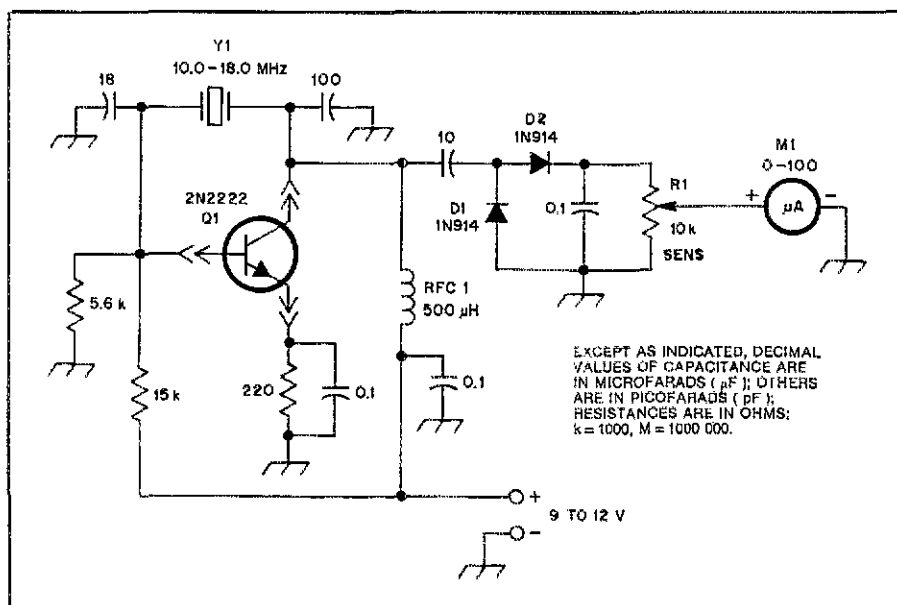


Fig 2—Schematic diagram of a tester that may be used when matching transistors for use in the circuit of Fig 1. A transistor socket is required at Q1 to permit plugging various transistors into the tester. R1 is a 10-k Ω linear-taper carbon-composition control. RFC1 can be a small RF choke of any value from 500 μ H to 2.5 mH. M1 provides ample sensitivity if it indicates 50, 100 or 200 μ A at full scale.

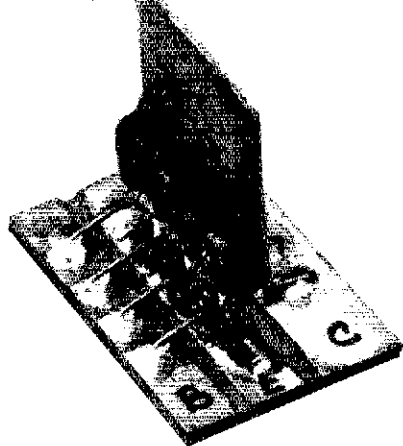


Fig 3—Photograph of four 2N4400s connected in parallel and glued to a small copper heat sink. A piece of PC board serves as a base for the power block (see text). Ballasting resistors are not included in this model.

the overall current distribution results in a more even thermal distribution.

We may construct our own ballasted-transistor blocks by combining a group of high-frequency, small-signal transistors. Fig 1 shows how this is accomplished using four low-cost 2N4400 plastic transistors. The bases and collectors of Q1, Q2, Q3 and Q4 are connected in parallel, but the addition of 1-ohm emitter resistors is required before the emitters are connected in parallel. Each transistor is capable of producing up to 0.5 W of output power when used singly as a class-C amplifier. The power-dissipation rating (maximum) for a 2N4400 is 1.5 W with a case temperature

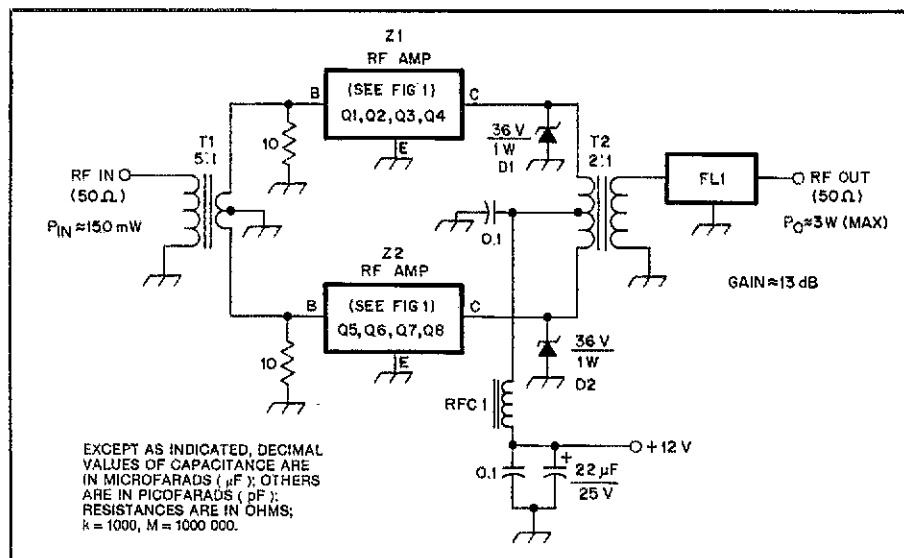


Fig 4—Example of how two of the Fig 1 power blocks may be combined in a push-pull 3-W amplifier. Impedance-transformation ratios are listed above T1 and T2. Zener diodes D1 and D2 may be used in lieu of the ballasting resistors if matched transistors are used. The diodes protect the transistors from excessive peak voltage during conditions of high SWR. Normalized values for FL1 components may be found in the filter section of *The ARRL Handbook*. T1 has 12 turns of no. 26 enam wire (60 μ H) on an Amidon FT-37-43 ferrite toroid (850 μ). The secondary has 7 turns, center tapped, of no. 26 enam wire. T2 has a center tapped primary winding (135 μ H); use 16 turns of no. 26 enam wire on an Amidon FT-50-43 ferrite toroid (850 μ). The secondary winding contains 11 turns of no. 26 enam wire. RFC1 (15 μ H) has 6 turns of no. 22 enam wire on an Amidon FT-37-43 toroid.

no greater than 25°C. It has an f_T of 200 MHz and a maximum collector-emitter voltage of +40. I have purchased 2N4400s for as little as 5 cents each at flea markets. Therefore, the arrangement in Fig 1

suggests a low-cost 2-W amplifier for QRP use. The 2N2222A transistor is also suitable for building an RF power block, and its specifications are similar to those of the 2N4400. Other small-signal transistors also

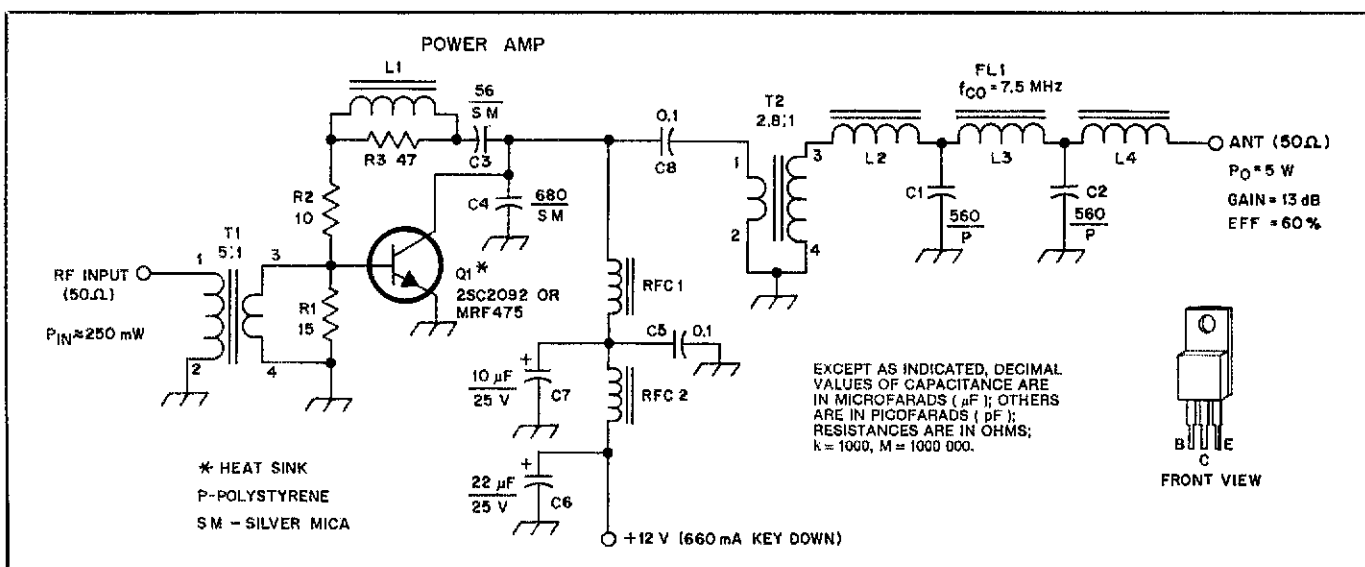


Fig 5—Schematic diagram of the 5-W RF power amplifier. Numbered components are so designated for PC-board layout purposes. C5 and C8 are disc ceramic. C6 and C7 are tantalum or electrolytic. R1, R2 and R3 are $\frac{1}{2}$ -W carbon composition resistors. Silver-mica capacitors may be substituted for polystyrene (P) types. Impedance transformation ratios are shown above T1 and T2.

L1—0.22- μ H inductor. Small RF choke or 8 turns of no. 24 enam wire on an Amidon T-37-6 toroid.
L2, L4—0.8- μ H inductor. 12 turns of no. 24 enam wire on an Amidon T-50-2 toroid.
L3—1.67- μ H inductor. 18 turns of no. 24 enam wire on an Amidon T-50-2 toroid.
RFC1—2.8 μ H choke. 24 turns of no. 26 enam wire on an Amidon T-50-2 toroid.
RFC2—42 μ H choke. 10 turns of no. 26 enam wire on an Amidon FT-37-43 toroid.
T1—Primary has 16 turns of no. 26 enam wire on an Amidon FT-37-43 toroid.
Secondary has 6 turns of no. 26 enam wire.
T2—Primary (Q1 side) has 9 turns of no. 24 enam wire on an Amidon FT-50-43 toroid. Secondary has 15 turns of no. 24 enam wire.



power amplifier. Use D1 and D2 if you do not include the ballasting resistors. T1 and T2 are toroidal broadband transformers. FL1 is a low-pass filter that permits the flow of fundamental frequency energy

gain will increase substantially as the operating frequency is lowered; this phenomenon frequently leads to amplifier self-oscillation. The feedback circuit equalizes the frequency response while aiding the amplifier stability.

C4 is used to suppress VHF harmonic energy. The C4 reactance is sufficiently high at HF to prevent undue signal loss from 1.8 to 30 MHz, but at VHF and UHF it presents a low reactance that allows VHF currents to flow to ground.

FL1 is designed for 40-meter operation. The filter component values were scaled from the tables of normalized values in *The ARRL Handbook*. The amplifier may be used from 160 through 10 meters by choosing the proper FL1 values. Maximum power output will be on the order of 5 W on each band, assuming that sufficient drive reaches the base of Q1. An input power of 250 mW produces 5 W of output at 7 MHz. Slightly more drive may be needed at 15, 12 and 10 meters, owing to the circuit losses. Q1 operates in class C for greatest efficiency. A small heat sink is ample for CW operation with a class-C amplifier of this power level. Fig 6 is a photograph of the 5-W amplifier.

Switch-Around TR Circuit

Let's assume that you will be driving one of the amplifiers in this article with a QRP (low power) transmitter or transceiver. It is desirable, therefore, to have some type of TR (transmit-receive) circuit for use with the QRP amplifier. This will allow the antenna to be routed around the amplifier during receive, and will provide a set of terminals for receiver muting.

A practical TR circuit is shown in Fig 7. Q1 is a PNP relay-driver switch. When the control line is shorted, relay K1A is actuated. This switches the antenna from the receiver to the amplifier output (transmit mode). Relay contacts K1B are used to control the receiver muting circuit. D2-D4, inclusive, protect the receiver input circuit from damaging levels of RF voltage, should the contacts of K1A stick together during transmit. The arrangement of Fig 7A is for use with a separate transmitter and receiver. The relay contacts must be connected differently when using an amplifier with a QRP transceiver. These changes are shown in Fig 7B. The circuit of Fig 7A is shown photographically in Fig 8.

I used a DIP style of miniature relay for K1 of Fig 7. Most DIP relays will allow CW speeds up to 20 WPM without flying apart or exhibiting undue contact bounce. They are noisy as they follow the transmitter keying unless the TR module is contained in a sound-proof box. Therefore, the relay specified is not recommended as a keying relay. A better choice is a reed relay, if you can find a SPDT unit; two such relays are required for DPDT action. SPDT reed relays are not common as surplus, and new ones are expensive.

Care must be taken in any design to

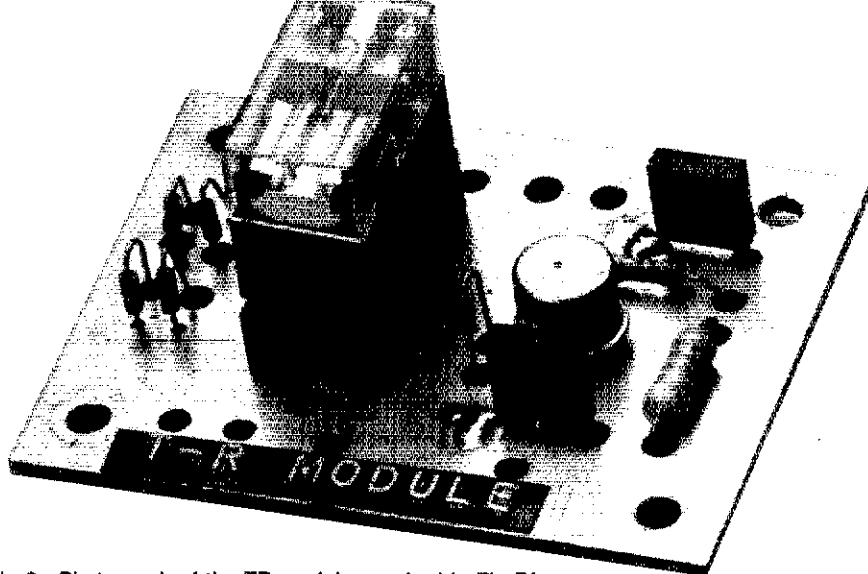


Fig 8—Photograph of the TR module as wired in Fig 7A.

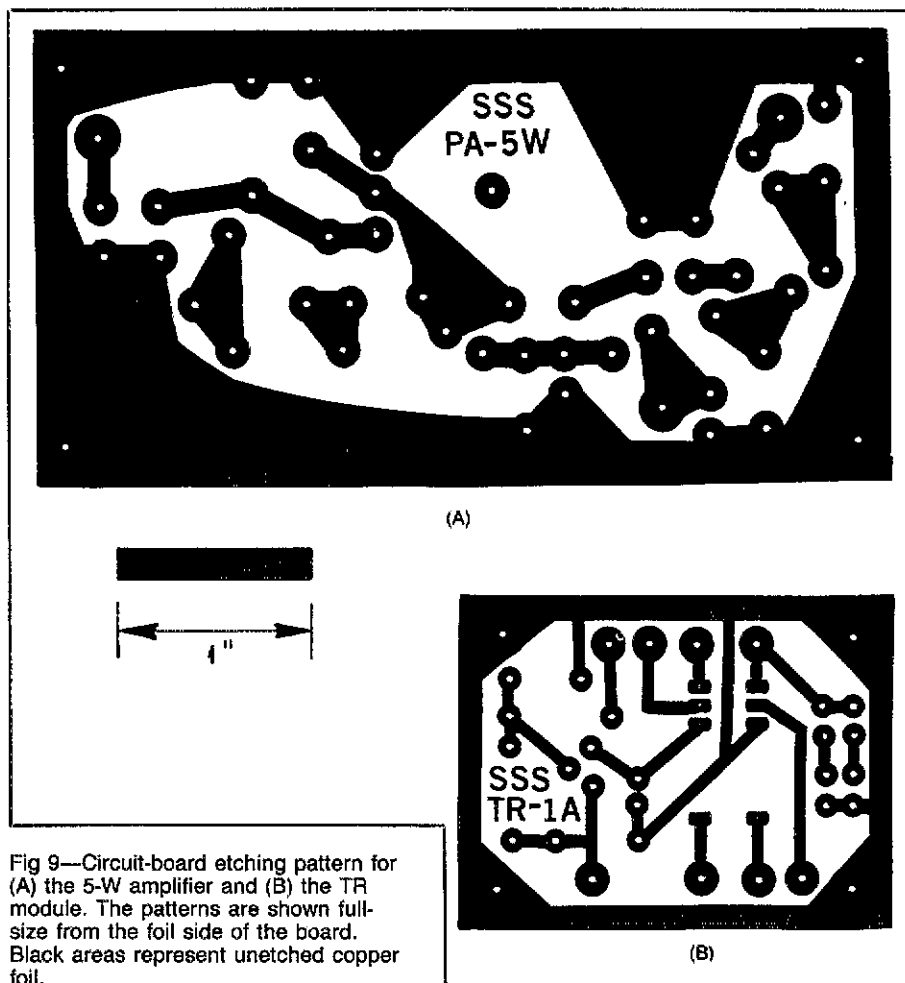


Fig 9—Circuit-board etching pattern for (A) the 5-W amplifier and (B) the TR module. The patterns are shown full-size from the foil side of the board. Black areas represent unetched copper foil.

prevent what is called "hot switching." This means that when a TR circuit is used, such as that shown in Fig 7, the control circuit must ensure that the antenna is connected to the output amplifier (via the relay contacts) prior to, or at the same instant the RF driving power is applied to the final amplifier input. If this is not done, the amplifier must momentarily operate into an open load. This can damage the PA transistors, and it may cause an RF

transient or spike to be transmitted when the antenna portion of the relay closes. Good quality relays that operate with minimum closure delay are, therefore, mandatory.

Practical Considerations

Circuit-board patterns and parts-placement diagrams are given in Figs 9 and 10. Double-sided PC board is recommended for the amplifier of Fig 5. The

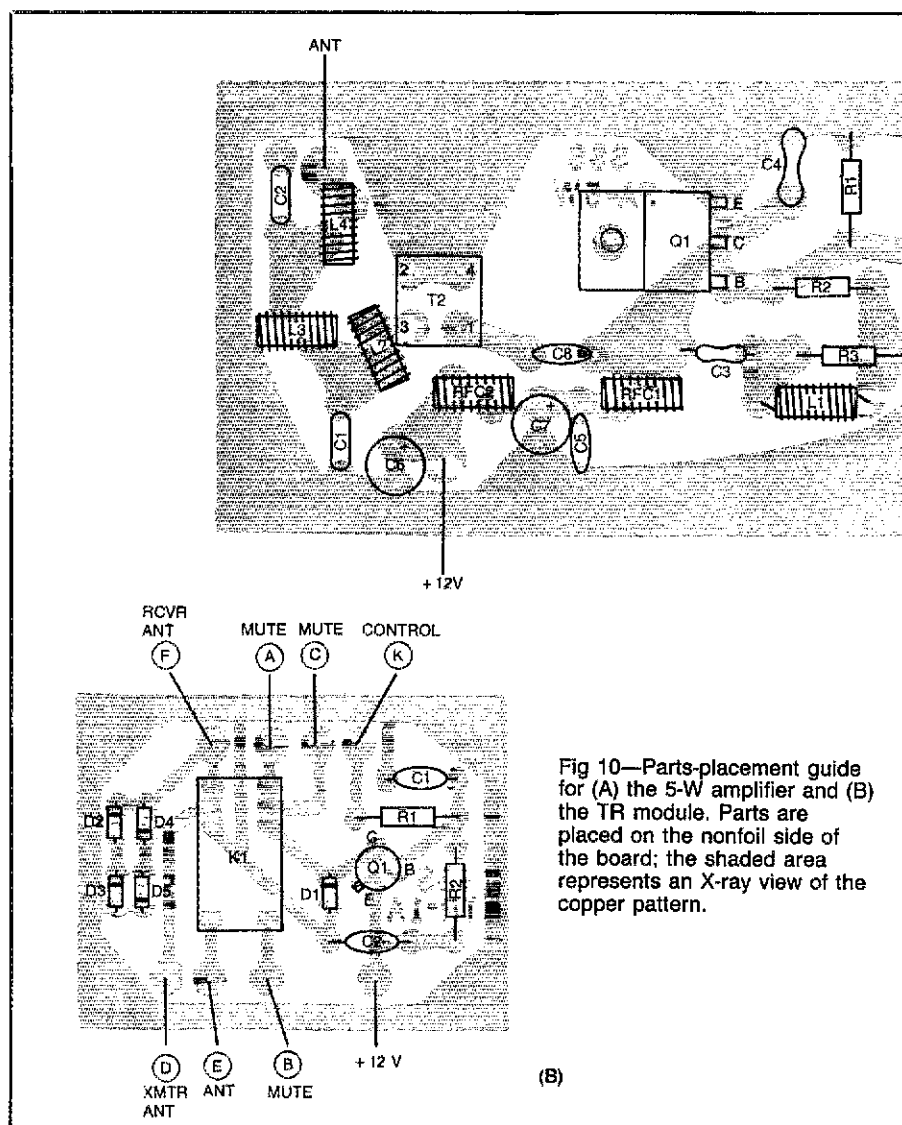


Fig 10—Parts-placement guide for (A) the 5-W amplifier and (B) the TR module. Parts are placed on the nonfoil side of the board; the shaded area represents an X-ray view of the copper pattern.

ground-plane side aids amplifier stability. I was out of double-sided PC stock when I built the unit in Fig 6. However, I have observed no instability symptoms while operating the amplifier on its single-sided PC board.

All of the toroidal coils for the amplifier are mounted vertically. A few drops of Elmer's Glue® or epoxy cement may be used to affix the coils to the PC board. A low-cost TO-220 heat sink is used on Q1 of Fig 5. Heat-sink compound is used between the tab of the transistor and the mounting surface of the heat sink.

All leads carrying RF energy to and from the amplifier and TR module should be made from coaxial cable, with the shield braid grounded at each end of each line. RG-174 cable is excellent for this purpose.

Please keep in mind the need for proper excitation power for the two amplifiers discussed here. Too little drive will result in low output power, and too much drive can cause excessive power dissipation in Q1. The latter condition overheats the transistors or exceeds the safe base-emitter voltage ratings. Either form of misuse can

destroy a transistor quickly! The exciter should be equipped with a drive control, such as a potentiometer in the +V_{CC} line to one of the low-level stages. You may determine the proper drive level by increasing the excitation while observing the amplifier output power. There will be a point at which no further output occurs as the drive is increased. This is known as the "saturated power output." Once this condition is noted, reduce the drive until the amplifier output power just starts to drop. This will be the point of optimum drive for the amplifier. You will find that amplifier distortion is considerably less at optimum drive than when excessive drive is applied. Amplifier output power may be observed with a QRP SWR indicator, or by using a VTVM or FET VOM with an RF probe. A wideband scope may also be used for this measurement. The test should be made while using a 50-ohm dummy load at the amplifier output.

Closing Comments

Although specific power levels are discussed in this article, there is no reason why

you cannot design amplifiers for greater output power by following these guidelines. This article was meant mainly as an idea source for those of you who like to build your own equipment. Who will be the first to build a 25-W RF power amplifier from a bag of 2N2222As? To that end, I recall laughing in 1952 at my friend, John Baumler, W8UUN (now a Silent Key), who built a 400-W SSB amplifier around six miniature 6CL6 tubes in parallel. I found it necessary to eat a large serving of crow after I saw (and heard) his 4- × 4-inch linear amplifier in operation!



QEX: THE ARRL EXPERIMENTERS' EXCHANGE AND AMSAT SATELLITE JOURNAL

It is often said that the moon's phases affect people's behavior. But, what about the moon being responsible for a successful moonbounce contact or one that's barely perceptible above the noise? How does its phase, declination and distance dictate when EME activity will be acceptable? Fourteen graphs will help you plan your moonbounce activity up to the turn of the century.

The June issue of QEX includes articles on:

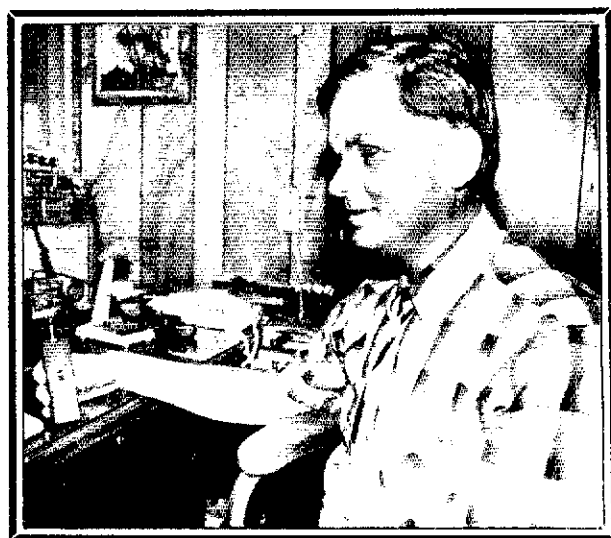
- "Position and Phase of the Moon, 1987-2000," by Michael R. Owen, W9IP/2
- "Computer Interface for the KR-400 and KR-500—Part 2," by Frank H. Perkins, Jr, WB5IPM
- "Cable Counting," by Paul Newland, AD7I

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The Squawker: A Light Detector

This simple device is used primarily as an aid for a blind amateur. Sighted amateurs, however, are sure to find at least one of the applications mentioned here suited to their purpose.

By Butch Bussen, WA0VJR
Box 142, Wallace, KS 67761



One of the more useful things I keep at my operating position is a little box you can hold in the palm of your hand. When exposed to a light source, the box makes a noise. I played around with this circuit several years ago and my friend, Jim Stewart, who built it for me, calls it the Squawker. It is aptly named, as it does emit some rather strange noises!

Description

The Squawker (shown in Fig 1) consists basically of a photocell and an audio oscillator powered by a 9-V battery. The amount of light reaching the photocell controls the oscillator frequency and hence, the pitch of the tone. With no light shining on the photocell, the pitch is so low that you can easily count the clicks produced by the 555 timer. When the Squawker is exposed to a bright light, it emits a high-frequency note. If you put a Squawker in your shirt pocket, you can drive everyone else in the room crazy just by walking around and allowing different light intensities to reach the photocell! Okay, so it's a neat little toy, but of what *good* use is this device?

Putting the Squawker to Use

I have several good uses for my Squawker. I am totally blind and have no light perception at all. Sometimes I go to my basement workbench with a sighted friend and forget that sighted people need a light, even if I do not. (When the power fails, guess who gets to run errands for everyone and start the generator!) I usually try and remember to turn *on* a light, but often forget to turn it *off*. If I am the last one to leave a room, the light is usually left on. Most people forget that I really do not need the light, so they leave it on for me.

Enter the Squawker. All I have to do is wave it around the room to see if the light was left on. Sure, most of the time I could feel the switch and tell if it is on or off.

That is assuming that "up" is on and "down" is off. In my shop, however, I have three-way switches and the on or off position of one switch is determined by the position of the other switch. With the Squawker, I can go around the house and make sure all the lights are out before I leave the room or go to bed.

The amount of light reaching the photocell controls the pitch of the tone.

There are other times when I want to make sure a light is on. I sometimes want to be sure the yard light is on when someone is coming home late. Before I got the Squawker, I would sometimes turn the yard light on thinking I was doing someone a big favor only to discover later that the bulb

was burned out! The Squawker is also handy for checking car tail lights, turn signals or trailer lights.

Have you ever stopped to think about all of the things that have LEDs on them these days and how much you depend on them? Take a look around the average ham shack and you will see what I mean. Try and imagine what it would be like if you could not see, or did not have all of those little LEDs. Is the clarifier on your transceiver off or on? Which line is blinking on your phone? You turn on your receiver and there is no audio output. How can you tell the receiver's even on? I have even used the Squawker to see if tube filaments are lit. My AEA PK-232 packet-radio modem has 21 LEDs on the front panel. That's almost enough to illuminate a small Christmas

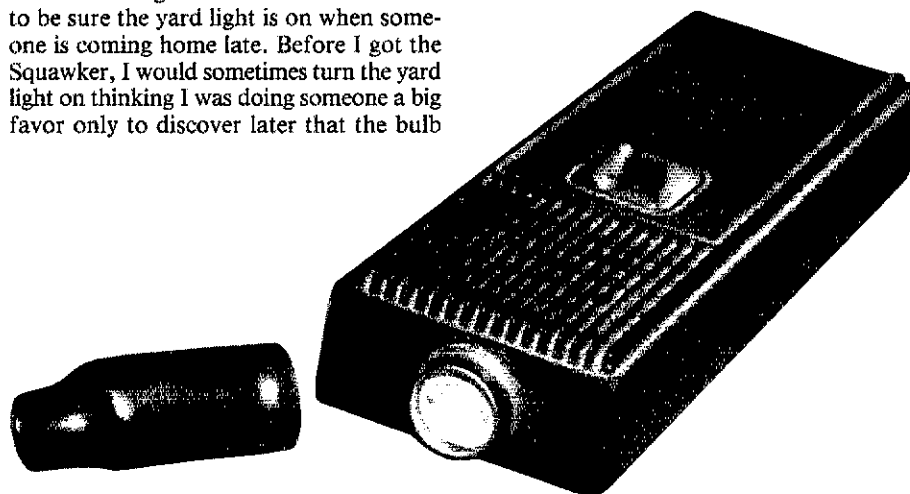


Fig 1—The Squawker. A salvaged cassette recorder microphone case is used as the enclosure. The photocell is the cylindrical light-colored object in the foreground. To the left of the Squawker is a piece of heat-shrink tubing used as a light shield when examining LEDs (see text).

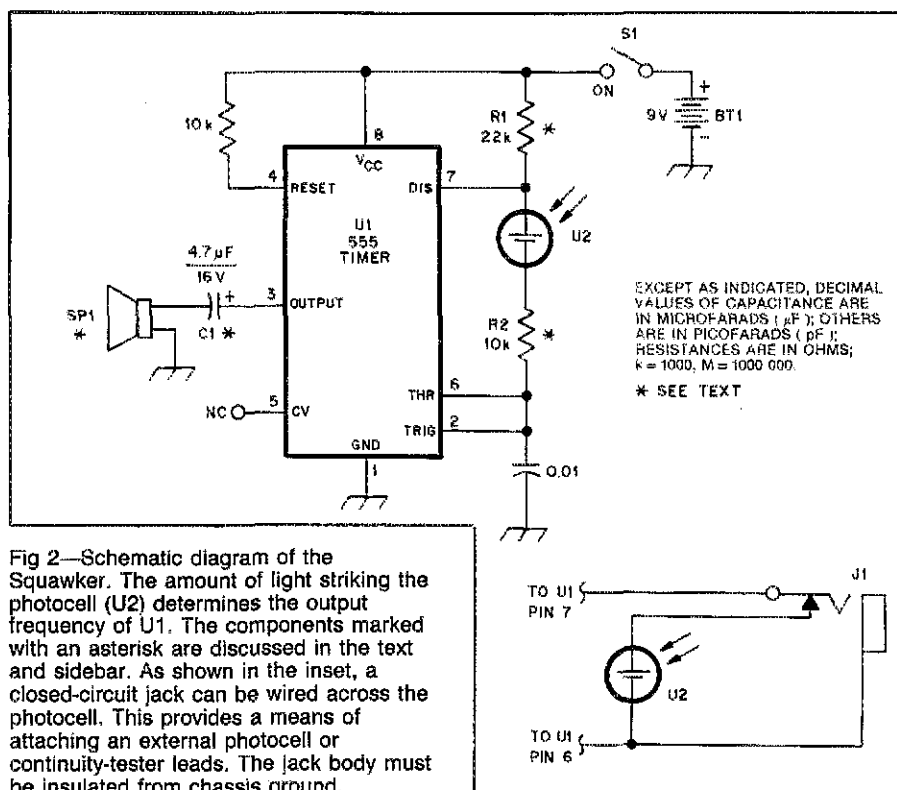


Fig 2—Schematic diagram of the Squawker. The amount of light striking the photocell (U2) determines the output frequency of U1. The components marked with an asterisk are discussed in the text and sidebar. As shown in the inset, a closed-circuit jack can be wired across the photocell. This provides a means of attaching an external photocell or continuity-tester leads. The jack body must be insulated from chassis ground.

tree! (Speaking of Christmas trees: The Squawker works fine for checking those Christmas-tree lights that worked okay last year, but for some reason never do when you unpack them!) For such a simple device, the Squawker has a multitude of uses.

Construction

The Squawker can be built in almost any kind of enclosure. It should be comfortable to hold in your hand. Mount the photocell at one end of the container so that it can be pointed easily at a light source. My Squawker is built in a salvaged Craig cassette recorder microphone case. The dynamic cartridge acts as the speaker, and

the PAUSE switch turns the Squawker on and off. A standard 9-V battery fits nicely where the microphone cord was stored. Perf-board construction is adequate for a project this simple.

Parts values are not critical. U1 is a common 555 timer IC. I have used standard 8- Ω speakers and dynamic microphone cartridges as output transducers. Use whatever fits the box that contains the Squawker. Depending on the impedance of the speaker, you may have to change the value of the electrolytic capacitor, C1.

I have found some photocells that work better than others, but a common Radio Shack photocell (RS 276-116 or 276-1657), or even a surplus phototransistor, works

fine. I used a 10-k Ω resistor in series with the photocell in my unit. You may want to experiment with this value [see the sidebar.—Ed.] depending on the photocell you use. With no resistor, the output tone of my Squawker went so high that I could not hear it! The more light the photocell sees, the less resistance it has, and the output tone increases in frequency. As the light decreases, the resistance increases and the frequency drops. With the 10-k Ω resistor in mine, I just can hear the tone at its highest frequency. If you turn on the Squawker in total darkness, it won't make a sound until it sees a little light to get it started.

Wiring Description

For sighted readers, the schematic diagram is shown in Fig 2. A circuit wiring description follows as it would be presented aurally to visually handicapped hams: Pin 1 of U1, the 555 timer, goes to ground and to the negative terminal of the 9-V battery. The positive terminal of the battery is wired to the arm of an SPST ON/OFF switch. The other side of this switch is the VCC line. Pin 2 is bypassed to ground through a 0.01- μ F capacitor. Pin 2 also is tied to pin 6. Pin 6 is connected through a 10-k Ω resistor (R2) to one side of the photocell. Pin 3 is wired to the positive end of a 4.7- μ F electrolytic capacitor, (C1). The negative side of this capacitor is connected to one side of the speaker, and the other side of the speaker is grounded. Pin 4 is pulled high through a 10-k Ω resistor to VCC. Pin 7 connects to the other side of the photocell and also through a 22-k Ω resistor (R1) to Pin 8. Pin 8 is wired to VCC. Pin 5 is not used and remains unconnected.

You may want to wire a closed-circuit phone jack across the photocell so that when a cable is plugged into it, the Squawker's photocell is taken out of the circuit. If you use a metal enclosure, insulate the jack from chassis ground. You now have a light detector or a continuity tester. You can also hook another photocell to these test leads.

Applications Ideas

The Squawker is sensitive enough to tell if an LED is lit. I had to come up with a way to keep other light sources from shining on the photocell when concentrating the Squawker on one LED. On some equipment, several LEDs are mounted quite close together, and I need to know which one of the bunch is on. The solution is to use a piece of heatshrink tubing, preferably black, as a shield (see Fig 1). It should be just the right diameter to slip over the photocell, and about 1 inch long. Shrink one end down so that the piece of tubing is funnel shaped. With this piece of tubing slipped over the photocell, you can put the small end right over the LED in question. See Fig 3.

Here is an idea that works quite well for

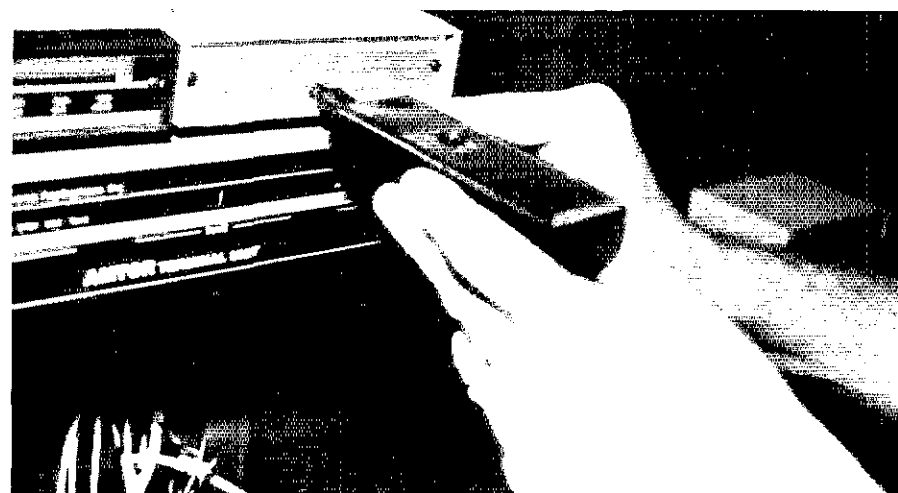


Fig 3—The Squawker being used to check LEDs on a KPC-2 packet modem.

constantly monitoring a particular LED. Hook the external photocell through a high-value fixed resistor or potentiometer. Set the resistance so that when an LED is illuminating the photocell, the speaker ticks very slowly. Choose the resistor and photocell that gives you just the right ticking noise. The goal is to create a sound

that is not objectionable and can be ignored easily. But if you want to, you can listen for the "tick tick tick" and know that the LED is on. There is an LED on my Kantronics KPC-2 that is illuminated when I have unacknowledged packets. I tape the external photocell assembly to the front of the KPC-2 so that it sees only the

LED I want to monitor. Admittedly, this is a bit haywire and may not be much for looks, but it sure beats taking your hands off the keyboard and holding the Squawker in place to check the LED. A better approach is to build a similar circuit inside your modem and let the voltage that feeds the LED also go to a gate that turns the oscillator on and off.

Another Squawker Version

I tried some modifications to the simple circuit presented by Butch in Fig 2. Using values of 100 k Ω for R1 and R2 produced some positive results. The upper end of the frequency range was lowered and the audio output level increased considerably. With a 9-V battery, in fact, I found it desirable to introduce a volume control between the negative end of C1 and the speaker. A 500- Ω thumbwheel trimmer potentiometer works well for this purpose. The resistance value changes also allowed the circuit to operate at low volume with a supply voltage as low as 3 V. I used an RS 276-116 photocell and found it to be quite sensitive.

I built my version of the Squawker—see Fig 4—in a plastic box (RS 270-220) that measures 13/16 \times 2 \times 4 in (HWD). The small speaker and subminiature ON/OFF switch were salvaged from my junk box, although similar items are also available from Radio Shack and other parts-supply houses.

A piece of pad-per-hole perf board and point-to-point wiring are used to mount the components. I used a socket for the IC. (The volume control is omitted in this version of the Squawker, but there's more than enough room on the board for a subminiature potentiometer.) The photocell is secured with epoxy cement in a hole drilled in one end of the enclosure. Pieces of double-stick tape secure the battery and perf board within the box. Small notches were made in the box cover to clear the outer edge of the speaker rim.

To make the speaker grill, a pattern of small holes was drawn on a paper template. The template was then taped to the box, and a punch used to locate the center of each hole. The holes were drilled slowly, as the plastic is quite soft and is easily deformed. Dabs of epoxy cement fasten the speaker to the box cover. A 7555 IC (CMOS version of the 555) can be used for U1 if you want to reduce the battery current drain. Without altering the circuit in any other way, however, the audio output level will be considerably lower with the 7555 than with the 555.—Ed.

The Squawker is sensitive enough to tell if an LED is lit.

That is the Squawker! It is a neat little circuit whose usefulness depends only on your imagination. Try it—it makes a great weekend project!

Butch Bussen was first licensed in 1961. His Novice call, WN0HGV, expired without his being able to make a single QSO. In 1968, Butch obtained his General class license. Butch has been an active amateur ever since. He attended the School for the Blind in Kansas City, Kansas for 11 years and attended a local high school during his senior year. No Braille textbooks were available, so learning materials had to be placed on audio tape. Because no cassette recorders existed then, Butch carried around a 7-inch reel-to-reel deck.

Butch graduated from high school in 1966 and attended a local vocational technical school for the next three years. There he studied electronics and took a two-year telephone course and a two-year electricity course in three years. It was about that time he got back into Amateur Radio.

After completing vocational school, Butch worked part time for an uncle doing construction work. He also did some work for a local TV repair shop. Not much TV work, Butch says, just radios, stereos and tower work. Butch acted as the troubleshooter and let someone else do the soldering. Butch and his wife, Nancy, KA0NVF, have two children, Terra is 13 and Chris is 16.

For the past several years, Butch has run a small shop out of his home doing citizen band radio, commercial two-way radio, and satellite TV sales and service. A little over three years ago, he got his first computer, and now enjoys writing and marketing special talking software. [You'll be seeing more from Butch in an upcoming article series, "Amateur Radio and the Blind." You'll learn how he combines computers and Amateur Radio to operate the various modes.—Ed.]

QST

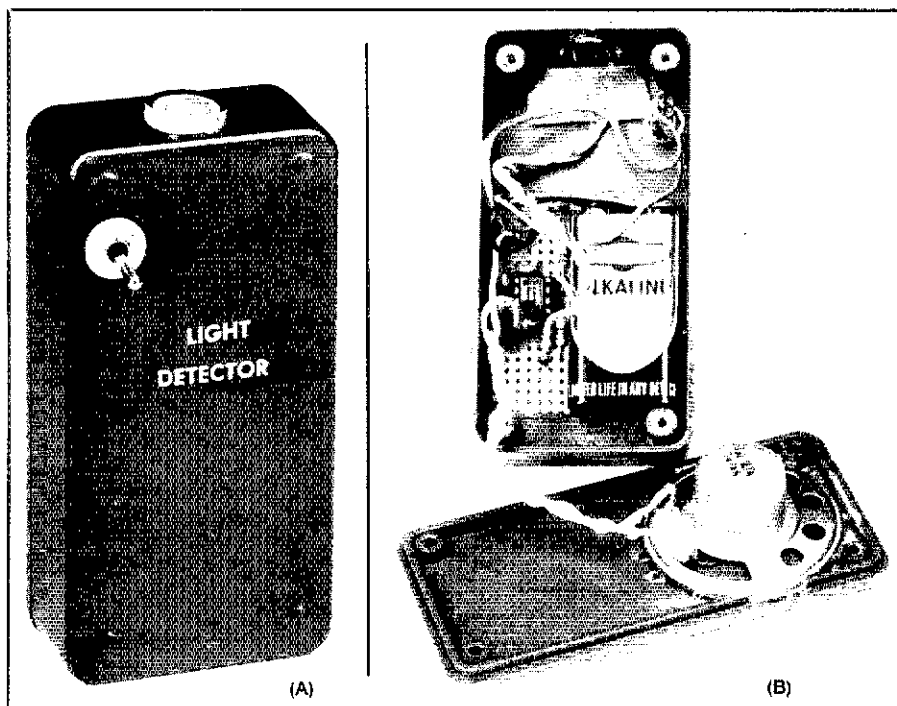


Fig 4—Another version of the Squawker. At B, an inside view of the assembly. See sidebar for construction information.

Strays



I would like to get in touch with...

☐ hams for VHF and eyeball QSOs during my visit to southern and western USA Jul-Sep. Hans Prader, OE5FOL, A-4553 Schlierback 352, Austria.

☐ hams who lived in Laurelton, New York 1955-1970. Rob Brownstein, NS6V, 3881 Winkle Ave, Santa Cruz, CA 95065.

☐ Masons and Order of Eastern Star members in Michigan, for starting a newsletter and net. Send QSL card to Wells Chapin, W8GI, Michigan Masonic Homes, 1200 Wright, Alma, MI 48801.

☐ anyone who writes music, for forming a musicians net on 2 meters. Bill Copeland, WB6RVE, PO Box 163, Perris, CA 92370.

A DOUBLE HALF-WAVE LOOP ANTENNA

[Here is some modern information on an interesting antenna that has been in *The ARRL Antenna Book* for years.—Ed.]

□ Fig 1 shows an effective, easy to build and inexpensive HF antenna. The plans are from an old issue of *QST* that I bought at the Wheaton Community Radio Hamfest in 1984.¹ The more I read about the double half-wave loop, the more interested I became; so I decided to give it a try. This antenna can be built for any band (see Table 1), but I decided to try it for 15 meters, because of the convenient size. Table 2 is a materials list for the 15-meter antenna. Because the antenna is 85 inches wide, I suggest that it be assembled outdoors. The necessary materials can be found at most local hardware stores.

For 15-meter operation, the hoops should have a circumference of about 22.1 ft, with a 3-inch end gap. Each loop is made of 1/4-inch (ID) copper tubing. Some snug fitting

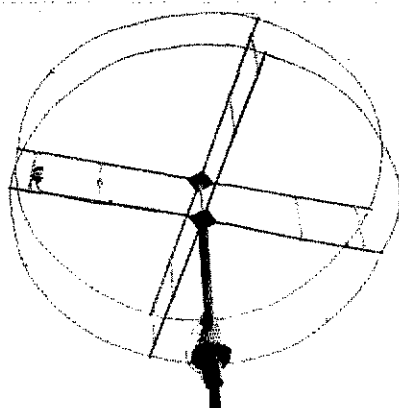


Fig 1—A photo of KA9LYR's completed loop antenna.

clear-plastic hose is forced over the hoop ends to maintain the gap (see Fig 2). The circles are mounted so that the hoop gaps line up with each other (see Table 1).

The two circles are mounted parallel to each other and separated 1.0 inch for each meter of wavelength at the operating frequency ($1 \times 15 = 15$ inches). PVC tubing (1/2-inch ID), a few tee fittings and two electrical-junction-box covers form the hoop-support structure (see Fig 3). Steel pipe flanges are used at the center of the spoke assemblies, and also on the 1 1/4-inch mast pipe.

The hoop-support structure may appear weak, but it is not. Since I live in the windy Chicago area, I know how strong an antenna must be to survive adverse weather. The PVC structure is flexible, lightweight, durable and wind-resistant.

I wasn't sure how to construct a 72-Ω twisted-pair feed line, so I came up with a different feed method using 52-Ω coax. At the suggestion of my brother Tom, WB9EAW,

¹J. Reinartz, W1QP, "Concentrated Direction Antennas for Transmission and Reception," *QST*, Oct 1937, pp 27-28.

Table 1

Dimensions for the Dual Half-Wave-Loop Antenna

Frequency (MHz)	Circumference (Ft)	Spacing (Inches)	Gap (Inches)	Diameter (Ft)
1.80	260.00	160	33.33	82.76
3.75	124.80	80	16.00	39.73
7.15	65.45	40	8.39	20.83
10.07	46.45	30	5.96	14.79
14.18	33.02	20	4.23	10.51
21.23	22.05	15	2.83	7.02
24.94	18.77	12	2.41	5.97
28.85	16.22	10	2.08	5.16
52.00	9.00	6	1.15	2.86
146.00	3.21	2	0.41	1.02

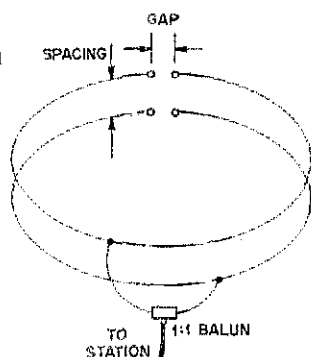


Table 2

Parts List for KA9LYR's 15-Meter (21.150 MHz) Dual Half-Wave-Loop Antenna

Qty	Description
3	1/2-inch PVC pipe (10-ft sections)
16	1/2-inch PVC tees
2	3/4-inch pipe to 1/2-inch PVC connectors
2	4 x 4 x 1/8-inch steel plate (cover from large electrical junction box)
2	3/4-inch pipe flanges (steel)
1	1 1/4-inch pipe flange (steel)
2	Sliding copper clamps to fit around copper tubing (may be fabricated from 3/8- by 6-inch strip of copper flashing)
1 ft	Plastic tubing to fit snugly over ends of copper hoops
46 ft	1/4-inch ID soft copper tubing
1	1:1 balun
1	Can of PVC-pipe cement
	Assorted no. 6 hardware
4	No. 10 nuts and bolts (for 1 1/4-inch pipe flange)

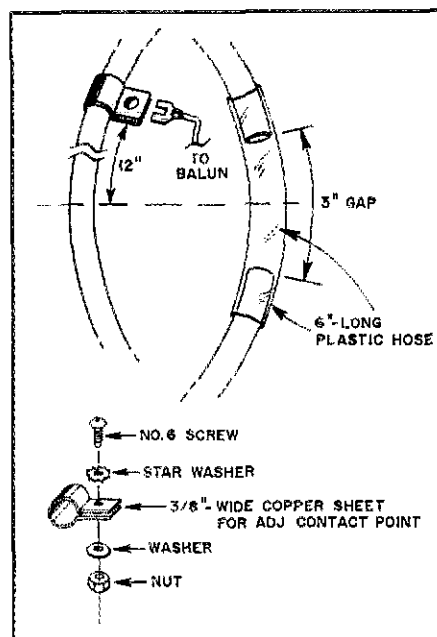


Fig 2—Construction details of the individual hoops. The plastic hose must fit tightly over the copper tubing in order to hold the ends in place (A). Make two sliding clamps to feed the antenna (B). [Use stainless steel hardware to prevent corrosion.—Ed.] Place one clamp on each hoop, and position them on opposite sides of the hoop center line (also see Table 1).

there is a 1:1 balun between the antenna and the coax. I determined the correct feed-line attachment points while exciting the antenna with a dip meter. The best setting was about 12 inches on each side of the balun. The SWR is low, and the antenna seems to have good directivity.

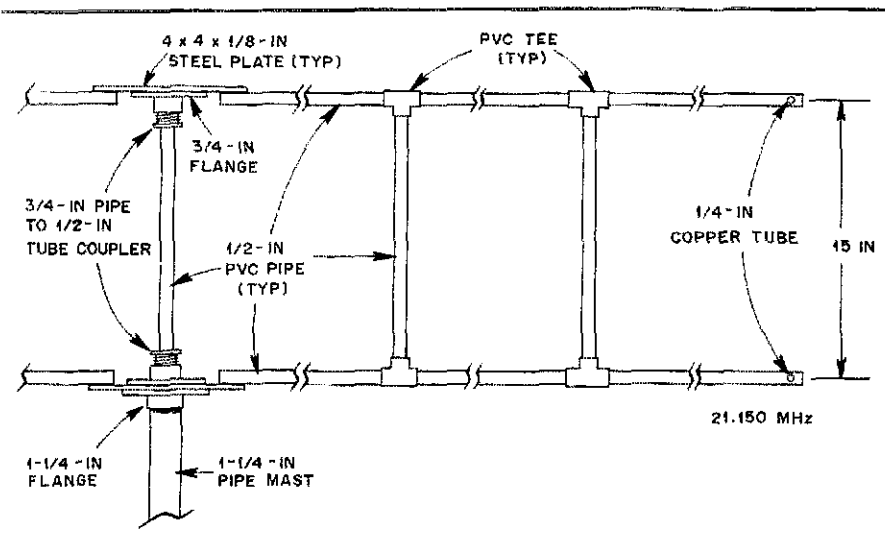
The major radiation lobe occurs on that side of the antenna closest to the current loop (feed point). [Visualize the major lobe by imagining an arrow drawn from the open hoop ends, across the middle of the circle.—Ed.] Signal reduction appears in the opposite direction. The field-strength gain in the forward direction appears to be about 28%, compared to a dipole. The front-to-back ratio seems to be about 6 dB.

On-the-air performance is good. My rig is a Ten-Tec Century 21 that provides 60 W to the antenna, which is mounted at 20 ft. I used a "Green Mountain" vertical antenna for comparison. (It has four radials 65 ft long and 15 radials 30 ft long.) The loop works well on stateside contacts. My first DX contact on the new antenna was YS1JBL in Salvador, followed by ZFICA in Cayman Islands;

OE1LYA, Vienna; UA3AJ, USSR; VO1OS, Newfoundland; and JA5JTE, Japan. These contacts did not all occur in one day, but I can sure hear a difference between the performance of the vertical and the loop! —Dick Kaitchuck, KA9LYR, Des Plaines, Illinois

MOUNT AN INVERTED V ABOVE YOUR BEAM ANTENNA

□ Our lot is small and nearly filled with house, patio, walkways, driveway and so on. Thus, there is little choice in the selection of a low-band antenna—we put up a trapped, inverted V for the 40- and 80-meter bands. It was placed in the usual way, below our triband beam with the apex



← Fig 3—One spoke of the PVC-pipe hoop-support structure. Use two no. 6-32 screws, nuts and lockwashers to fasten each spreader arm to the appropriate steel plate. Four similar sets of no. 6-32 hardware fasten the 3/4-inch flanges to the plates. Use no. 10 hardware to fasten the bottom plate to the 1 1/4-inch flange. All arms are similar except for balun and feed-point details. Mount the balun on the vertical PVC strut closest to the feed point.

Fig 4—Proper choice of the critical dimensions, h and α , allows one to successfully place a wire antenna above a rotatable array. (The turning radius of the rotatable array is the variable, r .) Allow some extra height for wire sag.

at about 45 ft. Lackluster performance prompted us to strive for improvement.

Why not mount the V above the beam? Any additional antenna height should help. A little trigonometry provided the following information: If the angle, α , between the antenna wires and the mast is at least 45° , and if the apex of the V is mounted above the center of the beam by at least the turning radius (plus a little extra height and/or angle to allow for wire droop and wind sway) there should always be clearance between the two antennas (see Fig 4).² The V-mast mount must allow the beam to rotate while the V antenna stands still.

A pair of Vs, oriented perpendicular to each other (see *QST*, Aug 1982, p 45; Nov 1970, p 17), would guy the extension mast quite nicely. Unfortunately for us, that setup would place one of the V legs right over our neighbor's house. We didn't even ask; instead, we angled the two legs somewhat, in the horizontal plane, and used a third guy (broken up into non-resonant lengths with insulators) to support the mast. Since we wanted to lift the 1 1/4 x 18-ft extension mast to the top of the beam mast manually, we chose lightweight aluminum tubing as the best material for the extension. Our feed point and the guy line is mounted on a PVC assembly that rotates freely inside the top of the extension mast (see Fig 5).

The end-support ropes are tied to convenient trees. The V apex is about 70 ft high (over $\lambda/4$ on 80 meters!), and the ends are about 30 ft high. The entire antenna is now above the house and the high-voltage ends are safely elevated. The rotatable array seems more stable in high winds because of the guyed extension mast, and beam performance is unaffected by the V antenna.

With this improvement, the 'BDN DX tally has soared from 16 to 37 countries on 75 meters! So try giving your inverted V a lift!—Martin, W6BDN, and Daniel, N6BZA, Levin, Menlo Park, California

²[Keep in mind that an apex angle of 90° is suggested as a minimum. The optimum apex angle for an inverted-V antenna is about 120° . If possible, make the extension mast shorter, and elevate the dipole ends more.—Ed.]

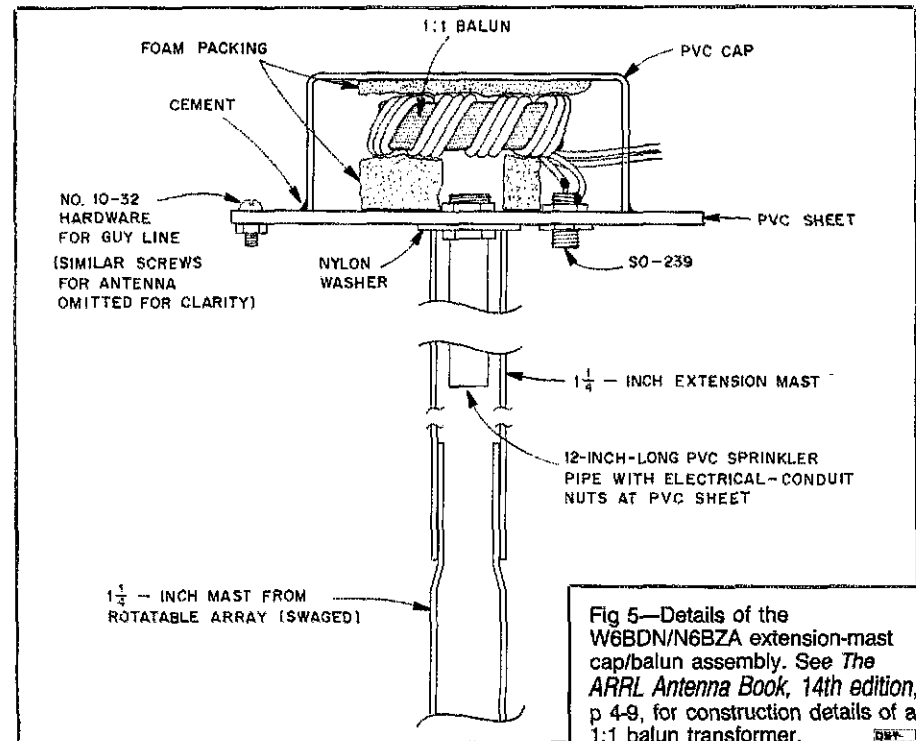
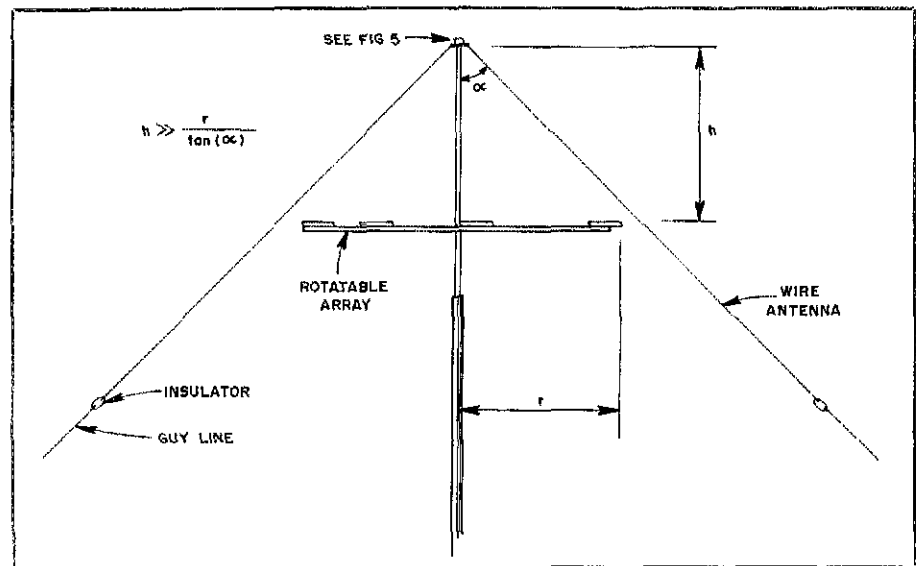


Fig 5—Details of the W6BDN/N6BZA extension-mast cap/balun assembly. See *The ARRL Antenna Book*, 14th edition, p 4-9, for construction details of a 1:1 balun transformer.

receptacles oriented so that the ground holes face the side of the box (see Fig 2). At least one company in Canada manufactures such power strips.—*Rene Beaudry, VE3JKR, 983 Goren Ave, Ottawa, ON K1G 2T8, Canada*

[An ad in the February 1987 issue of *Modern Electronics* (p 94) features the Zapstar. The Zapstar is a 6-outlet surge-protection filter with EMI/RFI filtering. This outlet strip has the receptacles mounted as described by Rene. Zapstar is manufactured by Severts-Zorman Engineering, Inc, 7144 W McNab Rd, Ft Lauderdale, FL 33319, tel 800-624-8189. In Florida, call 305-722-7770. Price: \$59.95.—Ed.]

REPLACEMENT DETECTOR

□ I have a circuit to replace the peak detector used by Steve Stuntz in his Atari CW interface.* This circuit is much simpler than the original, and on occasion has enabled the computer to dig CW out of the noise that even I was having trouble with.

Steve's circuit has problems with QRN and even the noise floor when you use a receiver with no provision to disable the AGC. I tried the original peak detector circuit with a Drake R-4C equipped with good CW filters, and the circuit still performs poorly. Every burst of static is interpreted by the computer as a high-speed CW signal. The computer then averages this and thinks that the speed has increased. It takes a couple of letters for the computer to get back to the correct speed, and by that time, another noise crash upsets things again. The peak detector works only for extremely good signal-to-noise ratios, and if there is QSB, you must compensate by using the audio gain control because the peak detector works best with the AGC off.

The circuit I use is shown in Fig 3. The 567 PLL is available at Radio Shack (276-1721), and the rest of the components are generally obtainable from one's junk box. The lock-in frequency is inversely proportional to the product of $R1 \times C1$. If you use a CW filter, it would be wise to tweak the lock-in frequency to the center frequency of the CW filter.

I originally saw this idea in *Ham Radio* magazine.⁷ The circuit can be used to key a code-practice oscillator, thus eliminating

QRM and QRN. Anyway, this detector is much better than the peak detector, and I thought others might like to experience the improved performance.—*Rob Frohne, KL7NA/W9, 1320 Palmer Dr, No. 311, West Lafayette, IN 47906*

TVI—ANOTHER APPROACH

□ I found K. C. Jones's item about a VCR curing (instead of causing) TVI most interesting.⁸ I'm a bit surprised, since VCRs are notoriously susceptible to TVI. The hint, however, brings out a point that seems to have been overlooked when discussing cures for TVI. That is, what really needs to be addressed is the C/I (carrier-to-interference) ratio; simply put, the desired to undesired signal ratio. As a rule of thumb in the CATV world, a C/I ratio of 50-60 dB is usually sufficient to keep the undesired signal from being noticed, although the ratio can be as little as 35 dB, depending on many factors.

Think for a moment of the ramifications of this ratio. There are three ways to achieve a good C/I ratio: Increase the level of the desired signal (as did Mr Jones), decrease the level of the undesired signal, or do both—simultaneously, if possible. Which method is the best and/or easiest to effect depends on which frequencies are involved, and where the undesired signal is being introduced, to mention two factors.

What I really want to point out is that hams shouldn't consider only the trapping route when combating TVI. They should also investigate the enhancement route. Naturally, you would want to use a TV-signal amplifier that's well shielded so as to avoid causing interference to the amplifier with the ham gear, or vice versa.

To illustrate the value of the "don't raise the bridge, lower the water" concept, I had some TVI when first hooking up TVs and using my Radio Shack Color Computer and C64 in the shack. Installing all sorts of high-pass filters had little positive effect. If anything, the TVI seemed to get worse. Finally, I removed all the filters and installed a \$15 10-dB amplifier (VSA-10-550), available from Viewsonics.⁹ (Viewsonics is a well-known name in CATV, so I felt safe using their product.) *Voilà!* Problem solved!

What I think happened was this: I wasn't reducing the level of the *unwanted* signal with the filters because the unwanted signal was being introduced after the filter (or riding over the filter—a common problem). But I was attenuating the desired signal, thereby lessening the C/I ratio. Adding the amplifier brought the C/I ratio to a value sufficient to eliminate the TVI, since the I part wasn't being amplified.

Hopefully, this information may prove useful to someone battling the TVI scourge. Since the amplifier mentioned covers the FM broadcast band, this procedure may help solve such interference problems as well.—*Bob Wanderer, KT2D, PO Box 1159, Pompton Lakes, NJ 07442-0159*

*K. Jones, "Flash! VCR cures TVI," Hints and Kinks, *QST*, Dec 1986, p 45.

⁹Viewsonics, PO Box 36, Jericho, NY, tel 800-645-7600 or 516-921-7080.

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.

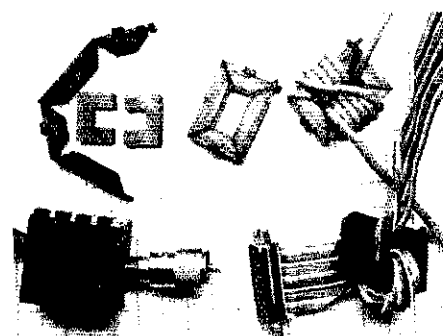
Feedback

□ The following information was omitted from the caption for Fig 3 of Wes Hayward's "A Unified Approach to the Design of Crystal Ladder Filters," May 1982 *QST*, pp 21-27: D1 is a hot carrier diode, type not critical. L1 (95 μ H) is 15 turns of no. 28 enam wire on an Amidon FT-37-43 ferrite toroid core. T1 (4:1 impedance ratio, 42 μ H per winding) is 10 bifilar turns of no. 28 enam wire on an Amidon FT-37-43 ferrite toroid core. Q1 through Q4 are 2N3904 or 2N2222A transistors. Y1 is the crystal under test, 2 to 10 MHz.

New Products

TEXPRO SNAP-ON-CHOKES

□ TEXPRO Snap-On-Chokes introduce a novel form of construction to simplify the application of an anti-interference technique that has long been appreciated by the experts. The device is a common-mode choke that reduces radiation from the currents associated with cables acting as transmitting or receiving antennas—even shielded cables. It can be used in place of a balun at the antenna feed point. It is effective with domestic radios, TV, audio equipment, computers and communications systems.



The Snap-On-Choke consists of a two-piece ferrite core and a plastic clamp that can be disassembled, then reassembled around a cable or cord. Its performance is similar to that of toroidal ferrite cores, and is effective over the 0.5- to 200-MHz frequency range. The choke can be clamped onto cables with a diameter of up to 10 mm, or many turns of thinner cable can be wound within the opening. A number of chokes can be snapped together if necessary. Use of the choke does not void the equipment warranty.

Distributor: Computerradio, Box 282, Pine Brook, NJ 07058, tel 201-227-0712. Price: Single choke, \$4; package of 4 chokes, \$15. Add \$2 for shipping and handling. Supplied with specification sheet and installation instructions. If not satisfied, you may return the chokes within 30 days for a refund, less shipping.—*Bruce O. Williams, WA6IVC*

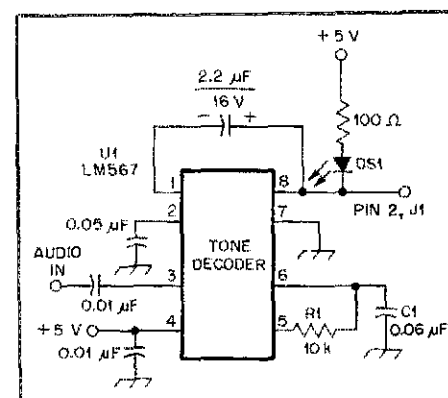


Fig 3—A PLL detector for CW. Adjustment of the $R1C1$ product changes the lock frequency. Resistors are $\frac{1}{4}$ -W units. DS1 is an LED.

My Stay in the USA

A German exchange student remembers his visit stateside—and the role he played in a ham radio rescue.

By Christoph Janker, DF3TJ/KF4KT
Lanaustr 8, D-5300 Bonn 1
Fed Rep of Germany



Are you one of the lucky ones who hold an Amateur Radio license? Congratulations! You have a lot of funny, interesting or even incredible surprises ahead of you.

My first surprise with ham radio was passing the exams at the FCC office in downtown Atlanta, Georgia. That was in January 1977, half a year after my take-off to the United States. I had the great luck of being one of the 400 or so exchange students from DL on the year programme 1976/77. When I landed in Atlanta on July 28, 1976, I knew I had a beautiful and interesting year ahead of me.

Six dull weeks passed as I waited for my license and call. I had almost given up hope of ever getting the ticket, when my "mom" (host mother), Joana, one day came to school to bring me that long-awaited, suspicious-looking envelope. I remember she popped into the chemistry lab waving the envelope and saying, "Isn't this the thing you've been waiting for?" Dear Joana! She knew what I had gone through. Opening the envelope to check for your call is a feeling at least as dazzling as opening presents on your birthday. (Later, I found out that there is no need to open the envelope—you can see your call on it!) That was the day Christoph Janker became WD4CPK.

The setup at my home in Dunwoody, Georgia was nothing big—an HW-16, an electronic keyer and a dipole. But it was a big thrill to be on the air for the first time, and I was surprised how well I did get out on 40 meters. The first night I worked FOØ, and the next couple of days half of Europe.

Time came up for the next surprise. I found out about the Georgia Tech Radio Club, joined in, and was invited to operate their station, W4AQL, which means busi-

ness: A KWM-2A, a 30 S1 linear, the Drake twins and a 6-element beam helped me to work DXCC in a couple of months.

Now, don't get the impression that I was only hamming all day. In fact, operating at W4AQL always proved to be a bit difficult. First thing I had to do was get downtown with the bus system, then take a walk of a good mile, pick up the station keys at the police station, and finally spend the night in the shack (and sleep on the floor or on a couple of chairs). But it was worth it. 20 meters usually was in good shape, and I was able to talk in German to many DLs. I'm glad I had that practice—I was about to forget my native language.

With all the other activities I was involved in, the year passed very quickly. Suddenly, I found myself in the last week of my stay. I tell you, a year isn't that long at all! Although I had to get organized for my departure, I reserved a weekend for the last night at W4AQL. Not in my dreams could I have imagined what was going to happen that night.

As usual, I was on 20, looking for some friends to say good-bye to and work some last DX from stateside. Around 3 AM EDT, I started to get tired. Fortunately, some nice guys from VK kept me awake with very nice and long QSOs. The last one listed in my log that night was VK7OH. I turned the dial up and down a couple more times and was ready to hit the big switch when I heard a strange signal on 14,251 kHz. That was at 4:20 AM EDT.

I knew there was something unusual going on, but the signals were barely audible. I called in and had the message repeated several times, but I just could not read it completely. Great luck that Tom, YV5TK, came up on frequency. He had a

little better copy, and it became clear that the signals came from the 91-ft Panamanian ship *Rhinoceros*, which had sprung a leak about 200 miles south of Jamaica. The ship's captain was using the ship's license number, HP 3422, as a call sign. He told me he had a VHF marine-band radio on board, but was unable to contact anyone with it. Immediately, I alerted the FCC monitoring station in Marietta, Georgia. They came up on frequency to listen and notified the 7th district Coast Guard Search and Rescue Headquarters at Miami.

About 15 minutes later, the first Coast Guard station came up on frequency: "WD4CPK, this is NMA, November-Mike-Alfa Coast Guard communications station in Miami, Florida." Unfortunately, they could not copy the signals from the *Rhinoceros* at all, so we had to relay all the upcoming information to them. The ship's captain told us he was coming from Barranquilla, Colombia and his destination was the Canal Zone, but he was not able to tell us his location—the ship's navigation instruments did not work. The need for a direction-finding net became apparent.

After all important information had been passed, HP 3422 was asked to stand by and report only every 15 minutes to save battery power. All the *Rhinoceros* crew could do was wait to be rescued. But at least everything was under way. A C-130 Air Force rescue plane had been dispatched from Albrook AFB in the Canal Zone, and the Coast Guard direction-finding net was pinpointing the *Rhinoceros* every time it reported.

(continued on page 45)

Plan of Action Tested

Simulated Emergency Test Results, 1986.

By Steven Ewald, WA4CMS

Assistant Public Service Manager

The 1986 ARRL Simulated Emergency Test afforded radio amateurs throughout North America the opportunity to prepare for the unexpected emergency. Setting goals, contacting served agencies and practicing emergency-communication procedures were all on the agenda around the third weekend of October 1986. The results are highlighted here, and represent the efforts and imagination of the Amateur Radio Emergency Service, the National Traffic System and many other radio amateurs active in public service.

SET Goals Set the Stage

The Falmouth Amateur Radio Association (Eastern Massachusetts) exercised a little imagination in their 1986 Simulated Emergency Test. Emergency Coordinator David Lovering, N1CLC, recounts the weekend:

"We wanted to try something different this year. We were asked by the local hospital to provide emergency communications for them during their annual emergency certification. This year's simulated test was a 'school bus accident' in which several children participated as 'victims' and were actually transported to the hospital by ambulance with all of the attendant ceremonies.

"Our goal was to try packet radio as a means of providing the hospital emergency room staff with personal information about the victims prior to transporting them to the hospital. One packet station was set up with emergency power at the 'accident' site, while another was set up in the hospital emergency room. Communications were first established through the local digipeater and then direct. Health-and-welfare messages were also handled via packet through the digipeater.

"This year's SET accomplished at least two major goals: (1) It provided the local



Max Blood, N4CVV (foreground), gathers weather information with help from John Laing of the National Weather Service while a simulated ice storm hits metropolitan Atlanta during Georgia's 1986 Simulated Emergency Test. (Metaphor, Inc photo)

amateurs a chance to try a new medium in an emergency situation. (2) It demonstrated the usefulness of packet and the resourcefulness of local hams to the hospital emergency staff. The hospital staff was amazed at the reliability of packet and the opportunity it presents. We were able to send information to the hospital about the victims before the Emergency Medical Technicians and ambulance arrived on the scene!"

A Stormy Scenario

The radio amateurs in the tristate area of West Virginia, Kentucky and Ohio worked in cooperation with the National Weather Service during the 1986 SET. On October 21, the Tri-State Two Meter Net was called into operation over the KK4Y repeater. A simulated weather emergency was in progress. Net Manager and Emergency Coordinator KZ8Q of Wayne County, West

Virginia, analyzed the situation:

"We were informed via the statewide net on 75 meters that severe thunderstorms were brewing between Lexington, Kentucky and the Ohio Valley and had 68-mile per hour winds, 1/4-inch hail and possible tornadoes." Soon after the simulated alert started, over 25 stations had checked into the net. Liaisons with the National Weather Service and NTS nets were on duty. Emergency Coordinator KZ8Q continued to build the network by assigning stations to recruit radio operators in western locations to act as weather spotters during this simulated alert. "All in all, a total of 47 stations were on board the Tri-State Two-Meter Net or in contact by liaison stations. Their locations ranged as far north as Meigs County, Ohio, as far south as Martin County, Kentucky, as far west as Covington, Kentucky and as far east as Putnam County, West Virginia."

The Results Are In

The Simulated Emergency Test results are organized in two main categories: National Traffic System and Local Activity. The National Traffic System includes Area and Region Nets and Section/Local Nets. These results were reported by Net Managers. Local Activity shows the work of the Amateur Radio Emergency Service as reported by local Emergency Coordinators and District Emergency Coordinators.

Each entry's total score was based on a preannounced point system. Point values were assigned to a variety of categories and exercises related to emergency communications. SET participation, operating emergency-powered equipment, exchange of SET traffic and interaction with community and service agencies figured prominently in the scoring guidelines. Since ARES and NTS are separate divisions of Amateur Radio public service, ECs and Net Managers followed different scoring guidelines.

1986 ARES Analysis

	1986	1985	% Change
Total ARES Members Reported	15,404	14,933	+ 3.15%
Members on CW	8,158	7,597	+ 7.38%
Members on VHF	13,923	13,338	+ 4.38%
Emergency-Powered (HF)	3,363	4,492	-33.57%
Emergency-Powered (VHF)	10,346	10,395	- .47%
Members Mobile (HF)	3,835	2,908	+31.87%
Members Mobile (VHF)	13,032	12,906	+ .97%
Net Sessions/Drills per Year	18,676	18,957	-1.47%
NTS Liaison	273	260	+ .5%
RACES Liaison	233	215	+8.3%

1986 SET Top Ten

Local Activity	Total Points	Section/Local Nets	Total Points
1) Ohio	8245	1) Ohio	5668
2) Indiana	3944	2) Indiana	2858
3) Eastern Pennsylvania	3874	3) Florida	2338
4) North Carolina	3287	4) California	1472
5) Southern Florida	2485	5) North Carolina	1250
6) Georgia	2157	6) Maryland	1223
7) Maryland/DC	1952	7) Illinois	1108
8) Orange	1805	8) Alabama	1038
9) Northern Florida	1264	9) Connecticut	999
10) Western New York	1147	10) Iowa	697



National Traffic System

Area and Region Nets Reporting

Cycles One and Two

Net	Reporter	Total Points
Eastern Area	WB4PNY	291
Central Area	W5KLV	149
2nd Region	W2XD	58
3rd Region	WA3THT	56
5th Region	WB5YDD	243
7th Region	WB7WOW	182
8th Region	KA8CPS	195

Cycles Three and Four

Pacific Area	W7EP	176
2nd Region	W2MTA	141
4th Region	KAJSL	203
6th Region	W6INH	63

Section/Local Nets

Net	Net Manager	Total Points
Alabama		
Alabama Traffic Net M	KJ4MG	1038
Arizona		
Verde Valley ARES Net	KQ7T	111
California		
Amador Co ARC	KE6NS	43
Banning/ Beaumont ARES/ RACES/VIP	WA6HFE	65
Hemet Valley 2-Meter Net	N6FXM	464
Marcom RACES Net	K6WX	618
North Bay AHA ARES Net	KD6T	63
Southern California Net	WF6O	119
Yermo-Baker ARES/RACES	N6EHI	100
Colorado		
Northern Colorado Traffic Net	N8GBE	124
Connecticut		
Connecticut Net	K1EIR	152
Connecticut Phone Net	KA1BHT	218
ECARA Emergency Net	KB1VM	96
Millford ARES Net	W1UWU	37
Northwest Conn ARES Net	W1UNV	75
Weston	K3ZJU	94
Western Conn Net	WB1GXZ	327
Florida		
Emergency Net of Martin Co	K4ZK	188
Florida Phone Traffic Net	WB4WYG	195
Manatee Co ARES Net	WA3TOX	192
Marion Co Emergency Net	WD4PQN	170
Pinellas Co ARES/RACES	W4GPL	1351
Seminole Co ARES		242
Georgia		
Dalton ARC	KJ4NK	72
Gwinnett ARES	W4AURT	175
Hawaii		
Kaui ARC VHF Net	KH6S	58
Idaho		
ISRA-Magic Valley	WB7CYO	63
Illinois		
Chicago Traffic Net	KA9DXI	204
Christian Co Net	W9NLX	74

Madison Co ARES	NA9X	758
South Jacksonville Repeater Net	N9EHN	74
Indiana		
Cass Co Emergency Net	W8CFT	58
Dekalb Co Amateur Net	KA8RNY	181
Gibson Co ARES Net	KB8NR	22
Huntington Co ARES Net	WA9DRI	123
Indiana Traffic Net	KD9DU	1212
Lake Co ARES Net	N9DFU	415
Manon Co ARES	W9KGE	330
Miami Co ARES	K9SBW	72
Pike Co ARC	W9NCE	105
Porter Co ARC	KA9OSU	178
Tri-State Emergency Net	KA9EIV	109
Whitley Co ARES Net	KA9JB	53
Iowa		
Golden Ridge ARC	WA8AUU	58
Hamilton Co ARES Net	K0EJP	48
Iowa 75-meter Net	N0HEP	67
Jasper Co Emergency Net	K0JYZ	60
Page Co ARES	WB0GI	58
Polk Co ARES Net	KD8EO	212
SCAR ARES Net	NS8X	51
West Central Iowa ARES Net	K8CNM	126
Kansas		
Central Kansas ARC Traffic Net	N8GCC	85
Zone 5B ARES Net	W8NYG	45
Kentucky		
Kentucky Novice Traffic Net	KB4OZ	111
Louisiana		
Louisiana Traffic Net	N5ANH	48
Maryland		
Howard Co SET Net	WA1QAA	377
Maryland Slow Net	KC3Y	42
MAVEN Tri-State 2-Meter Net	KA3FRB	177
Washington Co 2-Meter Net	W3DFW	387
Washington Co 2-Meter Net	KC3DW	240
Massachusetts		
Pepperell ARES Net	KB1FJ	71
Michigan		
Flat River Free for All	K8BOG	102
Ionia Co ARES Net	KA8BTB	76
Lark Net	K9BOJ	95
Thorn Net	W8SJK	112
Wayne Co ARES	N8CLH	182
Minnesota		
Cerven-Scott ARES	KD8SF	39
Marshall Area Emergency Net	WD8BZU	156
Northern St. Louis Co ARES	WD8GUF	72
Missouri		
Cooper Co Net	WB8ROT	77
Lebanon ARES Net	WB8BHC	29
Morgan Co ARES Net	N8AYI	27
ZAEN	N0BE	228
Montana		
Montana Traffic Net	KF7R	242
Nebraska		
Cheyenne Co 2-Meter Net	KA8AND	124
Eastern Nebraska 2-Meter ARES Net	KA8QDX	43
Tri-State ARES Net	NF8N	54
New Hampshire		
Granite State FM Net	K6UXO	101
Northern Co Emergency Net	K1OIQ	100
Sea Coast Emergency Net	K1ACL	85
Twin State Emergency Call	WB1GXM	121
Western Rockingham Co	W4PAS	113
New Jersey		
Bergen Co Emergency Net	N2BMN	101

Hudson Co Area Hunterdon Co Traffic Net	NE2P	118
Traffic and Emergency Net	WA2FPO	92
NJ Phone Net	W2CC	84
New York		
New York Public Operations Net	WB2IDS	113
CNY/OCREN Net	WA2PUU	307
Rensselaer Co ARES Net	WA2ZYM	179
Western District Net	WB2OWO	273
North Carolina		
ARES of Forsyth Co	N4MBI	189
Ashe Co ARES	N4JRE	173
Central Carolina ARES 2-Meter Net	WB4JFX	36
Davidson Co ARES Net	K4SWN	54
Macon Co ARES	K4JHF	140
NC Evening Net	WB4WII	94
NC Morning Net	WB4HRR	339
Piedmont Emergency Traffic Net	WB4HRR	61
Rowan Co ARES	WB4AQK	127
Sandhills Emergency Net	K4QWK	47
Ohio		
ARES/RACES Emergency Net	K8JYF	93
Belmont Co ARES	WB8YFD	203
Buckeye Net RTTY	W8EK	447
Central Ohio Traffic Net	N8EFB	404
CLARC-ARES	KH6JCT	85
FARA ARES	WB8PHL	168
Guernsey/Noble Co	WB8TRK	108
Harrison Co ARES	K8XS	117
Jackson Co Traffic Net	K8XKL	53
Licking Co Emergency Net	KA8RBQ	216
Lucas Co ARES Net	WB8DYW	844
Madison Co Traffic Net	KA8DJZ	45
Ohio ARES	N8GQL	26
Ohio Novice Net	WB8KSW	38
Ohio Single Sideband Net	WB8JGW	979
Ohio Slow Net	N8AEH	76
Ohio Sunrise		
Slow Net	KA8GJV	84
Reservoir ARA Net	W8DN	64
Scioto Co Emergency Net	WA8NRC	21
Tri-State Amateur Traffic Net	N8FWA	538
Trumbull Co ARES Net	KA8WMD	63
Tuscarawas Co	KA8HGU	118
Van Wert Area Emergency Net	K8LMN	96
Van Wert Emergency 2-Meter Net	WB8MLV	96
Warren Co Disaster Serv	N8FBB	177
Washington Co ARES Net	N8CSM	50
Wayne Co Traffic Net	KA8CGF	289
Williams Co ARC	KD8IC	115
Xenia Traffic & Info Net	WB8PWG	37
Pennsylvania		
EPA Net	AA3B	84
Huntingdon Co ARES Net	WA3DBW	82
Keystone Phone Net	N3EMD	54
Lancaster Co Emergency 2-Meter Net	WA3HLP	102
McKean Co ARC	WB3CLW	28
WPA CW Net	WA3UNX	58
Rhode Island		
Aquidneck Island Comm	W1JFF	62
South Carolina		
York Co 2-Meter Emergency Net	KB4BZA	158
South Dakota		
Blackhills ARES Net	WB8ZSC	20
Tennessee		
CO/ARES	N4LZH	52
Texas		
Monday Night Net	K3WIV	120
Scurry Co Emergency Net	KE6ZW	133
Southeastern District Net	ND5F	138
Virginia		
Rap ARES	AA4GL	99
Rockingham Co Emergency Net	WA4JC	68
Vermont		
Vermont Traffic Net	K7IQ	103

W1KOO Simulated Emergency Net	NB1A	83
Washington		
Clark Co ARES Net	K7CLL	224
Thurston Co Emer- gency Service	KE7HA	55
West Virginia		
Harrison Co ARES/RACES Net	WB4GYH	196
Taylor Co WX Net	K8UQY	142
West Virginia ARES/RACES	K8QEW	99
West Virginia Phone Net	W8YVP	22
Wisconsin		
Brown Co ARES Net	WB9NRK	59
Calumet ARES	KN9P	67
Green Fox ARES	KA8VOA	57
Local Activity		
Area	Reporter	Total Points
VE		
Alberta		
Calgary	VE8AFO	1531
Ontario		
Kemptville/Merrickville	VE3GNW	64
York Region	VE3KDO	139
1		
Connecticut		
Danbury	NA1O	78
District 1	KU1Q	123
Glastonbury	K1SSO	96
Goshen	KA1JVN	71
Millford	W1UWU	34
NE Conn	KB1VM	393
Eastern Massachusetts		
Falmouth	N1CLC	180
Pepperell	W7HCP	151
Maine		
Aroostook Co	WA1YNZ	188
Hancock Co	AK1W	115
New Hampshire		
Northern Co	K1OIQ	188
Seacoast Region/ Stratford City	WA1PEL	124
South Western District	WB1GXM	144
Western Rockingham Co	W4PAS	85
Rhode Island		
Newport Co	W1JFF	149
Vermont		
Canaan	WA1JVV	41
Chittenden	NS1A	88
2		
Eastern New York		
Columbia Co	KA2MYJ	62
Rensselaer Co	WA2ZYM	278
New York City- Long Island		
Township of Babylon	K2EAX	68
Western Suffolk Co	W2GZD	384
Northern New Jersey		
Bergen Co	N2FJU	83
Chatham Borough & Township	W2UH	81
Englewood	W2CC	29
Hudson Co	W2KB	138
Hunterdon Co	NE2P	133
Monmouth Co	W2ZEE	197
Morris Co	WB2VUF	123
Northern New Jersey	N2BMN	291
Passaic City	N2DXP	54
Southern New Jersey		
Cumberland Co	WA2EUX	212
Western New York		
Chemung Co	WA2OUT	124
Chenango City	K2Y	68
Delaware Co	W2TFL	30
Jefferson Co	KA2OTS	60
Lewis Co	WA2DEP	104
Monroe Co	N2EH	358
Onondaga Co	WA2PUU	199
Oswego Co	KY2F	154
Yates Co	WA2VKX	50
3		
Eastern Pennsylvania		
Berks Co District 1	WB3FPL KA3DVY	104 3187

District 2	WB2O0B	275	South Texas		1450	Miami Co	K98Z	121
District 5	N3EFW	328	Bexar Co	WA6RNV	1077	Montgomery	N8GQL	1018
Maryland/DC		1952	Clear Lake	K5BY	120	Morrow Co	N8QQL	18
			Southeast District	W5CKC	253	Sandusky Co	W88KW	90
Allagany Co	W3DFW	304				Scioto Co	W8NRIC	4
Baltimore Co	WB3EF3	164	6			Stark/Carroll	W8AYE	837
Calvert Co	W3ZNV	57				Summit Co	W88HFZ	140
Frederick Co	K3RXK	624	East Bay		158	Trumbull Co	W88WV	96
Howard Co	WA1QAA	535	Vallejo	KD6T	158	Tuscarawas	K8HGU	299
Kent Co	W33UJE	53	Los Angeles		98	Van Wert Co	W8YIH	150
Somerset Co	KA3MZK	111	Northwestern District	K6YMJ	98	Warren Co	K8IOW	214
St Mary's Co	WA5UNR/3	104				Washington Co	N8CSM	69
						Williams Co	K8OFE	201
Western Pennsylvania		632	Orange		1805	West Virginia		777
Allegheny Co	N38PB	212	Caucha Valley	NR6P	198	Hancock Co	K9QEW	108
Butler Co	WB3LKO	194	Riverside Co	WA9QMV	210	Harrison Co	W84GYH	138
Huntingdon Co	WA3DBW	129	Riverside District 3	W8HFE	101	Kenawa Co	K8BZM	89
McKean Co	WB3CLW	49	Riverside Maroon Dist	K6WX	523	Mineral/Grant Co	KQ8E	148
Washington Co	N38KW	48	San Bernardino Dist 7	W06NG	145	Roanoke	KQ8CR	57
			San Bernardino Co	N6ADV	171	Taylor Co	K8UQY	158
			Dist 10	N6GDM	459	Wood Co	WDBLKT	81
Alabama		407	VESCOOM District					
Macon Co	K4HJX	40	San Diego		231			
Morgan Co	W4MOI	169	Southern District	W06GSS	209	Illinois		1538
Tuscaloosa Co	N4JUB	198	Eastern San Diego Co	N6NKJ	22	DuPage Co	N9CIB	68
Georgia		2157				Lake Co	K8JMG	630
Catoosa	N4KFN	62	Santa Barbara		153	Madison Co	N8XK	455
Chatham	KA4HHE	246	Lompoc	N6LFJ	153	Morgan Co	W9CES	71
Cherokee Co	N4MYV	208				Cook Co	W8SURA	334
Cobb Co	K4KME	310	Pacific		453			
Fulton North	K4NQV	234	Island of Hawaii	W16BDH	180	Indiana		3944
GEMA	N4MYV	188	Kauai Co	K16S	124	Cass Co	W8CFI	98
Gwinnett Co	KC4LU	225	Maul Co	K16H	149	DeKalb Co	W9QVI	254
Morgan Co	N4NZE	121				Floyd Co	K8FDF	675
National Weather Service	WA4PZD	350	Sacramento Valley		112	Gibson Co	K8AJB	68
Red Cross	N4FBN	99	Amador Co	K6GNS	112	Huntington Co	N8SHA	201
Whitfield Co	K4IG	114	San Francisco		416	Knox	K8LMJ	188
			Sonoma Co	W8DTV	416	Lake Co	N9DFU	643
North Carolina		3287				Manon	W8KGE	647
Ashe Co	N4JRE	248	Santa Clara Valley		918	Miami Co	W8BFNR	86
Beaufort Co	WA4SLC	171	Campbell	W8KEQ	112	Noble Co	W8BTZ	110
Cabarrus Co	W8BBOQ	107	Cupertino	W8VDF	118	Owen Co	W89BKA	16
Catawba Co	WB4HPR	168	Palo Alto	W8GKR	152	Pike Co	W8BNCE	231
Clay Co	W4RQP	74	Salinas Valley	W8GKR	207	Porter Co	KA9ONS	285
Davidson Co	K4SWN	114	Santa Cruz	N8IYA	170	Ripley	W8GOTX	182
District "E"	K4WY	313	Sunnyvale	W8BAX	159	Vanderburgh Co	KA9GIV	173
Edgecombe Co	W4N4Z	205				Washington Co	N9DER	40
Forsyth Co	N4MBI	190				Whitley Co	W89UNL	71
Lee Co	W4R4E	64	7					
Macon Co	K4JHF	268	Arizona		466	Wisconsin		346
Moore Co	K4CF	275	North Central	K17P	144	Brown Co	W89NRK	70
Nash Co	KF4R	211	Pima Co	K7KYW	322	Calumet Co	K8NP	135
Pasquotan Co	W4TLA	80				Green Lake	K89WC	81
Polk Co	N4LUB	77	Idaho		632	Price County	AG9G	59
Polk Co	K4IRD	163	Ada Co	N7GIV	187			
Rowan Co	W8AAQK	164	Bonner Co	N7HJZ	83	Colorado		43
Scotland Co	W89HIK	102	Cassia Co	W47NR	55	Clear Creek Co	W8BEX	43
Wake Co	N4MYB	260	Kootenai	N7BI	227			
Wayne Co	W4HTE	53	Twin Falls Co	W87NQ	80	Iowa		1905
						Buchanan Co	N8FGI	108
Northern Florida		1264	Utah		438	Buena Vista Co	K8EVC	43
Duval Co	WA4RGO	231	Davis Co	N5TK	186	Cass Co	K8QZ	283
Marion Co	W4FRJ	256	Utah Co	KF8Q	253	Crawford Co	K8CNM	166
Orange Co	W4FAB	242				Dickinson Co	W8FO	60
Seminole Co	W4FI	208	Washington		972	Hamilton Co	K8EJP	29
Volusia Co	KF4TM	328	Clark Co	K7CLL	214	Henry Co	N8BJ	292
South Carolina		354	Cowlitz Co	N7UD	274	Jasper Co	K8JYZ	94
Dorchester Co	W4C4C	34	Island Co	KA7UBW	121	Linn Co	K8EGA	160
Marion Co	NG4S	61	Jefferson Co	K7RBT	123	Page Co	W8BGI	94
South Myrtle Beach	W8ETJ	51	Thurston Co	KA7NRA	92	Polk Co	K8BEO	273
York Co	K84BZA	196	Whidbey Island	KA6ITE	148	Scott Co	N8UG	66
						Story Co	N8BX	108
Southern Florida		2465				Winneshiek/Howard	N8JY	134
Central Brevard	WB4WYG	71	Michigan		1392	Kansas		585
Dade Co	W4IYT	319	Ionia Co	W8LCU	118	Brown Co	W8SRR	106
Hendry Co	AA4BN	106	Kent Co	K8BGO	205	Zone 3	KAUJM	14
Hillsborough Co	KR4X	372	Livingston Co	N8AKZ	236	Zone 5B	W8NYG	63
Manatee Co	W84TOX	295	Monroe Co	W8BEFK	160	Zone 9	W8ASTH	166
Marin Co	K4ZK	208	Montcalm Co	W8BVF4	170	Zone 12	W8OAG	62
Pineellas Co	W4GPL	1094	Ottawa Co	W8BZF4	173	Zone 14	W8BYJT	174
Tennessee		406	Sanilac Co	W8CUP	90			
Anderson Co	N4LZH	141	Wayne Co	KZ8V	250	Minnesota		748
East Sullivan Co	W4DEKA	87	Ohio		8246	Carver/Scott	N8BX	44
West Sullivan Co	AA4DL	178	Allen Co	W8TY	179	Central Area	W8UCE	150
Virginia		622	Anglaize Co	K8LMN	165	Kandiyohi Co	K8BJ	82
Augusta Co	KA4NWK	228	Ashland Co	AG8N	79	Northern St Louis	W8GUF	96
Charles City Co	K4JST	14	Belmont Co	K8IP	175	Sherburne	W8CF	68
Middlesex Co	AA4HQ	78	Central Ohio	W8BKO	564	Sioux District/		
Rockingham Co	W4JZC	121	Champaign/Logan	K8GNM	39	Lincoln Co	W8BZU	237
Virginia Northern Neck	AA4GL	42	Clermont Co	W8TSX	348	South Central District	W8BZON	72
Virginia Beach	WA4TCJ	139	Clinton Co	W8BZZR	58	Missouri		1813
			Columbiana Co	K8JDI	87	Barry Co	W8SNNY	140
5			Darke	W8AKZ	422	Boone Co	N8JT	203
			Fairfield Co	W8SGO	115	Butler Co	W8BIU	96
Arkansas		140	Fayette Co	W8PHL	150	Cooper	W8BROT	112
Baxter Co	WM5W	140	Greene Co	N8CY	12	Franklin Co	W8BELL	177
			Guernsey/Noble Co	W8BTRK	158	Hickory Co	N8BX	127
Louisiana		156	Hamilton Co	A8BL	295	Lincoln Co	W8BMAG	76
Calcasieu Parish	WB9HIV	156	Hancock Co	N8AEH	79	Morgan Co	N8AYI	22
			Harrison Co	K8RYS	41	Section "T"	W8BMR	95
Northern Texas		804	Highland Co	K8CKY	30	Statewide	K9OCU	506
Howard Co	W85EJ	74	Homes Co	W8BHV	124	St Charles Co	N8EZH	259
Hunt Co	K2SCU	155	Huron Co	W8ADJ	88			
McLennan Co	N8AJF	38	Jackson	N8GY	42	Nebraska		458
Nacogdoches Co	K5VFN	164	Knox Co	K8SWH	228	Cheyenne Co	W8BOOX	153
Scurry Co	K85ZW	193	Licking Co	N8FN	226	Dakota	N8BN	86
			Loran Co	N8FRA	82	Lancaster Co	W8BOMS	89
			Lucas Co	W8BHHZ	601	Scotts Bluff	W8BGM	130
Oklahoma		1144	Madison Co	K8KHS	19			
Oklahoma Central Dist	N5FM	680	Manioning	N8BZ	130	South Dakota		241
Washington Co	W8S2P	464	Marion Co	W8NEE	257	Pennington Co	W8BZSC	27
			Medina Co	K8DJZ	72	Statewide	K8KPY	214
			Mercer Co	W8DN	92			

My Stay in the USA

(continued from page 42)

By this time, communications from the southern US had faded out completely and K1CPF took over the job of relaying information, and the Coast Guard station at Norfolk, Virginia had taken the place of NMA. The next couple of hours were mostly spent with pinpointing, and I was quite busy handling messages from the Coast Guard and the rescue plane to other stations by landline.

With the morning hours coming up, we had another problem: QRM! I'm sure that none of them interfered on purpose, but, still, many of us (including myself) have got to watch the frequency a lot better before starting to call "CQ." It happened more than once that some fellow called "CQ" right on the frequency while HP 3422 was transmitting and the direction-finding-net was trying to locate him.

Another problem came up. Apparently, some hams who have not completely mastered the English language thought we were a DXpedition and called us for a contact.

One great thing is the maritime mobile net. I asked that net to check to see if there was a ship close enough to the possible location of the *Rhinoceros*. No luck that time, but the net promised to keep a watch and inform us immediately on 14,251 kHz if they should find any ship that could be of assistance.

The last signals of the *Rhinoceros* were picked up around 11 AM EDT, and the frequency became quiet in the next hour. Everybody was holding his breath. Around noon, an Air Force search plane called in: "We've found them!" Rubber rafts were dropped to the floating crew; the *Rhinoceros* had already disappeared. Finally, the 11 crewmen were picked up by the American freighter *Aquarius* at 6:49 PM EDT. They had been in the water or aboard life rafts for about seven hours, but all were in good condition and needed no medical attention. All this happened on July 17, 1977. What a day!

Thanks to Tim Mallory, WD4EON, for saving me that day by bringing breakfast. Lots of thanks to my host family, Joana and Frank H. Welton and their sons, Chris and Cameron. They were super and made my one-year stay possible. I will never forget all this great hospitality and kindness.

See you on the air stateside!

Since returning to Germany, Christoph has completed his undergraduate studies and is currently attending law school at the University of Bonn. He was elected to and served in the Kreistag, a local council, in his hometown of Ravensburg, and was a member of the Landesschulbeirat, an advisory council to the Secretary of Education. Since moving to Bonn to attend school, Christoph's amateur activities have been on hold, but he hopes to get back on the air soon, with a personal computer, to have some fun with RTTY, AMTOR and packet.

Novice Enhancement Goes Digital

Now that you're up to speed in the Novice phone bands, here's how to make your first packet-radio contact. Come on in—the data's fine!

By David Newkirk, AK7M

With Novice Enhancement came new *digital communication* privileges for Novices and Technicians. How can you make use of them? You may have already heard enthusiastic local hams talking about sending computer data over the air—"packet radio," they call it. What's it all about, and how can you get involved?

Switching from code to voice is easy: Just learn a few new operating techniques, plug in a microphone and you're in business. Moving from voice to digital communication is easy, too: You can pick up the operating techniques quickly, and if you already own a transceiver and a computer, you're over halfway there.

Novice digital communication privileges include radioteletype (RTTY), AMTOR and packet radio. VHF/UHF packet radio is the most popular of these modes among Novices and Technicians, so in this article we'll concentrate on getting you up and running on 1.25-meter packet. For more on RTTY and AMTOR operation, see the latest (seventh) edition of *Tune In the World with Ham Radio*, and the third edition of *The ARRL Operating Manual*, both available from your dealer and from ARRL.

SETTING UP FOR PACKET

Most ham packet-radio contacts involve the direct transfer of information between computers. As you type information into your computer, the computer (with the help of accessory equipment) processes what you've typed. Your transceiver sends the processed information over the air. On the receiving end, another computer processes the information received from another transceiver and sends it to a computer screen or printer. Fig 1 shows a diagram of what you need to get started in packet radio. Let's cover the components shown there one at a time.

For VHF or UHF packet, an FM voice

transceiver is all the radio you need. (Older rigs may require a bit of system tweaking to work properly, as explained in the sidebar "VHF Packet With Older Rigs.")

Yes, you also need an antenna and feed line! Your personal computer is next on the list, because you'll be using it to generate transmitted data and display the data you receive.

The only special piece of equipment you need for packet radio is a *terminal-node controller* (TNC). The TNC accepts information from your computer and assembles the data into small bursts called *packets*. Packets aren't just bite-sized chunks of computer data, though, because the TNC adds information about addressing, error-checking and control as it assembles your data into packets. The addressing information includes the call signs of the sending and receiving stations. The address may also include call signs of

stations acting as relays for the packet.

The error-checking information in each packet allows the receiving station to determine if the received packet contains errors. (That is, *data* errors encountered during transmission and reception of the packets. Because the TNC accepts whatever data your computer sends to it, it can't correct crummy typing!) If the received packet contains data errors, the TNC at the receiving station asks for a repeat transmission until the packet is received error-free. When an error-free packet is received, the receiving station transmits an acknowledgment packet to the sender.

Breaking up the data into packets allows several stations to share one frequency. This is possible because packets from one station can be transmitted between packets sent by other stations. Also, your TNC can be set to ignore packets addressed to other

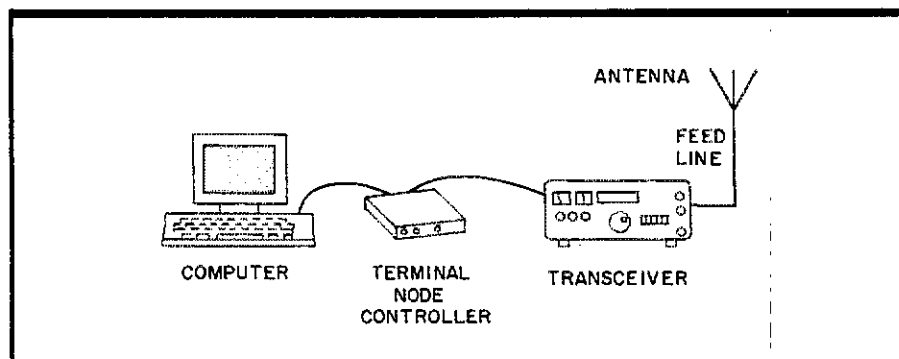
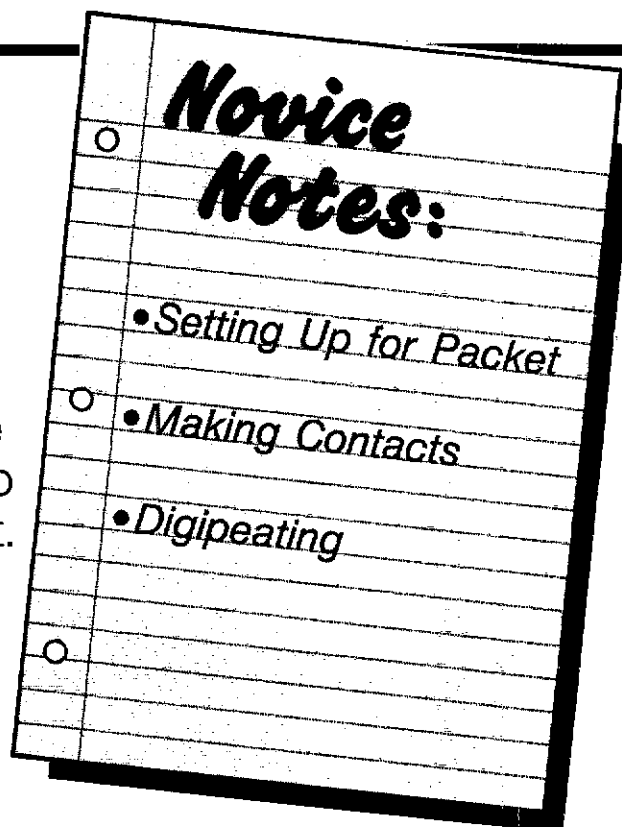


Fig 1—Here's the equipment lineup for a basic packet-radio station. The terminal node controller (TNC) takes information from your computer and assembles it into *packets* suitable for transmission over the air. The TNC also converts incoming packets into information your computer can display.

stations. In addition, packet addressing allows *digipeating*—the relaying of packets through several stations before the data reaches its final destination.

The heart of the TNC is a special-purpose computer that handles packet assembly and disassembly. Usually, the TNC contains a *modem*, too. A modem—short for *modulator/demodulator*—converts packet data into audio signals suitable for transmission over radio. It also converts *incoming* audio data into a form that can be understood by the TNC's packet assembly/disassembly computer.

The best place to find out detailed instructions on how to connect your TNC, radio and computer is your TNC manual. Someone from your local radio club will probably be able to help you if you have problems getting set up. Also, don't be afraid to ask around on the local voice repeater. Many of the hams on VHF FM are also on packet!

ON THE AIR WITH 1.25-METER PACKET

What does a packet contact look like? The procedures in the following examples apply to most of the TNCs on the market today. Some TNCs may use different command formats, so consult your operating manual if you're not sure.

Telling the TNC Who's Boss

First, you must tell the TNC your call sign. You'll probably have to do this only once, because most TNCs are able to "remember" your call even when power is disconnected. Should you need to change this information, most TNCs will let you

do so at any time. Before you can tell the TNC your call sign or give it any other command, it must be in command mode. You know the TNC is in command mode when you see this prompt:

cmd:

This indicates that the TNC is waiting for input, and we'll refer to it as the command prompt from now on. To tell the TNC her call sign, KA1MJP types:

MYCALL KA1MJP <CR>

"<CR>" means "carriage return." On some computers, this key may be labeled ENTER or have an arrow (↵). The TNC returns to the command prompt after it accepts your call.

Listening on the Channel

Next, try a little snooping on an active packet frequency. Your best bet on 1.25 meters is 223.40 MHz. Just as you can do on voice and code, you can monitor channel activity—"read the mail"—on

packet even if transmissions are not directed to you. This is called the *monitor mode*. To enter the monitor mode, simply type MON ON at the command prompt. You may also need to type MFROM ALL. (Consult the operating manual for your TNC to be sure.) Once your TNC is in monitor mode, activity on the channel will look something like this:

WA6JPR>WB6MYH: HELLO SKIP,
WHEN IS THE NEXT OSCAR 10 PASS? K
WB6MYH>WA6JPR: HANG ON
WALLY, I'LL TAKE A LOOK.

The call signs of the stations involved in a packet contact are separated by ">" in the address format "FROM>TO." The contents of the packet appear after the "...". With your TNC in monitor mode, your computer displays everything transmitted on the channel, whether or not it's addressed to you. This can make for quite an eyeful, as shown in Fig 2.

```
W1AW-4>K1CE:You have new mail, please kill after reading:
W1AW-4>K1CE:Msg# TR Size To From @ BBS Date Title
W1AW-4>K1CE:5807 N 420 K1CE K1MON W1AW 870308 HI AGAIN
W1AW-4>K1CE:K1CE de W1AW: at 2101z on 870308, 142 active msgs, last msg #5839
W1AW-4>K1CE:(A,B,D,H,I,J,K,L,R,S,T,U,W,X)>
W1AW-4>K1CE:Enter title for message:
W1AW-4>K1CE:Enter message, ^Z (CTL-Z) to end, it will be message 5840
WA3VIL>KA1MJP:Hi Leslie, are you going to the club meeting? KK
W1AW-4>K1CE:K1CE de W1AW: at 2101z on 870308, 143 active msgs, last msg #5840
W1AW-4>K1CE:(A,B,D,H,I,J,K,L,R,S,T,U,W,X)>
W1AW-4>KE3Z:Max. path length: 2 digis
W1AW-4>KE3Z:KE3Z de W1AW: at 2123z on 870308, 143 active msgs, last msg #5840
KA1MJP>WA3VIL:No, Larry, I have too much work. I have to go
W1AW-4>KE3Z:(A,B,D,H,I,J,K,L,R,S,T,U,W,X)>
W1AW-4>KE3Z:Enter title for message:
KA1MJP>WA3VIL:back in tonight. Maybe next month. KK
W1AW-4>KE3Z:Enter message, ^Z (CTL-Z) to end, it will be message 5841
```

Fig 2—In monitor mode, your TNC responds to *all* of the packet activity on a frequency—even if the packets are not addressed to your station. Your computer displays the action.

VHF Packet with Older Rigs

Most VHF and UHF FM transceivers these days use *synthesized* tuning. With such rigs, you change frequency by setting thumbwheels, poking a keypad or turning a tuning knob. Just a few years back, however, *crystal* frequency control was common. For each transmitting frequency, you had to install a different crystal in the rig. Because of this, most crystal-controlled transceivers allow coverage of only a handful of channels at a time.

Older crystal-controlled transceivers may be used on packet, but here are a few words of caution. Many older rigs cannot switch from receive to transmit quickly enough for packet operation. Most TNCs have an adjustable "transmit delay" that causes the TNC to key the radio and then wait a second or so before actually sending the packet. (What's a TNC? You'll know in a minute—see the text!) Older radios may require this transmission delay. In addition, an older rig may have passed through the hands of several amateurs, and some of the internal settings may have been "adjusted." Although such adjustments may not be a problem when you use the rig for voice communications, the rig may not work on packet. So, if you plan to use an older rig on packet, try to locate an experienced packet-radio operator who can help you set up your station.



Are Computers Your Thing?

Huh? You're a potential Novice, and computers turn you on more than radios? No problem—you don't have to be a radio engineer to link your computer to other computers via amateur packet radio. All you need to do to qualify for a Novice license is pass a five-word-per-minute code receiving test and get 22 questions right out of a 30-question multiple-choice exam. Bet your telecommunication interests won't stay limited to computers for long!

Calling CQ on Packet

You can send a CQ by entering the TNC's converse mode. Command the TNC to go into converse mode by typing:

CONV <CR>

Some TNCs allow you to type K instead of CONV. Now, you can type your CQ message:

MIKE IN SAN DIEGO LOOKING FOR ANYONE IN SIMI VALLEY

You don't have to type "CQ" and your call sign. The TNC adds your call sign as the FROM address and CQ as the TO address. The receiving TNC adds these addresses to the front of the text as it is displayed.

Making a Connection

To answer a CQ or establish a contact, use the CONNECT command. When two packet stations are *connected*, each station sends packets specifically addressed to the other station. To connect to another station, type:

Connect W9DY <CR>

where W9DY is the call sign of the station you wish to contact. Most TNCs let you use C as an abbreviation for "connect."

If W9DY's packet-radio station is on the air and receives your connect request, both stations exchange packets to set up a connection. When the connection is completed, your terminal displays:

*** CONNECTED to W9DY

and your TNC automatically switches to the converse mode. Pretty slick!

Now, everything you type at your computer keyboard is sent to the other station. A packet is sent whenever you enter a carriage return. It's a good idea to type K, BK, O or > at the end of a thought to say "Okay, I'm done. It's your turn to transmit."

Breaking a Connection

When you're finished conversing with the other station, return to the command mode by typing <CTRL-C>. (Hold down the CONTROL key and press the C key at the same time.) When the command

prompt is displayed, type:

Disconne <CR>

and your station will exchange packets with the other station to break the connection. (Most TNCs allow the use of D in place of "Disconne.") When the connection is broken, your computer screen displays:

*** DISCONNECTED

You'll see the DISCONNECTED message at other times, too. If your TNC receives no response as you try to connect with another station, the TNC will repeat the connect request. How many times your TNC *retries* is determined by the setting of the TNC's *internal retry counter*. (See your TNC operating manual for more information on this.) When the number of unsuccessful retries exceeds the setting of the retry counter, your TNC stops sending connect requests and your terminal displays:

*** retry count exceeded

*** DISCONNECTED

A TNC can reject a connect request if it is busy or if its operator has set CONOK (short for *CON*nect *OK*) to OFF. In either case, your TNC takes the hint and your computer displays:

*** W9DY busy

*** DISCONNECTED

DIGIPEATING

Sometimes, terrain or propagation will prevent your signal from being received by the other station. Packet radio can get around this problem by using other packet stations to relay your message to its

destination. All you need to know is the call signs of active packet stations that can relay signals between your station and the station you want to contact. Once you know of a station that can relay your signals, type:

Connect K9MWE Via W1AW-6 <CR>

where K9MWE is the call sign of the station you want to connect to and W1AW-6 is the call sign of the station that will relay your packets. The "-6" following W1AW is a *secondary station identifier* (SSID). The SSID permits up to 16 packet stations to operate under one call sign. For example, W1AW-5 is a 2-meter packet repeater, and W1AW-6 is a 1.25-meter packet repeater.

When W1AW-6 receives your connect request, it stores your request in memory until the frequency is quiet. Then, it retransmits your request to K9MWE on the same frequency. This is *digi*peating, a contraction of "*digital repeating*." If K9MWE's packet-radio station is on the air and receives the relayed connect request, your station can exchange packets with K9MWE via W1AW-6 to set up a connection. Once the connection is established, your terminal will display:

*** CONNECTED to K9MWE
VIA W1AW-6

W1AW-6 will continue to relay your packets until the connection is broken (see Fig 3).

Digital and voice repeaters both repeat, but the similarity between them ends there. Digi repeaters differ from typical voice repeaters in a number of ways; in fact, they aren't "repeaters" at all in the technical sense. Most digi repeaters receive and transmit on the same frequency; a voice repeater receives and transmits on *different* frequencies. A digi repeater does not receive and transmit at the same time; a voice repeater

The Nature of Packet Emissions

Packet radio uses two *states* to convey information, as does CW. The FCC refers to the on-off keying we use for CW contacts as A1A emission. During packet transmission, the transmitter is left on continuously, and digital information is conveyed by switching ("shifting") the transmitted signal between two different frequencies.

These two frequencies are known as MARK and SPACE. MARK is the "on" state; SPACE is the "off" state. Such emission is designated by the FCC as F1B. It's also known as *frequency-shift keying* (FSK). The MARK and SPACE frequencies are 200 Hz apart for 300-baud packet radio operation; 1200-baud packet uses tones spaced 1 kHz apart.

For packet operation at VHF and UHF, *audio-frequency-shift keying* (AFSK, or F2B emission), is the thing. AFSK is similar to FSK, except that an FM voice transmitter is used. In AFSK, the transmitter is modulated by feeding audio tones corresponding MARK and SPACE into the microphone jack. At the 1200-baud rate commonly used for VHF/UHF packet, the AFSK tones are 1200 and 2200 Hz. This is referred to as the "Bell 202" telephone modem standard.

How Fast Is Packet?

Just as Morse code can be sent rapidly or slowly, digital communications can be sent at a variety of speeds. Morse code speed is usually expressed in words per minute; the *baud* is the unit of transmission speed for digital signals. (In a single-channel transmission, 1 baud equals 1 digital bit of information transmitted per second.) The common signaling rates in packet radio are 300 and 1200 bauds: 300 bauds at HF, 1200 bauds at VHF and UHF. How do these compare with code speeds? Hold onto your chair: Roughly, 1200 bauds equals 1440 words per minute!

cmd:c k9mwe v w1aw-6

*** CONNECTED to K9MWE via W1AW-6

Hi Dave, what's up? KK

hi Bud. Just wondering if we can bring the desk over tonight. KK

No problem. Got the room all set up and everything. What time do you think you'll be here? KK

Well, that's up to Stuart. Probably around 6 or so. KK

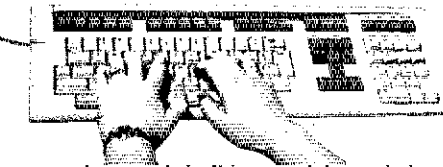
OK, see you then. SK

See you at 6.

cmd:D

*** DISCONNECTED

Fig 3—If you can't connect directly to the station you want to contact, you can connect via a *digi*peater by specifying the call sign of the relaying station in your connect request. In this complete packet contact, the originating station connects with K9MWE via a digipeater, W1AW-6.



immediately transmits what it receives. In fact, a digipeater is "smarter" than a voice repeater: A digipeater receives a packet, stores it temporarily until the frequency is clear, and then retransmits the packet. Also, a digipeater repeats *only* those packets that are addressed to it for relay. A voice repeater repeats everything it receives on its input frequency.

What if one digipeater isn't enough to get your message through? You can use more digipeaters! In fact, you can specify as many as eight stations in your connect request. Add them to your request by separating their call signs with commas:

Connect K9MWE Via W1AW-6,
WB9AWB-1 <CR>

This causes your TNC to send the K9MWE connect request to W1AW-6, which relays it to WB9AWB-1. Then, WB9AWB-1 relays it to K9MWE.

Yes, this is pretty neat! But use digipeaters wisely. Don't try to use more than one or two digipeaters at a time during prime operating hours (evenings and weekends). How come? Well, each time you use a digipeater, you're competing with other stations attempting to use that digipeater. A competing station may send a packet at the same time *you* do. The result is a packet *collision*. The digipeating TNC can't handle this, so it waits for a clean packet. At the same time, *your* TNC, having received no acknowledgment, dutifully sends your packet again after a short time. Everything's hunky-dory for your retry—if the competing station doesn't retry at the same time! If it does, there's another collision.

This can go on for only so long. Soon, your TNC reaches its retry limit and disconnects the link. The more digipeaters you use, the more stations you compete with, and the greater the chance of packet collisions.

Who Can Digipeat?

Any packet-radio station can act as a digipeater. In fact, most TNCs are set up to digipeat *automatically* without any intervention by their operators. You still need the operator's cooperation, however, because a TNC's digipeating capability can be disabled on command. Generally, though, most packet-radio folk leave their TNCs' digipeater function on, disabling it only under special circumstances—that's what ham spirit is about!

Although you are not allowed to be the control operator of a voice repeater until you upgrade from the Novice class, you *may* leave your TNC's digipeater function enabled. The FCC recognizes the distinction between digipeaters and voice repeaters in this case, and everyone realizes that an effective packet-radio system depends on having Novice digipeaters available.

OPERATING TIPS FOR VHF/UHF PACKET

Most TNCs are optimized for

VHF/UHF FM operating, so getting on the air is a simple matter of tuning to your favorite packet-radio frequency after turning on your radio, computer and TNC. At 1.25 meters, Novice packet activity centers around 223.40 MHz. If there's a voice repeater on that frequency in your area, ask around at a club meeting or on the repeater. *Someone* will know where the packet activity is!

The growing population of packet-radio enthusiasts makes for greater occupancy of packet channels. In light of this, one thing you should avoid is unnecessary *beaconing*. For more on this, see the sidebar "Go Easy on the Beacon."

If you're involved in a direct connect (a contact made *without* using a digipeater), move your contact to an unoccupied simplex frequency. Otherwise, you'll have to sit out many retries—and disconnects—especially on a frequency where digipeaters are also exchanging packets. For more information about recommended packet operating frequencies, see *The ARRL Repeater Directory*.

WHAT IF I STILL HAVE QUESTIONS?

We've covered just the basics of packet-radio operation here. For instance, we haven't talked about packet bulletin-board systems (PBBSs) and how you can use them to store and forward messages to other stations in a packet network. And we haven't forgotten 10-meter packet radio; it's just that operating techniques are a bit different at 28 MHz, and 1.25-meter packet is a big enough chunk for one article. If you're up for more reading, the seventh edition of *Tune In the World with Ham Radio*, available from ARRL, can tell you

more about these packet topics. This also goes for *The ARRL Operating Manual*, as well as articles in *QST* and the other ham magazines. Interested in a packet-radio newsletter? Okay, the ARRL also publishes *Gateway* 25 times a year. How about a packet book? Try *Get ***Connected to Packet Radio* by Jim Grubbs, K9EI. *Get Connected* is a good introduction to packet for newcomers, and it's available from ARRL, too.

Finally, get connected to your local radio club! People can teach you better than books, and there are sure to be a few packeteers in your local club. For a list of clubs in your area, write to the ARRL Club Services Department.

WHAT'S NEXT?

With your new emission privileges, you can zap data back and forth on packet radio and talk it up on phone. You probably won't be letting the old straight key or keyer collect dust, though, because code is fun, and efficient when propagation conditions are poor. What say we review the skills you need for better communication in the Novice code subbands? Next in Novice Notes: "A Fresh Look at CW." See you then.

Dave Newkirk works at ARRL HQ as an Assistant Technical Editor for QST.

This article is based on material by Bruce S. Hale, KB1MW (*Tune In the World with Ham Radio*, seventh edition, Chapter 12); Stan Horzepa, W1LOU (*The ARRL Operating Manual*, third edition, Chapter 9); and Harold Price, NK6K ("What's All This Racket About Packet?" July 1985 *QST*, pp 14-17, and "A Closer Look at Packet Radio," August 1985 *QST*, pp 17-20.)

Go Easy on the Beacon

Your TNC has a beacon function. This function allows you automatically to send an unconnected packet at regular intervals. Why do this? Well, the purpose of the beacon function is to generate activity on a channel when there is none. Usually, a beacon packet contains a message saying that you're on the air and ready to make contact via packet radio. A great idea—*sometimes*.

In the early 1980s, packet stations were rare. Newcomers to packet radio barely knew about local packet activity if established packet stations didn't beacon—and packet radio stations already on the air might not have become aware of a newcomer's existence if new stations didn't announce themselves regularly. So, the TNC beacon function was useful because it let other packeteers know that a new packet station was on the air.

Today, beacons are *usually* unnecessary because there's plenty of activity on packet channels. Unnecessary beaconing means interference on busy frequencies. So, if you're getting on packet radio for the first time, *don't* beacon—just put your TNC in monitor mode and snoop around on 223.40 MHz for a few minutes. You'll get a feel for who's on the air in nothing flat. When one of the stations you're monitoring disconnects, send a connect request to that station. After a few connections, your existence on the air will be well-known.

The advent of *packet bulletin board systems* (PBBSs) make it easy for new packeteers to become well-known. Just leave a message announcing the existence of your new packet station on the PBBS. This is light-years more effective than beaconing because your PBBS message can be read even when your station is off the air!

So, it's a good idea to disable your TNC's beacon function unless beaconing is clearly appropriate. Do this by typing:

Beacon Every 0 <CR>

at the command prompt. Everyone else on the channel says "Thanks!"

League Members to Choose Board Representatives

There is just one national-level, multi-faceted, general organization of Amateur Radio operators in the United States—the ARRL. How are its policy decisions made? Who steers the ship? You, the Full members of ARRL do!

It goes without saying that your views, through ARRL, are very important. The collective voice of the membership speaks through its elected Board of Directors. These Directors and Vice Directors serve two-year terms, without salary. You nominate and elect them as your "senators" in a representative assembly.

This year, it is the turn of ARRL Full members (that is, licensed amateur members of all categories—Life, Youth, Senior, Family or Annual) in the Atlantic, Dakota, Delta, Great Lakes, Midwest, Pacific and Southeastern Divisions to pick a Director and Vice Director for the 1988-89 term.

If you are in any of these seven Divisions, read on—this blurb's for you!

ARRL Divisions

The policies of the League are established by 16 Directors (the CRRL President and Vice President serve as Canadian Director and Vice Director, respectively) who are elected to the Board on a geographical basis to represent their Divisions and constituents (see page 8 of any *QST* for a list of the Divisions, Directors and Vice Directors). These Directors serve for two-year terms, with eight standing for election in alternate years. Just as in national or state politics, ARRL voters/members have the privilege and responsibility either to decide they like the actions of their incumbent representatives and support them actively for reelection or to decide that someone else could do a better job and work for their election. Vice Directors are also elected at the same time.

Call for Nominations

Nominations are now open for Director and Vice Director in the Atlantic, Dakota, Delta, Great Lakes, Midwest, Pacific and Southeastern Divisions for the two-year term beginning January 1, 1988. From now until August 20 at noon, League Headquarters will accept nominating petitions signed by 10 or more Full members of a Division, naming a Full member of that Division as a candidate for Director or Vice Director.

The candidate must submit information (on a form provided by Headquarters) that will allow the Executive Committee (EC) to determine his/her eligibility in accordance with the ARRL Articles of Association and By-Laws, along with a statement of not more than 300 words setting forth his/her qualifications. The candidate may also submit a recent photo of himself/herself. The EC will meet shortly after August 20 for this purpose, so candidates should make sure their information form arrives at Headquarters as early as

possible but **no later than August 20**. (It is in the candidate's best interest, obviously, to get the nomination in early. If there is to be a mid-August nomination for some unavoidable reason, the candidate information, 300-word statement and photo should accompany the nominating petition.) The statement will be included with the ballot mailed to members and will be reprinted without content editing; if the statement as submitted exceeds 300 words, the first 300 words will be used. The statement must not contain any derogatory reference to any person or entity. The candidate must also submit an accompanying signed statement certifying that the information is true to the best of the candidate's knowledge and belief. Any willful violation of this statement will be grounds for disqualification by the Executive Committee.

The nominee must hold at least a Technician class amateur license, must be at least 21 years of age and must have been licensed and a Full member of the League for a continuous term of at least four years immediately prior to the election. No person is eligible whose business connections are of such nature that he or she could gain financially through the shaping of the affairs of the League by the Board or by the improper exploitation of his office for the furtherance of his own aims or those of his employer. The primary test of eligibility is the candidate's freedom from commercial or governmental connections of such nature that his influence in the affairs of the League could be used for his private benefit. The idea behind these rules is to ensure that candidates: (1) possess a lasting interest in Amateur Radio and the League, (2) have the legal capacity to make decisions for ARRL and (3) are free from conflicts of interest.

Balloting Will Follow

Whenever there is more than one candidate for either office, ballots will be sent to all Full members of the League in that Division who were in good standing as of September 10. (You must be a licensed radio amateur to be a Full member.) The ballots will be mailed not later than October 1 and, to be valid, must be received at HQ by noon Tuesday, November 20. A group of nominators can name a candidate for Director or Vice Director, or both, but there are no "slates" as such—each candidate appears on the ballot in alphabetical order. If a person is nominated for both Director and Vice Director, the nomination for Director will stand and that for Vice Director will be void. A person nominated for both offices does have the option, however, of declining the higher nomination and running for Vice Director if he or she wishes. Since all the powers of the Director are transferred to the Vice Director in the event of the Director's death, resignation, recall, move of permanent residence out-

side the division from which elected or inability to serve, careful selection of candidates for Vice Director is just as important as for Director.

Nominating Form

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

Executive Committee
The American Radio Relay League
225 Main St
Newington, CT 06111

We, the undersigned, Full members of ARRL residing in the... Division, hereby nominate... of... as a candidate for Director; and we also nominate... of... as a candidate for Vice Director from this Division for the 1988-1989 term.

(Signature... Call...
City... ZIP... Date...)

Nominees, or indeed any member, may obtain a copy of the Articles of Association and By-Laws, along with a pamphlet outlining the duties and responsibilities of elected League officials, from ARRL Headquarters.

Absentee Ballots

All ARRL members who are licensed by FCC but temporarily residing outside the US are eligible for Full membership. Those members overseas who arrange to be listed as Full members in an appropriate Division prior to September 10 will be able to vote this year where elections are being held. Members with APO and FPO addresses should take special note of this provision; in the absence of information received to the contrary, ballots will be sent to them based on their postal address.

Even within the US, Full members temporarily living outside the ARRL Division they consider home may have voting privileges by notifying the Secretary prior to September 10 giving their current *QST* address and the reason another Division is considered home. If your home is in the Atlantic, Dakota, Delta, Great Lakes, Midwest, Pacific or Southeastern Divisions, but your *QST* goes elsewhere, please let the ARRL Secretary know as soon as possible, but no later than September 10, so you can receive a ballot for your home Division.

The Incumbents

These persons presently hold the offices of Director and Vice Director, respectively, in the Divisions conducting elections this year;

Atlantic—Hugh A. Turnbull, W3ABC, and James M. Mozley, W2BCH; *Dakota*—Howard Mark, W0OZC, and Richard Whiting, W0TN; *Delta*—Clyde O. Hurlbert, W5CH, and Lionel A. "Al" Oubre, K5DPG; *Great Lakes*—George S. Wilson III, W4OYI, and Allan L. Severson, AB8P; *Midwest*—

Paul Grauer, W0FIR, and Claire Richard "Dick" Dyas, W0JCP; *Pacific*—Rodney J. Stafford, KB6ZV, and James Knochenhauer, K6ITL; *Southeastern*—Frank M. Butler Jr, W4RH, and Evelyn Gauzens, W4WYR.

Petitions need 10 or more signatures of Full

members and are due at Headquarters by noon August 20. If there is only one candidate for an office, he or she will be declared elected by the Executive Committee; otherwise, ballots will be mailed not later than October 1 to Full members of record as of September 10. To be valid, ballots must reach

Headquarters before noon November 20. The new term will begin at noon January 1, 1988.

For the Board of Directors:

May 15, 1987

Perry Williams, W1UED

Secretary

FCC RECONSIDERS, REQUIRES VECs TO MAINTAIN ONE QUESTION POOL

The FCC has issued a Memorandum Opinion and Order in response to six petitions for Reconsideration it received in Docket 85-196, the rule making that transferred maintenance of the question pools from the FCC to the VECs, making it possible for each VEC to maintain its own question pools independent of other VECs. ARRL had filed one of these petitions urging the Commission to continue to maintain the question pools as the only way to ensure standardization among the different VEC groups. In its Petition, the ARRL stated that it was possible for a "multitude of different question pools" to arise, and that candidates for the same class of license may be required to take examinations of widely different levels of difficulty and quality.

The FCC said that in view of the work by VECs toward standard question pools and "the widespread sentiment in favor of standardized pools," it has now accepted in part the ARRL arguments. The Commission changed Section 97.521 of the amateur rules to require VECs to maintain one common question pool for each examination element and will require that the present question pools stay in effect at least until January 30, 1988. The FCC said that VEC maintenance of the question pools "involves revising existing questions and adding new questions to reflect changes in technology, regulations or other developments which have a bearing on the amateur service."

However, FCC declined to continue to maintain the question pools, saying it had the authority to allow the VECs to assist it with the amateur examination workload.

FCC also affirmed its earlier ruling that all telegraphy message elements must meet the requirements on containing all 26 letters, 10 numerals, three punctuation marks and four prosings. (At the Dayton Hamvention® VEC Forum, some VECs had indicated that it was difficult to write messages that contained these requirements. In order to do so, they said, messages must be written that take longer than 5 minutes to send. At the FCC Forum, Commission representatives said there was no requirement in the amateur rules requiring that telegraphy examinations had to be 5 minutes long. The examination can be as long as necessary to satisfy the requirements.)

The following is the new wording of Section 97.521:

97.521 VEC question pools.

All VECs must cooperate in maintaining one standard question pool for each written examination element. Each standard question pool must contain at least ten times the number of questions required for a single examination. See

International Amateur Radio Arrangements

Countries with which the United States shares reciprocal-licensing/operating agreements

LU Argentina	SV Greece	YN Nicaragua
VK Australia	J3 Grenada	LA Norway
OE Austria	TG Guatemala	HP Panama
C6 Bahamas	8R Guyana	ZP Paraguay
8P Barbados	HH Haiti	OA Peru
ON Belgium	HR Honduras	DU Philippines
V3 Belize	TF Iceland	CT Portugal
CP Bolivia	VU India	J6 St Lucia
A2 Botswana	YB Indonesia	S7 Seychelles***
PY Brazil	EL Ireland	9L Sierra Leone
VE Canada	4X Israel	H4 Solomon Islands
CE Chile	I Italy	ZS South Africa
HK Colombia	6Y Jamaica	EA Spain
TI Costa Rica	JA Japan	PZ Suriname
5B Cyprus	JY Jordan	SM Sweden
OZ Denmark	T3 Kiribati	HB Switzerland
HI Dominican Rep	9K Kuwait	9Y Trinidad
HC Ecuador	EL Liberia	T2 Tuvalu
YS El Salvador	LX Luxembourg	G United Kingdom**
3D2 Fiji	3A Monaco	CX Uruguay
OH Finland	PA Netherlands	YV Venezuela
F France*	PJ Neth Antilles	YU Yugoslavia
DL FR Germany	ZL New Zealand	

*Includes all its overseas departments/territories.

**Includes the following territories: VP2A (now V2), VP2D (now J7), VP2M, VP2S (now J8), VP2V, VP5, VP8, VP9, VS6, YJ, ZB2, ZD7 and ZF.

***Cancellation claimed by Seychelles.

Countries with which the United States shares third-party traffic agreements:

V2 Antigua	C5 The Gambia	ZP Paraguay
LU Argentina	9G Ghana	OA Peru
VK Australia	J3 Grenada	V4 St Christopher
V3 Belize	TG Guatemala	J6 St Lucia
CP Bolivia	8R Guyana	J8 St Vincent
PY Brazil	HH Haiti	9L Sierra Leone
VE Canada	HR Honduras	3D6 Swaziland
CE Chile	4X Israel	9Y Trinidad
HK Colombia	6Y Jamaica	GB United Kingdom**
TI Costa Rica	JY Jordan	CX Uruguay
CO Cuba	HL9 Korea*	YV Venezuela
HI Dominican Rep	EL Liberia	4U1ITU ITU, Geneva
J7 Comm Dominica	XE Mexico	4U1VIC VIC, Vienna
HC Ecuador	YN Nicaragua	
YS El Salvador	HP Panama	

*Not permanently but temporarily around Christmas in past years.

**Limited to special-event stations with call-sign prefix GB (GB3 excluded) and to stations on Pitcairn Island (VR6).

Section 97.21. No question in a question set may be used for a written examination in an examination session coordinated by any VEC unless it appears on the standard question pool. The standard question pools must be published and made available to the public prior to their use for making question sets.

NEW STAFF AT HQ

Larry J. Shima, W0PAN, is the new HQ

Controller. Larry was first licensed in 1953, and is a Life Member of ARRL. He served as ARRL Section Communications Manager of Minnesota and from 1970-75 as Director of the Dakota Division. Larry was a founding Director of the ARRL Foundation and later served as its President. A graduate of Iowa State University, he is a retired Lieutenant Commander in the Supply Corps of the US Naval Reserve and has also served as Controller and Personnel Director for several companies.

FOREST SERVICE PROPOSES RENTAL HIKES

The Forest Service has proposed a new fee schedule for the various radio and television services, including Amateur Radio, presently renting US Forest Service land sites in the Midwest, West, Central and some Eastern states for repeater, microwave or other radio uses. The areas affected are in the Eastern, Northern and Rocky Mountain Regions of the Forest Service, which consists of sites from Montana to Maine. Presently, a number of Amateur Radio repeaters are located at these sites, which typically are rented for \$50-100 yearly.

Complicating matters is that each Region has proposed a different fee schedule! The largest increase has been proposed by the Rocky Mountain Region, which would raise repeater rentals to \$1000. This region consists of sites in Kansas, Nebraska, South Dakota, Wyoming and Colorado. The Northern Region has proposed minimum fees of \$150, and the Eastern Region \$200.

There are nine Forest Service Regions, and there is a possibility that other Regions will shortly propose site rental increases. Further details on this proposal can be found in the March 31, April 30 and May 4 editions of the *Federal Register*.

Since the three Regions published their proposals separately, the date comments are due are different for each Region. HQ also understands that there have been requests to extend the comment period, but the Forest Service has not yet acted on them.

Presently, comments concerning the Rocky Mountain Region proposals are due July 1 and should be mailed to: Gary E. Cargil, Regional Forester, Rocky Mountain Region, USDA Forest Service, 11177 W Eighth Ave, Lakewood, CO 80225. Comments to the Eastern Region are due July 6 and should be mailed to: Floyd Marita, Regional Forester, Eastern Region, Forest Service, USDA, 310 W Wisconsin Ave, Milwaukee, WI 53203. Comments to the Northern Region are due July 1 and should be mailed to: James Overbay, Regional Forester, Northern Region, USDA Forest Service, Federal Building, PO Box 7669, Missoula, MT 59807.

The ARRL Executive Committee, in its meeting May 16, has authorized the filing of comments opposing fees for amateur installations.

220 UPDATE

The ARRL had petitioned the FCC asking that it issue an order directing that Aerotron, Inc show cause why a Cease and Desist Order should not be issued against them. Aerotron had advertised its ACSSB equipment as being available for 216-222 MHz—a violation of the Commission's marketing rules for equipment requiring type acceptance.

The FCC, in a letter to ARRL Counsel Chris Imlay, N3AKD, has now declined to take such action, saying it had received assurances from Aerotron that the violation would not be repeated.

The Association of Radio Reading Services (ARRS) has filed a petition requesting reconsideration of the FCC denial of their earlier petition for 500 kHz of the 220-MHz band.

The ARRL has now filed comments supporting the Commission's denial of the ARRS petition. The ARRL said: "The limited support for the proposal from radio reading services, and the complete absence of support

from individual print-handicapped persons, leads inescapably to one of two conclusions: either there is no demand for the separate radio service proposed by ARRS, or there is no demand for additional radio reading services generally."

The ARRL also noted that noncommercial, educational FM stations, which utilize one of its two subcarriers for commercial purposes, are already required by the FCC to accommodate radio reading services on the other subcarrier.

The ARRL comments concluded that this proposal by ARRS was "unnecessary and impractical" and said that the FCC had correctly analyzed the points made by the ARRS and found that "the ARRS' proposal overall was unsupported and did not justify the relief requested."

Preserve 220-MHz Task Force Report: The ARRL staff has compiled, with the help of 220-MHz frequency coordinators, a summary of the majority of the activity on the 220-MHz band. The report lists users by frequency and represents 34 states. An additional appendix of over 1100 weak-signal users was included.

This report was sent to ARRL Counsel Chris Imlay, N3AKD, to aid him in writing the ARRL response to the FCC's proposal in Docket 87-14.

ARRL PETITIONS FOR ID CHANGE BY ALIENS

The ARRL has petitioned FCC to amend Section 97.313 of its rules that pertain to station identification by alien amateurs operating under a reciprocal agreement in the US. Specifically, the League petitioned the FCC for reciprocal operators in the US to put their prefix first, followed by their call sign. For example, "W4/DL6TJ" instead of "DL6TJ/W4."

In its petition, submitted on May 14, ARRL stated that this identification method has been endorsed by the International Amateur Radio Union (IARU), and many countries worldwide are already using it.

This petition had been approved by the ARRL Board of Directors at its January 1986 meeting, but had been put on hold because of a Canadian/US agreement, dating back to 1952, which specifies the current call sign system. However, after investigation, it appears that this should not block the suggested change.

NEW FCC CHAIRMAN

Dennis Patrick, 35, is the new FCC Chairman. Patrick is a native of Los Angeles, and went to college and law school there. He was a law clerk for William Clark, then a California Supreme Court Justice, who was later named Secretary of Interior by President Reagan.

Patrick joined the White House staff in 1981 and was appointed an FCC Commissioner in 1983. As Chairman, Patrick is expected to continue the deregulation policies of his predecessor, Mark Fowler.

SECTION MANAGER ELECTION NOTICE

To all ARRL members in the Alaska, Alabama, Delaware, East Bay, Kansas, Michigan, New Mexico, Santa Barbara, Tennessee, and Western Massachusetts Sections: You are hereby solicited for nominating petitions pursuant to an election for Section Manager. Incumbents are listed on page 8 of this issue.

A petition, to be valid, must contain the signatures of five or more Full ARRL members residing in the Section concerned. Photocopied signatures are not acceptable. No petition is valid without at least five signatures on that petition. It is advisable to have a few more than five signatures on each petition.

Petition forms (FSD-129) are available on request from the ARRL Headquarters but are not required. The following is suggested:

(Place and date)

Field Services Manager, ARRL
225 Main Street, Newington, CT 06111

We, the undersigned Full members of the... ARRL Section of the... Division, hereby nominate... as candidate for Section Manager for this Section for the next two-year term of office.

(Signature... Call... City... ZIP...)

Any candidate for the office of Section Manager must be a resident of the Section, a licensed amateur of Technician class or higher, and a Full member of the League for a continuous term of at least two years immediately preceding receipt of a petition for nomination.

Petitions must be received at Headquarters on or before 4 PM Eastern Local Time September 4, 1987.

Whenever more than one member is nominated in a single Section, ballots will be mailed from Headquarters on or before October 1, 1987. Returns will be counted November 24, 1987. SMs elected as a result of the above procedure will take office January 1, 1988.

If only one valid petition is received for a Section, that nominee shall be declared elected without opposition for a two-year term beginning January 1, 1988.

If no such petitions are received for a Section by their specified closing date, such Section will be resolicited in January 1988 QST. An SM elected through the resolicitation will serve a term of 18 months.

Vacancies in any SM office between elections are filled by the Field Services Manager.

You are urged to take the initiative and file a nomination petition immediately.

Richard K. Palm, K1CE
Field Services Manager


REPEAT NOMINATING SOLICITATION

Since no petitions were received for the Maryland-DC and New Hampshire Sections by the petition deadline of March 6, 1987, as a result of Notices in January and February QST, nominating petitions are hereby resolicited. See the above notice for details on how to nominate.

SECTION MANAGER ELECTION RESULTS

Balloting results: In the Northern New Jersey Section, Robert R. Anderson, K2BJG, received 960 votes and Jack D. Wilk, N2DXP, received 264 votes. Mr Anderson was declared elected.

In the West Texas Section, Amelia "Milly" Wise, W5OVH, received 297 votes, and Leslie Bannon, WF5E, received 259 votes. Mrs Wise was declared elected.

In the Rhode Island Section, Charles H. Diluglio, K1DA, received 237 votes, and William M. Foss, KA1JXH, received 61 votes. Mr Diluglio was declared elected. 

Moved and Seconded ...

Minutes of Executive Committee
No. 426
Birmingham, Alabama
May 16, 1987

AGENDA

1. Approval of Minutes of March 21, 1987 meeting.
2. Study requested of the Executive Committee by the Board:
 - 2.1. Regarding the procedures used in evaluating qualifications of candidates in ARRL director/vice director elections, Minute 81, 1987 Annual Meeting.
3. FCC Matters:
 - 3.1. Review of status of ARRL response regarding General Docket 87-14, Amendment of Part 2 of the Commission's Rules Regarding the Allocation of the 216-225 MHz band.
 - 3.2. Review of planning of ARRL Response to the FCC inquiry in PRB-3, Privatization of Special Call Sign System.
 - 3.3. Review of the draft request for special temporary authorizations for automatic control of HF packet.
 - 3.4. Other FCC matters.
4. Consideration of ARRL comments on behalf of radio amateurs in the determination of rental fees for electronic sites under the control of the Forestry Service, Department of Agriculture.
5. IARU Affairs:
 - 5.1. Report on IARU Region 1 Conference.
 - 5.2. Report on IARU Administrative Council Meeting.
 - 5.3. Consideration of IARU Proposal No. 184, Concerning the Admission to IARU Membership of the Egypt Amateur Radio Society.
6. Local antenna/RFI matters.
7. Consideration of restructuring the West Indies Section.
8. Review of progress on Board directives:
 - 8.1. By the vice presidents and/or chairmen for the committees.
 - 8.2. By the Executive Vice President, on Board directives affecting Headquarters.
 - 8.3. By the Executive Vice President, on the proposed visitors' center.
9. Recognition of new Life Members.
10. Affiliation of clubs.
11. Convention matters:
 - 11.1. Approval of division, state and section conventions.
 - 11.2. National Convention matters.
12. Date and place of next meeting.
13. Other business.

Pursuant to due notice, the Executive Committee of the American Relay League met at 8:30 AM, Central Daylight Time, Saturday, May 16, 1987, at the Ramada Civic Center Plaza in Birmingham, Alabama. Present were President Larry E. Price, W4RA, in the Chair; First Vice President Jay A. Holladay, W6EJJ; Executive Vice President David Sumner, K1ZZ; Directors Frank M. Butler, Jr., W4RH; Clyde Hurlbert, W5CH; Paul Grauer, W0FIR and George S. Wilson, III, W4OYI. Also present were Secretary Perry Williams, W1UED, and Counsel Christopher D. Imlay, N3AKD.

1. On motion of Mr. Grauer, the Minutes of the March 21, 1987, meeting were adopted as printed.
2. Study requested by the Board:
 - 2.1. With regard to a study of procedures used in evaluating the eligibility of candidates for election to the offices of director and vice director, as requested in Minute 81 of the January 1987 Board Meeting, the Executive Committee clarified questions about eligibility dates and administrative practices to assure timely review of candidate eligibility.
3. FCC Matters:
 - 3.1. As concerns General Docket 87-14 which would amend Part 2 of the FCC Rules, so as to reallocate the frequencies 220-222 MHz to the government and non-government Land Mobile services, during extended discussion the Committee reviewed actions taken to date and tactics planned for the next several weeks to mount the strongest

possible defense of amateurs' continuing use of the entire 220-225 MHz band. The Committee noted with pleasure comments submitted in support of our position by a Congressman, the Canadian Radio Relay League (in response to an invitation to do so tendered by the Committee at its March 21 meeting), several government entities, several manufacturers and at least two thousand individual amateurs and local clubs.

3.2. Moving next to further consideration of the FCC inquiry in PRB-3, Privatization of Special Call Sign System (SCSC), the Committee expressed its appreciation of the prompt and favorable action by the FCC on the requests for extension of time to file comments in the matter until July 31. The Committee discussed at length the report of a special committee on PRB-3 for the period since the March 21 meeting at New Orleans and commended them for their work. On motion of Mr. Butler, the Executive Vice President was directed to explore with corporation counsel the various alternatives for implementation of an SCSC, and the tax, corporate and liability implications of ARRL involvement therein, following the guidelines adopted at New Orleans entitled, "Conditions Under Which The ARRL Could Approve Callsign Program." The Executive Committee was in recess for luncheon, from 12:12 to 1:20 PM.

3.3. The Executive Vice President reviewed progress toward finalization of a draft Request for Special Temporary Authority (STA) regarding development of HF packet networks. Under the STA, about 40 stations specifically listed in the application would be permitted to operate HF packet nodes under automatic control, to perform a controlled study of HF packet networks. (The final outcome of PR Docket 85-105 last year was to allow automatic packet operations above 50 MHz but not on the HF or MF bands. However, the way was left open for an STA permitting a study.) It has been newly agreed to limit the study to six months to minimize impact on other amateur operations, and defer a request to use speeds greater than 300 baud.

3.4. Other FCC matters:

- 3.4.1. Counsel Imlay distributed copies of the Memorandum Opinion and Order on the question of Volunteer Examiner Coordinator (VEC) maintenance of question pools, PR Docket 85-196, released May 14. The Committee also reviewed a draft agenda for the July meeting of VECs to be held in Atlanta July 10. Without objection, it was ordered that the Executive Vice President prepare a position paper on VEC subjects for that meeting, and circulate it to the Executive Committee for comment as soon as possible before the end of June.
- 3.4.2. Counsel Imlay reported briefly on RM-5836, a petition for rulemaking by Regency Electronics. The petition would require that manufacturers of scanners warn customers about the implications of the Electronic Communications Privacy Act of 1986. The petition was deemed not to be of concern to amateurs at its present stage.
- 3.4.3. The Committee considered an FCC Notice of Proposed Rulemaking, General Docket 87-107, regarding "A/B" switches to be required on cable conversion devices. Without objection, it was agreed that Counsel would file brief comments urging a requirement that the "antenna" position of such switches be grounded when not in use so as to minimize interference to amateurs.
- 3.4.4. Counsel Imlay reported that the ARRL had filed an official complaint against Aerotron for advertising non-type-accepted devices for the 216-222 MHz band, in violation of FCC rules. The Commission reported to us that the manufacturer had agreed to refrain from further violations of this type, so no official action was being taken.
- 3.4.5. Counsel Imlay reported that one-third of the documents we had requested from the FCC under the Freedom of Information Act (FOIA) in connection with General Docket 87-14 had been released to the public generally. The remainder of the request was denied by the Commission staff, citing Rule 5 which protects internal opinion documents. Without objection, it was ordered that Counsel proceed with an appeal to the FOIA officer of the Commission.

4. Turning next to consideration of an ARRL

position regarding rental fees proposed for electronic sites under the control of the Forestry Service, Department of Agriculture, on motion of Mr. Grauer, Counsel was directed to file, in consultation with the Legal Strategy Committee, strong comments protecting the interests of the Amateur Service and minimizing the adverse financial effects of the Forestry Service proposals.

5. IARU Affairs:

- 5.1. President Price reported on his perspective of the IARU Region 1 meeting as an observer. The Region 1 Division is, he reported, very well organized; preparations for the Conference were thorough. Topics discussed of especial interest to U.S. amateurs included the development of packet radio, the ITU exposition in Geneva later this year called Telecom 87, and Project Goodwill, the program wherein donations by U.S. amateurs and clubs were used to purchase 20-meter equipment in kit form for use in new and developing countries.
- 5.2. EVP Sumner, as a member and Secretary of the IARU Administrative Council, gave a digest of its meeting over the Easter weekend, immediately following the Region 1 conference. Much of the meeting was devoted to the increasing likelihood that there will be a worldwide frequency allocations conference around 1992 or 1993, specifically to attempt to find more frequency space for the Broadcasting Service in the HF region below 11 MHz, and to find space for an expanded Mobile Satellite Service in the 1 to 3 GHz band. The minutes of the Council meeting have been completed, and are being reviewed by its members before publication.
- 5.3. On motion of Mr. Wilson, the Secretary was directed to cast the vote of the ARRL in favor of IARU Proposal No. 184, regarding the admission to membership in the Union of the Egypt Amateur Radio Society.

6. Counsel Imlay reported briefly on local antenna matters. Beyond these individual cases, he reported that there would be a seminar for Volunteer Counsels at the ARRL National Convention in Atlanta in July. Director Wilson and Mr. Imlay are working on having the seminar count for continuing education credit in those states which require it.

7. The Executive Committee noted the unique characteristics of the West Indies Section of ARRL, and, on motion of Mr. Grauer, directed the Executive Vice President to prepare alternative solutions to address member concerns.

8. Review of progress on Board directives:

- 8.1. By the vice presidents and/or chairmen for the committees:
 - 8.1.1. Mr. Price, as chairman of the Executive Committee, reported on appointments to new special committees. The Ad Hoc Committee on Amateur Radio and the Media, as called for at Minute 56 of the 1987 Annual Meeting of the ARRL Board of Directors will comprise:

Thomas B. J. Atkins, VE3CDM, Chairman
Roy Neal, K6DUE
Richard S. Moseson, N2BFG
Edward L. Tobias, KR3E

Mr. Atkins is recently retired following a long career on the business side of broadcasting in Canada. Mr. Neal now serves as a consultant to NBC, following a distinguished career with its news organization. Mr. Moseson is an Associate Producer with CBS News, and is Chairman of the ARRL Public Relations Advisory Committee. Mr. Tobias is with the Associated Press in Washington. Members will be named soon to the Education Task Force responsive to Minute 73, 1987 Annual Meeting, from among more than two dozen individuals who have expressed an interest in appointment having a professional background in curriculum development.

8.1.2. First Vice President Holladay reported briefly for the Membership Services Committee, which met April 23 in Visalia, CA, and will meet again in Atlanta just prior to the Second Board Meeting, and for the Special Study Committee on Advisory Committees, which has several matters under discussion "by circulation."

(continued on page 81)

All letters will be considered carefully. We reserve the right to shorten letters selected in order to have more members' views represented. The publishers of *QST* assume no responsibility for statements made herein by correspondents.

NOVICE EXCITEMENT

□ I've been following Novice Enhancement with great interest and the day has finally come! I was on the 10-meter band the other night and I came across a Novice on phone. Boy, was I in for a surprise! It all started with a simple call: "KA1PGP...this is KB1NU...Go ahead..." Talk about excitement! I felt like I was the Novice and was on the air for the first time. David, KA1PGP, 9 years old, has been a Novice for only 4 or 5 months. His voice was a little shaky but the excitement was overwhelming. David was only about 40 miles away, but it was the other side of the world for him. I was his sixth contact. Let me tell you, that QSO was fantastic. I think David will stay in Amateur Radio; he has probably learned more in one night of SSB operation than in many 40/80-meter CW contacts. David actually had a mini-pileup going once amateurs realized he was a 9-year-old Novice.

Good luck, David—and welcome to the world of ham radio!—*John Petrowicz, KB1NU, Rowley, Massachusetts*

FIVE MINUTES OF HIS TIME

□ I always enjoy the Correspondence column of *QST*. As I was reading it this morning, I recalled the following story.

A ham friend was working in his yard when a young fellow stopped and asked if he was a ham. My friend said that he was and they talked for awhile. They eventually ended up in his radio shack where a lengthy conversation ensued.

This young fellow had so many questions about licensing that my friend called an Extra Class licensee and asked him to talk to this potential ham who was so eager to get a license.

The Extra Class licensee acted rather "stuffy." He said "Well, I suppose I could allow him five minutes of my time." A few weeks later the potential ham stopped by and he was as happy as a clam: He had passed the Novice, General and Advanced in one sitting! It seems that he had been a radio operator in the Air Force. A few days later, my friend ran into the Extra Class operator on 75 meters. He said to him, "It's a good thing you only had five minutes of your time for that guy. There's no telling what he could have done with half an hour!"—*D. Scott Gray, K7WPC, Coos Bay, Oregon*

GENERATOR POWER: IS IT BEST?

□ Regarding Wendell Tulencik's May 1987 *QST* article entitled "A Few Thoughts on Emergency Power," I have read his arguments and have come to different conclusions. Considerations of generator cost, noise, cabling, switching circuits, fuel availability and storage, exhaust fumes and equipment maintenance all make good arguments *against* the use of generator power. Reducing power needs and using solar power may save a lot of hassle. A protracted emergency may

exhaust your fuel reserves and more fuel might not be available; that is not a worry with solar power.—*Michael Sakarias, KL7KE, Juneau, Alaska*

50 YEARS LATER

□ I just rejoined the ARRL after a 50-year absence of membership. After 50 years, I am still pleased with what I see in *QST*. Since amateurs don't build their own equipment as much as they used to, I thought the technical articles in *QST* might not be as interesting as they used to be. But I find the League's journal to be bigger and better, interesting and informative.—*John M. Willcutt, W6DHP, Exeter, California*

FRIENDSHIPS REKINDLED

□ Rarely do I read all the Stray filler inserts with the same devotion which I give to the rest of *QST*. However, the Stray on page 72 of March 1987 *QST* concerning Bo Bo Pike, W6HV, leaped at me.

Back in 1942, I was a young aspiring staff announcer at KGBX in Springfield, Missouri. On the staff with me was a young and talented studio engineer named Bo Bo Pike. Could this be the same Bo Bo Pike I had known?

A quick response to my letter revealed that he was indeed the same Bo Bo Pike I had known those many years ago. We have begun to correspond and fill in the history of the intervening years that have passed so quickly. Thanks to Strays for helping renew an old and valued friendship.—*Jack Sobel, W8SVM, Chesterfield, Missouri*

REFLECTIONS OF A YOUNG OT

□ Ten years ago this week, I received my Amateur Radio license and I became a member of the ARRL. I am only 25 years old and it is hard to believe that a decade has passed since I became an Amateur Radio operator.

In 1977, I was a long-haired junior in high school, and I found very few people who possessed an interest in Amateur Radio, let alone a license. However, Dr Roger Kaul, K3TM, gave me the test for the Novice class as well as much needed confidence. My father gave me space in our house for radio equipment and helped me string my first dipoles from treetop to treetop in the yard. The ARRL provided operating aids, code-practice tapes, specialized books and helpful *QST* magazine articles. With such guidance, I was able to go down to the imposing FCC headquarters in Washington, DC, to take and pass the Technician license. I returned home in triumph. Yet, I owned no VHF equipment, and I could not afford any until several years later, long after passing the 13-WPM General class code examination.

Ten years has brought with it WARC, packet radio, volunteer examining, a new call sign for me and many other changes in Amateur Radio. I was very glad to see the appearance of the Making Waves column of

QST, and I hope it smooths the road youthful hams face when starting this new and fascinating hobby. It is a resource I wish I had 10 years ago. I have observed, no doubt as others have, that the League has weathered these changes well in the past 10 years. The complete editorial revision of most of the League publications is a sparkling example of how well the needs of the changing amateur community have been met. I have grown up in the past 10 years, and now have a career of my own, but I know that I have become a better person through my League and Amateur Radio.—*Matt Furek, N4DLA, Bethesda, Maryland*

MORE MESSY SHACKS

□ Your April photo spread on the messiest ham shack was absolutely hilarious! Even my nonham XYL went into hysterics. The captions were equally funny. Perhaps this was just your usual April fool gag, but it proves that Newington really has a sense of humor!—*Lou Schurrer, WB6OON, Ventura, California*

□ I think the Messy Shack Contest was the funniest article on Amateur Radio that I have ever read. Nothing has given me more encouragement than those pictures.—*Bob Johnson, N7CFX, Seattle, Washington*

BEYOND WX

□ You've put out a CQ because you wanted to make a QSO. A ham in another country answered you because he wanted to make a QSO also. You've already exchanged the usual ritual of weather and equipment. Now what? It helps to be curious. Start asking questions. Where does he work? Does he have other hobbies? What is his house like? What kind of car does he drive? Does he grow tomatoes or petunias? How about pets? Maybe he has a dog, cat or a fish.

The same inquisitiveness applies to hams in the United States. I happen to live near cranberry country. There are only about four places in the world where cranberries grow and southeastern Massachusetts is one of them. I think that I am right in saying that these unique berries grow in sandy soil. Ditches are flooded throughout the bog to protect the berries against the autumn frost. During the summer, the bushes seem to be a dull green, but as autumn nears they become a patchwork of reds and maroons on which the sun's rays play. We all eat cranberries with our turkey during the holidays; I think that some ham in another state or country might just be interested in what little I can tell him about Massachusetts cranberries.

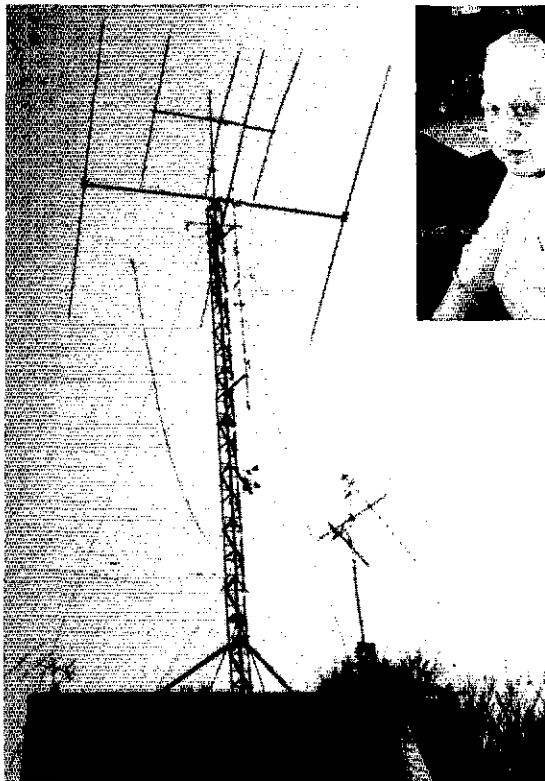
Now I have never been to the state of Washington, and until I get there, I'd be happy if some ham could share the beauty of that state, or any other state with me. What about their salmon? I don't think I could turn down a good recipe for that tasty fish!—*Anna Hannum, K1LJT, North Easton, Massachusetts*

The Senior DXer—W2TP

"Musty" Mustermann, W2TP, born in the last century, celebrated his 90th birthday June 28, 1987. This young-at-heart DXer is an integral part of this writer's DX background, having always been "there," always heard chasing DX (successfully!), always contributing to club activities, and always remaining the right role model for what we like to think DXers are.

Musty has lived in Leonia, New Jersey since 1923. Before Leonia, he lived in both Jersey City and Union City. At the age of 10, beginning with his radio interest in the Boy Scouts, Musty built a receiving set. As a young man, prior to WW I, he held the call AWL. At just about the end of that war Musty began receiving that exciting new ham radio journal *QST*, and received the original call issuance of 2TP. Simple addition tells you that W2TP is more than a 60-year ARRL member and solid supporter of the League.

This DX pioneer was very active in the 1920s, and heard on all continents when 10 meters became an available band. He has been a regular on the DXCC Honor Roll for decades, and holds numerous awards, including 5BDXCC and 5BWAS. Ham radio activity has included active membership in the prestigious North Jersey DX Association and the Radio Club of America, and past presidency of the Hudson Amateur Radio



"Musty" Mustermann, W2TP, and his antenna farm.

Council. During Musty's work lifetime he was a mechanical engineer, employed with several large companies in refrigeration and in the elevator field.

The hams in my family (W1CW, K1ZX) join with Musty's fellow club members in the North Jersey DX Association in congratulating him on an exemplary 90 years! (A very special thanks to Hans, W2TO, for reminding us of just a few of the manifold highlights of W2TP's background.)

DEBUT

The following material, and three delightful years of contributions, is courtesy of W6BDN.

I walk quite a bit for relaxation and exercise. Along the way, I daydream, think, and discuss a variety of topics with myself.

For me, my pursuit of (and eventual contact with) VU7WCY/GDG, Laccadives, was a real adventure. It certainly was a new one I'll never forget. Thoughts about the various aspects of that adventure kept popping into my head as I walked. As the weeks went by, those thoughts became words, then the words evolved into sentences, and the sentences into paragraphs. Eventually, the entire tale was inscribed in my mind. One Sunday afternoon, I returned home from walking, sat down with pencil and pad, and dictated the story to myself. Okay, so now I've got a DX true adventure tale. What should I do with it? I sent it to Ellen [for How's DX?]. Nothing happened. Oh well, I gave it a try.

My XYL, Barbara, and I were going camping for the Fourth of July week. We loaded the gear, plastic raft and supplies into the wagon. The mail arrived just before we departed. It included the July '84 *QST*. I tossed it onto the heap—some good vacation reading. Off we went to Peninsula Campground.

In mid-summer it's usually very hot at Folsom Lake near Sacramento (we camp on the side opposite from the prison). The compensation is that the water is nice and warm for swimming and frolicking. Our mid-day routine was to get wet about every 20 minutes, scoot under our shade canopy, sprawl on a cot, and read. Lazily

browsing through *QST*, I shouted to Barbara, "Hey, honey, here's Listening for the Laccadives. She used my story."

VISALIA DX CONVENTION

A recipe for a DX convention appeared in a column of our journal some time back, originated (as you might expect) by those radio-active DXers on the West Coast. That column noted "that the convention ingredients were simple and readily available: an active radio club with a predominance of DXers to sponsor the thing, invitations to DXers within a hundred miles or so, a program devoted to DX subjects like antennas and such, a suitable meeting place, and a popular chairman to handle the thing. Toss the ingredients together and prepare to enjoy yourselves." Shades of the joint Northern and Southern California annual April DX Convention in Visalia, California! How's DX? certainly was well ahead of the times, with those descriptive words appearing in this column, written by W1JPE (aka W1DX) in December 1938!

Almost 50 years later, an April 1987 DX-travaganza was highlighted by the banquet appearance of LA1EE, with the very first presentation of the 3Y1EE 1987 Peter I DXpedition, at the Saturday night banquet. This incredible operation, co-operated by LA2GV (presenting a well-received program during the DX Program at the Dayton HamVention®) encountered the best weather in 100 years in that hostile part of the world, permitting approximately 16,000 contacts! (Does N3II know he was their first con-

tact?) Einer won over the audience with his earnestness, good humor, excellent exposition and fascinating slides—his youthful appearance belying his extensive background. (Einer operated as JW1EE in Svalbard 1970-1972, in addition to superb contesting from LA1K.) F6GXB's 1986 Clipperton adventure was an eye-opener for this reporter, showing the seas around Clipperton (notorious for their wildness) at a flat calm. The interesting program ran consecutively so it was possible to catch all the engrossing presentations, which included (in part) DXing with Personal Computers (N6VI/W6EL), Contest Forum (K3ZO, N6BT and others)—with well thought-out comments on station layout for maximizing operator efficiency, VK9XI (ZLIAMO's Christmas Island story), a superbly presented proposal for restructuring a portion of the DXCC rules by K3NA (more on this later), TI9W/Cocos, VK9YW Cocos-Keeling by W5KNE of *QRZ DX* fame, and the indomitable Colvins with Yasme '87 (Indian Ocean DX-pedition). (Lloyd and Iris have now earned DXCC from over 100 different countries, and she is recovering nicely from her accident.) The Sunday breakfast presentation featured JY7Z/N6TJ and his team, breaking up the crowd as they entered wearing authentic Jordanian head gear.

Obviously the programs are of great interest at an event like this. That, coupled with the opportunity to meet old friends (among the 500+ attending!), makes it something few active DX types would willingly miss. There were lots of "extras," of course: the opportunity to congratulate the first Asian elected to *CQ's* Hall of

Fame—JA1BK, fantastic code competency demonstrated by the master N6RA, and participation in the hilarious eyeball QSO Party (originated at the 1986 Pacific Northwest Convention), where you received various points for meeting attendees (and having them sign your "log").

Congratulations to this year's host, the Northern California DX Club, for providing a program that only the Southern California DX Club could hope to surpass in 1988. (A review of the DX doings at the Dayton HamVention next issue!)

ARRL DXCC LIST

The new printing, with the ARRL DXCC 50-year logo on the cover, may have escaped your attention. A nifty addition is a prefix cross-reference list that will be mighty handy, ie, H5, S4, S8 and V9 (African homelands) all count for ZS, L2-9 = LU, CY-CZ = VE, 7S = SM. The new list even includes Peter I! For those readers unfamiliar with this \$1 ARRL publication, note that it includes a great deal: rules for the DXCC awards, the Countries List with notations for continent, ITU and CQ zones, and boxes for modes/bands. In addition, it is a reminder of how to use the ARRL Outgoing QSL Service, countries with which the US has third-party-traffic agreements, deleted countries, etc.

A SHORT NOTE ON YU-LAND

Last fall, I had a chance to visit the little town of Bogatic in Yugoslavia. About 20 km from where I stayed was Nik, YZ7XX, someone I had spoken with on 20 meters for three years. I met Nik, his father YU7MBG and brother YU7MIT. The station included an FT-102 and a home-brew amplifier, quad, vertical and an inverted V. I got to visit the local radio club, YU7GST, and saw the club awards and CW classroom. The club

Troster's Tips for Easy Listening

Policemen

You are the DX operator. The rarer your country is, the greater the possibility you will attract a big pileup. The bigger the pileup, the greater the chance there will be a few "policemen" helping you out (on your transmit frequency). These are usually well-intentioned operators who break in on your frequency to give directions to stations calling you (like directing traffic).

Usually policemen direct callers with "up 5," or whatever, to tell someone calling on your frequency that you are listening 5 kHz above your transmit frequency, and not on your own frequency. This happens when you, the DX op, are using split-frequency operation (as you should be). Policemen are mildly tolerable and sometimes helpful if they transmit once—quickly!

It is when policemen begin to blast some hapless caller, or to give your QSL information/times/frequencies, etc. that they become obnoxious. They are interfering with your transmission, and they are playing your record. And, when policemen begin directing other policemen things really get ridiculous. Ultimately most policemen create more problems than their direction service is worth. You, the DX op, should continue to operate as though no policemen were there.

Callers note: Resist temptation vigorously. *Don't be a policeman!*—W6ISQ

offered free two-hour lessons three times a week for beginners. At Nik's station, I talked on 80 to many of my friends in Greece, Italy and Romania. Ham radio is great, and I hope to return for another visit.—VE3NRP

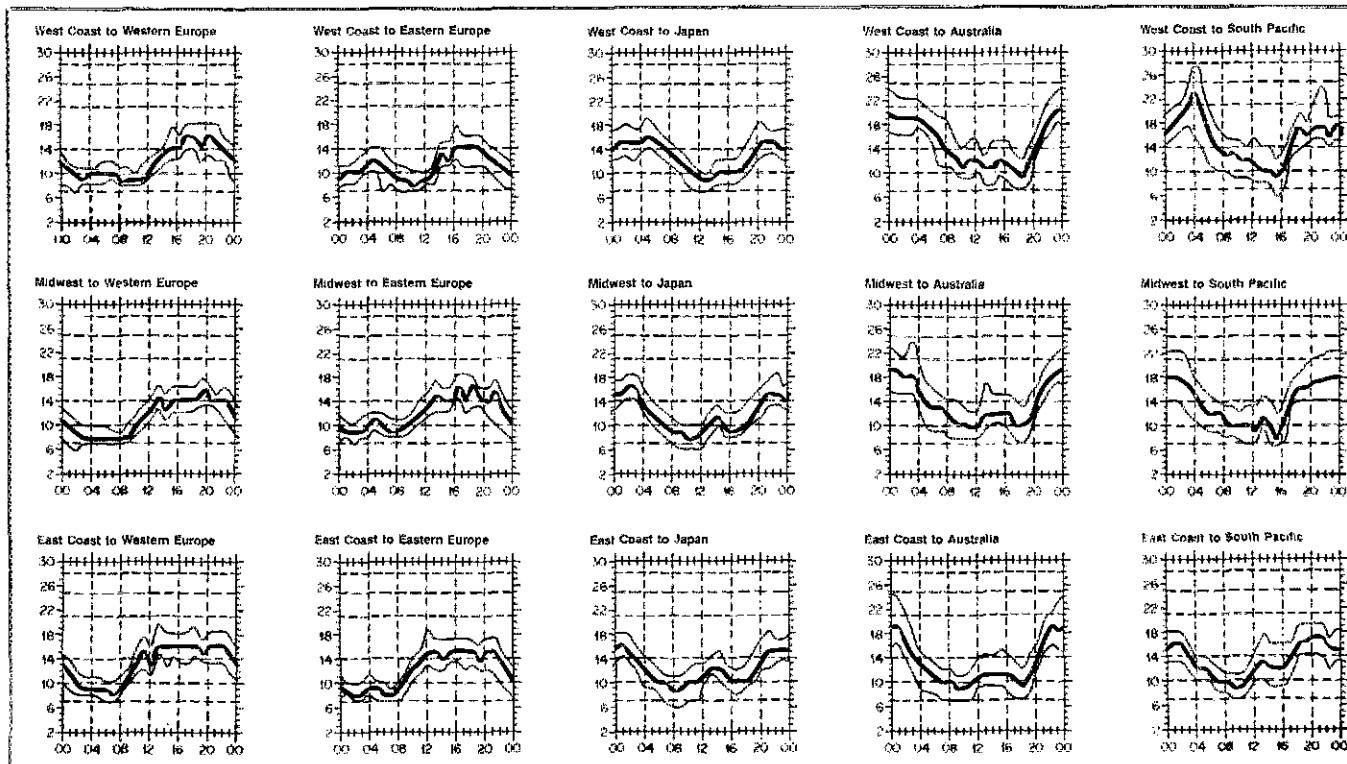
THE CIRCUIT

□ **Berlenga Island:** Six CTs have just finished operating from IOTA EU-40, using the calls CT0BI CQ0BI CS0BI and CR0BI. All get confirmed via CTIAHU, Box 2763, 1119 Lisbon, Portugal.

□ **Peter I:** For the first time a DXpedition has occasioned a hit (sic!) song: *The Ballad of Peter I*, set to music by W6VG. It wowed (well, sort of) the audience at the Visalia DX Con-



In January, cruise-shipboard-maritime Per, LA3FL, visited W1CW/YL trying his hand at calling CQ DX computer style! (W1YL photo)



When are the bands open? These charts predict this month's average propagation conditions for high-frequency circuits between the U.S. and various overseas points. One chart for East Coast to West Coast is also included. On 10 percent of the days of the month, the highest frequency propagated will be at least as high as the uppermost curve (highest possible frequency, or HPF). On 50 percent of the days of the month, it will be at least as high as the middle curve (maximum usable frequency, or MUF). On 90 percent of the days of the month, it will be at least as high as the lowest curve (optimum traffic frequency, or OTF). See April 1983 QST, page 63, January 1977



SUIER in Cairo. Ezzat is president of the Egypt Amateur Radio Society, and QRV on 80-10 meters. (tnx DK7PE)

□ **ZK1XV**: "Bing" was in the South Cooks Jan 19-Jul 14, 1986 and hopes to be operating from the North Cooks at about this time. QSL via "Bing" Crosby, VK2BCH, Box 344, Forster, NSW 2428, Australia.

□ **Clubs**: The Minn-Dak DX Association officers now include Pres K0ALL, Sec'y KS0Z and Dir N0BCW.

□ **HL9**: HL9HP is compiling a list of all previous HL9 operators for club use. Hutch, NK0S (ex-HP1XHH, YS9HH), needs the operator's HL9 call, dates of operation, present call and address information. Contact HL9HP at: H. C. Hutchison, D-46, 271st CAC, APO San Francisco, CA 96271-0148.

□ **TI**: Al notes that N2AO/TI5 isn't him; he, N2AO, has never been in Costa Rica!

□ **Mellish**: K4ADN regretfully has had to call off the planned August Mellish DXpedition. Ken



Well-known **N0ZO/DU2** is now active all bands as 5H3ZO. QSL via K0LST. (tnx DK7PE)

vention. "I've got the Antarctic blues, and I'd give up 8 pair of my shoes for someone to give me the news of what calling frequency to use. I got the Antarctic Island blues. I've got the three Wye blues."

□ **Equatorial Guinea**: July 10-19 look for 3C1CW (via F6GXB), 3C2A (TR8JLD, cards via AK1E) and 3C3CR (via TR8CR). Cards for the past 3C0A operations still go to TR8JLD.

□ **5N0WRE**: Larry notes that he achieved his 100th country for the Golden Jubilee DXCC Award on March 31, after 2 months of actual activity. As a reminder, his manager is K4JZQ.

□ **Awards**: The K1BV DX Awards Directory is in the works and should be a knockout. So far the total stands at 587 different DX awards, and the format will probably wind up suitable for loose-leaf binding. Ted will give free, for an SASE, a supplemental listing of 1987 awards. Write to K1BV at 525 Foster St, South Windsor, CT 06074-2936.



ZP5XDW is much improved and contemplating a QSY to CE this year. Doug tried a hand at W1YL's "alternate station" in south Florida last January. (W1YL photo)

intends to try again, however, and hopes for more positive support from those who would like to join him.

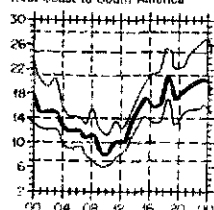
□ **ROARS**: The 15th Anniversary of the Royal Omani Amateur Radio Society includes an award for working or hearing A4XXV on two different bands or modes between May 11 and Aug 11. Details on this and the Sindbad Net Award from ROARS, Box 981, Muscat, Sultanate of Oman.

□ **5T5XX**: DL1VJ operated CW only from Mauritania Nov/Dec '86. QSL via Bernd Laenger, DL1VJ, Schlossbergst 3, D-6603 Sulzbach/Saar, Fed Rep of Germany.

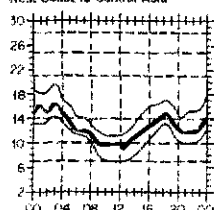
□ **FS**: KD5GY operated the first part of this month; QSL via his home address.

□ **Deadlines**: Plan on getting material to this column's editor the first few days of the month for the issue two months hence (ie, I need your input by July 5 for the September issue). **END**

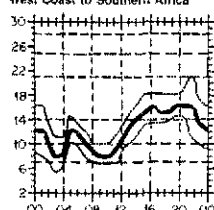
West Coast to South America



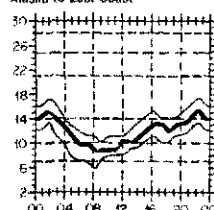
West Coast to Central Asia



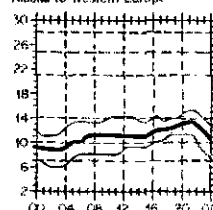
West Coast to Southern Africa



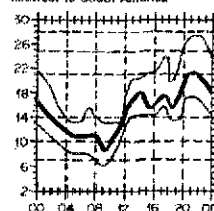
Alaska to East Coast



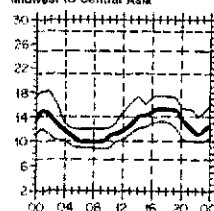
Alaska to Western Europe



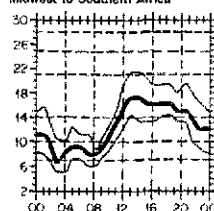
Midwest to South America



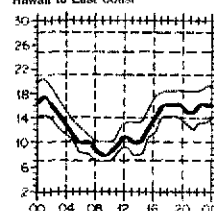
Midwest to Central Asia



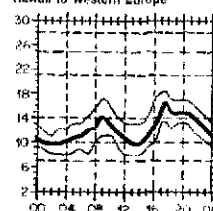
Midwest to Southern Africa



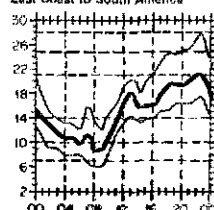
Hawaii to East Coast



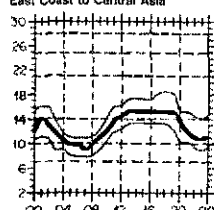
Hawaii to Western Europe



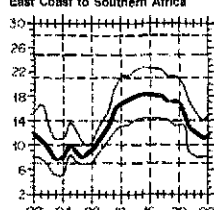
East Coast to South America



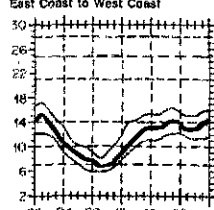
East Coast to Central Asia



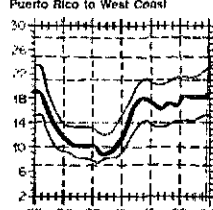
East Coast to Southern Africa



East Coast to West Coast



Puerto Rico to West Coast



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 July 16 to August 15, 1987, assume a sunspot number of 14, which corresponds to a 2800-MHz solar flux of 74.

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 April 1 through April 30, 1987. An SASE will bring you the rules and application forms for participation in the DXCC program.

New Members

Mixed

DK0UB/102	GM4UZY/103	JF1WLK/109	JA0FLL/114	SM6DIN/231	YU2CRD/109	KD2WQ/129	K5FNR/105	WB6OKK/283
DL2DAV/109	HA5DQ/120	JR1XIS/110	JH0KOE/108	SM7BIC/277	YU2SA/115	KQ3F/164	WD5BZO/108	K7FL/107
DL4ZBI/110	HA7RI/106	JF2GLS/106	OE2CHN/105	SM0LZT/115	ZF2FK/100	N3CIX/100	K6MS/114	W7JJO/101
DL7AEY/107	HB9DCZ/204	JA5MHD/106	OE4KQW/222	UA9CBO/309	K1VSG/105	N4FVE/124	KB6DSX/101	KJ8M/260
G3KEC/103	HL4CCM/113	JF6EFO/103	SM2OTU/193	VE6TK/130	KA1ERL/137	N4LBJ/102	KE6KT/111	UA9GCB/100
G4WIS/109	I4EFE/112	JF7RZJ/105	SM5DUT/128	VK5BDY/102	KB2BJA/124	WS4N/101	WA6SDR/110	NS0B/104
GD0AVF/107	JA1WYQ/110	JF7TYA/122						

Radiotelephone

DF6IZ/108	HL4CCM/113	JG1XVK/112	OZ3WK/302	VK5BDY/101	WA1LVW/122	N4ONI/100	KF5CA/141	WK6E/116
DF8TJ/253	IK5AMB/146	JF6EFO/102	PA3BXC/107	YV5IAL/100	KB2BJA/116	WB4AYE/100	KE6QB/110	WB6OKK/283
G0BMU/110	I8UDU/104	JF7TYA/121	PY1APS/331	KA1ERL/134	KD2WQ/126	WD4CQY/101	KG6KW/108	K8MDU/100
GU4WQP/105	I8FDH/132	ON8XE/110	SM6DIN/108	KB1LL/101	KQ3F/105	WN4KKN/143	W6HKF/139	W9LCR/100
HB9BVQ/279								

CW

DJ4ET/125	F6DZS/162	HG6VZ/136	OZ2UN/101	PY7DH/104	SM6DIN/213	YU2CKL/134	WB2TTY/100	AD8W/126
DK9EO/102	G3VMW/239	OZ1GHS/118	PA3BXC/107	SM2OTU/168	UA9CBO/116	NG1G/108	K6MS/103	KJ8M/184
EA1CHN/103	G4UOL/106	OZ1JMN/114	PY1CRP/138	SM5DUT/128	VE1CIL/106	KA2UJH/100	W6YHM/130	K0ZX/116

RTTY

PY2FR/120	N2BAT/102							
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160 Meters

SM7BIC/117	UA4HBW/105	K1XM/108	W4DHZ/106	WA4VDE/103	KM5H/102	W7FG/102	K89U/105	WB9HAD/104
RT4UA/104	W1AB/101	W2PN/102						

5BDXCC

UA0AG	G4GIR	DF8TJ	I8SAT	DJ5GG	W6TEX	JH7QXL	NE4F	W4OVU
A12K	E18EK	VU2CVP	JA5IU	K4YI	G3VMW	JA7JWF	OE4KQW	W8FJK
G4BWP	SM0BFJ	VU2DVP	JH7FMJ	AE1T				

Endorsement

Mixed

CU2CE/273	HC1MD/306	LA9SN/202	VO1EJ/276	AE3S/308	KE4MM/253	WA5IPS/270	AB8W/262	W9GMS/296
DL1ES/316	HC8MD/202	OH3SG/290	WL7K/208	KT3H/200	KF4AV/135	KB6ZL/269	K8IP/335	W9MYQ/300
DL4MCF/127	I5MMC/249	OH5OZ/270	YU2WV/251	W3BTX/325	K4HL/174	N6DX/344	K8ZTT/296	W9TAJ/303
EA4AYD/125	IK7CJV/225	PA3BUD/160	ZS2RM/320	W3EEK/235	N4HOH/253	N6JE/200	KD8IW/281	WA9BXB/250
EA8RCT/168	IT9RAN/256	PY2ZJ/220	ZS5YF/188	W3MQF/203	W4RA/299	NV6L/250	N8ATR/290	WA9WYB/251
F2VX/327	K1INLI/290	SM0JHF/157	K1INLI/215	W3CJS/251	WN4KKN/212	W6TEX/291	N8DUY/181	WD9INF/126
F67CB/F5/159	JR1BVU/262	UK1CK/346	K1UM/316	W3ZBF/226	K5EOA/305	WJ6O/225	W8LZV/299	K0RW/127
G3JG/270	JR1CVV/226	UA2AO/332	W1KG/326	WA3CGE/308	K5MC/240	WN6J/158	W8NPF/323	K0ZX/292
G3VKW/307	JA2GBO/305	UA3CT/346	WA1LVW/228	AA4FS/125	KA5CQJ/250	KC7TB/228	W8BVP/302	N0DJ/175
G3VMW/258	JA2INS/320	VE3CWE/305	NN2F/264	AA4SY/124	KB5AS/299	KF7F/271	KD9WK/175	W0ZV/124
G4BUE/307	JA2JSF/323	VE3NSZ/226	NR2W/154	K4JAG/251	N5HB/293	NU7D/189	KG9N/299	W0JF/280
GM4KLO/199	JA2JW/351	VE3OIT/160	W2HG/294	K4LNA/175	W5EW/175	W7KSK/175	N9DOK/270	WB0DLT/128
HB9DDZ/154	KP4EQF/311	VE7NS/162	WB2BNH/178	KD4OM/199	W5HT/257	W7LGG/310	NM9H/158	WD0HNQ/226

Radiotelephone

CT1AHU/161	HH5CB/270	KL7HRN/163	VE5QY/270	N3CWP/251	W4TDW/321	WN6J/158	K8WOW/279	K0YX/225
CU2CE/273	I2JSB/296	KL7XO/197	VE7OR/202	N3EHD/181	WC4B/200	K7LYT/175	K8ZTT/287	KD9WK/175
CU2CR/276	I3ZSX/200	LA1XDA/131	WL7K/203	W3DR/267	WF4V/314	KC7XB/260	K8YV/113	KG9N/283
DJ5DA/315	I5MMC/247	LA9SN/192	XE1LJ/301	W3IQS/295	K5UKN/323	KD7TO/175	N8ATR/290	N8BA/307
DL3RK/333	IK9GC/175	PY2ZJ/221	XE1NJ/170	W3MQF/200	N5BCL/177	N7GMN/304	N8BO/308	N8BOK/202
E18EK/262	I8UAV/119	SM5DUP/151	YC0BOK/135	W3ZBF/177	WB5NTI/258	NK7Y/225	N8DUY/177	W9TAJ/297
F2VX/324	JA1BRK/337	UA1CK/346	ZP5CE/316	WA3CGE/304	WQ5Y/205	NT7C/149	W8BCE/174	W9WYN/184
F6FYD/186	JA1NLI/290	UA2AO/329	K1GW/213	KE4MM/253	KD6ZM/175	W7KSK/149	W8BVP/302	KD0IT/177
F67CB/F5/154	JR1CVV/193	UA3CT/321	K1QJ/173	KE4VU/262	N6DX/316	AD8W/250	K9HEK/172	NB0C/202
G3VKW/305	JA2GBO/284	UA9CBO/309	KB2XP/260	N4ETA/284	W6NGZ/159	K8IP/264	K9VAL/310	W0JL/186
G4BUE/284	JA2JSF/312	UD6DR/315	N2EPN/209	W4RA/293	W6ZPV/285	K8MID/264	K9ZO/304	WD0HNQ/226
HC6EA/304	JA2JW/339	VE3CWE/262	NR2W/131					

CW

DJ5DA/257	HB9DDZ/140	PA3BUD/153	YB2FEA/132	W2LZX/294	KF4AV/132	K5EOA/269	KA7NNJ/125	K9Z0/287
DL3RK/280	HH2VF/238	SM6CNX/183	ZS2RM/240	AF3E/176	W4NUS/225	K5MC/227	K8IP/254	KG9N/227
FE2VV/150	JA2GBO/274	TG9N/309	K1GW/159	AA4V/250	WC4B/199	NT5G/134	K8ZTT/228	W9FF/155
G3VQV/128	JA2INS/270	VE3CWE/253	K1KOB/175	K4MF/228				

RTTY

KA5CQJ/187	W0LHS/181							
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160 Meters

AA4MM/151	W4MGN/149	W8UVZ/125						
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The Latest Software from You

A lot of you must have spent the past winter in front of your computer keyboard coding ham radio application software because the mailman has been delivering a lot of new goodies lately. The following is a compendium of new, free software that is now available (next month, new pay-for software will be featured).

Nothing is absolutely free. If an author asks for a stamped (with sufficient postage), self-addressed disk mailer and blank diskette or diskettes in return for his handiwork, please send him what he has requested. I am amazed by the number of letters I receive from authors who get "stuffed" in this regard. Such treatment only results in authors becoming less willing to distribute "free" software, so support your software author.

Commodore 64 Contesting

Bill McClellan, KV0I, has generously offered to provide On Line readers with a collection of contest programs he has written for the Commodore 64™ computer. Included in his offer is a newly revised set of logging, duping and scoring programs for the ARRL Sweepstakes Contest. The programs feature support for all dot matrix printers, error-checking of ARRL Section entries, displays of Sections needed and Sections worked, logging during or after the contest, and precontest utility programs.

Besides the Sweepstakes programs, Bill will also include programs for the ARRL International DX Contest, ARRL 10- and 160-Meter Contests, IARU Radiosport Championship, CQ World Wide Contest, CQ

WPX Contest, 73 SSB World Championship and the NCJ North American QSO Party. To obtain this set of programs, send a stamped, self-addressed disk-mailer and a blank 5 1/4-inch diskette to Bill at 3304 Jo Ann Ave, Omaha, NE 68123.

IBM PC Morse Code Training

Using an IBM® PC to learn Morse code is very popular these days. Here are two Morse code training programs to prove it.

M. Lee Murrah, WD5CID, has written his training program with functions that include teaching code element and character sounds, code reception in various formats (random code groups, random words, contents of disk text files, keyboard-entered text and simulated QSOs), and code sending by keyboard entry or by using the ALT key as a straight key. The user tests his code speed by copying on the keyboard and by taking a simulated FCC code examination. The program may be obtained by downloading it from the GENIE™ IBM Roundtable or by sending a stamped, self-addressed disk mailer and a blank 5 1/4-inch diskette to WD5CID at 10 Cottage Grove Woods SE, Cedar Rapids, IA 52403.

Jay Duthler (call sign pending) is currently distributing the sixth release of Morse Tutor. The program features 5 to 50 WPM training, five types of code reception (random character groups, random word groups, practice QSO, disk file and keyboard entry), quizzing on groups and words by means of the keyboard, 500 to 2000 Hz selectable tone and on-line help. This program may be obtained by downloading "morse421.arc" from GENIE, or by sending a stamped, self-

addressed disk mailer and a blank 5 1/4-inch diskette to Jay at 7575 W 106th, Apt 57, Overland Park, KS 66212.

IBM PC SSTV

Niel Wiegand, WA5VLZ, has written an IBM PC (and clone) program that displays and prints black-and-white SSTV pictures with a minimum of additional hardware. It may be obtained by downloading "SSTV2.ARC" from The 3 Winks BBS (tel 301-670-9621) or the Jimnet BBS (tel 512-837-0953), or by sending a stamped, self-addressed disk mailer and a blank 5 1/4-inch diskette to Niel at 911 North Bend, Austin, TX 78758.

Radio Shack TRS-80 Model I/III Packet-Radio BBS

Greg Day, KC8JN, is distributing KC8JN PBBS, a WØRLI packet-radio mailbox emulation program for the Radio Shack TRS-80® Model I and III computers. The program features a partial implementation of the WØRLI commands and functions for a single-port system and includes several enhancements. It is written in Microsoft BASIC and has a Z80® object code serial driver subprogram for the RS-232-C interface. The program was designed to run with the DOSPlus operating system for use with the Kantronics KPC-2 TNC, but it can be modified easily for use with a TAPR TNC 2. To obtain the software, send a packet radio message to Greg (KC8JN @ KC8JN) or write to him at 109 Meadow Rd, Wintersville, OH 43952.

HELP WANTED

I would like to get in touch with...

- anyone who has an AMTOR program for an Apple® IIc or IIe computer that works with an AEA CP-1 interface. Mark Harris, KC7RD/5N9, Kaduna Dept of State, Washington, DC 20520.
- anyone who has written software for the Apple IIe computer with an Apple Super Serial Card to communicate with a Kenwood TS-940S transceiver via the Kenwood IF-232C/IF-10B interface. Keith R. Rogers, WA5IMC, 9007 Herts Rd, Spring, TX 77379.
- anyone who has interfaced an Apple Macintosh computer with a Yaesu FT-101 transceiver and an AEA CP-1 interface. Harry M. Randel, WD2AID, 574 West Ct, Scotch Plains, NJ 07076.
- anyone who has interfaced an Apple Macintosh or Radio Shack TRS-80 computer with AEA's Dr. DX. Frank DeNuzzo, W6SWM, 4335 Woodstock Rd, Santa Ynez, CA 93460.
- anyone with information on connecting an Apple Macintosh Plus computer with a Tono 8-777 communications terminal. Dave Buda, WA2RYC, 18 Nutley Ave, Nutley, NJ 07110.
- anyone using an AT&T PC 6300 or an IBM PC with a ham radio interface for RTTY, CW, AMTOR, etc. Dick Genaille, W4UW, 719 Quarterstaff Rd, Winston-Salem, NC 27104.
- any US or Canadian hams who use the BBC Model B microcomputer with DFS for ham radio

or other applications. Jon Carp, GM8XFT, Engineering Squadron, RAF SAXA VORD, Haroldswick, Unst, Shetland ZE2 9TJ, United Kingdom.

- anyone with information on converting a Commodore 64 computer to operate on 12 V dc for use with an AEA MBA-TOR cartridge. Jeff Baker, KB4YKQ, 209 Maywood St, Blacksburg, VA 24060.
- anyone who has interfaced an IBM PC with

an ICOM IC-735 transceiver. John Ross, N2GSE, 224 Middlesex Rd, Matawan, NJ 07747.

- anyone who has a circuit diagram for the NTC 1300 (Model 1300 CL) color television monitor. A. Roy Taylor, VE3AHY, 543 Oakridge Dr, London, ON N6H 3E8, Canada.
- anyone who has Amateur Radio or SWL applications for the Kaypro 2-84 computer running CP/M. Bruce E. Kirkpatrick, NØGYK, 665 Winona Ct, Denver, CO 80204. [GFT]

PX: Back to BASIC

Summer's here and the time is right for BASIC in disk read! (If you get that one, let me know.) This installment of PX presents three programs written in BASIC for your keyboarding enjoyment.

Program 153 is a pi network calculator by Ralph Fowler, N6YC.

Program 154 compiles a list of needed DXCC countries for members of a DX club (73 cents postage required).

Program 155 is an MUF calculator by M. S. Reda, NØBML.

To obtain a listing of any PX program, send a business-size SASE with 39 cents postage (unless noted otherwise) to ARRL, Dept PX, 225 Main St, Newington, CT 06111 (CRRL members can send their SASEs to CRRL, PO Box 7009, Stn E, London, ON N5Y 4J9). Use a separate SASE for each program request and write the PX program number of the desired program at the lower left-hand corner of the SASE. Please do not send correspondence other than PX requests to Dept PX.

A list of all 155 programs in the PX library is also available by sending a business-size SASE with 22 cents postage to Dept PX.

Why not FM?

The advent of FM has undoubtedly been the greatest factor in introducing large numbers of amateurs to the world above 50 MHz. This tremendous influx has been of great help in fending off those who would grab our VHF and UHF assignments for their own, usually commercial, purposes. In addition to furnishing much-needed activity on our VHF bands, FM has provided us with what we have needed since the dawn of Amateur Radio: a good system of local communication. FM repeaters spread across the country represent a resource to support local and regional communication ranging from ragchewing to the handling of vital emergency traffic.

For those whose sole interest is communicating with nearby stations, FM is a very effective mode. However, many feel the urge to learn what else can be done on the VHF and UHF bands. I frequently receive letters from people who wonder if FM is an appropriate mode for expanding their DX horizons. Some cite accounts appearing in *The World Above 50 MHz* reporting 800- to 1000-mile contacts on 2 meters or 70 cm, and wonder if FM was, or could have been, used for such work. The answer is that almost all of the long-distance work described in the column, unless otherwise stated, is done using CW or SSB. This fact isn't because I intentionally ignore DX accomplished on FM, AM or ATV, it is because these modes are not as apt to produce the kind of extended ranges usually discussed in this column. There are exceptions, of course. When they occur, and are reported to me, I try to get them into print. Of particular interest are long-distance ATV contacts. AM work is also newsworthy, particularly in the light of its rarity these days.

Sporadic-E contacts using FM, especially on 6 meters but occasionally on 2 meters as well, do occur quite frequently. The reason why FM can be used for working E_s on 6 meters is that signals propagated via this mode are often quite strong, particularly for single-hop distances out to about 1200 miles. In the case of multihop paths, FM contacts

are much less common. Multihop E_s on 2 meters, using any type of emission, is extremely rare. Working DX on FM via tropospheric bending is also quite frequent and can be a lot of fun. Under the right conditions, contacts of up to several hundred miles can be accomplished either on simplex or through repeaters. One of the problems with using repeaters for this sport is that it may be a source of annoyance to others, since the DXer frequently unintentionally brings up a number of machines in addition to the one he or she is trying to access. Another problem with FM during really super tropo openings, either on simplex or through repeaters, is the difficulty of finding a clear channel. Since FM is generally channelized, the task is quite difficult. Lack of a clear channel limits one's ability to listen for very weak signals. Because, generally speaking, the weaker signals are likely to be the ones from the greatest distance, the ability of FM to cover really great tropo distances is limited. Also working against hearing very weak FM signals in the presence of stronger ones on the same frequency is one of FM's greatest attributes, known as capture effect. Capture effect can be very advantageous when attempting to eliminate interference to a local station from one or more distant ones. This characteristic is an important consideration the FCC uses in allocating FM broadcast channels. For example, it is common that two local-service, 3-kW FM stations with antenna heights up to about 300 feet above average terrain, are placed as close to one another as 65 miles. It is obvious that, as useful as it is for some applications, FM's superior capture effect is not particularly well suited to DX work. Another factor working in favor of CW and SSB for covering really great distances is that they are both what might be called envelope types of modulation. That is, there is no carrier during times when nothing is being said. A good operator can often copy a weak signal right through a strong one by listening between the dots and dashes or words. By contrast, an FM station transmits a steady

carrier whether or not the operator is talking at the particular instant.

But just suppose you can find a clear channel on which to try your FM DXing. There is another factor that works to the disadvantage of FM as a weak-signal mode—its bandwidth. FM, as commonly practiced on VHF and UHF by both amateurs and commercial communication users, employs a deviation of approximately 5 kHz and a channel width of about 20 to 25 kHz. By contrast, SSB occupies about 3 kHz, and CW can be squeezed into bandwidths well under 1 kHz. It is a well-known tenet of radio communications that the narrower the bandwidth, the less noise picked up by the receiver. It is apparent that the less noise heard by the receiver, the weaker the signal it can detect. This, coupled with the capture effect, makes FM a threshold mode. Below a critical signal-strength level, it is very difficult to copy much, if any, intelligence. However, once the signal exceeds that critical threshold, the background noise suddenly disappears, and the station is said to be full quieting. On the other hand, SSB and CW gain gradually in their copiability as the signal strength rises. The bottom line is that for the very weak signals usually encountered on very long tropo paths, as well as some other types of DX propagation, SSB has an advantage over FM of about 9 dB and CW an additional 5 to 6 dB beyond that.

Thus, those of you who want to get the most out of the VHF and UHF bands, perhaps getting into the states-worked boxes or going for the VUCC Award (see January 1983 *QST*), might want to start shopping for a multimode rig. With such equipment, you can continue to talk to friends on FM while using the rig to become familiar with the exciting "other VHF." Many of those who have gone this route have reported that it has opened a whole new world of fun and excitement for them. In addition to the thrill of DX, they have met many new interesting and knowledgeable friends.

VETERAN CONTRIBUTOR TO HAWAII BEACON SYSTEM IS SILENT KEY

During an otherwise very pleasant visit to the West Coast VHF Conference in early May, I learned of the untimely passing of Bob Cook, W6PJA. I had only recently become acquainted with Bob via telephone and correspondence in connection with writing several accounts of the tropo path that frequently opens between Hawaii and the West Coast. W6PJA contributed greatly to the understanding of this phenomenon by his participation in the construction of the KH6 beacons and diligent monitoring of them at his home

in Fullerton, near Los Angeles. Professionally, Bob was employed at Henry Radio, where he was responsible for the design of several of that firm's VHF amplifiers.

ON THE BANDS

6 Meters—By the time you read this column, you will have the benefit of hindsight, but, as this is being written in early May, I can only project what kind of sporadic-E season 1987 will produce. From all indications, it appears that it will be very interesting, both from the standpoint of excellent propagation and variety of DX opportunities. Last month's column reported some early April DX, includ-

ing South American and Mexican openings from New Mexico. Those openings continued into the latter days of April. On the 20th, K5FF and OM W5FF near Albuquerque came up with new countries, her 72nd and his 71st, by working YS1ECB in El Salvador. That station worked many others from New Mexico to Florida in the approximately one-hour opening that began about 2300Z. K5ZMS reports that YS1ECB told him during their contact that he had worked US stations on April 6, 7 and 10, as well as this opening. W5OZI Junction, TX EM00 reports working XE1GE south of Mexico City at 0150Z April 21 and heard him working many 5s and 7s, so the opening wasn't limited to YS1ECB.

Incidentally, Pat's call was listed incorrectly as W5QZI in the May column, for which I apologize. W5OZI expresses his support for the use of 50.200 MHz for domestic work and hopes that people will, in time, gravitate to that frequency.

As the lusty month of May arrived, single and doublehop E_s propagation erupted all across the country. WA1OUB writes to report the early arrival of doublehop at his New Hampshire location. Bob says that he worked stations in New Mexico, Arizona, Utah, Wyoming, Colorado and California between 2000Z May 3 and 0200Z May 4. W6JKV, who I saw at the West Coast VHF Conference banquet Saturday May 2, told me that the band had been open most of the day, including a number of East Coast stations. One of Jim's contacts was his friend in Atlanta, N4HSM, who accompanied him on many of his DXpeditions.

The missionary work by K1ZFE and a number of others who contributed to the project of putting Haiti on 6 meters has paid off. Beginning the first week of May, many East Coast stations reported contacting HH7PV for a widely needed new country.

Want to work a new country on 6.2 meters or one of the higher bands? An excellent opportunity will present itself July 18 and 19 during the CQ VHF WPX Contest. The country is the United Nations Building in New York City. Yes, the UN counts as a DXCC country, and the 4U1 prefix should be popular in this contest. 4U1UN is scheduled to be on with high power on 6 and 2 and very respectable power on the other bands through 13 cm. Good antennas will be mounted atop the 40-story building, and a short feed line run should help the station to make many contacts. Operators will include: W1GNC, W1XX, NJ2L, KA3V, W3UBQ and KB9NM. QSLs should go with an SASE to H. A. Bohning, W2MZV, 145 Troy Meadow Rd, Parsippany, NJ 07054.

N4LTA Spartanburg, SC reports that he has put on a new 6-meter beacon. The frequency is 50.070, and the antenna is a halo at 30 feet. The power is switched between three levels—100 mW, 1 W and 10 W—with about 15 seconds being devoted to each level. Pat is looking for reports and will send a special QSL for those writing him describing reception of the beacon. Address is Pat Bunn, 171 Spring Lake Dr, Spartanburg, SC 29302.

2 Meters and Up—Dominating the news this month for 2 meters and the higher bands is another of those tremendous Gulf Coast tropes that visit that part of the country from time to time. Two distinct sessions seem to have taken place during the last days of April. According to a letter from WA5HNK near Houston, enhanced conditions began April 18 and lasted for three days. Joe's report concentrates on 70- and 23-cm work, including 23-cm contacts with WB5LUA and KD5RO, N5WS, WASTKU and W5GG—all in the Dallas area. Some of these stations had signals ranging up to S9 plus 40 dB. The following day he worked W9BN/5 Little Rock, AR on 70 cm and several more North Texas stations plus W5JTL in Mississippi, WD5AGO Oklahoma, WD5GQM Louisiana and KL7JG/4 in Florida. During one, 70-minute period, WA5HNK says that he was able to work five states. One of the high spots for him was completing a 1289-MHz ATV contact with WA4GRK at a distance of

Look for 2-meter standings next month.

740 miles. Joe believes that this may be the first 23-cm ATV contact between Texas and Florida.

K1FJM/4 near Miami observed the enhanced conditions at 0100Z April 30 and reports working South Texas station W5TPV EL87, N4QU/MM in both EL77 and EL78, WD4VCC EL79 in the Florida Panhandle, N5HNS Louisiana EL29, WD4SBV Alabama EM61 plus a number of others on 2 meters.

W5UWB Kingsville, TX comments that the Gulf trope lasted just long enough for him to work a few Florida stations during the 70-cm Sprint April 29. John's log includes K8CS/4, WD4AHZ and K3KTY/4 all EL87, N4QU/MM in both EL77 and EL78, KB4DZX and K4DZP both EL95 along with WB4OOJ EL88. Total contacts numbered 22 with a multiplier of 13. This may not seem like much for many of us in more populated parts of the country, but for his location southwest of Corpus Christi, it's something to brag about.

MORE MICROWAVE ACTIVITY

It's getting so that the microwave bands are providing a significant percentage of the news in the world above 50 MHz. I believe that this is a situation we have long wished for and welcome all reports of work in this part of the spectrum. I know that also goes for KA1GT and his column, The New Frontier, which also appears in this issue. That column concentrates on the techniques used on the bands above 1 GHz, while The World Above 50 MHz will continue to report operating accomplishments. Therefore, you can expect to see frequent references to The New Frontier for technical details of equipment, etc.

W2PGC in Western New York reports that he is active on 13 cm with about 20 W from a TWT and a 45-element loop Yagi. So far, Sam has been able to work W8YIO in Michigan at 262 miles and VE3LNX about 90 miles across Lake Ontario.

It has been only a few months since the first reports were flashed of reception of moon echoes on 3456 and 5670 MHz. Next came the first two-way contact on 3456 between W7CNK/5 Oklahoma City and KB5RO near Dallas. Already we have a second two-way. Once again, W7CNK and his helpers were on one end. This time on the other end were several members of the Colorado Front Range Microwave Society including K0KE, K0RZ, KA9NEH, KB3ZR, WB0QGF and KD0GT. During the April 12 attempt, the initial honors went to K0KE, followed shortly by K0RZ. Signals ran 559 on the Colorado end and 529 the other direction. For details of equipment used, see The New Frontier. I predict that we will be hearing a lot more of 9-cm EME in the months to come.

Another fast-moving area is in one that most of us would have only recently concluded to be all but impossible for amateurs—SSB/CW operation at 10-GHz and above. Many are reporting such activity at 10 GHz, some with

commercial transverters from SSB Electronics, but quite a few with home-constructed gear. But, SSB at 24 and 47 GHz! Just after the June column was put on the wire to Headquarters, I received word from WA3RMX/7 regarding work that WB7UNU and he have been doing on those bands. Tom said that last summer Lynn and he worked over a 115-mile path from Paulina Peak, OR to Mount Hood in the same state on the 13, 9, 5, 3 and 1.2-cm (24-GHz) bands using SSB in each case. He thought that this work was worthy of being listed in the Microwave Standings, which first appeared in the April column. (I agree.) He went on to take exception with my establishing 100 miles as the minimum necessary for listing in the case of the bands above 24 GHz, pointing out that, at 47 GHz and above, absorption in the atmosphere, and lack of equipment to generate sufficient power to overcome it, make that figure very difficult to attain. He went on to explain that WB7UNU and he had already worked over a 5-mile path on 47.040025-GHz SSB. No sooner had I received that letter when another arrived saying that they had extended their 47-GHz range to 13.92 miles. Still not a hundred, but darn good for that part of the spectrum. The 100-mile minimum for listing in the Microwave Standings is by no means cast in stone, and I invite comments and suggestions. Incidentally, I had the pleasure of meeting both Tom and Lynn at the West Coast VHF Conference and seeing some of their 47-GHz SSB equipment. I can testify that, while it is well constructed, it is definitely amateur gear, not commercial laboratory equipment. Keep up the good work, fellows.

Strays



I would like to get in touch with...

☐ hams who are also involved professionally in public service: EMTs, paramedics, police officers, fire fighters, etc., for inclusion in a directory available to all who contribute. Jeff Howell, WB9PFZ, 20 Catalina Estates, Charlestown, IN 47111-1607.

☐ hams of Chinese background and others interested in SSB ragchewing in Cantonese and other Chinese dialects. Tom Ma, KA0WUG, or Dwayne Kinney, KA0WVV, 15 NW Maple St, Waite Park, MN 56387.

☐ hams who were at Western Electric or US Navy ENM Group, Dec 1941-Dec 1945. Harry Gartsman, W6ATC, 9921 Sunset Blvd, Beverly Hills, CA 90210.

☐ hams who also keep bees. Tom Mitchell, KC3YD, PO Box 339, Bethel, PA 19507.

☐ hams who are also in MENSA. Art Candell, N4PCK, 4153 NE 130 Ct, Silver Springs, FL 32688.

☐ hams in the New York City metropolitan area interested in forming a 2-m AM net. Joseph Schwartz, K2VGV, 11 Windham Loop 1JJ, Staten Island, NY 10314.

☐ hams who would like to exchange club patches. Chuck Martin, F/AB4Y, CPU A316, APO New York 09777.

More on 10-GHz Equipment and Operation

The ARRL Board of Directors has approved the VHF/UHF Advisory Committee recommendation of 10.368 GHz as an official calling frequency. This is probably no surprise to those involved in narrowband work on 10 GHz since it has been a standard frequency for many years. Its origins lie in the fact that it is an integral multiple of lower amateur frequencies (144×72 , 432×24 or 1296×8) and thus can be generated by frequency multiplying techniques. This was probably of more importance in earlier years now that linear transverters are becoming more popular, though direct multiplication may still be the easiest way to generate appreciable power.

SSB-Compatible FM

On the subject of multiplying to 10 GHz, PA0EZ sent along the following comments on a technique sometimes called "SSB compatible FM," which has been used in Europe for some time. This approach does not use expensive and sometimes hard-to-come-by mixers and linear power FETs.

My system starts with an 1152-MHz, 10-W signal, but this much power is not required. My first transmitter used a $\times 9$ multiplier with a varactor diode. Power output at 10 GHz was more than 100 mW with a multiplication efficiency less than 10%. My second transmitter had two triplers cascaded. This one yielded 300 mW at 10 GHz. My latest addition is an MGF 2124 power amplifier with 800 mW output. The multiplier approach appears to be the easiest way to generate a powerful signal at 10 GHz, but it can generally be used only for CW or FM. A technique called SSB compatible FM will allow a multiplier-generated signal to be copied on an SSB receiver. The original SSB signal (in my case 14.55 MHz) is 100% clipped using a PLL. The frequency deviation in the original SSB signal remains, but the amplitude modulation is lost. This signal is now divided by 108 using TTL and an intermediate frequency shift. The resulting signal is mixed up to 96 MHz. I use a VXO here and have a first IF at 10.7 MHz, with a 30-kHz crystal filter to suppress the TTL parasites. The 96-MHz signal (VXO controlled) is now multiplied times 108 to 10,368 MHz. The resulting signal again has the original frequency (or phase) deviation. The amplitude modulation is still missing, but it is not essential. This signal can be copied on an SSB receiver.

10-GHz EME Tests

Further information on 10-GHz EME has been received from an article in *DUBUS* (1/87) sent in by PA0EZ. I4BER performed successful tests on Oct 8-9, 1986. CW echoes were obtained with 100 mW; with 700 mW, decent SSB echoes were heard. The antenna was a 32-m dish with 65 dB gain! Polarization was simultaneous left and right circular. Transmitter and receiver were both homemade GaAsFET constructions. The receive system noise temperature was 320 K,

but this can be reduced to 80 K by the use of an available (radioastronomy) receiver. Tests via the moon could be arranged with properly equipped stations. I4BER can be contacted at the following address: G. Tomassetti, I4BER, Via Ferravilla 7, 40127 Bologna, Italy.

10-GHz Transverter

Kent Britain, WA5VJB, reports that four members of the North Texas Microwave Society now have SSB Electronics transverters for 10 GHz, and he has sent in the following information:

The SSB Electronics transverter comes in three units—the local oscillator (XLO-1), the receive mixer (XRM-1), and the transmit mixer (XTM-1). It starts out with a 2.5-GHz local oscillator of a conventional type. The 2.5-GHz signal is then fed to the receive mixer, where an active quadrupler multiplies the LO up to 10,224 MHz. Some of the LO is coupled into an active GaAsFET mixer, and the rest goes to the transmit mixer. A dual-stage preamp using an MGF-1303 driving an MGF-1302 rounds out the receiver. The transmit mixer takes 5 mW of LO power from the receive mixer, mixes it with the 144-MHz IF signal and follows with three amplifier stages. The normal MGF-1601 final gives 100 mW output, while the optional MGF-1801 final gives 200-250 mW. Both mixers are beautifully constructed on Teflon® PC board. Thus far, four members of the North Texas Microwave Society have these SSB transverters on the air. Only one unit had problems (with the LO). Some frequency drift has been noted on SSB and CW, but it's quite minor considering the frequency involved. One note of caution: As they come from Germany, the transverters have no protection from voltage spikes or reverse polarity. Be sure to install appropriate diodes and capacitors on the power leads. Also, even the briefest accidental transmission into the receive mixer would be fatal. To be safe, I recommend the use of some kind of buffer amp, perhaps an old 2-meter preamp followed by a 10-20 dB pad, to protect the receive mixer. SSB operation on 10 GHz still isn't the land of appliance operators, but this amazing bit of technology sure makes getting on the band a lot easier.

3456-MHz NEWS

Keith Ericson, K0KE, reports a 3456.1-MHz EME QSO between W7CNK in Oklahoma City, Oklahoma and K0KE in Denver, Colorado on April 12. The path loss to be overcome for these QSOs is about 280 dB. Equipment at K0KE consisted of an ICOM IC211 as an IF transceiver, with a homemade transverter. The transverter uses a CTI oscillator and Vari-L DBM-500 mixer. The transmit side consists of a 3-stage MMIC

amplifier driving a surplus Western Electric 416B tube amplifier (4 W) driving K0RZ's 12-W solid-state amplifier. The receive side is an Amplica LNA with 43 dB gain and a 1.9-dB noise figure, along with a 7-pole interdigital filter. The antenna used for this QSO is a Scientific Atlanta 10-meter dish at a commercial downlink facility owned by Tribune Broadcasting of Denver. The dish has approximately 48 dB gain and a 0.6° beamwidth at 3456 MHz. At W7CNK, equipment included a homemade transverter driving an 80-W TWT amplifier, an Avantek ATF 10135 preamplifier (noise figure less than 1 dB) and a 16-foot dish. Keith reports that signals were strong enough that everyone at the Denver end could copy them through the IC211 internal speaker!

47-GHz NEWS

More activity from Oregon on 47 GHz. Tom Hill, WA3RMX, reports that on March 8 he contacted WB7UNU/W7TYR over a 13.92-mile path. Signals were 10 to 30 dB out of the noise. The weather was cloudy and hazy, with a slight misting rain just beginning at one end. The path was just barely visible using a 30-power telescope. Equipment consisted of linear transverters with 15-dB noise figures at both ends. WB7UNU had 44 μ W output and a 9.5-inch dish. WA3RMX used 3.5 mW and a 28.5-inch dish. Tom notes that such loud signals indicate the possibility of significantly longer paths with dry weather, bigger antennas and the use of CW.

Strays



QST congratulates . . .

the following radio amateurs on 50 years as ARRL members:

- William Graves, W0QZZ, of St Louis, Missouri
- Kenneth Geideman, W8AJJ, of Sebring, Florida
- George Scott, W2LFX, of Vincentown, New Jersey
- Woodrow Guile, W1EBO, of Norwich, Connecticut
- Thomas Boone, W4COC, of Greensboro, North Carolina
- Garold Sears, W5AIR, of Houston, Texas
- Frederick Burns, W2KWW, of New Milford, New Jersey

I would like to get in touch with . . .

hams who are US Naval Academy alumni, to join a net Mondays at 1600Z on 7280 kHz or 1900Z on 14.338 MHz. I'd also like to get in touch with radiation survivors of Operation Sandstone/1948 Eniwetok or Operation X-Roads/Bikini, Tests A and B. Jack Dougherty, W7HXX, 20 Santa Fe Ct, Prescott, AZ 86301.

The Microwave Novice

Reports from the Dayton HamVention® indicate that 220-MHz equipment is hot! By the end of the Dayton weekend, there was little in the way of 220-MHz equipment left for sale on the convention floor. Across the country, Novices are making an impact on 220 MHz (actually, 222.10 to 223.91 MHz). The new users of the old repeaters have breathed some fresh air into the band. So, what about that other band in the world above 50 MHz that is now open to Novices?

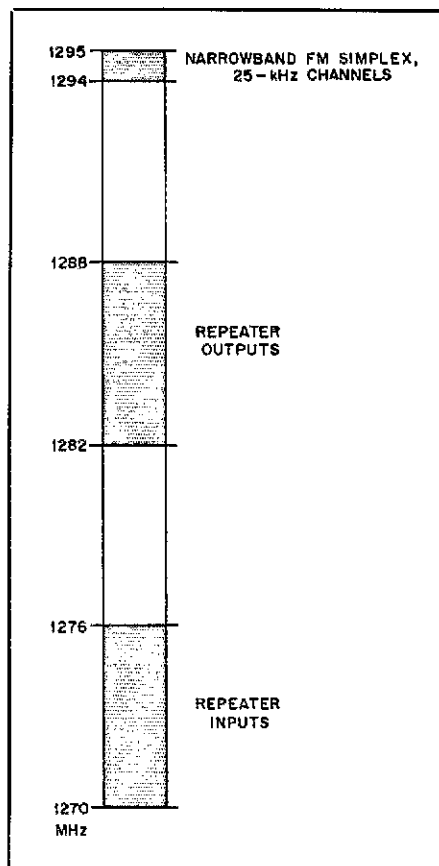
The "other band" is 1270 to 1295 MHz. It is now available to Novices using a maximum of 5 watts PEP in the FM voice mode plus the SSB, CW, RTTY, AMTOR, packet, facsimile, and slow-scan and fast-scan television modes.

At this time, commercial equipment for 1270 to 1295 MHz is limited. However, as more and more Novices jump on the 1270-MHz bandwagon, the demand for equipment will increase and more equipment will become available to meet the new demand. Presently, both ICOM and Kenwood sell 1-watt mobile FM transceivers, and ICOM also sells a 1-watt hand-held FM transceiver, a 10-watt mobile FM transceiver, a 10-watt base multimode (including FM) transceiver and a 10-watt repeater. (Novices cannot be the control operator of repeaters, but a Technician or higher class ham can and may be interested in operating a 1270-MHz repeater for Novices to use.)

According to the band plan that was adopted by the ARRL Board of Directors, repeater input channels lie every 25 kHz between 1270 and 1276 MHz (1270.025, 1270.050, 1270.075, etc); the output channels are at the same interval between 1282 and 1288 MHz (1282.025, 1282.050, 1282.075, etc), with a 12-MHz separation between input and output. For example, a repeater that has an input frequency at 1271 MHz would have an output frequency at 1283 MHz (1271 MHz + 12 MHz = 1283 MHz). The band plan also calls for FM simplex channels every 25 kHz between 1294 and 1295 MHz (1294.025, 1294.050, 1294.075, etc), with 1294.5 MHz as the national FM simplex calling frequency.

The operating procedures on 1270-MHz FM are similar to those used on 220-MHz FM, as described in the May 1987 installment of this column. The major exceptions are that the distance covered on 1270 MHz is much less than the mileage provided by 220 MHz. Also, the RF generated at 1270 MHz may be injurious to your eyes, so do not point an antenna in the direction of your or anyone else's eyes. (The jury is still out on this, but why take a chance.)

The Novice band on 1270 MHz is 25 MHz wide. That is approximately six times greater than all of the HF Amateur Radio allocations (below 50 MHz) for all license classes! There is a lot of territory available on this new Novice band, and such space gives everyone a little elbow room to experiment with new



techniques and procedures that can advance the state of the communication art. The 1270-MHz band is where Novice experimenters can make a niche for themselves.

THE FATE OF 220 MHz

The FCC is now deciding our future on the 220-MHz band. Will things remain the same or will we be forced to cram 5 MHz of Amateur Radio communications into 3 MHz of radio spectrum?

FM is the mode of preference in the upper 3 MHz of our 220-MHz band and, if that upper 3 MHz is all that remains after the FCC acts/axes, you will need an RF crowbar to find a spot to operate, especially if your mode is not FM! New band plans would have to be formulated to accommodate all modes without compromising the operations of the users that are already there (what a nightmare that would be!). And the users already there include the Novices who have been exercising their new 220-MHz privileges since March 21. By the time the FCC acts, Novice operations will have just begun to get some roots in place on 220 MHz. It would be a real shame if some of the Novice operations had to be uprooted to accommodate a new band plan!

Let us hope that everyone reading this column sent in their comments concerning this FCC proposal and that the quantity and quality of the comments in support of the status quo managed to sway the FCC in the right direction.

REPEATER LOG

According to March 1987 reports received, repeaters were involved in the following public-service events: 403 vehicular emergencies, 20 medical emergencies, 11 fire emergencies, 9 public-safety events, 4 drills, 4 power failures, and 4 search and rescues.

The following repeaters were involved (followed by the number of events): W2VL 38, WA2ZWP 8, WA6BJY 13, WD6DIH 15, KA6EEK 51, W6FNO 308, K6TZ 12, K8DDG 10.

Strays



I would like to get in touch with...

- ☐ anyone with a manual/schematic for a Lafayette HA460 6-m rig. George Lynch, KA1TY, 109 Newport Dr, North Syracuse, NY 13212.
- ☐ anyone with a manual for a Waveforms audio oscillator, Model 510-B, or an HP 3400A RMS voltmeter. Irv Seidman, W2GNZ, 902 Van Court Ave, Elberon, NJ 07740.
- ☐ anyone with a manual for a KLM Multi-2700 transceiver. Marvin Hess, W2WKU, 204 Queensway Rd, Elma, NY 14059.
- ☐ anyone with a manual for a Tempo 2020 HF transceiver. Brian Baskett, WA7PVE, 5802 Swan Creek Dr, Tacoma, WA 98404.
- ☐ anyone who has phase-modulated a Gonset G-50 6-m communicator. Howard Houser, WA3YPB, 227 Valley Dr, Morrisville, PA 19067.
- ☐ anyone with a manual/schematic for an Echophone Commercial Model CE-3 receiver. Dick Cosma, KA1NRW, 377 Wilder St, 201, Lowell, MA 01851.
- ☐ anyone who has converted to 2 meters a Motorola FM hand-held used in the 154 "utility" frequency. Dave Mirise, K8MTL, 8432 Cherinoya Dr, Orlando, FL 32817.
- ☐ anyone with information on using a TI-99/4A for ham radio, and also information on modifying a Collins S-1 receiver and transmitter and a Kenwood R-1000. Donald Tucker, W7WLL, 9216 SW Fir Grove La, Portland, OR 97225.



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Vice President and Secretary: Harry MacLean, VE3GRO
Treasurer: William Loucks, VE3AR
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William A. Gillespie, VE6ABC
David Fancy, VE7EWI
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General Manager: Raymond Staines, VE3ZJ
CRRL Outgoing QSL Bureau: Box 113, Rothesay, NB E0G 2W0
Bureau Manager: Donald Welling, VE1WF

CRRL Members to Elect Officers

To CRRL members in all parts of Canada: You are hereby solicited for nominating petitions pursuant to an election for CRRL President and CRRL Vice President.

Names of the incumbents appear on this page. Under CRRL By-laws, candidates for President and Vice President must (1) have been CRRL Full members for a continuous term of four years at time of nomination, (2) have held a Canadian Advanced Amateur Certificate or equivalent throughout those four years, and (3) be at least 21 years of age. Additional information may be found in the CRRL By-laws, available on request.

To be valid, a nominating petition must carry the signatures of 10 or more CRRL Full members. It is advisable to have more than 10 signatures. Photocopied signatures are not acceptable. Signatures must be on the petition.

Petition forms (EDC-1) are available from the CRRL Headquarters office in London, Ontario, but are not required. The following form is acceptable:

(Place and date)

CRRL Elections Committee
Box 7009, Station E
London, ON N5Y 4J9

We, the undersigned CRRL Full members, hereby nominate... (name and call sign) as candidate for... (President or Vice President) for a two-year term of office beginning 1988 January 01.

Nominating petitions will be received at the CRRL Headquarters office until 1200 EDT 1987 August 20. Eligibility of candidates will be determined shortly after that. If only one eligible candidate is nominated for an office, that candidate will be declared elected. If more than one candidate is nominated for an office, a balloted election will take place. On

or just before 1987 October 01, the CRRL Elections Committee will mail ballots to all persons who, on 1987 September 10, were CRRL Full members. The ballots will carry a copy of the CRRL By-laws governing the election, and biographical material, up to 300 words in length, supplied by each of the candidates. Marked ballots will be received at the CRRL Headquarters office until 1200 EST 1987 November 20 and will be counted shortly after that in the manner prescribed in the CRRL By-laws. Results will be announced on WIAW, and in the CRRL News bulletins and QST.

Over the next two years, CRRL will need the best leadership possible. You are urged to take the initiative and file a nominating petition immediately.

B. Robert Benson, QC, VE2VW
Counsel, Elections Committee

CRRL NOTES

□ CRRL did send a formal submission to the US FCC, supporting ARRL and all US amateurs in their bid to prevent reallocation of the 220-222 MHz band to the US Land Mobile Service. (CRRL would normally express its views on US matters to ARRL, through mechanisms established by IARU. However, in this case, ARRL confirmed that it did not object to CRRL communicating directly with FCC.) The CRRL submission argued: (1) that US Land Mobile use of 220-222 MHz would have an adverse effect on the Canadian Amateur Service; (2) that DOC has actively promoted amateur use of 220-225 MHz, particularly for packet radio, and would not likely follow the FCC example if the proposed reallocation were to take place; and (3) that being so, continued Canadian amateur activity on 220-222 MHz would probably interfere with the proposed Land Mobile Service, making it a second-class service at best.

□ CRRL is no longer publishing the ITU "banned countries" lists. These lists are often inaccurate. Sometimes this is because an administration changes policy without notifying ITU. Sometimes this is because officials in some administrations misinterpret questions on the ITU questionnaires and submit incorrect information. Sometimes this is because of delays in returning questionnaires. We've checked it out with our contacts in DOC. No harm is done by trying to work a station operating from a country on the banned countries list. If the station is truly forbidden to contact you, it will remain silent. Otherwise, you may just work a new country! □ CRRL has modified the rules for its "Worked All QST Award." Contacts with any combina-

tion of eight stations using a QST call sign will qualify an operator for this award. QSL cards are no longer required. A copy of log entries, certified by the operator and two other licensed amateurs, will do the trick.

□ CRRL members are reminded that all membership records formerly held by ARRL are now held by CRRL at its Headquarters office in London, Ontario. If you have a change of address or a new call sign, do not use the card, addressed to ARRL, that comes with QST. Instead, write directly to CRRL. Please mention your call sign—your old call sign, if that is what has changed. This helps CRRL office staff locate your membership record in less than three seconds!

DOC NOTES

□ Many club newsletters are still listing previously published dates for DOC Amateur Radio examinations. Just a reminder that DOC no longer conducts such examinations four times a year. Examinations are now scheduled as required, at the discretion of personnel in each DOC District Office.

□ DOC is revising BP-23, the document that specifies the maximum amount of RF energy that may be radiated by Canadian cable television systems. CRRL has learned that the revised document will propose a 6 dB increase in permissible radiation on VHF frequencies, including cable channel E, which coincides with the 2-metre amateur band. CRRL has sent an appropriate letter of concern to the Minister of Communications.

□ CRRL has learned that a draft copy of a DOC Discussion Paper, "Jurisdictional Issues in the

Regulations of Antenna Structures," is in limited circulation and has reached some municipalities. The paper suggests that provinces and, by extension under Canadian law, municipalities, may have the right to regulate the aesthetic and safety aspects of antenna structures to the extent that their regulations do not "sterilize" radio-communications, which is a federal undertaking. Again, CRRL has sent an appropriate letter of concern to the Minister of Communications.

NOTES FROM ALL OVER

□ As a result of articles in this column and in TCA, a number of amateurs have been asking about a possible CRRL-CARF merger. A CRRL committee is continuing to study the matter and will present its report to the CRRL Board at its 1987 Meeting, to be held in Toronto August 29-30.

□ Congratulations to Jim Swail, VE3KF, who was named recently to the Order of Ontario for his work in developing devices for the blind. Jim, who is blind himself, works at National Research Centre, Ottawa, and has written for QST.

□ The agenda for the 1987 National Amateur Radio Symposium, sponsored by CARF, CRRL and Saskatoon Amateur Radio Club, has been set. Workshops will deal with Spectrum Management, Working with DOC, EMI Concerns, Selling Amateur Radio, and the Future of Amateur Radio in Canada. The Symposium will run in conjunction with the Saskatchewan Hamfest, to be held in Saskatoon July 31-August 02.

□ Don Cole, VE6EY, advises that the organizers of the Olympic Torch Relay have decided to provide their own communications. Don thanks amateurs across Canada who offered their services.



President: Richard L. Baldwin, W1RU
Vice President: Carl L. Smith, W0BWJ
Secretary: David Sumner, K1ZZ
Assistant to the Secretary: Naoki Akiyama, N1CIXJH1VRQ

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Japan

The International Amateur Radio Union—since 1925 the federation of national Amateur Radio societies representing the interests of two-way Amateur Radio communications.

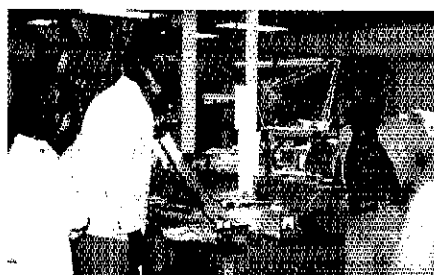
Would You Be Willing to Help?

One area of the world that needs to have an explosive growth in Amateur Radio is the continent of Africa. If, for the purposes of this discussion, and in order to underline the problem, we exclude figures for the Republic of South Africa, there are only slightly over 1000 radio amateurs in Africa. It further appears that, overall, most of this number are expatriates—that is, citizens of other countries who are more or less temporary residents at their Africa locations.

This is a distressing situation if we are to promote a stable and steady growth of African radio amateurs in Africa. It is a distressing situation if we are to successfully convince African telecommunications officials to support the Amateur Radio Service at International Telecommunication Union (ITU) allocations conferences.

What to do? At the present, we have several avenues of approach. One is through the course in Amateur Radio Administration—a course that so far has been presented once in Nairobi (all the participants at that session were from Africa), once in Tokyo, and three times in Newington (where a total of seven of the participants were from Africa). The ARA course provides participants with an extensive review of the international regulations and a thorough discussion of how to generate domestic regulations based on international regulations. More than that, the course provides extensive documentation as to why the Amateur Service is valuable and why support of the Amateur Service is a good investment for an administration. Our hope is that those who participate in the course will be enthusiastic in their support of the Amateur Radio Service and will infect others with their enthusiasm.

Laudable as that may be, it solves only part of the problem. We still need to find a way to provide Africans with equipment they can afford. Africa is not yet fully developed, and the amount of money a citizen of an African country can spend on Amateur Radio equipment is often somewhat less than what is affordable in, say, Europe or North America. Transceivers selling for \$1000 US are too rich for many of those Africans who might become enthusiastic radio amateurs, especially when you consider that import taxes may be as high as 100% in some of the African countries. Because such a huge import tax doubles the cost of the equipment, several African countries, through the efforts of IARU societies and cooperative telecommunications officials, have made arrangements for



USTTI students get a hands-on demonstration in the ARRL Lab.

the legitimate importation of Amateur Radio equipment via telecommunications authorities that would avoid an import tax altogether.

Still the cost of modern transceivers is high by African standards. And so we have initiated in-person discussions and correspondence with some manufacturers of Amateur Radio equipment to see whether there is a possibility of producing a simplified transceiver that could be sold for something less than \$200 US. Some of us believe there is a

market for equipment in that price range, and that the market would gradually expand. Understandably, unless some private financing could be found to support this experiment, production of such low-cost transceivers could be a gamble for any manufacturer.

There is another possible solution, and this is where you, the reader, could play a role. Sitting around in ham shacks throughout North America and Europe there must be hundreds of unused, older, second-hand transceivers—rigs that have been replaced by some more modern and exotic devices. The question is, if IARU were to pay the shipping costs to a central collection point, and if IARU were to then assume the responsibility of delivering these rigs to the appropriate countries in Africa, to be used only by Africans, how many of you would be willing to donate those unused transceivers in order to expedite the growth of Amateur Radio in Africa? If this idea strikes a responsive chord, please send to W1RU (address at the top of this column) a postcard with a brief list of what you would donate, together with your name, call and address. If there is enough response, we'll be back in touch with you by personal and individual correspondence. For Heaven's sake, don't send any gear yet! [E]

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		Major ARRL Operating	
Members	Jun 1987, p 51	Events and	
Club Contest Rules	Jan 1987, p 81	Conventions—1987	Jan 1987, p 57
DX Contest Awards		Novice Enhancement	
Program	Feb 1987, p 82	Report and Order	Apr 1987, p 64
Element 2 Question Pool,		QSL Bureaus	
New and Revised		Incoming	Jun 1987, p 54
Questions, Answers	Apr 1987, p 23	Outgoing	Mar 1987, p 67
Frequency/Mode		Reciprocal-Operating	
Allocations	Apr 1987, p 70	Agreements	This issue, p 51
Golden Jubilee of DXCC		Tech and General	
Award	Sep 1986, p 60	Written Exams	Apr 1987, p 29
Hamfest Calendar Rules	Sep 1986, p 84	Third-Party-Traffic	
Ham Radio-Related		Agreements	This issue, p 51
Landline BBSs	Nov 1986, p 58	10-GHz Cumulative	
HF World Championship		Contest Rules	Jun 1987, p 82
Rules	Apr 1987, p 88	1987 ARRL National	
License-Renewal		Convention	Jun 1987, p 45
Information	Apr 1987, p 70	220-MHz Band NPRM	Apr 1987, p 16

Sailing the High Seas with VE7YL

"Elizabeth King started a new career this week as she arrived here from Vancouver, British Columbia to check over new radio equipment being installed aboard the Norwegian passenger ship, *Vito*," reported the *San Pedro Daily News* in February 1947. For Elizabeth, this was the first step in an adventure she had planned and hoped for since she graduated from Sprott Shaw Radio School in Vancouver with a Second Class License.

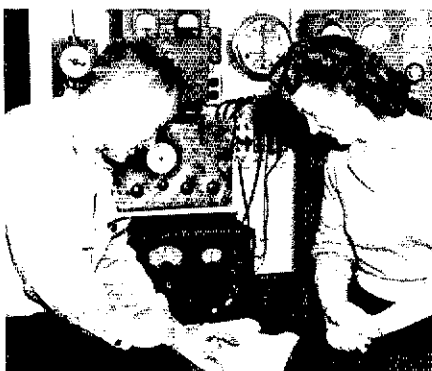
During World War II, several Canadian YLs worked as radio operators on Norwegian ships in the Atlantic and Pacific oceans. Elizabeth was determined to join their ranks. An opportunity became available soon after she earned her first license, but Elizabeth's parents didn't think too much of the idea. Understandably, they were not enthusiastic about seeing their daughter sail away on an oil tanker or cargo ship headed for the South Pacific war zone. Elizabeth dutifully put her plans on hold and took a job with the Canadian government for three years, working at the Coast Station VAI in Vancouver and later with the Department of National Defense in Victoria. When a position on a ship became available in January 1947, Elizabeth wasted no time in applying. Shortly thereafter, she left for San Francisco and boarded the *MS Vito*, her first home at sea. Later, she became the radio operator on the *MS Skauvann* and sailed the Pacific to Japan, China, the Philippines, Singapore, Hong Kong and Australia.

Those four exciting years were filled with new friends and fascinating ports of call. "All of the trips were wonderful ones, but I suppose that the first was the most memorable simply because it was the first. After joining the ship in San Francisco, we sailed to San Pedro, California for dry docking and, joy of joys, a radio shack full of new equipment. We took on cargo up and down the West Coast and, last but not least, a deck cargo of pigs destined for Manila."

No sooner had Elizabeth boarded the ship when she was informed that her duties would include signing the crew on and off as well as being secretary to the Captain. The first of those two jobs included accompanying the crew to the Immigration Office and Norwegian Consulate, not always an easy job.

"Radio work was not taxing. An occasional message to our agents in the next port of call, messages to and from the crew to family in Norway, especially at Christmas time, copying the news and weather and getting time checks kept me busy," said Elizabeth. "The most time-consuming job was doing pay sheets and trying to write letters in Norwegian."

Both *Vito* and *Skauvann* had accommodations for limited numbers of passengers, so it was always fun on leaving the last port before heading across the Pacific to meet and get to know these guest passengers. Many of them became good friends of Elizabeth, and frequently she was invited to their homes



Elizabeth meets with representative of MacKay Radio, who was in charge of installing the radio equipment onboard the *MS Vito*, her first home at sea.

when the ship returned to their part of the world.

When Elizabeth signed off *Skauvann* in early 1951, it was the beginning of another exciting part of her life. She had met Reg Anderson in Vancouver several years earlier. "He had rescued me from a snow bank when I was trying to ski," she laughs. In 1951, Reg was employed for an oil company in Sumatra, and Elizabeth flew to Singapore, where they were married.

The Andersons spent the next 11 years living overseas and moving from Sumatra to Venezuela (where their two children were born), Holland, Curacao and back to Canada in 1966.

It wasn't until 1971 that Elizabeth became involved with radio again—this time Amateur Radio. "Reg had a friend in Calgary who was an amateur, and I went to his shack to listen and try my CW again. I was a bit rusty, but delighted to discover that I hadn't forgotten it. How lovely it sounded! I was hooked," remembers Elizabeth. Reg presented her with an FT-101 and a 14AVQ for Christmas, and later that year Reg and Elizabeth earned their VE calls—VE7BIY and VE7YL.

Early in 1972, Reg was transferred to Iran. Elizabeth remained in Canada to supervise the children while they finished their school year. Then, she sold the house and packed up the family, including the dog, for an indefinite tour of duty abroad. Shortly after the family settled in Abadan, Elizabeth and Reg applied for and received their EP2 calls. Being licensed as EP2EA and EP2RS did not imply that they had permission to bring the radio equipment into the country! That permission was not granted until January 1974, but during February, EP2EA was on the air!

With the help of their cook, Reg installed the 14AVQ atop the mud roof of the house. Fortunately, it was winter, and the temperatures were reasonably cool. Later, when the beam was erected, Elizabeth remembers it was 125 degrees in the shade. During their years in Iran, the Andersons had the opportunity

to visit a Norwegian ship that was in port, and Elizabeth met the radio operator, who was a YL. "We had a wonderful talk, and she was amazed to hear that I, too, had sailed on Norwegian ships for four years," remembers Elizabeth. This particular YL was married to one of the officers on board, and today Amateur Radio operators around the world know her as VK9NL, Kirsti Smith.

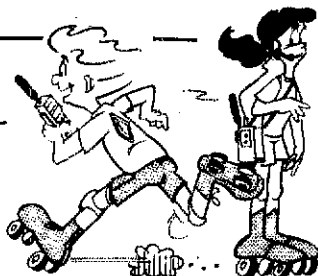
Elizabeth and family left Iran in early 1977 and moved to the Netherlands, where she became PA9ELA. A year later, she was on the air from Jakarta as YB0ADT. "I was still working on CW only when I got my Indonesian call sign, and it was one of the local Jakarta amateurs who finally persuaded me to try SSB. What fun!" A new mode enabled Elizabeth to locate the "Natter Net" on 20 meters, and it was here that she met many YLs. "Having a chat with VK2HD, VK6YL, Diana, G4EZI and Hisako, JJ1LQI became part of my daily routine," says Elizabeth.

As Reg's retirement date grew nearer, Elizabeth was frantically trying to earn her DXCC YL certificate, sponsored by the Canadian Ladies Amateur Radio Association. "I had only a few more countries to get, but it seemed to be getting more and more difficult as I got more frantic and desperate," laughs VE7YL. "With the help of the girls on the Natter Net, who scouted the bands for YL voices and reported back to me as quickly as possible when a new and wanted YL was heard, I managed to work 101 YL countries just before YB0ADT went QRT."

The friendships from the net grew, and in 1980 when Reg retired, Elizabeth and he took a trip to Australia and New Zealand to meet amateurs, especially the YLs from the Natter Net with whom she had been chatting over the previous years. "In one of my conversations on the Net with VK6YL, Jill asked me what I was doing at the time. I said, 'Oh just sitting here in my evening gown and tiara waiting to go out to dinner!' Lo and behold, while staying with Jill in Perth, she presented me with a tiara with my YB0ADT call engraved across the front. Needless to say, this now hangs on my shack wall here in Vancouver."

Today, Elizabeth's love of Amateur Radio and its challenges, its friendships and the opportunity to meet new operators keeps her active on the bands. "I love working new YLs and getting YL-sponsored certificates and thoroughly enjoy belonging to YL organizations, reading their newsletters. BYLARA, CLARA, YLRL, WARO, JLRS and ALARA are an important part of my life and working a new YL country is still a thrill."

VE7YL has worked 118 YL countries, an extraordinary feat to which any DXYL hunter can attest. "Writing a short note to each new YL and hearing from her makes this world a smaller and friendlier place," philosophizes Elizabeth. Through Amateur Radio, I have so many wonderful people, and I look forward to meeting many, many more." □



Incoming QSL Cards

"I love to chase DX and receive QSL cards, but how can I do it without a lot of hassle?" Does this sound familiar? If so, you're not alone. There are many hams who don't fully understand how a QSL bureau works.

There are two types of QSL bureaus: incoming and outgoing. This article will deal with incoming QSL bureaus and cards. The purpose of an incoming QSL bureau is to be a clearinghouse for QSLs arriving from foreign countries. The service is free, and ARRL membership is not required.

There are 11 QSL bureaus, one for each US call area. Their addresses can be found in the June or December installment of QSL Corner, or write to ARRL HQ.

By contacting a ham in another country and asking for a QSL card, you set into motion a long chain of events. Assuming the operator on the other end of the QSO gets the card filled out and sends it off quickly, the card still has a long way to go before it is hanging on the wall of your shack.

The other operator will send it to the outgoing bureau of his country. That bureau will then send it to the States. Usually, the QSLs are distributed for further processing to individual sorters, each of whom is responsible for a letter in the alphabet. So, if your call is N7DDM, the card goes first to the Seven Area Bureau, then to the "D" sorter.

How do you go about getting any card that may be for you?

1) Keep self-addressed 5- x 7 1/2-inch envelopes on file at your bureau, with your call in the upper-left corner, and affix at least one unit of First Class postage. If you prefer, just make sure you have money on file.

2) Respond quickly to any bureau request for envelopes or money. It means you have run out and won't receive any cards.

3) Notify the bureau *in writing* of any new

QSO Cassettes

Like all DXers, I occasionally suffer from the NITL (not in the log) syndrome. During the 1988 CQ DX Contest, I worked Morocco. I couldn't convince the Moroccan station, though. He told me I wasn't in the log. No QSL card and no confirmation of a country I needed.

I would like to share an idea with you on how to coax that rare DX QSL card into your shack. My return rate from DX ops since I started using this method is almost 100%.

I keep a cassette recorder wired into the audio output of my receiver. When I hear a DX station I want to work, I turn on the recorder. I leave it on until I work the station and usually a few minutes afterward, I then dub that section

of the tape onto a C-30 cassette. I try to include a few QSOs before my own and a few afterward. I fill out the label on the cassette to include pertinent information (see photo).

I then type a short note to the DX op, telling him I am enclosing a tape of our QSO plus a few others that he might enjoy hearing. I also pay the op an honest compliment. Was he very efficient in working the pile-up? Did he have a good fist? Was his signal strong?

I enclose this cassette, a self-addressed envelope, IRCs, a note and a picture of my station or a postcard of the area in a 4- x 6-in envelope and send it Airmail. The cost of mailing ranges from \$1.35 to \$2. Add to the postage the IRCs, printing, etc. and you now have over \$3 invested in getting a QSL card. This is about twice the usual cost of sending a QSL, so you can see why I keep this method of QSLing for the rare ones that I really need.

After you receive your answer and have the QSL in hand, the master tape can be reused or filed for future use. I like to save mine. I enjoy replaying some of the more interesting ones, and they also make excellent training tapes for the beginning DXer.—Bruce Vaughan, NR5Q



calls and address changes, or if you don't want your cards.

4) Include an SASE with any request for information. The bureau manager can't

afford to pay postage on all replies.

5) Most bureaus will hold cards for 90 days. After that, they get tossed. Make sure you have a way for cards to get to you.

TEEN CONTACTS

It is always fun to contact someone your own age who has similar interests. Teenagers seem to have trouble finding each other on the bands. The two hams listed below are interested in setting up QSOs with other young hams. Write to either to set up a sked.

Andrew Soule, KA1MVK

E1 Birch Hill Estates

Bangor, ME 04401

Jeremy Bierbach, KA3QMR

1424 Mohican Dr

Pittsburgh, PA 15228

HAM BULLETIN BOARD

A new bulletin board devoted to ham radio, *Amateur World*, has come on line. Michael Kemps, N6OQU, a 16-year-old ham in Rancho Palos Verdes, California, has gotten

his program debugged and is ready to go. The bulletin board is 1200 bauds, 1 stop bit, 8 bits, no parity; it can be accessed by calling 213-377-0450.

So far Mike has about 200 users of the board, and more than half of them are hams. Mike is actively recruiting young hams/computer buffs to add to his list of users. His address is: Michael Kemps, N6OQU, 26605 Deepbrook Dr, Rancho Palos Verdes, CA 90274.

YOUNG HAM OF THE YEAR AWARD

Nominations are open once again for the *Westlink Report's* "Young Ham of the Year Award." This is the second year the award has been available. For complete rules, send an SASE to me at the address at the top of this page.

Strays



I would like to get in touch with...

☐ former members of WW II Signal Corps stationed in Barrackpore, India, for photo and call letters of the traffic and weather radio installation at the airport. Alvin Agard, WD9CSE, 493 Peach St, East Dubuque, IL 61025.

☐ hams who play war games. Don Jensen, 300 East 40th, Apt 11-M, New York, NY 10016.

☐ hams interested in biocommunications or ultrasonics. Bill Copeland, WB6RUE, PO Box 163, Perris, CA 92370.

☐ hams interested in agriculture and/or plant nurseries. Carlos Paez, TI2CC, PO Box 7370, San Jose 1000, Costa Rica.

Clubs Keep the Embers Warm

I remember my first passing interest in Amateur Radio. The strange new sounds that emitted from my dad's Hallicrafters receiver. The lure of copying CW signals from faraway places that conjured up pictures of dense jungles and hidden dangers. Yet it took several starts before the spark caught fire and burned into a hot-white flame. My dad was the spark that kept me interested in putting forth the effort to get that Novice class license. Letters have been sent to League HQ indicating that clubs often provide the gentle breeze that fans cooling interest into renewed excitement.

"Our club has been very fortunate to have so many people interested in our progress," wrote Mahlon Dimond, KA3PMC, advisor of the Middle School Ham Radio Club in Bedford, Pennsylvania. "Our local radio club, Bedford County Amateur Radio Club, has been very supportive. Jay Williams, K3SCM, gave us a Hallicrafters SX-110, a Heathkit DX-40, code oscillators, keys and reference materials. His help is much appreciated."

"Thanks, we couldn't have done it without you," added Gene Rolfsema, KB7WH, club trustee of the Dean Morgan Junior High School, in reference to Archie comic books and other materials League HQ sent to his school. At least 23 of those in the science class are licensed amateurs, said Gene. "Last November, we asked you for information, you supplied it, and we had code and radio classes daily for six weeks in this enriched 8th-grade science class."

Summer Doldrums Is the Time to Plan for Autumn Adventure

Several articles about *Archie's Ham Radio Adventure* have appeared in teaching publications and have sparked a marked increase in teacher requests for the Archie comic book. *Instructor*, May 1987, page 22, contained a plug for Amateur Radio with a picture of the Archie comic book. *American Teacher*, April 1987, page 12, also suggested *Archie's Ham Radio Adventure* as a tool for Language Arts.

You can help these teachers bring the excitement of Amateur Radio to the classroom. The Club Services Department often gets requests from teachers for hams in their area to come into the school and demonstrate Amateur Radio to their students. We can put you in touch with

teachers in your area needing that special spark to get their students excited about learning all that Amateur Radio has to offer. Who knows where all that excitement will lead? And schools are not the only place where prospective hams gather. We also get letters from people in hospitals, prisons and nursing homes, who seek help in getting started in Amateur Radio. The possibilities are endless. Fortunately, however, the Amateur Radio Service possesses an unlimited resource: people excited about their own hobby! Let's spread the excitement around. Now is the time to plan; your club can make the difference.



Archie's Ham Radio Adventure and QST vie for attention at a meeting of the Middle School Ham Radio Club, in Bedford, Pennsylvania.

Welcome SSCs!

The following clubs have demonstrated their zeal for enhancing enjoyment of Amateur Radio and going the extra mile in serving their local communities. These clubs were granted Special Service Club status after demonstrating effective programs in six areas: (1) Public Relations, (2) Emergency Communications, (3) Training, (4) Technical Advancement, (5) Operating Activities and (6) ARRL Membership Recruitment. The number in parentheses is the number of club members.

Welcome aboard!

Beaumont ARC, Beaumont, TX (46)
Coastal Area Repeater Society, Savannah, GA (63)
Fox Cities ARC, Appleton, WI (94)
Indianapolis RCA ARC, Indianapolis, IN (80)
Mt Tom Amateur Repeater Assn., Springfield, MA (300)
Radio Assn of Western New York, Tonawanda, NY (98)
Shenandoah Valley ARC Inc, Winchester, VA (84)
University of Texas ARC, Austin, TX (22)

The following renewing Special Service Clubs have reaffirmed their commitment:

Canton ARC, Canton, OH (210)
Central Georgia ARC, Warner Robbins, GA (117)
Clover Leaf ARC, Brooksville, FL (23)
Edmond ARS, Edmond, OK (60)
Gloucester County ARC, Pitman, NJ (165)
Goddard ARC, Greenbelt, MD (81)
Great Bay Radio Assn, Dover, NH (181)
Hernando County ARA Inc, Brooksville, FL (105)
Huntington County ARS, Huntington, IN (31)
Indianapolis Red Cross ARC, Indianapolis, IN (85)
Jackson County ARC Inc, Ripley, WV (30)
Lake Monroe ARS Inc, Orlando, FL (120)
Maury ARC, Hampshire, TN (35)

Mountaineer ARA, Grafton, WV (32)
Neptune ARC, Neptune, NJ (32)
Newington Amateur Radio League, Newington, CT (42)
Nittany ARC, State College, PA (115)
Ocean Monmouth ARC, Bradley Beach, NJ (100)
Okaw Valley ARC, Greenville, IL (37)
Owensboro ARC, Owensboro, KY (95)
Ozaukee RC, Saukville, WI (90)
Pacific Radio Amateur Transmitting Society, Kaneohe, HI (8)
Palomar ARC, Vista, CA (321)
PHD ARA Inc, Liberty, MO (540)
Pike County ARC, Stendal, IN (37)
Pikes Peak Radio Amateur Assn, Colorado Springs, CO (100)
Riverland ARC, LaCross, WI (81)
Rochester ARA, Rochester, NY (931)
Rock Creek ARA, Silver Spring, MD (115)
St Paul RC, N St Paul, MN (316)
San Fernando Valley ARC, Van Nuys, CA (201)
Sandusky Valley ARC, Fremont, OH (28)
Sonoma County Radio Amateurs Inc, Santa Rosa, CA (93)
South Brevard ARC, Melbourne, FL (80)
Squaw Island ARC, Canandaigua, NY (30)
Susquehanna County ARC, Montrose, PA (50)
Tamaqua Transmitting Society, Tamaqua, PA (19)
Theodore Roosevelt ARC, Dickinson, ND (33)
Top of Panhandle ARC, Booker, TX (8)
Triple "A" ARA Inc, Freedom, PA (151)

The FCC Form 610: All New for 1987

The FCC is required to make sure folks have the skills to operate an amateur station properly. FCC licensing is the manner in which the government ensures that amateur operators hold the necessary skills to carry out their operations. This brings us to our old friend, the FCC Form 610—all new for 1987. The FCC Form 610 is the potential amateur's introduction to the amateur testing and licensing procedure. This form has undergone many changes in the past few years. In this installment, we shall examine the new Form 610 and some commonly asked questions associated with it.

Amateurs and/or potential amateurs must use the Form 610 for renewal and modification (such as change of address or change of call sign) of Amateur Radio licenses. This form may also be used for reinstatement of licenses that have expired within the five-year grace period and for requests for new Novice licenses. Only June 1984 and later editions of the FCC Form 610 may be used. Use of earlier editions of the form will delay issuance of your license; your application will be returned without action, and you will be required to refile on a current form. The Form 610 was revised in early 1987 to reflect the changes that Novice Enhancement brought and to provide for written examination credit. The latest Form 610 has an expiration date of 12-31-89.

Administering VE's Report

Items A through G of the Administering VE's Report should be completed by the VEs. Applicants should not complete this section.

Section I

Complete *Section I* if you are applying either for a new or upgraded license, or for renewal, reinstatement or modification of your present license.

Item 1—First attach a photocopy of your license if you have a license. FCC prefers the photocopy placed on the back of the 610 at the top facing out.

Item 2—This item lists the specific purposes of the application: new license, renewal, reinstatement, call-sign change, name change, address change or station-location change. Simply check the item or items that apply and complete the corresponding blanks.

Item 3—List your current call sign, if you hold one.

Item 4—List your operator class.

Item 5—Enter your name and any suffix, such as Jr or III. Your name must agree with your signature on line 13. For example, if your name is John Jones, Jr, you must use your suffix when you sign the application. If your name has changed, check Item 2F and complete the corresponding blank.

Item 6—Give your birth date in the form of month, day and year, such as 6-10-63.

Item 7—List your current mailing address. The mailing address *must* be within the US or its territories (also see Item 8). A postal box, RFD number or General Delivery is sufficient. You should keep in mind that you will be responsible for all FCC mail sent to that address.

Item 8—List your current station location (it may be different than that of your mailing address in Item 7). Your station location must be a specific geographical location, *not* a box number. The address must be within the US, American Samoa, Baker Island, Desecheo Island, Guam, Howland Island, Jarvis Island, Johnston Island, Kingman Reef, Kure Island, Midway Island, Navassa Island, Northern Mariana Islands, Palmyra Island, Peale Island, Puerto Rico, US Virgin Islands, Wake Island and Wilkes Island. All other locations are not under FCC jurisdiction.

Item 9—Virtually all amateurs will answer "no" to this question. An "environmental impact" is defined in the rules as (a) a new antenna or structure over 300 feet in height, or an increase in the height of an existing structure by more than 10%, which results in a final height of over 300 feet; (b) facilities which are to be located in an officially designated wilderness area, wildlife preserve area or a nationally recognized scenic and recreational area, or facilities which will affect sites significant in American history; (c) construction which involves extensive changes in land surface features. If the answer to Item 9 is "yes," you must submit the required Environmental Impact Narrative Statement (EINS) along with your application.

Items 10, 11 and 12—These items refer to the question which asks, "Do you have any other Amateur Radio application on file with the Commission that has not been acted upon?" If you have filed another application which has not been acted upon, answer "yes." Answer "yes" *only* if you sent the 610 directly to the FCC. Note that this does not include an application that would upgrade your license class. If your 610 was filed with a VEC, then you would answer "no"; the application would be pending with the VEC *not* the FCC! For example, a Technician passes his General on June 12 and is issued a Certificate of Successful Completion of Examination. He passes his Advanced class examination on June 19. The FCC will not process his Advanced application until the FCC receives a copy of his General class license from his VEC. Since he passed General a week ago, the only license he has from the FCC is that of Technician. As soon as the amateur receives it, he must send a photocopy of his General license to the VEC where he took the examination. Upon the VEC's receipt of the amateur's General license, the application will be sent to the FCC for processing. Therefore, from the amateur's standpoint, his application is pending with the VEC, *not* the FCC. His answer would be "no." Important note: You no longer have to wait 30 days before retaking an amateur examination.

Item 13—Sign the application certifying that your statements are true, complete and correct to the best of your knowledge. *An applicant's signature must agree with Item 5.* The application should be dated in Item 14. Always double check your application, making sure all information is correct. You should also make a photocopy of the 610 for your files. The completed form should be sent

to FCC, PO Box 1020, Gettysburg, PA 17326

Section II-A

Section II-A is completed by the Volunteer Examiners (VEs) who administer the Novice examination elements. The examiners must send the completed form to Gettysburg within 10 calendar days of the successful exam. There is one very important change to the Form 610: As of March 21, 1987, two Volunteer Examiners are required to administer the Novice examination because of the new FCC Novice Enhancement rules. The VEs for the Novice test need not be accredited with a Volunteer Examiner Coordinator (VEC), but they must meet the following criteria. Each VE who is administering the Novice examination must: (1) hold a current General, Advanced or Extra Class license issued by the FCC; (2) be at least 18 years old; (3) not be related to the applicant; (4) never have had his or her license suspended or revoked; and (5) not own a significant interest in or be an employee of any company engaged in the manufacture or distribution of Amateur Radio equipment, or in the preparation or distribution of any publication used in preparing for an Amateur Radio license.

Section II-B

Section II-B deals with Technician, General, Advanced and Extra Class exams. This section must be completed by three VEs who administer the examination to the applicant for Technician class or above. These VEs must be accredited with a VEC, of which the ARRL/VEC is the largest. All accredited VEs who are administering an examination other than the Novice examination must complete Section II-B of the Form 610.

Renewals/Modifications

Q. I filed an application with the FCC over 90 days ago, and I have heard nothing from the FCC. What should I do?

A. If you have not received a response from the FCC within 90 days, write to the Gettysburg office of the FCC (address above). You should include with your letter a photocopy of your application or the following information: name and address, birth date, present call sign and class of license, date of application, Volunteer Examiners' names (if it is a Novice exam) or the name of the VEC (if it is a VEC-coordinated exam).

Q. My license has already expired. Can I still renew it?

A. Yes—under a *grace period*. If you possess a license with a five-year license term (issued before December 16, 1983), and you fail to renew your license, you have a five-year grace period in which your license may be renewed. If two years or more of the grace period has lapsed, you will lose your call sign and will be assigned a new call. You will not need to

(continued on page 79)

Coming Conventions

July 25-26

West Virginia State, Jackson's Mill

July 31-August 2

Oklahoma State, Oklahoma City

August 1-2

Northern Florida Section, Jacksonville

August 7-9

West Gulf Division, Austin, TX

August 22-23

Northwestern Division, Tacoma, WA

August 29-30

Great Lakes Division, Saginaw, MI

ARRL NATIONAL CONVENTIONS

July 10-12, 1987—Atlanta, Georgia

Sept 9-11, 1988—Portland, Oregon

NORTHERN FLORIDA SECTION CONVENTION

August 1-2, Jacksonville

The 14th Annual Greater Jacksonville Convention will be at the new Prime Osborn Convention Center. The site is near the junction of I-10 and I-95 on the banks of the St. Johns River. A full slate of programs and forums will be scheduled, and the convention will feature an expanded, indoor swap area along with many exhibitors of new equipment. Doors open 8 AM-5 PM on Saturday and 9 AM-3 PM on Sunday. Exhibitor and swap area set-up will be 1 PM-7 PM Friday. The Greater Jacksonville Convention is sponsored by six major ham clubs in the Florida Crown area, and all proceeds will go toward the betterment of Amateur Radio. Registration is \$5. Swap tables are \$9 for one day and \$15 for the weekend. Air conditioned,

plenty of parking, shuttle bus service and much more. Walk-in VE exams on Saturday at 1 PM. Talk-in on 146.16/76. For information on exhibitor booths, contact Barry Baines, WD4ASW at 904-398-5185. For swap tables, reservations and hotel information, call 904-350-9193, or write to PO Box 10623, Jacksonville, FL 32207.

OKLAHOMA STATE CONVENTION

July 31-August 2, Oklahoma City

The Central Oklahoma ARC is sponsoring their Ham Holiday and Oklahoma State ARRL Convention at the Lincoln Plaza, 4445 N. Lincoln Blvd. High-tech programs, demonstrations, VE tests, ARRL Forum and nontechnical programs are scheduled. Talk-in on 147.63/03. Features

include Saturday night banquet, Sunday morning QCWA Breakfast, awards and much more. Preregistration is \$7 before July 22, or \$9 at the door. Flea-market tables are \$2 with preregistration. For more info, write CORA Ham Holiday, PO Box 850142, Yukon, OK 73085-0142.

WEST VIRGINIA STATE CONVENTION

July 25-26, Weston

The 29th Annual West Virginia State ARRL Convention will be held at Jackson's Mill 4-H Camp near Weston. This weekend convention features net meeting, DX forum, ARES/RACES meetings, technical forum, MARS meetings, amateur gear auction, flea market and much more. The FCC exams will start at 8 AM July 25. Deadline for preregistration is July 18. No walk-ins accepted.

For information on registration and lodging, write to WV State Amateur Radio Council, 103 Cleveland Ave, Nitro, WV 25143. For camping information, write to Chuck McClain, K8UQY, Rte 4, Box 161, Grafton, WV 26354. FCC examination requests, write to: R.E. Robinson, KU8C, Rte 2, Box 302, Fairmont, WV 26554. Send a completed 610 Form, SASE, copy of license and a check for \$4.35 payable to ARRL-VEC. Enclose an SASE when requesting a Form 610. For general information about the convention, contact general chairman Albert H. Hix, W8AH, 860 Alta Rd, Charleston, WV 25314, or call 304-344-1215.

QST

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.

Arizona (Flagstaff)—Jul 24-26: The Amateur Radio Council of Arizona will present Hamfest '87 at the Fort Tuthill Fairgrounds, off I-17, south of Flagstaff, Friday 12 PM-6 PM, Saturday 8 AM-6 PM and Sunday 8 AM-3 PM. Free admission. Swapmeet, forum, commercial exhibits. VE exams on Saturday. Refreshments, camping (self-contained RVs). Talk-in on 447.150/442.150 and 22/82. For further information, contact Murt Weitzel, KB7NE, 2642 E Alta Vista, Tucson, AZ 85716, tel 602-326-4297.

Colorado (Woodland Park)—Jul 25-26: The Mountain ARC will hold its 6th Annual Swapfest/Campout in the Colorado Rockies at Red Rocks Campground, 3 miles northwest of Woodland Park on Colorado Hwy 67. Gate opens Friday for camping at 4 PM. Fee for camping and/or selling \$5 per day. Advance reservations requested. Bring own tables (or tailgate). Potluck dinner Saturday evening. Refreshment stand available. Talk-in on 146.97 and 145.16. For reservations or information, contact MARC c/o Chuck Hamilton, N0HCH, PO Box 448, Divide, CO 80814, tel 303-687-3641.

Illinois (Chicago)—Jul 26: The Amateur Cross Link

Repeater and DeVry ARS will hold their 1987 Hamfest outdoors on the campus of the DeVry Institute of Technology. Indoor area provided for dealers and manufacturers. Doors open at 8 AM. The location is 3300 N Campbell. Talk-in on 147.225, 223.84 and 443.700. Bring your own tables to set up. There will be forums for XYLS, packet radio, DX and much more. Free Novice and other testing available. Tickets are \$3 in advance, \$4 at the door. Send a check to ACLR, PO Box 348257, Chicago, IL 60634. For more information, call 312-712-7000.

Illinois (Downers Grove)—Jul 12: The DuPage ARC is sponsoring their Hamfest/Computer show at the American Legion Grounds, 4000 Saratoga. Doors open 8 AM-2 PM. Admission is \$2 in advance, \$3 at the door. Activities include VE testing and much more. Talk-in on 146.52 and 145.25. For more info, write to PO Box 71 Clarendon Hills, IL 60514, tel 312-495-1253 days or 312-985-0527 evenings.

Illinois (Willow Springs)—Aug 9: The Hamfesters Radio Club is sponsoring their Annual Hamfest at the Santa Fe Speedway 6 AM-6 PM. Admission is \$3 in advance, \$4 at the door. Activities include flea market and swap meet. Talk-in on 146.52. For more info, contact Hamfesters Radio Club, PO Box 42792, Chicago, IL 60642, tel 312-403-1043.

Indiana (Indianapolis)—Aug 9: The Shadow of the Pyramids ARC is sponsoring their hamfest 8 AM-5 PM. Location is just south of 96th Street, across I-465 from the Pyramids. Admission is \$1 in advance, \$2 at the door. Talk-in on 146.94. Features include, food, VLF forums, microwave, Novice and 160-190 kHz experimental band, plus much more. For more info, contact David Johnston

†ARRL Hamfest

or Jim Boyer at 317-875-8640 or 317-875-8749.

Indiana (Indianapolis)—Jul 11-12: The Indianapolis Hamfest Assn is sponsoring their Hamfest at the Marion County Fairgrounds. Doors open at 8 AM; admission is \$5. Technical forums, banquet and much more. Talk-in on 146.16/76. For more info, contact the Indiana ARA, PO Box 11776, Indianapolis, IN 46201, tel 317-356-4451 or 317-745-6389 days, 317-356-4451 or 317-745-6389 evenings.

Kentucky (Georgetown)—Aug 9: The Central Kentucky ARRL Hamfest is sponsored by the Blue Grass ARS. Location is on Longlick Rd and US 25 at Scott County Senior High School. Admission is \$5 in advance, \$6 at the door. Hours are 8 AM-4 PM. Talk-in on 16/76. Features include tech forums, exhibits, license exams, food and drinks. Free flea-market space. For more info, contact Bill DeVore, N4DIT, 112 Brigadoon Pkwy, Lexington, KY 40503, tel 606-273-8345 days or 606-257-3343 evenings.

Louisiana (Shreveport)—Aug 7-9: The ARK-LA-TEX Hamfest will host the First Ten-Ten International Hamfest at the Shreveport Expo Hall. Activities include tech talks, forums, exams and a large, indoor flea market. Admission is \$3 in advance, \$5 at the door. For registration or info, contact ARK-LA-TEX Hamfest, c/o Jim Burnley, N5HVS, PO Box 4252, Shreveport, LA 71104-4252.

Maryland (West Friendship)—Jul 26: The Baltimore Radio Amateur TV Society is sponsoring their Hamfest/Computer Fest at the Howard County Fairgrounds, Rte 144 at Rte 32, adjacent to I-70. Indoor tables are \$20 each along the wall with access to ac power, \$10 each in the center of the floor. Outdoor tailgating is \$5 per space. Admission is \$4. The fairgrounds will open for dealer setup on Saturday at 2 PM. Overnight

security provided. The fairgrounds open at 6 AM on Sunday for all. For info and table reservations, write to W3GKK, BRATS, PO Box 5915, Baltimore, MD 21208. Tables must be reserved in advance. Tables will not be sold the day of the hamfest.

Massachusetts (Topsfield)—Jul 24-26: The 2nd ARRL "Heavy Hitters Hamfest" will be held at the Topsfield Fairgrounds, US Rte 1 (8 miles north of Rte 128). Giant flea market outdoors and indoors (in case of rain), exhibitors and food. Program includes ARRL forum, CW and QSL contest, fox hunts, packet-radio demo, RTTY mailbox demo, antenna-measurements demo, live music, license exams, alternative activities and more. Free camping Friday and Saturday night for tents and self-contained RVs. Hotels include the Sheraton-Tara, Best Western and Howard Johnson, all located in nearby Danvers. Talk-in on 146.64 and 147.285. Admission is \$3 in advance, \$4 at the door; under 12 free with an adult. Send check payable to Heavy Hitters Hamfest, PO Box 411, Waltham, MA 02254. Enclose SASE. Exams held at nearby school. For information and reservations, contact Russ Corkum, WA1TTV, 21 Thorndike St, Arlington, MA 02174.

Michigan (Marquette)—Jul 25: The Hiawatha ARA is sponsoring their Upper Peninsula Hamfest at the Ramada Inn in downtown Marquette on Washington St. Admission is \$2. Doors open 9 AM-5 PM. Talk-in on 146.76 and 146.97. Features include antenna forum, packet radio, antique radio display, plus much more. For more info, contact Hiawatha ARA, 100 N Daisy, Rte 2, Ishpeming, MI 49869.

Michigan (Petoskey)—Jul 11: The Swap and Shop Computer Demonstration will be held 9 AM-2 PM at the fairgrounds. Talk-in on 146.52 and 146.07/67. Free RV parking Friday night (for self-contained RVs). Camping at Magnus Park or Petoskey State park. Refreshments available, with lunch served 11 AM-1 PM. Admission is \$2.50 at the door. Tables are \$3 for 8 ft; splits allowed. For more info, call 616-347-8693 or 616-582-7322.

Minnesota (St Cloud)—Aug 9: The St Cloud ARC Hamfest will be held at the Whitney Senior Center (off Hwy 10 into Sauk Rapids via Benton Dr to 9th Ave, Northway Dr, south of Vo-Tech school; off I-94 to Hwy 15 to Vo-Tech school and Northway Dr). Ticket donation is \$3; extra ticket is \$2. Lunch counter available. Talk-in 146.34/94 primary and 147.615/015 secondary. For more info, contact SCARC, Box 141, St Cloud, MN 56302.

Missouri (Washington)—Jul 19: The Zero-Beaters ARC is sponsoring their 25th Annual Zero-Beater Hamfest held at the Bernie H. Hillermann Park. Free admission. Parking is \$2 for flea market. Doors open 8 AM-3 PM. Talk-in on 84/24 and 52. VE exams, food and drink available. Limited covered rental space available. For more info, call Al Lanwermyer, WB0QBS, at 314-239-2072.

Montana (Great Falls)—Jul 17: The Great Falls Area ARC is sponsoring their 53rd annual Glacier-Waterton International Hamfest at Three Forks Campground on the southern edge of Glacier National Park. Activities include 2-m bunny hunts, QCWA meeting, seminars, contests, women's and children's activities. Talk-in on 146.10/70 and 146.52. For further information, contact Shirley Smith, KC7OA, 1822 14th Ave S, Great Falls, MT 59405, tel 406-452-5958.

Nebraska (Anselmo)—Jul 25-26: The Central Nebraska ARC is sponsoring their Victoria Springs Steakfry Hamfest at the Victoria Springs State Recreation Area. Admission is \$5. Activities include a weiner roast on Sat night, charcoal-broiled steak at noon on Sun. Church services will be offered on the grounds. Talk-in on 146.40/147.00. Camping and hookups will be available for RVs. For more info, write to L. D. Dunbar, HCBQ, Box 24, Milburn, NE 68813, tel 308-942-3555.

New Jersey (Augusta)—Jul 19: The Sussex County ARC will sponsor SCARC '87 at the Sussex County Fairgrounds, Plains Rd off Rte 206. Doors open at 8 AM. Registration \$3. Indoor tables \$7 each. Tailgate space \$5. Food and refreshments. Acres of free parking. For more info, write to Don Stickle, K2OX, Weldon Rd, RD 4, Lake Hopatcong, NJ 07849, tel 201-663-0677.

New Jersey (Ewing)—Jul 12: The East Coast VHF Society will hold its annual Hamfest and Antenna Gain Measurement Contest on the campus of

Trenton State College. Events include antenna gain measurements on 144 through 2300 MHz, NF clinic, home-brew exhibit and VHF/UHF/microwave oriented flea market (bring your own table and goodies.) The flea market begins at 8 AM, other activities at 10 AM. Admission and selling is free. For further info, contact K2TXB at 609-268-9586.

New York (Alexander)—Jul 12: The Batavia Hamfest, sponsored by the Genesee Radio Amateurs, will be held at the Alexander Firemen's Grounds, Rte. 98, 6 AM-5 PM. Commercial exhibits open at 9 AM. Activities: breakfast, OM/YL programs, flea market, chicken BBQ, ICOM day, free camping (electric \$2) and VEC exams. Ticket: \$3 before July 1, \$4 at gate. Talk-in on 144.71/145.31 and 146.52. For more information, write GRAM, POB 572, Batavia, NY 14020; tickets from Knute Carlson, 26 Burke Dr, Batavia, NY 14020.

New York (Poughkeepsie/LaGrange)—Jul 11: The Mt Beacon ARC Hamfest will be held at the Arlington Senior High School. Tickets are \$3; children free. Tailgating space is \$4. Tables \$6 (one free table and admission). Doors open at 8 AM (for sellers 7 AM). Talk-in on 146.37/97 and 146.52. For more info, call or write Julius Jones, W2IHY, RR 2 Vanessa La, Staatsburg, NY 12580, tel 914-889-4933.

North Carolina (Asheville)—Aug 1-2: The Western Carolina ARC is sponsoring their Western Carolina ARC Hamfest 7 AM-5 PM both days. Take exit 9 off I-26 (Asheville Airport), across from the airport at the Agricultural Center. Admission is free. Talk-in on 146.76 or 146.91. Features include, food, exams on site, plenty of room for RV hook-ups, picnic and entertainment on Sat night. For more info, contact Joseph T. Snipes, K14DY, 123 Shelburne Rd, Asheville, NC 28806. For reservations, contact Garland Lance, NC4N, 854 Sand Hill Rd, Asheville, NC 28806, or call 704-259-5977 or 704-667-3758 days, 704-255-0393 evening.

North Carolina (Spruce Pine)—Jul 11: The Mayland Technical College is sponsoring their first annual hamfest. VE exams will be offered by the area's VEs. Swap shop, barbecue dinner and seminars in digital electronics also included. There will be a two-hour lecture in the morning and a two-hour lab session in the afternoon. Two sessions will be run to keep the groups as small as possible. The hamfest will be on the campus of the college, located on Hwy 19 East, Take Hwy 226 off the Blue Ridge Parkway to Hwy 19 and follow the signs. For more info, contact Don H. Lovelace, Electronics Instructor, Mayland Technical College, PO Box 547, Spruce Pine, NC 28777, tel 704-765-7351.

North Dakota (Dunseith)—Jul 11-12: The 24th International Hamfest and Computerfest will be held at the International Peace Garden between Dunseith, ND and Boissevain, MB. Activities include transmitter hunts, mobile judging and CW contests. Activities for kids and nonhams. Motels and camping facilities available. Free space for vendors and flea market. Talk-in on 52 simplex. For more info, write NTARC, Box 2002, Minot, ND 58702.

Ohio (Bowling Green)—Jul 12: The Wood County ARC is sponsoring their 23rd Annual Ham-A-Rama at the Wood County Fairgrounds. Free admission. Doors open 8 AM-4 PM. Talk-in on 147.18/78 and 146.52. Tables are \$7, trunk sales \$3 per vehicle width. Food and drink available. For more info, contact Ross Mergenthaler, NS8C, 2682 Joseph Rd, Pemberville, OH 43450, tel 419-837-5270.

Ohio (Wheeling Park)—Jul 19: The 9th Annual TSRAC Wheeling Hamfest/Computer Fair will be held 9 AM-4 PM. Dealers welcome; five-acre flea market. Family activities at park. Admission is \$3 in advance, \$4 at door. For info or reservations, contact Carl Williams, WD8PPS, 9 E High St, Flushing, OH 43977, tel 614-968-3652.

Pennsylvania (Warrington)—Aug 9: The Mid-Atlantic ARC announces its annual hamfest to be held 8 AM-3 PM, rain or shine. Tailgate setup begins at 7 AM. Hamfest located at the Bucks County Drive-In Theatre, Rte 611 (5 miles north of the Willow Grove exit of the Pennsylvania Tpk). Admission is \$3, with \$2 additional for each tailgate space. Bring your own table. Ample parking, refreshments. Talk-in on 147.66/06 or 146.52. For more info, write MARC, 203 Second Ave, Broomall, PA 19008, or call John Bartholomew, WB3ELA, 215-356-7197.

Pennsylvania (West Mifflin)—Aug 2: The 50th Golden Hamfest will be held on the south campus of Community College of Allegheny County. Outdoor/indoor facilities, flea market, equipment and parts dealers, forums and much more. Talk-in on 146.13/73 and 146.52. For more info, contact Doug Wilson, WA3ZNP, 185 Orchard Ave, Emsworth, PA 15202.

Pennsylvania (Newton)—Jul 12: The Penn Wireless Assn is sponsoring their Tradefest '87 at Bucks Co Community College. Doors open 8 AM-4 PM. Admission is \$3. VE testing and refreshments available. Talk-in on 2 m and 440. For more info, contact Steve Ewall, WB3IRC, 3090 Bogle Rd, Bensalem, PA 19020, tel 215-752-1202.

Pennsylvania (Pittsburgh)—Jul 12: The North Hills ARC is sponsoring their hamfest at the Northland Public Library, 300 Cumberland Rd, between Rte 19 and McKnight Rd. Admission is free. Doors open 8 AM-3 PM. Talk-in on 147.69/09. VE exams at 1 PM, walk-ins accepted. Refreshments available. For more info, contact Robert V. Ferrey, Jr, N3DOK, 412-367-2393, or Rey Whanger, W3BIS, 412-828-9383.

Tennessee (Columbia)—Aug 2: The Maury Amateur Radio Club will sponsor its first annual indoor hamfest 8 AM-4 PM. Location is the American Legion Post 19 on the New Nashville Hwy. Admission is \$2; tables \$5 each. Food and refreshments, VE exams and much more. Talk-in on 147.72/12. For more information or reservations, contact George Russell, WB4JCR, Box 832, Columbia, TN 38402, tel 615-388-0577.

Vermont (Essex Junction)—Aug 8-9: The Burlington ARC will hold its annual hamfest all day, both days, at the Champlain Valley Fairgrounds. Indoor/outdoor flea market, packet, ATV demos and VE exams. Admission is \$4 US, \$5 Canadian, under 12 free. Talk-in 146.34/94. For more info, contact Barb Kimball, N1DLE, 1 Sundown Dr, Williston, VT 05495, tel 802-878-5555.

Virginia (Berryville)—Aug 2: The 37th Annual Winchester Hamfest, sponsored by the Shenandoah Valley ARC, will be held at the Clarke County Ruritan Fairgrounds, Rte 7, two miles west of Berryville. Doors open 7 AM-3 PM. Admission is \$4; under 12 and wives free. Tailgaters and limited tables, \$5. VE exams at 9 AM (limited walk-ins must register by 8:30 AM). Talk-in on 146.22/82 and 52. Breakfast, snack bar, barbecue lunch and women's activities. For more info, contact Rob Kinsley, NT4S, at 703-869-5113, or write SVARC, PO Box 139, Winchester, VA 22601.

Wisconsin (Eau Claire)—Jul 11: The Eau Claire ARC will hold its annual hamfest at the 4-H buildings on Fairfax St, behind Highland Mall. Doors open 8 AM-2 PM. Talk-in on 147.84/24. Free tables and coffee. Wheelchair accessible. Tickets \$2 in advance, \$3 at the door. For information/tickets, send SASE to Gene Lieberg, KA9DWH, 2840 Saturn Ave, Eau Claire, WI 54703.

Wisconsin (Oak Creek)—Jul 18: The South Milwaukee ARC will hold its annual SWAPFEST at the American Legion Post 434, 9327 South Shepard Ave. Activities 7 AM-3 PM. Parking, picnic area, hot and cold sandwiches, and refreshments available. Free overnight camping. Admission is \$3 per person, includes a "happy-time" with free beverages. Amateur Radio exams held during the day. A packet meeting also held. Talk-in on 146.94. For more info, write to the South Milwaukee ARC, PO Box 102, S Milwaukee, WI 53172-0102.

Wyoming (Jackson Hole)—Jul 31-Aug 1-2: The WIMU 87 Hamfest, Inc is sponsoring their Hamfest at the Virginian Lodge, next door to Grand Teton and Yellowstone National Parks. Admission is \$8 in advance, \$10 at the door. Doors open 6 PM-9 PM Fri, 8 AM-10 PM Sat and 8 AM-1 PM Sun. Talk-in on 146.52 MHz. Features include a Cowboy Cookout, Awards Ceremony, ARRL Forum, ARRL speaker John Lindholm, W1XX, seminars and much more. For more info, contact WIMU 87 Hamfest, c/o Cheryl Ransom, KA7OOE, HC36-2035, Riverton, WY 82501-9354, tel 307-856-1811.

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.

It is with deep regret that we record the passing of these amateurs:

N1AZG, Clarence M. Grady, Clinton, MA
 WA1BCY, Lloyd S. Maxcy, Warren, ME
 KA1BTN, Roger Paul Bernard, Rockport, MA
 W1CGV, Melvin W. Hook, South Burlington, VT
 W1CHG, Philip A. Parker, Westboro, MA
 W1CLG, Ralph M. Smith, West Rutland, VT
 W1DHC, John R. Tavares, Fall River, MA
 W1EKH, William P. Jarak, South Boston, MA
 KA1FTP, Herbert E. Berryment, Bryant Pond, ME
 W1IYD, Lawrence E. Swartz, Middleboro, MA
 W1JWH, George E. Young, Carver, MA
 W1JW, W. Robert Dresser, Trumbull, CT
 K1LOU, John O. Aylward, Peabody, MA
 W1NVH, Stanley J. Paskiewicz, North Billerica, MA
 WA1QCS, Walter A. Furbish, South Portland, ME
 W1QDJ, Arthur W. Ellis, Templeton, MA
 K1RZB, Theodore Elliott, Manchester, MA
 W2AFZ, Della M. Parker, Westville, NJ
 K2AYH, Albert J. Shutter, Slingerlands, NY
 W82BGU, Everett J. Coulson, Morris Plains, NJ
 N2CRC, Leslie S. Learned, Centerport, NY
 W2CVW, Ralph E. Ralls, Gibbstown, NJ
 W2CWE, Edward Daubaras, Islip, NY
 KB2GX, Arnold J. Ely, Niagara Falls, NY
 W2HWU, Conrad R. Kuhn, Edison, NJ
 W2IEV, DeForest O. Romain, Pompton Lakes, NJ
 W2KDP, Dorothy K. Gutman, Oceanside, NY
 W2QPV, Harry McLaughlin, Okeechobee, FL
 K2QPZ, Thomas W. Fluhr, Liberty, NY
 W82ROD, E. Emerson Steward, Bridgeton, NJ
 W2TRG, Joseph E. Casaletti, Utica, NY
 W3AEC, Thomas F. Kelly, Forestville, MD
 W3CBC, Edward A. Schramko, Earleville, MD
 W3ESO, Martin F. Oertel, Washington, DC
 W3KEK, Frederick R. Mumma, Mechanicsburg, PA
 W3KZY, John E. Gausmann, Lansdowne, PA
 WA3LGA, Walter H. Ellis, Jr., Watonsville, CA
 W3SZ, Gordon J. Shook, Forty Fort, PA
 W4CHL, Raymond O. Moss, Salem, KY
 N4FLO, Noel M. Walker, Jr., Tazewell, VA
 W4FZN, Charles Wheatley Cleveland, Montrose, AL
 *KD4GL, Gerald A. Shaw, Poquoson, VA
 W84GSV, Simon Silverman, Fort Myers, FL
 KE4HK, Charles F. Lovely, Kingston, TN
 W4HSM, Jay F. McLeod, Sumter, SC

WA4HYA, Earl Wood, Roanoke, VA
 W4INZ, Cicero C. Bryan, Sr., Phenix City, AL
 W4JII, John F. Larkin, East Point, GA
 W4LFS, Lowell D. Gasaway, Saint Cloud, FL
 W4MAA, Edward E. Warner, Astor, FL
 K4MAJ, Robert H. Hutcherson, Mount Juliet, TN
 KB4OC, George O. Russell, Orange City, FL
 W4BPAK, William J. Scott, Glendale Springs, NC
 W4PPW, William A. Hoelzer, Marietta, GA
 K4Q4Q, Andrew W. Oldham, Greensboro, NC
 K4UGW, Logan G. Trenner, Apopka, FL
 W4VVB, Austin L. Thompson, Mobile, AL
 W4WRM, Alexander C. Key, Alpine, CA
 W4YPA, John P. Six, Deltona, FL
 WA4ZTV, Charles R. Carruth, Lakeland, FL
 K4ZVY, Cowan A. "Gus" Beck, Adamsville, AL
 K5AH, H. J. Angell, Aledo, TX
 W5AHV, Waverly McBride, Jr., Groves, TX
 N5DAQ, Alexander Redchuk, Missouri City, TX
 N5GGL, Loy F. Seamster, New Orleans, LA
 WD5JFY, Harold E. Martinson, Manchester, NH
 *W5KDT, Wayne O. Brewer, Tow, TX
 W5LFT, William R. Dickson, Albuquerque, NM
 *W5OW, Charles L. Suggs, Boerne, TX
 W5SRXN, D. A. Godwin, Loveland, OH
 W6ANG, Samuel F. Strong, Sacramento, CA
 W6AP, Everett G. Henry, Vista, CA
 W6BDI, John A. Hadynski, Placerville, CA
 W6CZQ, George G. Enos, Lucerne, CA
 N6EQ, Bobby F. Gregory, Diamond Bar, CA
 K86GYB, John L. Dietrich, Los Gatos, CA
 N6HRV, Tracy Powell, Cambria, CA
 W6HR, Theodore C. Reid, Sherman Oaks, CA
 W6IFL, Peter C. Trapolino, Ocala, FL
 WA6LGD, William B. Dillon, Stockton, CA
 W6OZF, Fred J. Schnell, Oceanside, CA
 KA6PQO, Martin Shadle, Campbell, CA
 W6SMK, Marvin S. Springer, Los Angeles, CA
 K6UJ, Brandon Wentworth, Southwest Harbor, ME
 W6VU, Burton B. Greenleaf, Long Beach, CA
 WA7FEA, John A. Jordan, Portland, OR
 K7GQJ, William S. Benjamin, Seattle, WA
 *K7GR, George Raymond, Edmonds, WA
 *W7GYX, Miles L. Shepherd, Flagstaff, AZ
 W7LEE, Adolph Robert Turk, Salome, AZ

WB7QFM, Arthur E. Hoppe, Tacoma, WA
 WA7SGT, Ernest A. Murray, Longview, WA
 W7SPB, Leonard J. Oswald, Eugene, OR
 W7UJ, John Wildman, Springfield, OR
 KB8AB, Paul A. King, Ravenna, OH
 WB8BFT, Frank Hauck, Mason, OH
 N8CQD, Walter Smiglit, Powhatan Point, OH
 W8FDM, Curt A. Spring, Wadsworth, OH
 W8UGN, J. Parker Lillie, Cleveland, OH
 WB9AAV, Robert E. Boyer, Mattoon, IL
 WD9AWP, Gordon B. Knuckles, Beech Grove, IN
 W9DIW, Arthur J. Beckman, Miami, FL
 N9DMR, James C. Dady, Normal, IL
 K9FNP, John K. Mansfield, Gary, IN
 WD9GXC, William H. Benedict, Springfield, IL
 WD9IXO, Wilburn E. Dodd, Rantoul, IL
 W9JMF, Harlan C. Hanauer, Taylorville, IL
 KA9QVS, William R. Van Arsdall, Taylorville, IL
 WB9WXY, Lewis Volk, Jr., Escondido, CA
 WB9DCX, Ralph R. Robinson, Pueblo, CO
 W8GDD, Hal Beckham, Kansas City, MO
 K8JHO, Vincent A. Monforte, Sr., Placerville, CA
 KA8KHT, Edwin K. Rychner, Wadena, MN
 W8LFL, Ivan J. Ray, Coffeyville, KS
 W8OMB, William Kratzer, St. Louis, MO

*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

July 1937

- The Board has asked Communications Manager Handy to recommend ways we can make better (planned) use of our bands. The Editor suggests each of us give some thought to what sub-bands would be most efficient for DX, voice, QRR calls, etc.
- The first William S. Paley Award was made to Walter Stiles, W8DPY, for heroic emergency communications performance during the 1936 floods. F.C.C. Chairman Prall made the keynote speech during the presentation, broadcast over C.B.S., praising amateurs for their public service accomplishments.
- Another idea from W1QP's workshop gets efficient frequency multiplication for four-band output from a 3.5-Mc. crystal.
- W1HRX bolted heavy wooden ladders in sets of three to make a triangular mast of considerable strength and of course easy to climb.
- Hq. notes: The League is now issuing wallet-size membership cards as an alternative to the wall certificates. The staff is expanding to occupy the entire building at 38 LaSalle Rd. instead of just the top floor. Site selection is under way for the new memorial W1AW.
- A pair of quarter-wave stubs, one open end and one closed, are connected to the transmission line at W6AAR to effectively eliminate odd as well as even harmonics.
- The League has requested our government to propose, at the forthcoming Pan American Radio Conference, third-party-traffic privileges for amateurs in this hemisphere.
- In Part II of his treatise on v.h.f. propagation, Ross Hull describes his home-made continuous recording system: With each 5 db. increase in signal

reception, an additional clock is triggered, so that total time for each level may be kept.

- The five-meter band put on its annual May show, with numerous instances of DX openings, mostly from New England to the Midwest, some as long as one hour continuous contacts.
- W2AOE uses the "gate" action from a reverse diode circuit to obtain improved noise silencing.
- The League is strongly opposing a bill in the U.S. House which would limit issuance of radio operator licenses to applicants 21 years of age or older.
- Dixie "Squinch Owl" W4IR berates the current crop of foreign call-sign pirates, but facetiously adds that he needs only one more fake card to get a "bootleg" WAC.
- This month you can get a League membership (new or renewal) plus the current *Handbook* for just \$3.

25 Years Ago

July 1962

- Last-minute flash—Oscar II is in orbit, transmitting on 145 Mc.!
- The editorial page recounts the outstanding accomplishments in engineering, business and diplomatic circles, of our new League prexy, Herbert Hoover, Jr., W6ZH. "Herb" Hoover's stature will bring added prestige to the League's presence in Washington and indeed worldwide.
- Don't let the math scare you—simple arithmetic on W8JK's formulas will provide solutions for designing the circularly polarized (helical) antennas described by W4VSN and W4SGI.
- G3VA provides us a detailed history of the "Q"

code (back to 1912), relating various changes in common signals and listing some modern versions.

- Following up his "getting started" article on RTTY last month, W0AGD discusses simple test units that facilitate the design of the receiving terminal and adjustment of the f.s.k. system.
- The League has filed comments strongly opposing the proposal to establish fees for amateur licenses.
- K6QNY describes an advanced v.h.f. repeater system, with particular attention to receiver protection from adjacent high-power transmitter energy. Legal hurdles are as tough as technical ones, as FCC requires detailed logging—which means an automatic tape recorder.
- While east for the annual Board of Directors meeting, President Dosland, W0TSN, turned the first spadeful of earth for the new Headquarters building in Newington, Conn.
- Multiband amplifiers often radiate harmonics when the customary pi-network tank is used, but W6KEV found that by adding an L network the unwanted emission is greatly reduced. The kilowatt amplifiers he uses as examples give us other construction ideas as well.
- The Microwave Society of Long Beach is undertaking a civic project, working through youth organizations to interest juvenile delinquents in amateur radio and providing them with both training classes and station equipment when they are licensed.
- K2BTM liked the 220-Mc. converter design in the *Handbook*, but built it with Nuvisors instead of tubes and found reception much improved.
- Changes in the Communications Act affecting us: Change of address modifications will result in automatic license renewal, and notarization of the application is no longer needed (both actions to save paperwork). Also, FCC now has authority to levy fines of up to \$100 on rules violations.
- Plans are moving apace for the National Convention in Portland, Oregon, over Labor Day weekend.—W1RW

Building Upon Public Service Plans: Part 2

Part 1 of this article appears in the June 1987 Public Service column, page 72.

With the conveyance and convergence of high volumes of traffic, now passed in a variety of transmission modes, gateway stations performing a "translating function" between those modes (both amateur and commercial) become very necessary. The advent of digital HF traffic routings gives the concept of Regional gateway centers (clusters of stations connected via local network means) added meaning.

Gateway stations could eventually have a more expanded function as pivot points for automatic, computer-commanded traffic routing. The ARRL Ad Hoc Digital Committee is finalizing a proposal to the FCC for a Special Temporary Authority (STA) from the FCC. This would allow a tryout of 24-hour automatic HF packet-radio networking by selected stations on a national basis. If successfully tested, the FCC could be asked to allow HF autopacket on a regular basis.

In disaster or emergency situations, gateway stations might stand alert to receive the mobile response teams' output, ready to disseminate high-volume disaster traffic via many amateur and commercial modes. These clusters, each with a set of interacting gateway stations and jump teams, could provide basic coverage for North America.

In preparation for emergency operations, our group's gateway station, like any busy station, a hub for several wheels, serves ARES, RACES, MARS and five echelons of the National Traffic System in daily operation. The station is undergoing expansion. A concrete pad, atop three 2-foot-round, 15-foot-deep concrete piles, will support a 125-foot-high antenna tower. This triangular, welded aluminum tower measuring 5 feet at the base is scheduled to be erected this summer. The tower's top section will carry numerous directional antennas and will be rotated as a unit on a lazy Susan-type platform by electric motor and be remotely controlled from the radio room. Wire antennas will slope from the second tower section at 100 feet high. They handle automatic packet-radio activities, while the upper antennas handle the manual radio room operation. Computer equipment for the packet-radio functions, along with several kinds of radios, will soon be in place. Phone lines and a terminal for electronic mail and other online outlets are planned. A portable, emergency generator is also on the shopping list. For now, the radio room is housed in a rustic beekeeper's cottage while a funding search begins for larger, weather-secured

housing. Suspended cable connects the cottage with the antennas on the tower 10 yards away.

Local plans are in motion to link the station with Colorado's SARES (State Amateur Radio Emergency Service) repeater linking system. This effects an automated path between this integrated radio network and the wide-area NTS system. The completion of the SARES system in 1987-88 gives Colorado one of the most integrated, network-automated, load-worthy traffic systems in the US.

Paying the Bills of Expansion

The response-team project is an excellent way to give the public an opportunity to offer support to Amateur Radio public service, a welcome return for the ongoing service that Amateurs give to the public. This support could come in forms of monetary donations, donations of goods and services, or of time and effort. Corporate donors and granting foundations could be approached readily for support of some of these proposed projects.

Amateurs should think big, as long as their own active and integrated participation in public service is big. Some Amateur Radio operators have tended to stay behind the scenes at public events, where their consistent, meritorious actions go continually unnoticed, except by a couple of relieved and grateful event organizers here and there. Why not, when appropriate, join the out-front fun as well and show off the Amateur public-service Radio!

The proposed response-team missions and training experiences can parallel those of other emergency services that have similar programs. Reciprocal arrangements for training and preparation could be established. For example, first-aid training could be exchanged for help in assembling Red Cross materials, and radio amateurs could provide communications for Forest Service search-and-rescue teams in exchange for expedition leadership in wilderness environments.

Getting the Word Out

The broadcast media is open and accessible to citizens and independent producers. Public Broadcasting System or National Public Radio have constant needs for interesting programming, and Amateur Radio public-service activities can lend themselves to exciting portrayals. How about an action-team-style docudrama?

Teleconferencing companies and other electronic media companies oftentimes have facilities that might be utilized gratis by amateurs, perhaps for administrative meetings too cumbersome to be held on radio frequencies.

Long-distance conferencing using quickly advancing slow-scan television capabilities via telephone is a good way to save airfare. Public support of Amateur Radio will often match or exceed the radio operators' efforts in public service.

Now, there is that gateway station tower that you are trying to get off the ground! Amateurs tend to stick together in this kind of thing, but station assembly involves many aspects in which nonhams could readily participate. It can be easy to enlist expert volunteer contracting help for the station's design and construction aspects. Watch for commercial projects beginning near your station site. The personnel there might be willing to help you after hours by sharing equipment like cranes, bulldozers or cement trucks.

These ideas are mentioned with an overall thought in mind: Never underestimate the desire in others to share their resources and energies in a worthwhile cause which benefits everyone. You offer public service generously. Why wouldn't someone else do the same? Whenever possible, find ways to acknowledge and reward the efforts of contributors, hams and nonhams alike.

Conclusion

With the large-scale upgrading of technical capacity for Amateur Radio, and with the possibility of formation of APSCOM on the horizon, including specific projects leading to a more focused continental dispatch of traffic and handling of emergencies, there is a strong realization by ARRL of the imminent opportunity to effect an all-round improvement for Amateur Radio's public-service stance and the training that supports it. The existence of systemized, preplanned emergency procedures and traffic routings is absolutely important. How many SECs, STMs, ECs and NMs at this moment have current call-up sheets and plans for traffic dispersal in case of an emergency? One senses that there are not all that many well-pondered plans as to how to initiate one's response in the case of sudden emergency in one's locale.

ARRL is taking action along these lines, allowing a more focused readiness to be available. Input from the field organization, from you and from me, based in pertinent real experience, is an absolute must. It is probably time to review our personal and collective preparedness, and check in with our Section Leaders and League Officials, articulating and making known our continued pledge to be ready and available. This is the spirit of public service.—PenDell Pittman, N0DZA, Twelfth Region, Cycle Two, Net Manager

IN SERVICE...

□ Maui, HI—Mar 1. Maui County ARES members provided public-service communications for the 17th annual Maui Marathon. Marathon runners started at the center of Kahului and finished at the opposite side of the island in Kaanapali. Radio amateurs were assigned to each of the 12 aid stations and the finish line. Though repeater coverage was marginal in some areas, all went smoothly. —Melvin Fukunaga, KH6H, EC, Maui County, HI

□ Boise, ID—Mar 4. Ada County Civil Defense Coordinators asked local ARES members to participate in their countywide exercise. This was an excellent chance to show the communication abilities of Amateur Radio during this simulated emergency. Amateur Radio messages were conducted on 2-meter simplex on behalf of the Ada County Civil Defense. ARES members provided a service and learned from the experience. —Dan L. Marler, K7REX, EC, Ada County, ID

□ Kansas City, MO—Mar 15. Members of the Heart of America Radio Club provided safety communications for the St Patrick's Day Run. Amateurs observed runners on the 3-mile course and were prepared to report runners who were in trouble to the ambulance service. —Mike Bellinger, K0UAA, PIA, Kansas City, MO

□ Nanticoke, PA—Mar 24. Shortly after midnight, fire was discovered at a metal processing plant. Luzerne County Emergency Coordinator KB3JK was contacted by county officials, and the ARES net was activated by 2 AM. Over 14,000 people were evacuated from the area.

ARES members and MARS stations provided communications for government officials and the American Red Cross. While a local hospital and two nursing homes were being evacuated during the night, amateurs supplied necessary communications between the evacuation centers. The Luzern County ARES net remained on the air until 1 PM. —Kay Craigie, KC3LM, Section Manager, Eastern Pennsylvania, with information provided by KB3JK, AD3L and WA3PZO

□ Clark and Floyd Counties, IN—Mar 28. Amateur Radio operators provided communications in conjunction with a statewide earthquake emergency exercise sponsored by Indiana Department of Civil Defense and the Indiana National Guard. The exercise involved a simulated earthquake near Evansville. "Patients" were airlifted from the area to Floyd and Clark County hospitals. Many radio amateurs were involved in the 2-meter and 75-meter networks that linked the Indiana National Guard, the State Emergency Operations Center and the participating hospitals. —Jeff E. Howell, WB9PFZ, PIA, Charlestown, IN

□ Cheshire County, NH—Apr 6-8. Heavy spring rains combined with melting snow to cause flooding all across the northeastern part of the county. Two dams in Cheshire County were monitored closely by the Army Corps of Engineers.

ARES was activated on Monday, and the operators set up stations at Red Cross evacuation shelters in Keene and the Emergency Operations Center. As the depth of water at both dams began to rise, city officials asked

for on-site coverage by ham radio. A link on 2 meters was set up and maintained until Wednesday, when it was sure that water levels were receding.

Seventeen Amateur Radio operators logged over 200 working hours. Help came from neighboring Vermont and Massachusetts as well as other parts of New Hampshire. —Allan C. Merrill, W1FYR, EC Cheshire County, NH

□ Clark and Warren Counties, VA—Apr 11. Amateur Radio operators provided logistic communications for a 37.5-mile hike on the Appalachian Trail. Seven checkpoints and a command post were set up and operated by 14 radio amateurs from the Frederick County, Virginia ARES. The ARES team assisted the Potomac Appalachian Trail Club and the Appalachian Search-and-Rescue team during this all-day hike. —Steven P. Czaikowski, WB4TZR, EC, Frederick County, VA

□ East Hartland, CT—Apr 11. A woman had fallen and injured her leg while hiking in northwestern Connecticut. K1YON, a medical First Responder for the local volunteer fire department, received the message through the local civil-preparedness repeater on the 2-meter band. When he responded, he met the woman's husband at the end of the state forest road and discovered a tree was blocking emergency vehicle access.

Calling on the repeater, K1YON sent a message to fellow fire department member K1LRB and K1PUG to arrange for them to remove the fallen tree. While this was being accomplished by volunteer firemen, K1LRB and crew, carrying a backboard, were directed by K1YON to the accident site, approximately one mile up the state forest road and one-quarter mile up a steep ridge on the trail. The woman was safely transported down the trail and mountain road to the waiting ambulance. —Ted Jansen, K1YON, Civil Preparedness Coordinator, Hartland, CT

□ Williamstown, MA—Apr 11-12. Around 9 PM, town officials called on Amateur Radio operators to assist in the evacuation of a flooded mobile-home park. Communications were established between the evacuation center, town officials and the park. Three requests were made via ham radio to return to the flooded area to pick up medication (eg, insulin). Radio operators helped provide security for the mobile-home park after the evacuation was complete. —Dick Goodman, WB1HH, SEC, WMA

□ Point of Rocks, MD—Apr 18. Frederick County EC N3RO activated an ARES net at the request of Civil Defense when heavy rains hit the area. Point of Rocks, a town on the Maryland bank of the Potomac River, was close to flooding. WA3KHE and KA3LVY set up communications with the Red Cross at the scene. WB3FWE and WB3KQU ran NCS duty at the CD Emergency Operations Center in Frederick while WA3OHI maintained contact between both communication points. The town did not flood, and all personnel returned and the ARES net secured at 7 PM. —Rick Ogden, N3RO, EC, Frederick County, MD

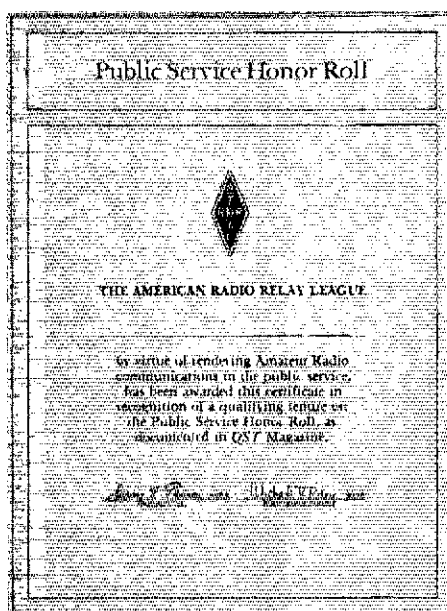
□ Kingwood, TX—Apr 26. Members of the Lake Houston Repeater Association and friends provided communications support for a March of Dimes walk-a-thon near Houston.

Since the walk was made over Kingwood's wooded trails, which are largely inaccessible to vehicles, 2-meter hand-helds and radio amateurs on foot were especially useful in seeing that everything ran smoothly. Over 600 walkers participated. In addition, the hams coordinated the movement of supplies and refreshments along the 8-mile route and kept in contact with walk-a-thon officials, first-aid stations and the Harris County Sheriff's Office. —Tom Lyda, KF5BX

□ Auburn, IN—May 1. A gasoline tank truck overturned on Interstate Highway 69 near Auburn. As a result, members of the DeKalb County ARES and Northeastern Indiana ARC supported local and state law officials with communications to reroute traffic and to control crowds. —Ron Koczor, K9TUS, Section Manager, Indiana

YOUR CONDUCTOR'S CABOOSE

STMs to Report Public Service Honor Roll Certificate Candidates?



To eliminate delays in awarding Public Service Honor Roll certificates to qualified candidates, the Public Service staff is proposing that Section Traffic Managers report qualified candidates directly to HQ as a part of their regular monthly reports. STMs should verify that the candidate has indeed qualified; that is, the candidate has made the PSHR listing for 12 consecutive months, or 12 months out of an 18-month period. HQ will then prepare and send the certificate to the candidate.

Before this new procedure is implemented, we'd like to give League members and Leadership Officials a chance to voice their support or opposition to this proposal. Please send your comments to Public Service Manager Mike Riley, KX1B, at HQ. Thanks!

Field Organization Reports
April 1987

ARRL Section Emergency
Coordinator Reports

Thirty-five SEC reports were received, denoting a total ARES membership of 19,812. Sections reporting were: ENY, ID, IA, LAX, MDC, MI, MN, MO, MS, NE, NFL, NLI, NNJ, NV, OH, OK, ONT, OR, PAC, SCV, SD, SDG, SFL, SJV, STX, SV, UT, VA, VT, WA, WI, WMA, WNY, WPA, WV.

Transcontinental Corps

Area	Successful Functions	% Successful	TCC Function Traffic	Total Traffic
Cycle Two				
TCC Eastern	107	89.16	679	1355
TCC Central	82	89.00	298	648
TCC Pacific	109	90.83	511	976
Summary	298	89.66	1488	2979
Cycle Three				
TCC Eastern	60	100.00	26	52
Cycle Four				
TCC Eastern	115	95.80	654	1329
TCC Central	81	87.10	531	1078
TCC Pacific	109	90.83	725	1414
Summary	305	91.24	1910	3821

TCC Certificates issued this month: W4UQ

TCC Roster

KB1AF N1BHH W1CE K1EIC W1EFW WA1FCD K1GRP KN1K KA1MKJ W1UNJ KT1Q W1QYY KA1T KW1U WB2EAG WA2FJJ W2FR W2GKZ NN2H KB2HM N2IC W2LWB W2RQ WA2SPL KA2JBD N2XJ N3COY N3DPF WB3GZU W3PQ KQ3T KB3JUD AA4AT N4EXQ WD4FTK N4GHI WA4JDH WA4JL N4KB WB4PNU W4UQ K4ZK N5AIMK N5BB N5BT W5CTZ N5DFO W5GHP K5GM AE5I W5JOV AJ5K W5KLV K5MXQ W5QVK KD5RC KA5SPT ND5T N5TC W5TFB K5TL W5TNT KB5W NQ5W KV5X WB5YDD W5VZ W6EOT K6LL W6INH K6UYK W6VZT W6FO KA7CPT W7EP KB7FE W7GHT N7HT W7IGC W7LG W7LYA KA7MUL K7OVK K7FR W7TGU W7VSE W8BO W8PMJ W8QHB AF8V KA8WNO N8XX WB8YDZ W9CBE W9EHS W9HBI W9UJ KA9RII W9SUYU KA9EPY W9GRW AD8A N8IA KC8D KD8J K8EZ KJ8G NX8J AIBO WA8OYI KS8U VE3FAS VE3GSQ VE8CHK

National Traffic System

Net	Sess	Tlc	Avg	Rate	% Rep	% Rep to Area
Cycle Two						
Area Nets						
EAN	30	1013	33.76	.751	88.9	
CAN	30	663	22.10	.511	100.0	
PAN*	58	520	8.96	.457	94.4	
Region Nets						
1RN	60	513	8.55	.415	89.0	100.0
2RN	59	380	6.44	.383	94.6	96.7
3RN	30	248	8.27	.500	96.0	86.7
4RN	60	681	11.35	.432	82.9	100.0
RN5	60	725	12.08	.471	90.0	100.0
RN6	55	200	3.67	.314	100.0	96.5
RN7	60	413	6.88	.390	86.7	98.2
8RN	60	340	5.67	.290	93.3	96.7
9RN	60	289	5.00	.355	84.0	100.0
ECN						53.3
TEN	60	568	9.46	.428	79.8	100.0
TWN	59	253	4.29	.330	74.9	98.2
TCC						
TCC Eastern	107	1355				
TCC Central	82	648				
TCC Pacific	109	976				
Cycle Three						
Area Net						
EAN	30	285	9.50	.471	84.7	

Region Nets							
1RN	29	82	2.83	.300	79.0	90.0	
2RN	30	166	5.53	.437	92.9	73.3	
3RN	22	12	0.55	.098	54.5	80.0	
4RN						90.0	
8RN						80.0	
ECN						90.0	
TCC							
TCC Eastern	60	52					
Cycle Four							
Area Nets							
EAN	30	1398	46.60	1.36	96.6		
CAN	30	986	32.87	1.26	100.0		
PAN	30	929	30.97	1.03	98.9		
Region Nets							
1RN	52	464	8.92	.574	95.5	96.6	
2RN	52	219	4.21	.388	76.0	86.6	
3RN	61	235	3.85	.337	97.3	96.6	
4RN	60	587	9.78	.390	100.0	100.0	
RN5	60	701	11.68	.670	100.0	100.0	
RN6	60	499	8.31	.807	98.3	100.0	
RN7	60	390	6.50	.741	86.1	96.6	
8RN	57	415	7.28	.414	87.0	96.6	
9RN	60	570	9.50	.633	97.9	100.0	
TEN	62	550	8.87	.635	77.5	100.0	
ECN	56	144	2.57	.321	64.0	100.0	
TWN	60	326	5.43	.409	88.4	96.6	
ARN	30	95	3.16	.093	100.0	100.0	
TCC							
TCC Eastern	115	1329					
TCC Central	81	1078					
TCC Pacific	109	1414					

* PAN operates both cycles one and two.
TCC functions not counted as net sessions.

ARRL Section Traffic Managers reporting: AL, AR, DE, GA, IA, IL, KS, MDC, ME, MI, MN, MO, MS, NC, NE, NFL, NH, NJ, NTX, OR, ORG, SB, SC, SD, SDG, SFL, 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.

397	112	AA4JV	94
K09CJ	W0OYH	WA2EPJ	VE7BNJ
154	W3UJ	N0DPF	N6MCOY
KA0EPY	W6FO	N7BHL	KC2ZO
137	111	102	W9DM
WX4H	W7VSE	WA4ANK	K4VVK
N4GHI		KA1MDM	N0BA
133	110	K2VX	93
VE4AJE	K09LT	K0GP	KC4VK
	N7FXJ	WD5GKH	K5UPN
131	NN2H	WA9VLC	KA1MDM
W2MTA	WA2FJJ	101	KA2UBD
	W9YCV	KA2UBD	KJ9J
128	109	AG9G	VE3ORN
VE4LB	N2EIA	KA2MYJ	92
127	N9BDL	N0FOO	N3EGF
KA9FFO	NQ2H	WD8QXT	K3JL
KA4NLK	KQ3T	WA2VJL	KQ3T
125	N3EMD	AC5Z	K4JST
K5MXQ	WA9VND	100	
WB2COWO	W8FPA	NC9T	90
122	107	N9BZZ	KB5ADE
KD7ME	KV5X	WB2RBA	KA1GWE
	K9CNP	WB4WQL	K14YV
121	106	W2QNL	VE3DPO
KA8TIK	KJ9L	WA4PFK	WD4KBW
K4ZK	N2XJ	99	W7GHT
120	WB6DOB	89	
WA4QXT	WB8JGW	WB1CBP	
KW1U	105	WA4TE	
118	WD9DZU	WA2ERT	
W3FA	WB1HIH	WA2SPL	
116	K8UQY	VE4X	
KA2F	KA1HFO	WA4EIC	
N4EXQ	104	WD8LDY	
114	WA1FCD	NE2W	
K2YQK	KZ9Q	WB8KWC	
WB4DVZ	AA4MP	96	
WB2EAG	W9CBE	WA6ZUD	
KB4WT	VE4RO	AJ5F	
	AA4AT	WB4WII	
	WB4KSG	WB2VUK	
	103	N2EQM	
	KT1Q	WB4ZTR	
	W9FWZ	95	
	N3DPF	KB1AF	

N0BKE	KD0NH	N4KRA	61
85	W2RRX	WA6QCA	NN4D
N1CPX	76	AE1T	W2FR
W9HBI	ND0N	K0BWI	W4TAH
WA6WJZ	VE3WM	AJ5K	KM5L
84	N70B	68	NR8C
KA8WNO	N0CLS	W4FMZ	WD8KBW
KA4TLC	K0ZBJ	KA4HHE	60
K0SI	75	VE3CYR	N2FLS
KT9I	WB9PFZ	KA0PDM	KA1LMR
WA4JLS	K9ZBM	K14BR	K2TWZ
WA4LTO	KA9RII	67	NJ9S
83	K0ERM	W7LNE	VE7ANG
AA4ZV	W7LBK	N1DHT	KA7EEE
82	74	KA4YHS	K42NZ/T
KJ3E	KA7AID	K6APW	VE3GSQ
WB8SYA	KA0SBY	66	N0HWD
81	WB5FQU	WB6QBZ	KA1HPC/T
W5VMP	WB5J	WA1TBY	W00UD
KB2AKY	WB4EPA	N8EVC	59
W1RWG	73	65	N2EVG/T
K3NNI	W1PEX	KA4PL	VE2EDO
WB2QMP	KB4BZA	K8UXO	57
KA2GNE	KA2ZKM/T	N2AKZ	WD5EEH/T
KA4GUS	WA4LLE	K2BKE	KA5QVY/T
N7GGSJ	WA3UZI	NF2N	54
KA8TNT	N8FXH	K4ZN	KA5UYV/T
80	WD8KQC	KB4JPN	50
AA4HT	72	K0PCK	W1YOL/T
N7BGW	W0FRC	KA0UEH	49
KA0ARP	KA2ZYX	K08KU	N4MM/T
NF8B	KA2TVX	64	48
79	KF4FG	N2DXP	KA6HJK/T
VE7EJW	WD2AHD	KNTU	47
VE7EJU	AIBO	W4HON	WA8DYS/T
K4IWW	VE7EJU	K08LV	44
KC3Y	KA8CPS	W4SME	KA1BBU/T
K4MTX	71	WB6GPM	43
W08K	KB7FE	63	42
N8FWA	KA5SPT	KA7MUL	KA9CTW/T
WB5YDD	N1CVE	WA4MNR	KA1NOI/T
78	VE3GT	WB0WNJ	N6FWG/T
KA5YIW	KA0ODQ	KA4FZI	40
KA1EXJ	KA5QVY/T	K8ND	40
K2KBT	70	N4KSO	WB4HXS/T
ND2S	K2YAI	KA4TWI	
WA3YLO	N8EFB	KB4LB	
WA0TFC	N8IBS	WA8DHB	
77	69		
N1AKS	N2GPA		

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	Divd	Total
W3CUL	695	969	1305	138	3107
W3VR	379	294	379	66	1118
WB9PY	0	853	72	507	1432
K09CJ	12	482	76	296	866
WD4JO	393	41	393	28	855
K4DOR	48	376	416	8	848
W9JUL	1	404	388	6	799
KT1Q	26	382	371	12	791
W6FO	2	386	341	11	722
KW1U	0	430	288	14	722
K6UYK	22	348	331	10	711
N4EXQ	16	360	288	47	709
W1PEX	0	121	562	19	702
N3DPF	58	293	340	9	700
KA8FEZ	—	—	—	—	640
N4GHI	55	284	273	26	638
WX4H	0	330	284	17	631
KA1MDM	0	291	290	10	591
KA2UBD	0	286	291	0	577
N4PL	130	137	263	11	541
KA7MUL	1	243	276	9	529
WB2COWO	25	196	288	19	528
WB7WJN	181	64	280	4	509
W5KLV	2	240	256	9	507
N1CPX	3	226	274	0	503

BPL for 100 or more originations plus deliveries:

N0DPF	194	W6AS	109
W1FYR	179	KA0EPY	105
W0FRC	140		

Independent Nets

Net Name	Sess	Tlc	Check-ins
Amateur Radio Telegraph Society	52	641	213
Clearing House Net	30	470	482
Empire Slow Speed Net	30	64	316
Golden Bear Amateur Radio Net	30	77	1687
IMRA	26	1017	1729
Mission Trail Net	30	81	899
NYSPTEN	30	39	502
Southwest Traffic Net	30	239	1739
West Coast Slow Speed Net	30	121	512
20 Meter ISSBN	26	297	823
75 Meter ISSBN	30	344	1387
7290 Traffic Net	48	543	2713

Results, 1986 ARRL 10-Meter Contest

By Billy Lunt, KR1R and Mary Schetgen, N7IAL
Contest Manager, ARRL Assistant Contest Manager, ARRL

This year, the ARRL 10-Meter Contest was full of surprises with unexpected band openings. Who would think there would be so much activity on 28 MHz during the bottom of the sunspot cycle? At the Contest Desk, entries exceeded our expectations. Logs received for the '86 contest numbered 719, about one-third of which were DX entries (204). This total represents a whopping 51 different DXCC countries. Not bad for a "dead" band!

The activity was brisk at the drop of the flag, 0000Z Dec 13, signaling the beginning of this fun-filled weekend. A look across the top spot in each W/VE category reveals that all four stations maintained good QSO rates. Roger, K1DQV, guest operating at superstation W3LPL, had the best rate going at the start, with 50 QSOs in 25 minutes while operating phone only. The other three class winners managed a rate of about one QSO per minute at the start. For the first 50 QSOs, it took K4XS (Mixed Mode) 65 minutes, N4VZ (CW only) 54 minutes and NR5M (Multiop) 51 minutes.

There were numerous reports about using backscatter, E skip and meteor scatter as tools to overcome the poor conditions. North-south propagation was prevalent in all areas, and east-west openings were few and far between. Although some reported that the best thing about the contest was being able to get a good night's sleep, K1DG claimed he worked 50 QSOs in a half-hour at midnight, leaving this thought open to question. Ten meters always proves to be an interesting band, defying efforts to predict the conditions.

Northern Florida leader Bill, K4XS, took the top spot in the mixed-mode category with 172k. Second-place winner K3EST/6 had only

a 50-point margin over N4ZC (WA8MAZ, op), who moved up from 4th in '85 to 3rd this year. The W/VE mixed-mode category was the most popular entry class this year.

In the Mixed-Mode DX box, KP4FI with 50k took top honors in a field of 42 entries, with European Continental Winner HA9RG

claiming a second-place win. DL6FBL took third place again this year.

Roger, K1DQV, at W3LPL, ousted last year's phone-only winner and this year's second-place winner, KE5FI, for first-place phone. K1UO with 99k took the third-place spot, with N2BJ and N6BFM fighting for fourth and fifth.

DX phone only was the most popular DX category with 77 entries received. TI2KD ran away with top honors with 165k, taking advantage of the north-south skip. Last year's winner, LU1E (LU3AJW, op), claimed se-

Top Ten—W/VE

Mixed Mode

Call	Score
K4XS	172,362
K3EST/6	139,490
N4ZC	139,440
(WA8MAZ, op)	
K5NW	118,696
WA2TBA	99,072
N2RM	98,764
WD9DZV	88,572
K1LL/0	85,200
AA4M	69,740
WB7FDQ	69,418

Phone

Call	Score
W3LPL	145,780
(K1DQV, op)	
KE5FI	123,576
K1UO	99,120
N2BJ	77,280
N6BFM	76,104
N8RA/1	72,618
AG8W	67,084
WB6MWJ	66,316
VE1BNN	64,624
WB5DGR	64,468

CW

Call	Score
N4VZ	83,676
W5HUQ	79,076
K5MK	72,688
KJ0H	63,840
KN0V	62,628
KB9S	55,200
W7FGT	52,000
K7QQ	46,848
AC0S	46,080
N4BP	43,800

Multioperator

Call	Score
NR5M	193,650
W8AIH/9	190,854
K5LZO	163,548
KG5U	146,686
W0XK	126,840
N2EOC	93,520
W2HWG	87,464
N4EJW	84,286
WB8BUQ	71,272
WD8ISK	62,496

Top Five—DX

Mixed Mode

Call	Score
KP4FI	50,372
HA9RG	42,328
DL6FBL	33,374
OH1ZAA	30,562
EA3FWE	25,338

Phone

Call	Score
TI2KD	165,078
LU1E	113,724
(LU3AJW, op)	
ZL1ANJ	83,840
CE4ETZ	55,520
YW6W	45,576
(YV6CAX, op)	

CW

Call	Score
OA4ZV	42,400
VK4XA	33,984
EA6KZ	18,908
TE4T	18,720
4X6IF	18,368

Multioperator

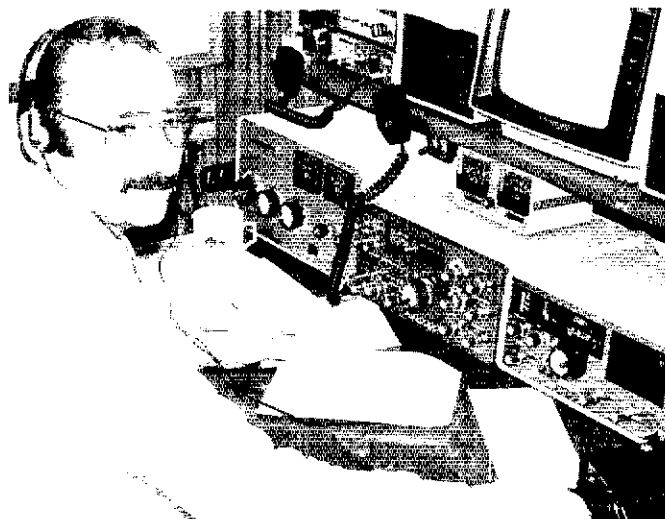
Call	Score
L4D	213,616
LU1UM	118,170
L2D	118,040
LU1VZ	101,824
EA8RCT	40,256

Division Leaders

Division	Mixed Mode	Phone	CW	Multiop
Atlantic	N2RM	W3LPL (K1DQV)	W3FX	KB3A
Canada	VE3XN	VE1BNN	VE1ASJ	VE3SAU
Central	WD9DZV	W9RE	KB9S	W8AIH/9
Dakota	K1LL/0	WB6MWJ	KN0V	—
Delta	K4LTA	N4BSN	K5MK	KB4RXM
Great Lakes	WA4EBN	AG8W	KD4U	WB8BUQ
Hudson	KC2QF	N2BJ	N2GIJ	N2EOC
Midwest	WA0QM/V	KB0PR	KJ0H	W0XK
New England	K01V	K1UO	W1GL	KX1G
Northwestern	K5MM/7	K7IDX	K7QQ	KE7C
Pacific	K3EST/6	K8BIM	W6NA	K8YA
Roanoke	N4ZC	K4YYL	KJ4X	WBAPA
	(WA8MAZ)			
Rocky Mountain	W5SO	W5HI	AC0S	KMBQ
Southeastern	K4XS	N6BFM	N4VZ	N4EJW
Southwestern	AA4M	W6SWM	W7FGT	K6HAI
West Gulf	K5NW	KE5FI	KB5UL	NR5M

DX Continental Leaders

Continent	Mixed Mode	Phone	CW	Multiop
Africa	—	—	—	EA8RCT
Asia	JA9RPU	JF2QGR	4X6IF	JA3YBF
Europe	HA9RG	F6KBF (F6INJ)	EA6KZ	YU3HR
North America	KP4FI	TI2KD	TE4T	KP4BO
Oceania	VE7QO/KH6	ZL1ANJ	VK4XA	—
South America	PY5FB	LU1E (LU3AJW)	OA4ZV	L4D



John, KJ0H, shows how to handle the pileups for a first-place 1A and fourth-place national CW-only win.

cond place ahead of Oceania Continental Leader ZL1ANJ, who moved one notch from last year's fourth place for a third-place win this year.

Bob, N4VZ, from Georgia, moved up from third in '85 for the first-place win in '86 among a field of 142 brass pounders in the second-most-popular W/VE category, CW only. Also moving up the ladder this year is W5HUQ, grabbing a second-place win this year from eighth in '85. Highest-scoring Mississippi winner K5MK took third place nationally among his peers.

Five Continental leaders made it to the Top Five DX CW box, with South American leader OA4ZV on top. VK4XA—Oceania,

EA6KZ—Europe, TE4T—North America and 4X6IF—Asia finished second, third, fourth and fifth, respectively, in the second-most-popular DX entry category, CW only.

Out of the 39 who tried W/VE multiop this year, NR5M from STX edged out W0AIH/9 for the first-place win. Last year's winner, K5LZO, slipped to third place this year, just ahead of fourth- and fifth-place winners K5GU and W0XK.


The first four spots in the DX multiop class category were South Americans, enjoying the effects of the north-south propagation. The crew of L4D took first place easily, with almost a 100k gap separating them from LU1UM and L2D, who fought fiercely for

second and third places with only 130 points score difference. LU1VZ claimed the fourth-place spot ahead of EA8RCT, African Continental Leader.

The 1986 ARRL 10-Meter Contest was again a very enjoyable contest with unexpected openings, which makes it unique. Some like it because of the slow QSO rates at night allowing for sleep, while others take advantage of those unexpected late-night openings to grab a few new multipliers. Don't forget to look for the Novices on both SSB and CW in 1987! It should be a great contest with the new Novice privileges (28.300-28.500 for SSB) and the sunspot numbers going up. See you next year on Dec 12-13.

Scores

DX scores are listed by continent and country according to the ARRL DXCC list. US and Canadian scores are listed by call area and ARRL section. Each line score lists call sign, score, QSOs, multipliers and entry class (A = Mixed Mode; B = Phone only; C = CW only; D = Multioperator).

	DJ3HJ		3,888	81- 24-B	PA2BH	13,840	173- 40-B	CX2AAL	34,080	284- 60-B	New Hampshire		
	DX3MAY		180- 10- 6-B	PA2DUO	5,452	94- 29-B	HC2CGM	476	34- 7-B	AF1T	37,152	387- 48-B	
	DL1HBT		18,200	130- 35-B	PA3ATZ	678	26- 13-B			K1DG	9,280	160- 29-B	
	DL10M		15,004	121- 31-C	PA6LVB	8,736	84- 26-C	HK3MAE	12,284	166- 37-B	NG1N	180- 18- 5-B	
	DL11TH		3,200	40- 20-C	PA3CQQA	4,800	48- 25-C	LU1E (LU3AJW,op)			W1END	3,696	44- 21-C
	DL1ZQ		1,904	34- 14-C	PA3DUA	1,248	24- 13-C				AK1L (+ KA1X)		
	DJ1KE		1,400	25- 14-C	PA3BEJ	1,144	22- 13-C	LU1EWL	113,724	722- 81-B			
	DL3ME		1,196	23- 13-C	PA2REH	1,104	23- 12-C	L4D (LU4DM,LU8ETS,LU8DQ,ops)	6,732	102- 33-C	Rhode Island		
	DL2SBC		924	21- 11-C	PA8VDV	1,104	23- 12-C	LU1UM (LU1s UFL,UFL,LU5UL,ops)	118,170	909- 65-D	K1IU	52,752	471- 56-B
	EA3FWE		25,338	206- 41-A	PA4DEC (PA3s AWW,CZW,DPK,PA8TUK,ops)	15,050	182- 35-D	L2D (LU5EG,LU7DXT,ops)	118,040	595- 65-D	K1U1	34,920	191- 45-C
	EA2CR		3,528	50- 21-A	SM5DYC	1,792	64- 14-A	LU1VZ (LU1s VJR,VK,LU3DXL,LU7VCA,ops)	101,824	688- 74-D	KA1NJW	760	13- 10-C
	EA3DZZ		4,840	121- 20-B	SM2RHK	1,122	23- 17-A				Vermont		
	EA3ERT		1,950	75- 13-B	SM4RFF	210	10- 7-A				WB1GQR	21,804	237- 46-C
	EA3THT		848	53- 8-B	SM8JOQ	864	36- 12-B				W3SOH	7,268	74- 23-C
	EA3ELM		726	33- 11-B	SM8TV (SM6s DER,DDI,ops)	9,840	115- 24-A				Western Massachusetts		
	EA3E2D		576	24- 12-B	SP6CIK	1,014	26- 13-A	OA4VZ	42,400	200- 53-C	WA1ZAM	7,112	60- 28-A
	EA7DZL		432	18- 10-B	SP6DVP	930	15- 11-B	PY5FB	682	18- 11-A	KZ1M	3,672	65- 17-A
	EA7DHP		360	18- 10-B	UA6ADC	6,888	152- 22-B	PF2ZDD	20,800	206- 50-B	K1SF	27,824	298- 47-B
	EA7DHK		192	12- 8-B	RA3DQ	320	16- 10-B	ZY6AKW	1,176	31- 19-B	KY1H	14,898	191- 38-B
	EA7AZA		120	10- 6-B	UA3TAM	96	6- 4-C	PT2TF	1,152	32- 18-B	W1PL	28,036	163- 43-C
	EA5DIT		18	3- 3-B	UB5SZ	9,840	115- 24-A	PS7KM	1,088	32- 17-B			
	EA7AAW		1,920	24- 20-C	UY5TE	3,200	50- 16-C	PT7CG	280	14- 10-C			
	EA6KZ		18,908	163- 29-C	UC2AAD	1,160	57- 10-A	YW8W (YV6KAX,op)	45,576	422- 54-B			
	G6ZY/EA6		14,352	138- 26-C	RO4QA	7,752	114- 17-C	YY1C (YV1CP,op)	21,484	262- 41-B	Eastern New York		
	F6KBF (F6INJ,op)		28,512	297- 48-B	UP2BPO	504	18- 7-C				KC2QF	48,944	416- 46-A
	F6AQJ		3,360	70- 24-B	UQ1GWG (UQ2s GAG,-437-83,-437-116,ops)	29,848	286- 28-D				N2BZP	17,238	182- 39-A
	F8WVE		1,440	45- 16-B	UR1RXT (UR2s CR,DU,JR,ops)	8,544	209- 18-A	Region 2			N2FEP	7,326	101- 33-A
	FD1JDD		2,200	55- 10-C	Y22WF	252	14- 9-B	KA1NHV/MM	200	12- 5-A	KY2N	4,350	59- 29-A
	F6EQV		816	17- 12-C	YU7MGU	144	12- 6-B				KU2Q/M	350	16- 7-A
	F9BB		384	12- 8-C	YU3HR (+ YU3BQ)	33,096	334- 42-D	W/V/E			K5NA/M	28	5- 2-A
	F9BBO (+ F9s DZ3,GIF,HLC)		32,938	215- 43-D				Connecticut			N2BJ	77,280	690- 56-B
	F6IFRP (F6s CWN,GWV,ops)		20,520	202- 45-D	TI2DKR	165,078	1019- 81-B				NA2M	4,800	100- 24-B
	G4VGO		4,444	78- 22-A	TE4T	18,720	130- 36-C				N2GUV	38,012	218- 43-C
	G4YLO		12,464	164- 36-B	ZF2AY (K9LA,op)	2,090	42- 19-A				W2KHQ	1,904	28- 17-C
	G0EHQ		10,508	142- 37-B	ZF2AG/ZF8	484	22- 11-B				WA2JQK (+ WA2UKP)	37,842	301- 51-D
	HA8RG		42,328	421- 44-A	Oceania								
	HG4XX		5,738	140- 19-A	K4YT/DU1	6,800	200- 17-B						
	HA8YX		12,240	204- 30-B	VE7QO/KH6	19,680	393- 20-A						
	HG5AEZ		3,696	88- 21-B	KH8CDO	178	11- 8-B						
	HA8C		3,600	200- 18-B	AH8EK	4,032	63- 16-C						
	HA8LZ		1,318	47- 14-C	VK5GZ	418	36- 4-A						
	H8KAX (HA8s LK6,LKC,ops)		9,500	120- 25-D	VK2KL	38,400	400- 48-B						
	IK2DZM		10,680	89- 60-B	VK2NCB	6,440	161- 20-B						
	I8BYG		6,968	134- 26-B	VK4XA	33,884	236- 36-C						
	I4CSP		2,850	57- 26-B	VK4TT	5,378	84- 21-C						
	IK2AEQ		1,360	40- 17-B	VK2BQ	4,536	81- 14-C						
	I2LYN		1,064	28- 19-B	VK2CWS	1,408	42- 8-C						
	I8YEF		600	20- 15-B	ZL1ANJ	63,840	456- 70-B						
	I4ULA		588	21- 14-B	ZL1AIZ	608	19- 6-C						
	IK0CPS		256	16- 8-B									
	LA9VDA		400	20- 10-B									
	LZ1OT		552	23- 12-B									
	LZ1IA		2,738	38- 18-C									
	LZ2VP		1,196	23- 13-C									
	LZ2KTS (LZ2DF,LZ2-E-44,ops)		31,760	279- 40-D									
	OH1ZAA		30,562	282- 37-A									
	OH7EU		1,086	25- 13-A									
	OH6YF		8,688	88- 19-B									
	OH1AF (+ ops)		2,280	44- 15-D									
	OK1TW		5,880	102- 30-A									
	OK1KZ		1,880	42- 18-A									
	OK3IF		2,108	31- 17-C									
	OK3ZVX		1,196	23- 13-C									
	OK3THM		1,056	22- 12-C									
	OK1DVK		792	18- 11-C									
	OK3CMZ		48	4- 4-C									
	ON6CR		1,016	30- 18-A									
	ON8WN		8,562	31- 13-B									
	ON5FV		196	14- 7-B									
	OZ7BG		120	9- 4-A									
	OZ3EV		1,050	25- 21-B									
	OZ8E		1,584	22- 18-C									
	PA0XPO		8,318	88- 33-A									
	PA3AFF		1,564	35- 17-A									

W2YIK	235-	11-	9-A	KB4PNQ	11,480-	120-	41-A	KCSCP	38,304-	280-	56-A	WA7HQD	7,830-	112-	29-A	KBUK	2,684-	63-	18-A
W2MTA	54-	5-	3-A	AA4WE	482-	18-	11-A	KSRF	24,516-	179-	54-A	WA7TUX	144-	18-	4-B	WVNZ	1,430-	45-	13-A
KA2CHX	10,856-	148-	36-B	W4CE	3,250-	288-	60-B	N5AFV	3,570-	60-	21-A	W7TE	2,688-	42-	16-C	ACAS	48,080-	237-	48-C
NA2A	8,352-	116-	36-B	W4ZGS	2,250-	45-	25-B	K5EFI	123,576-	813-	76-B	NS7B	1,620-	26-	15-C	WA8UYJ	14,136-	111-	31-C
N2EGO	4,128-	86-	24-B	KF4W	616-	22-	14-B	WBSDGR	56,468-	454-	71-B	Washington				KBJU	8,200-	81-	25-C
WB2TKD	546-	21-	13-B	W5HUQ	79,076-	373-	53-C	K5UCV	56,252-	318-	57-B	K5TL	8,932-	127-	22-A	KM9Q (+KJOL)			
K2SM	9,612-	89-	27-C	KD1U	864-	24-	9-C	W5SIX	10,336-	152-	34-B	K7DX	28,746-	311-	43-B	NBELY	52,224-	358-	48-D
KW2J	6,562-	78-	21-C	K5NA/M	4-	1-	1-C	WB5EA	8,930-	105-	33-B	KE7UI	34-	17-	1-B	KD8S			
W2OMV	2,380-	35-	17-C	KU2QM	4-	1-	1-C	W5DQD	11,038-	86-	32-C	K7QQ	48,848-	243-	48-C	(+KEBCR)	19,448-	121-	44-D
W2HG	1,920-	30-	18-C	South Carolina				KA5VDXN	420-	10-	7-C	W8KZV7	35,280-	196-	45-C	KJ8G (+KQGS)			
W2FUI	1,740-	29-	15-C	WB4V	28,388-	293-	47-A	NR5M (+KESV,NTSD)	193,650-	973-	75-D	K7WF	7,760-	97-	20-C		8,424-	114-	26-D
3				N4LTA	14,400-	184-	40-A	KSLZO (+NMSM,NSVF,WS98,N, RUS)	163,548-	780-	77-D	W7IEU	792-	22-	9-C	Iowa			
Delaware				KU2QM	100-	9-	5-A	K3SU (+KN5H)	146,686-	721-	71-D	KE7C (+WB7QJ)	38,960-	281-	44-D	WA8QW	49,720-	308-	55-A
N3DLM	12,464-	125-	38-A	K5NA/M	100-	9-	5-A	6				Wyoming				WB8EJ	11,588-	162-	37-A
N3ELK	4,048-	59-	23-A	K4YVL	44,308-	418-	53-B	East Bay				N7GVV	256-	14-	8-A	WA8BW	9,314-	108-	34-A
AC3T (KA3B,op)				K4ADI	27,600-	276-	50-B	WE8Q	1,950-	48-	13-A	K87M	980-	35-	14-B	K8BPR	22,264-	253-	44-B
K5NA/M	8-	2-	2-B	WA4OIJ	4,554-	69-	33-B	K8Q	20-	5-	2-B	K7MM	15,312-	115-	33-C	WB8QO	14,210-	145-	48-B
KU2QM	8-	2-	2-B	N4QJS	2,106-	39-	27-B	Los Angeles				NC7O	2,880-	35-	18-C	NBALX	13,024-	148-	44-B
WA9BZT/T	1,320-	26-	10-C	KJ4X	31,416-	185-	42-C	N6HC	58,024-	423-	47-A	8				WB8PF	4,736-	64-	37-B
Eastern Pennsylvania				N4LS	520-	13-	10-C	N6BIN	7,772-	114-	29-A	Michigan				KABNC	1,368-	50-	19-B
N3BNA	49,168-	332-	56-A	Southern Florida				N6EQS	11,340-	162-	35-B	K8DJR	18,200-	163-	45-A	K8BQ	3,410-	55-	31-B
KY3K	34,686-	259-	47-A	WB4BBH	11,248-	95-	38-A	NE6I	24,192-	144-	42-C	N9CQX	6,032-	86-	26-A	WB8MY	144-	9-	8-B
NE3I	17,568-	183-	36-A	AA4SR	6,912-	79-	27-A	N6HLR	21,904-	148-	37-C	K8JUM	5,616-	104-	18-A	Minnesota			
W3ARK	16,920-	183-	36-A	KI4PL	10,880-	121-	45-B	W6SGJ	1,976-	38-	13-C	K8OT	1,458-	29-	18-A	WB8HCH	28,638-	238-	43-A
K3TX	9,238-	137-	31-A	WK4F	1,218-	29-	21-B	Orange				N88T	810-	38-	9-A	WBYC (NB8SA,op)			
K3WW	3,408-	55-	24-A	N4BP	43,800-	219-	50-C	N8NKN	1,406-	37-	19-B	AG8W	67,084-	541-	62-B	W8QIT (NB8CB,op)	26,784-	223-	38-A
W3HMR	2,806-	47-	23-A	WD4AHZ	34,200-	170-	50-C	W6SX	4-	1-	1-C	WBWQJ	17,384-	212-	41-B	W8QIT (NB8CB,op)	26,784-	223-	38-A
K3ZLK	2,720-	52-	20-A	K1ZX4	26,576-	151-	44-C	Santa Barbara				KG7Z	13,104-	168-	39-B	W8GAD	7,250-	100-	25-A
WA3ADE	1,092-	26-	14-A	W4OO	13,824-	96-	36-C	N6NPP (WB6L,op)	56,784-	428-	52-A	KD8TM	2,448-	51-	24-B	K8VVF	6,192-	124-	24-A
WA3TQJ	490-	22-	7-A	N4EJW (+N4EJW)	64,268-	448-	57-D	W6FVG	31,248-	282-	42-A	NE8T	14,840-	119-	30-C	K8VVF	6,192-	124-	24-A
K3F	23,088-	222-	52-B	W4WWW (+K4AIGZ,KD4S M,S,KR4X)	56,430-	424-	57-D	W6TKF	10,857-	127-	33-A	K8LJO	3,312-	46-	18-C	AC8W	25,580-	284-	45-B
W3EHZ	4,234-	73-	29-B	Tennessee				KA2IOO	884-	18-	12-A	W8VSK	2,560-	40-	16-C	K8VVF	6,192-	124-	24-A
K3LCP	3,744-	78-	24-B	K4LTA	39,560-	229-	43-A	W6SWM	26,000-	250-	52-B	W8VSK	1,188-	27-	11-C	K8VVF	6,192-	124-	24-A
K3ZG	13-	208-	8-B	N4TGT	12,834-	183-	31-A	Santa Clara Valley				W8VSK	1,188-	27-	11-C	K8VVF	6,192-	124-	24-A
K3Q	792-	18-	11-C	K4PR	896-	19-	12-A	N6NPP (WB6L,op)	56,784-	428-	52-A	W8VSK	1,188-	27-	11-C	K8VVF	6,192-	124-	24-A
KY3T	360-	15-	6-C	N4BSN	49,800-	415-	60-B	W6FVG	31,248-	282-	42-A	W8VSK	1,188-	27-	11-C	K8VVF	6,192-	124-	24-A
Maryland-DC				K4JHT	7,954-	97-	41-B	KA2IOO	884-	18-	12-A	W8VSK	1,188-	27-	11-C	K8VVF	6,192-	124-	24-A
W3USS (K3ZJ,op)				K4KO	364-	13-	7-C	W6SWM	26,000-	250-	52-B	W8VSK	1,188-	27-	11-C	K8VVF	6,192-	124-	24-A
K3AA	6,750-	77-	27-A	KB4PKM (+N4JL,NY4N)	38,046-	334-	51-D	Ohio				W8VSK	1,188-	27-	11-C	K8VVF	6,192-	124-	24-A
K3MC	5,612-	84-	23-A	NR4S (+K4YL)	9,520-	113-	28-D	N6NPP (WB6L,op)	56,784-	428-	52-A	N8FU	10,362-	104-	33-A	K8VVF	6,192-	124-	24-A
W4KM	2,430-	60-	15-A	Virginia				N6NPP (WB6L,op)	56,784-	428-	52-A	W8VSK	1,188-	27-	11-C	K8VVF	6,192-	124-	24-A
NN3SI (W4KM,op)				K4LTA	39,560-	229-	43-A	N6NPP (WB6L,op)	56,784-	428-	52-A	W8VSK	1,188-	27-	11-C	K8VVF	6,192-	124-	24-A
KU2QM	1,008-	39-	8-A	NE3A	43,248-	309-	51-A	N6NPP (WB6L,op)	56,784-	428-	52-A	W8VSK	1,188-	27-	11-C	K8VVF	6,192-	124-	24-A
K5NA/M	42-	4-	3-A	W4UG	6,784-	75-	32-A	N6NPP (WB6L,op)	56,784-	428-	52-A	W8VSK	1,188-	27-	11-C	K8VVF	6,192-	124-	24-A
W3LPL (K1DQV,op)	30-	3-	3-A	K4OD	4,400-	57-	22-A	N6NPP (WB6L,op)	56,784-	428-	52-A	W8VSK	1,188-	27-	11-C	K8VVF	6,192-	124-	24-A
Western Pennsylvania				W4ACYH	29,300-	293-	50-B	N6NPP (WB6L,op)	56,784-	428-	52-A	W8VSK	1,188-	27-	11-C	K8VVF	6,192-	124-	24-A
N3AOE	7,880-	114-	35-B	KF4YH	23,712-	228-	52-B	N6NPP (WB6L,op)	56,784-	428-	52-A	W8VSK	1,188-	27-	11-C	K8VVF	6,192-	124-	24-A
W3PWO	7,960-	95-	42-B	N4MM	7,490-	107-	35-B	N6NPP (WB6L,op)	56,784-	428-	52-A	W8VSK	1,188-	27-	11-C	K8VVF	6,192-	124-	24-A
N3CZJ	7,216-	88-	41-B	N4MXT	5,766-	93-	31-B	N6NPP (WB6L,op)	56,784-	428-	52-A	W8VSK	1,188-	27-	11-C	K8VVF	6,192-	124-	24-A
K4CQY	1,020-	34-	15-B	K4JOP	17,168-	113-	37-C	N6NPP (WB6L,op)	56,784-	428-	52-A	W8VSK	1,188-	27-	11-C	K8VVF	6,192-	124-	24-A
K4CQY	1,020-	34-	15-B	N3OS	924-	20-	11-C	N6NPP (WB6L,op)	56,784-	428-	52-A	W8VSK	1,188-	27-	11-C	K8VVF	6,192-	124-	24-A
K4CQY	1,020-	34-	15-B	W4AITY (+K4B4QLM)	11,592-	136-	36-D	N6NPP (WB6L,op)	56,784-	428-	52-A	W8VSK	1,188-	27-	11-C	K8VVF	6,192-	124-	24-A
W3FCA	10,428-	79-	33-C	5				Arkansas				N6NPP (WB6L,op)	56,784-	428-	52-A	K8VVF	6,192-	124-	24-A
W3GCM	4,752-	54-	22-C	W5E	36,484-	321-	53-A	N6NPP (WB6L,op)	56,784-	428-	52-A	W8VSK	1,188-	27-	11-C	K8VVF	6,192-	124-	24-A
N3DMY	2,244-	33-	17-C	WB5SD	11,396-	140-	37-A	N6NPP (WB6L,op)	56,784-	428-	52-A	W8VSK	1,188-	27-	11-C	K8VVF	6,192-	124-	24-A
Western Pennsylvania				KU2QM	1,170-	27-	15-A	N6NPP (WB6L,op)	56,784-	428-	52-A	W8VSK	1,188-	27-	11-C	K8VVF	6,192-	124-	24-A
N3FAS	15,228-	159-	47-A	K5NA/M	252-	9-	9-A	N6NPP (WB6L,op)	56,784-	428-	52-A	W8VSK	1,188-	27-	11-C	K8VVF	6,192-	124-	24-A
K3LVO	3,840-	68-	29-A	KA5DLM (+K5AICJ, KD5RW,NS5JZ)	31,114-	331-	47-D	N6NPP (WB6L,op)	56,784-	428-	52-A	W8VSK	1,188-	27-	11-C	K8VVF	6,192-	124-	24-A
WA3GQU	990-	32-	15-A	Louisiana				W5E	36,484-	321-	53-A	N6NPP (WB6L,op)	56,784-	428-	52-A	K8VVF	6,192-	124-	24-A
KA3PMW	408-	15-	6-C	W5E	36,484-	321-	53-A	N6NPP (WB6L,op)	56,784-	428-	52-A	W8VSK	1,188-	27-	11-C	K8VVF	6,192-	124-	24-A
KB3A (+W3KHQ)	30,396-	240-	51-D	WB5SD	11,396-	140-	37-A	N6NPP (WB6L,op)	56,784-	428-	52-A	W8VSK	1,188-	27-	11-C	K8VVF	6,192-	124-	24-A
K3UA (+W3FSB)	40-	6-	2-D	KU2QM	1,170-	27-	15-A	N6NPP (WB6L,op)	56,784-	428-	52-A	W8VSK	1,188-	27-	11-C	K8VVF	6,192-	124-	24-A
4				K5NA/M	252-	9-	9-A	N6NPP (WB6L,op)	56,784-	428-	52-A	W8VSK	1,188-	27-	11-C	K8VVF	6,192-		

Rules, 1987 ARRL UHF Contest

Washington Mailbox

(continued from page 69)

The ARRL UHF Contest is an excellent opportunity to work toward the very popular VHF/UHF Century Club Award, available through 47 GHz. Grid squares are the multipliers in the contest and collected for VUCC. See January 1983 *QST*, p 49 (or write to HQ for a reprint), for a complete explanation of grid squares. The rules for this year's contest are the same as last year. However, be on the lookout to welcome Novices. Novice CW/SSB activity is just up from 222.1 MHz, and FM simplex is on 223.5 and 1294.5 MHz. An SASE to HQ will get you a summary and log sheet. Be sure to postmark your logs by September 2. Good luck!

Rules

1) **Object:** To work as many amateur stations in as many $2^\circ \times 1^\circ$ grid squares as possible using authorized amateur frequencies above 220 MHz and all authorized modes of emission.

2) **Contest Period:** Begins 1800 UTC Saturday, Aug 1, and ends at 1800 UTC Sunday, Aug 2. Entrants may use as much of this time as they wish.

3) Categories:

(A) **Single operator:** One person performs all operating and logging functions, as well as equipment and antenna adjustments.

(1) Multiband.

(2) **Single band:** Single-band entries on 220, 432, 902 and 1296 MHz, and 2.3-GHz-and-up categories will be recognized both in *QST* score listings and by 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. See also Rule 8 (Awards).

(B) **Multoperator:** Multoperator stations must locate all equipment (including antennas) within a circle whose diameter does not exceed 300 meters.

4) **Exchange:** Grid-square locator (see Jan 1983 *QST*, p 49). Example: W1AW in Newington, CT would send "FN31." Exchange of signal reports is optional.

5) Scoring:

(A) **QSO points:** Count three points for each complete 220- or 432-MHz QSO. Count six points for each complete 902- or 1296-MHz QSO. Count 12 points for each 2.3-GHz-or-higher QSO.

(B) **Multiplier:** The total number of different grid squares worked *per band*. Each $2^\circ \times 1^\circ$ grid square counts as one multiplier on each band it is worked.

(C) **Final score:** Multiply the total number of QSO points from all bands operated by the total number of multipliers for final score. Example: W1AW works W3CCX in FN20 on 220, 432 and 1296 MHz. This gives W1AW 12 QSO points ($3 + 3 + 6$) and also three grid-square multipliers. Final score is 12 QSO points \times 3 multipliers, or 36.

6) Miscellaneous:

(A) **Stations may be worked for credit only once per band from any given grid square, regardless of mode.** This does not prohibit working a station from more than one grid square with the same call sign. Such a roving station, however, must submit a separate entry for each grid square from which operation takes place. In this situation, the entrant may opt to

waive rule 6 (C) and use a single different call sign from each different grid square. Crossband QSOs do not count. Aeronautical mobile contacts do not count.

(B) Partial QSOs do not count. Both calls, the full exchange, and acknowledgment must be sent and received.

(C) A transmitter, receiver or antenna used to contact one or more stations under one call sign may not be used subsequently during the contest period under any other call sign (with the exception of family stations where more than one call is assigned to one location by the FCC/DOC). The intent of this rule is to accommodate family members who share a rig, not to manufacture artificial contacts.

(D) All equipment and antennas used by entrants must be owned and operated by amateurs. Use of nonamateur-owned gear is not prohibited, but use of such equipment places the entrant in a separate category, ineligible for awards.

(E) While no minimum distance is specified for contacts, equipment in use must be capable of real communication (ie, able to communicate over a distance of at least 1 km).

(F) Contacts made by retransmitting either or both stations, whether by satellite or terrestrial means, are prohibited. Frequencies regularly occupied by a repeater in a locality may not be used for contest work, even if the repeater is turned off.

(G) A station located *precisely* on a dividing line between grid squares must select only one as the location for exchange purposes. A different grid-square multiplier cannot be given out without moving the complete station (including antennas) at least 100 meters.

(H) Above 300 GHz, contacts are permitted for contest credit only between licensed amateurs using coherent radiation on transmission (eg, laser) and employing at least one stage of electronic detection on receive.

7) **Reporting:** Entries must be postmarked no later than Sep 2, 1987. Official forms are available for an SASE from ARRL HQ, and all entrants are strongly urged to send early for a set.

8) Awards:

(A) Single operator

(1) Top single-operator score in each ARRL Division.

(2) Top single operator on each band (220, 432, 902, 1296, and 2304-and-up categories) in each ARRL Division where significant effort or competition is evidenced. (Note: Since the highest score per band will be the award winner for that band, an entrant may win a certificate with additional single-band achievement stickers.) For example, if K2SMN has the highest single-operator multiband score in the Atlantic Division and his 432-MHz score is higher than any other Atlantic Division single op's, he will earn both a certificate for being the single-operator Division leader and an endorsement sticker for 432 MHz.

(B) Top multoperator score in each ARRL Division where significant effort or competition is evidenced. Multoperator entries are *not* eligible for single-band awards.

(C) Additional certificates, such as for Novices, may be awarded where significant effort or competition is evidenced.

9) **Disqualification:** See Jan 1987 *QST*, p 81.

retake any examinations as long as you fall within the grace period. All licenses issued December 16, 1983 or later carry 10-year terms, but are only allowed a two-year grace period.

Q. My license is pending with the FCC. Can I operate while I am waiting for my renewed license?

A. If you file a Form 610 before the expiration date of your license, you may continue to operate your station beyond the expiration date while waiting for your renewed license. If you file for renewal after the license has expired, you may not operate until you have received the license.

Q. Is there a fee for renewal?

There is no fee for renewal of an FCC-issued amateur license.

Q. I've lost my license. What can I do to obtain a duplicate?

A. A formal application to the FCC is not necessary. Simply explain the situation in a letter mailed to the FCC in Gettysburg. They will provide you with a duplicate of your license.

Q. Two of my friends, who are General class operators, recently taught a Novice class. They wrote to the FCC for 610 Forms, and the Commission sent them forms dated June 1985. Since these forms are "pre-Novice Enhancement," there is space for only one examiner to administer the examination to the potential Novice. Can Section I-A of forms dated 1984 and 1985 still be used?

A. Yes, the earlier dated forms can be used even though there is only one space for the two examiners who give a test to a potential Novice. Since two examiners are now required to administer the Novice examination, simply "squeeze in" the name of the second examiner. For information on how this should be done, see April 1987 *QST*, pages 21-28. The article, entitled "Novice Enhancement: New Test Procedures Start Now!" gives detailed information on this subject. The Commission has an abundant stock of 610s dated June 1985, and they must be used before the FCC prints new forms.

Q. Where can I obtain the "new" Form 610, which reflects the Novice Enhancement changes?

A. The ARRL, which has in-house typesetting capability, has typeset and printed the new Form 610 based on the new Form released by the FCC. The ARRL has provided a copy of the new 610 to all other VECs in the event they may not have typesetting capability. Copies of this "new" 610 are available from ARRL HQ for an SASE.

[Note: Questions in this column are typical of those asked of the FCC and other agencies. Questions and answers that appear are prepared by ARRL staff and have been reviewed by the FCC's Special Services Branch for agreement with current FCC interpretations and policy.]

JULY

1

West Coast Qualifying Run, 10-35 WPM, at 0400Z Jul 2 (9 PM PDT Jul 1). W6OWP prime, W6ZRJ alternate. Frequency is approximately 3.590 MHz. Underline one minute of the highest speed you copied, certify that your copy was made without aid and send to ARRL for grading. Please include your full name, call sign (if any) and complete mailing address. A large SASE will help expedite your award or endorsement.

Canada Day Contest, Jun QST, p 84.

11-12

IARU HF Championship, Apr QST, p 88.

13

WIAW Qualifying Run, 35-10 WPM at 0200Z Jul 14 (10 PM EDT, Jul 13). Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 174.555 MHz. See Jul 1 listing for more details.

18-19

CQ World-Wide VHF WPX Contest, sponsored by CQ Magazine, from 0000Z Jul 18 until 2400Z Jul 19 (48 hours). Use all authorized bands from 50 MHz through 1296 MHz (6 meters through 23 cm). Use all modes, except no repeater or satellite contacts. Exchange call sign and grid square. A station in a call area different from that indicated by his call sign is required to sign portable. Multipliers are the prefixes worked per band. Count 1 point per QSO on 50, 70 or 144 MHz; 2 points per QSO on 220 and 432 MHz; 4 points per QSO on 902 and 1296 MHz. Work stations once per band, regardless of mode. Multiply total QSO points times the total number of prefixes worked (the sum of the prefixes worked per band). Classes are: single operator, single band; single operator, multiband; single operator, single band, low power; single operator, multiband, low power; single operator, portable (with temporary power source); multioperator, single band; multioperator, multiband; multioperator, portable (with temporary power source); FM only. Low power is defined as 30-W PEP output or less. Trophies and certificates. Send entries before Aug 31 to SCORE, PO Box 1161, Denville, NJ 07834, or to CQ Magazine, 76 North Broadway, Hicksville, NY 11801.

QRP Summer Contest, sponsored by the DL Activity Group CW, from 1500Z Jul 18 until 1500Z Jul 19. CW only, 160 through 10 meters. Classes are: A—less than 3.5-W input (2-W output), single operator; B—less than 10-W input (5-W output), single operator; C—less than 10-W input (5-W output), multioperator; D—QRO stations, more than 10-W input (5-W output), to contact QRP stations; E—SWL. Class C stations may operate full time; classes A, B, D and E must break for nine hours (may be taken in two parts). Exchange RST, QSO-number and input, adding x if crystal controlled. QRO stations add /QRO. Operation is limited to one class per band, VFO or crystal controlled. No more than three crystals may be used on one band. Contact each station once per band. Count 1 point for QSO with own country, 2 points for QSO with own continent, 3 points for QSO with DX (outside own continent) per DXCC list. JA, PY, VE, W and ZS call areas count separately. Count 1 multiplier for each country and 1 for each DX QSO. Multiply points by multipliers on each band, then add band results. Crystal-controlled stations double total result. Submit a separate log for each band. Logs must be received within 6 weeks of the contest. Send logs (include 1 IRC for results) to Siegfried Hari, DK9FN, Spessartstrasse 80, D-6453 Seligenstadt, Fed Rep of Germany.

Colombian Independence Contest, sponsored by the Liga Colombiana de Radioaficionados, from 0000Z Jul 18 until 2400Z Jul 19. 160-10 meters, phone or CW. Categories: single operator, single band and mode (operators on 14 MHz compete only within this category); single operator, multiband, single

mode; multioperator, single transmitter, multiband, single mode; multioperator, multitransmitter, multiband, single mode. Work stations once per band. No cross band or crossmode QSOs allowed. Exchange signal reports and 3-digit serial numbers. Count 10 points for QSOs with HK stations, 5 points for QSOs with other DX stations, 1 point for QSOs within your country. (HK stations count 10 points with non-HK stations and 5 points with other HK stations.) Multiply by the sum of countries worked on each band added to the sum of HK districts worked on each band. Logs and summary sheet should include all data. Participation certificates for minimum of 50 QSOs (at least 10 of which are with HK stations for phone entries, or 5 for CW). Mail logs no later than Aug 30 to LCRA, c/o Direccion de Concursos y Diplomas, Apartado Aereo 584, Bogota, Colombia, South America.

SEANET Contest, CW, sponsored by the Philippine ARA. Work Southeast Asia stations, from 0000Z Jul 18 until 2359Z Jul 19. (Phone portion will be held Aug 15-16.) 160-10 meters, single operator-single band, single operator-multiband and multioperator-multiband categories. Send signal report and serial number beginning with 001 on each band. SEANET country prefixes: A35 A51 AP BV BY C21 DU FR8 FR FW8 HS HL HS H44 JA-etc JD1 KA KC6 KH2-through-4 KX6 P29 S2 S79 T2 T3s VK-all VQ9 V85 VS6 VU2 VU7 XU XV5 XW8 XX9 XZ2 YB YJ8 ZK ZL-all 3B6-through-9 3D2 4S7 5W1 8Q7 9M2 9M6 9M8 9N1 9V1 129. Contacts with SEANET countries count 2 points on 20-15-10 meters; 5 points on 40 and 80 meters; and 10 points on 160 meters. Double the preceding point values for bonus prefixes: DU HS YB 9M2 9M6 9M8 9V1 V85. (SEANET to SEANET contacts count 1, 3 and 6 points, respectively). Contacts within one's own country do not count. Multipliers are the number of SEANET countries worked $\times 3$ for others ($\times 2$ for SEANET to SEANET countries). Send 2 IRCs for results. Send your entry to SEANET Contest, CARL, PO Box 304, Cebu City, Philippines 6401.

25-27

County Hunters CW Contest, sponsored by the CW County Hunters Net, from 0000Z Jul 25 until 0200Z Jul 27. Work stations once per band. Work portables/mobiles again as they change county. Stations on county lines count as one QSO, but multiple multipliers. Exchange serial number, category (P for portables, M for mobiles), signal report, county and state (for US stations), province or country. Suggested frequencies: 3.575 7.055 14.065 21.065 28.065 MHz. Portables and mobiles call CQ below 7.055 and 14.065 MHz, others spread out above those frequencies. Count 1 point for QSOs with fixed stations, 3 points for portables or mobiles. Multiply QSO points by total US counties worked for final score. Mobiles and portables calculate their scores both on a state by state basis and overall for awards. Mail logs by Aug 31 (include a large SASE for results) to Jerry Burkhead, N6QA, 7525 Baltic St, San Diego, CA 92111.

26

WIAW Qualifying Run, 10-35 WPM at 2300Z (7 PM EDT) Jul 26. See Jul 1 and 13 listings for more details.

AUGUST

1-2

ARRL UHF Contest, p 79, this issue.

YL/OM Summer SSB Sprint, sponsored by the Young Ladies' Radio League, Inc. 1800Z-2200Z Aug 1. Open to all licensed OMs and YLs. OMs call "CQ YL" and YLs call "CQ OM." All HF bands may be used; no crossband operation. Net/repeater contacts do not count. Work stations once per band. Suggested frequencies: 3.940 3.970 7.240 7.270 14.250 14.280 21.380 21.410 28.580 28.610 Maximum power output: 1500 W PEP. Exchange: Station worked, RS, name, state/province/country. Entries in log must also

show date/time/band/power. Scoring: YLs count only OMs; OMs count only YLs for QSO pts. Station may be worked once on each band. Total contacts in each band, then add together for total QSO points. Alphanumeric multiplier: Using the last number and the first letter following that number of a call sign, there are a total of 260 combinations possible, ie, a possibility of 26 letters with each of 10 numbers 1-0. W1XZ is a 1X, W2GLB/7 is a 2G, and 9Y4A is a 4A, etc. Add the number of different alphanumeric combinations worked on each band. Add the total for each band together for your alphanumeric multiplier. Low power multiplier: Power output of 200 W PEP, or less at all times, may multiply results by 1.50 (low power multiplier). Total score: total QSO points \times alphanumeric multiplier \times low power multiplier (if applicable). Certificates to the three highest scoring OMs and YLs. Top scoring OMs and YLs from each district/province/country will receive certificate (must show at least 10 valid contacts on log). Please print or type logs; no carbon copy of logs, accepted. No logs will be returned. Indicate claimed score, sign log and mail before Sep 1 to Vice President Mary Lou Brown, NMTN, 504 Channel View Dr, Anacortes, WA 98221.

1-2

New York State QSO Party, sponsored by the Salt City DX Assn, from 1600Z Aug 1 to 1600Z Aug 2. New York stations may contact any station; out-of-state stations may contact New York State stations only. 160-10 meters (excluding WARC bands). Contacts of twice per band (1 CW and 1 SSB) permitted. Recommended frequencies include 1815 and 40 kHz up from bottom of all other bands on CW, and phone—1.880 3.880 7.280 14.280 21.380 28.580. Exchange: New York State stations send RS(T) and county. Others send RS(T)/county/state/province/country. A valid exchange requires confirmation of receipt of all information in both directions. NYS mobile stations changing their location during contest may be contacted as if they were a different station in each new county they operate from, that is, both QSO points and multiplier credit apply. Scoring: All stations count one point per 2X SSB QSO and two points per 2X CW QSO. Multiply total QSO points (maximum of 3 per station worked) by total multipliers (independent of band). For NYS stations, the multiplier is the sum of NY counties, other US states, Canadian provinces and other DXCC countries. NYS mobile stations multiply total valid QSOs \times sum of multipliers earned at each different county of operation. All others, sum of all NYS counties worked (maximum of 63). Certificates to highest scoring NY, USA, Canadian and DX entrants. Special awards to highest scoring single-op and New York State club operating from a rare NY county, and to the highest-scoring NYS mobile station. Send logs by Sep 21 to K2KIR, RD 1, Box 27A, Verona, NY 13478.

YO DX Contest, sponsored by the Romanian AR Federation, from 0000Z Aug 1 until 1600Z Aug 2. 80-10 meters, phone and CW. No crossmode QSOs. Classes: Single operator, single band; single operator, multiband; multioperator, multiband. Exchange signal report and ITU zone. YO stations will send two letters indicating their county. Count 2 points per QSO with own continent, 4 points for different continent and 8 points for YO stations. Multiply by sum of YO countries and ITU zones worked per band. Mail entries by Sep 3 to RARF, PO Box 05-50, R-76100 Bucharest, Romania.

1-3

Side Winders On Two Open QSO Party, sponsored by SWOT, from 1900Z Aug 1 to 0400Z Aug 3. Use SSB or CW from 144 to 144.3. No repeater or relay contacts permitted. Exchange call sign/SWOT numbers (if applicable)/grid-square locator. Contact with SWOT member counts two points and nonmember one point. The score is the total of points times total grid squares worked. Certificates for highest scores in ARRL Sections. Send log by

Aug 15 to Jerome Doerrie, K5IS, Rte 2, Box 72, Booker, TX 79005.

4
West Coast Qualifying Run, 10-35 WPM, at 0400Z Aug 5 (9 PM PDT Aug 4). See Jul 1 listing for more details.

8-9
European DX Contest, CW, sponsored by the Deutscher ARC, from 1200Z Aug 8 until 2400Z Aug 9. (Phone contest, Sep 12-13; RTTY contest, Nov 14-15). Work stations once per band; 3.5, 7, 14, 21 and 28 MHz only. Entry classes: Single operator, all band and multioperator, single transmitter. Multi-single stations must remain on a band for at least 15 minutes, except for a quick QSY to work new multipliers. Single operators may operate a maximum of 36 hours. The 12 hours of off-time may be taken in one to three periods and must be noted in the log. Non-EU stations work EU only. Exchange signal report and serial number. W/K stations also give state. Count 1 point per QSO and 1 point per QTC (explained below). Multiply by number of EU countries worked per band. European country list: C31 CT1 CT2 DL EA EA6 EI F FC G GD GI GJ GM GM-Shetland GU GW HA HB HB0 HV I IS IT JW-Bear JW-Spitsbergen JX LA LX LZ OE OH OH0 OJ OK ON OY OZ PA SM SP SV SV5-Rhodes SV9-Crete SV-Athos T77/M1 TA-European part TF UA-1346 UA2 UA-Franz Josefs Land UB UC UN/UKIN UO UP UQ UR Y22-99/DM YO YU ZA ZB2 1A0 3A 4U1-Geneva 4U1-Vienna 9H1. The multiplier on 3.5 MHz may be multiplied by 4, the multiplier on 7 MHz by 3, and the multiplier on 14-21-28 MHz by 2. A QTC is a report of a confirmed QSO that has taken place earlier in the contest and later sent back to an EU station. QTCs may be sent only by non-EU stations to EU stations. A QTC contains the time, call sign and QSO number of the station being reported (eg, 1300/DJ1QQ/134). A QSO may be reported only once, and not back to the originating station. A maximum of 10 QTCs to the same station is permitted; the same station may be worked several times to complete this quota. Only the original QSO, however, has QSO point value. Keep a uniform list of QTCs sent. For example, QTC 3/7 would indicate that this is the third series of QTCs sent, and that seven QSOs are reported. Awards. List 40 QSOs or QTCs per sheet. Use separate logs for each band. Dupe sheets must be submitted for bands with more than 200 QSOs. Deadlines: CW—Sep 15; phone—Oct 15; RTTY—Dec 15. Mail to WAEDC-Committee, Postbox 1328, D-8950 Kaufbeuren, Fed Rep of Germany.

11
WIAW Qualifying Run, 10-35 WPM, at 0200Z Aug 12 (10 PM EDT Aug 11). See Jul 13 listing for more details.

15-16
SEANET Contest, phone. See Jul 18-19 listing.

15-17
New Jersey QSO Party, sponsored by the Englewood ARA, from 2000Z Aug 15 until 0700Z Aug 16 and from 1300Z Aug 16 until 0200Z Aug 17. Phone and CW are considered the same contest. Work stations once per band and mode. CW QSOs in the CW subbands only. NJ-to-NJ QSOs allowed. Exchange signal report, serial number and QTH (county for NJ station, ARRL Section or country for others). Suggested frequencies: CW—1.810 3.535 7.035 7.135 14.035 21.100 28.100 MHz; phone—3.900 7.235 14.280 21.355 28.610 50.50.5 144-146 MHz. Suggested activity schedule: phone on the even hours; 15 meters on the odd hours, 1500-2100Z; 160 meters at 0500Z. NJ stations count 1 point per WVE QSO and 3 points for DX (include KP4, KH6 and KL7). Multiply by the number of ARRL Sections worked (including NNJ and SNJ, max 74). Non-NJ stations count 1 point per NJ QSO, and multiply by number of NJ counties (max 21) worked. Awards. Include an SASE for results and mail logs to be received by Sep 12 to EARA, PO Box 528, Englewood, NJ 07631-0528.

22-23
All Asian DX Contest, CW.
29-30
GARTG World-Wide RTTY Contest, Part 3.
Standard Contest Guidelines
1) Make sure your log details the date, time, band, call sign and complete exchange sent and received, for each QSO claimed for contest credit.
2) Your summary sheet should indicate your score, including how you figured it, and a declaration that you followed FCC/DOC regulations and the contest rules. Your name, call sign and complete address should be typed or printed in block letters.
3) Crossband, crossmode and repeater contacts are usually not permitted. Contacts with the same station on different bands are usually permitted.
4) Your log should be checked carefully for duplicate QSOs; and if more than 200 QSOs are made, dupe sheets should be included with your entry.
5) Your log may be considered a checklog or disqualified if it is incomplete or if too many errors are detected by the contest committee.
6) Avoid standard net frequencies.
7) International contests generally offer awards to top scorers from each US call area and each country, state QSO parties to each state/province.
8) Your summary sheet should include the following statement: "I have observed all competition rules as well as all regulations established for Amateur Radio in my country." The declaration should be signed and dated.

Moved and Seconded . . .

(continued from page 53)

8.2. The Executive Vice President presented a chart, "1987 Annual Board Meeting Action Items," and answered questions from the group on items therein. Oral additions to the report included: relative to Minute 58, the Volunteer Resources study concerning selection of sites and sponsors for ARRL conventions and hamfests was broadened to include the question of whether only amateur groups could be sponsors; and relative to ongoing interest by the Board and its committees in Headquarters operations, on plans to fill vacancies in the EVP's immediate staff.
8.3. Mr. Sumner also presented the progress report on the Visitors' Center. Dr. Owen Garriott, W5LFL, former astronaut who was "the first amateur in space" has agreed to serve as chairman of a Concept Development Committee for the Visitors' Center. Tasks remaining in the near term include choosing a name for the center, selecting members of the Garriott committee, and preparing a final draft of fundraising plans for review by the Administration and Finance Committee as provided for in Minute 61, 1987 Annual Meeting.
9. On motion of Mr. Wilson, the names of 20 newly elected Life Members were recognized, and the Executive Vice President was directed to list their names in QST.
10. On motion of Mr. Butler, the following clubs were declared affiliated, all in category I:
Botsford Amateur Radio Club, Farmington Hills, MI
Buzzards Roost Repeater Association, Nellig, NE
Ephrata Area Repeater Society, Inc, Ephrata, PA
Metrocrest Amateur Radio Society, Carrollton, TX
Philadelphia Area Repeater Association, Valley Forge, PA
Ripley County Repeater Association, Osgood, IN
Sierra Amateur Radio Club, Greenville, CA
With the election of these clubs, the League has 1699 active affiliated clubs in Category I, 14 in Category II, and 124 in Category III.
11. Convention matters:
11.1. On motion of Mr. Wilson, the following conventions were approved:

Exam Info

WILL THE REAL FORM 610 PLEASE STAND UP?

The FCC says that anyone may reproduce the Form 610 as long as the copies are of the same kind of paper stock that the FCC uses, including the color and weight. Form 610s that are submitted to the FCC but do not meet these basic standards will likely be returned to the applicants without action.
Because of this requirement, the ARRL/VEC recently returned all of the Form 610s from one session to the VE Team that conducted the test session. This action did not invalidate the exams taken or the upgrades earned, but all of the candidates were required to resubmit applications to the VE Team. The net result was that the candidates were forced to wait several more weeks for their newly achieved licenses.
We supply all of our VE Teams with blank Form 610s for use with their test sessions. Also, applications are available from ARRL HQ for an SASE. Make sure that your application won't be delayed because of a technicality; use Form 610 applications that are currently valid. For a detailed look at the new Form 610, see this month's Washington Mailbox column.

Alabama State Convention	Aug 15-16, 1987	Huntsville, AL
Pacific Div. Convention	Oct 2-4, 1987	San Jose, CA
Illinois State Convention	Nov 15, 1987	Rockford, IL
Ohio State Convention	Feb 26-28, 1988	Cincinnati, OH

11.2. Mr. Butler reported briefly regarding the program for the ARRL National Convention in Atlanta, GA, July 10-12, 1987; without objection, the plans were approved.
12. The Executive Committee will meet next on call of the President. There is a meeting tentatively planned for Saturday, September 5, 1987.
13. Other business:
13.1. On motion of Mr. Butler, the Controller, Larry J. Shima, W0PAN, was added to all checking and savings accounts of the League as an authorized signer on behalf of the Treasurer, subject to previous policy with respect to number of signatures and limitations on authority.
13.2. On motion of Mr. Wilson, the Executive Vice President is directed to open two savings accounts at the Connecticut National Bank titled, "Lowery Fund I" and "Lowery Fund II" in compliance with Minute 47 of the July 1986 Board Meeting. The two accounts are to be funded equally with the \$85,000 previously restricted by the Board, plus interest accumulated since July and with subsequent disbursements from this estate also to be divided equally between the accounts.
There being no further business, on motion of Mr. Wilson, the meeting adjourned at 6:08 PM.

Respectfully Submitted:
Perry Williams, WIUED
Secretary

Life Members Elected May 16, 1987

LuAnn D. Albury, WBSLNW; Prahlad K. N. Ayengar, KB7AFS; Charles Berry, WD8NVY; David L. Buda, WA2RYC; James Harold Cheek, AA42W; Dan H. Hinz Jr, WA3VHS; Mark S. LeBlank, KB7AKX; Elizabeth Y. Miller, WA4EFP; Ann Neff, WD4FAV; Carroll F. Neff Jr, K4JSR; Donald E. Rebar, KA3EBT; Susan B. Ripoll, KA4UVI; Jack Simpson, N6CSC; Joseph J. Slifko, KG6UY; Mary Ann Wahl, KA8UWO; Keith L. Watson, WB9KHL; C. Arthur Williams; Glenn E. Williams; Guy F. Williams; Larry D. Wolfgang, WA3VIL.

Special Events

Conducted By Mary Schetgen, N7IAL
Assistant Contest Manager, ARRL

Cambridge, Great Britain: The Royal Air Force, Chicksands Base, will be operating GB2USA in conjunction with the Friendship Fete celebration. Continuous operations from Jul 1-7 on 14.235. Send for special QSL by sending your QSL via the bureaus.

Clarksburg, West Virginia: The Stonewall Jackson ARA will operate WB8ZVS for the First American Values Weekend celebration held Jul 3-5. Times: 1700Z-2100Z on 7.235 and 2100Z-0100Z on 3.860, daily. A special certificate is available for an SASE to Rob Pisegna, NR8X, 21 Meadowcrest La, Bridgeport, WV 26330.

Moffett Field, California: The Naval Air Station, Moffett Field, in cooperation with NASA Ames Research Center ARC, will operate K6MF from 1600Z to 0100Z Jul 3-5, daily. The Navy Blue Angels will be performing in their new F-18 aircraft, and it is expected that the *Voyager*, along with Burt Rutan and Jean Yeager, will be in attendance. Suggested frequencies: 14.280 21.380. For special QSL, send SASE to AARC, Box 146, Moffett Field, CA 94035.

Luckenbach, Texas: The Southwest Dallas County ARC will operate KD5WN from 2000Z Jul 3 to 1700Z Jul 5 to commemorate the First Annual Luckenbach Mini Expedition. Operations will be 10 kHz up from bottom of General phone bands. For special QSL, send your QSL and SASE to address in *Callbook*.

Thompson, Ohio: KD8FJ will operate Jul 4, from 1400Z, in Independence Day celebrations from Heritage Hill Camp. Frequencies: Lower edge of 80- and 40-meter General phone band and, if propagation warrants, in the 10-meter Novice phone band at 28.450. For 8- x 10-in certificate, send QSL and SASE to George Bair, KD8FJ, 386 Cedarbrook Dr, Painesville, OH 44077.

Chatham, Ontario: The Chatman Kent ARC will operate VE3CRC from 1200Z-2200Z Jul 4, in celebration of Chatham's Festival of Nations. Phone and CW on 80-10 meters, packet and phone on 2 meters. Certificates for your QSL card to Cliff Russell, VE3NGG, RR 1, Chatham, ON N7M 5J1, Canada.

Cornelia, Georgia: The Southern Piedmont ARC will operate WD4NHV on Jul 4 in celebration of the centennial year of Cornelia, Georgia, the home of the Big Red Apple. Listen for operations in the 80-40-20 meters bands. For a certificate, send your QSL and a 9- x 12-in SASE to SPARC, Box 52, Cornelia, GA 30531.

Staunton, Virginia: The Valley ARA will operate N4ICT in conjunction with the Statler Brothers Happy Birthday USA celebration. From 1200Z Jul 4 to 0030Z Jul 5. Suggested frequencies: phone—3.855 7.230 14.250. Send your QSL and 9- x 12-in SASE to Valley ARA, Box 1091, Staunton, VA 24401.

Clinton, Iowa: The Clinton Iowa ARC will operate KD8PY on Jul 4 (times not specific) to celebrate the Clinton Riverboat Days. Suggested frequencies: CW—3.720 7.120 21.120 28.120; phone—3.875 7.275 14.275 21.375 28.400. Special certificate available for no. 10 SASE to Darryl Petersen, KD8PY, RR 1 Box 84, Bryant, IA 52727.

Hannibal, Missouri: The Hannibal Missouri ARC will operate KA9RTV Jul 4-5 in celebration of the National Tom Sawyer Days festivities. Suggested frequencies: phone—7.240 14.255 21.340 and for the Novices, 28.400. Send your QSL and 8½- x 11 in SASE to HARC, Box 1522, Hannibal, MO 63401.

Hobbs, New Mexico: The State Line ARC will operate KT5I on Jul 5-12 (times not specific) in celebration of the 1987 National Soaring Championships—Open Class. Operations from the site of the new National Soaring Society Headquarters, on the bands 10-80. For large certificate, send QSL and contact no. to State Line ARC, Box 1423, Hobbs, NM 88240.

Lake Canton, Oklahoma: Oklahoma amateurs will

conduct their fourth annual "Field Day" exercises Sat and Sun, Jul 11-12, beginning 1900Z from the Canton Lake Recreational Area. Listen for WD5HPU-WA5LTM-others in the General phone portions of the 40-10 meter bands. Commemorative certificates are available; send your QSL and large SASE to Tim Mauldin, WA5LTM, Lake Canton Field Day, Box 19097, Oklahoma City, OK 73144.

Battle Creek, Michigan: The Southern Michigan ARS will operate W8DF from Jul 11-17 (no specific times listed), for the Battle Creek International Hot Air Balloon Championship. Suggested frequencies: CW—7.040 14.040; phone—3.890 7.240 14.250. For a 9- x 12-in certificate, send a large SASE to SMARS, Box 934, Battle Creek, MI 49016.

Miamisburg, Ohio: The Mound ARA will operate W8DYY from 1200Z Jul 11 to 0200Z Jul 12 and 1200Z-1900Z Jul 12 to celebrate the 25th anniversary of the club. The event will also mark the first anniversary of the train derailment that led to the White Phosphorous Disaster. Suggested frequencies: phone—7.245 14.245 21.295. Special Novice operation, on the half hour, at 28.400. For a special QSL, send QSL and SASE via WD8ATS, 7425 Barr Cir, Dayton, OH 45459.

Atlanta, Georgia: The Atlanta RC, hosts of the Atlanta Convention, will operate W4DOC from 1300Z-2200 Jul 11 and 12. Suggested frequencies: CW—3.730 7.130 21.130 28.130; phone—3.875 7.275 14.275 21.275 28.375. For special certificate, send QSL and SASE to Mary Cantrell, KA4WAK, Box 813712, Smyrna, GA 30081.

Holmdel, New Jersey: The Holmdel ARC will operate K2DR from 1500Z-2200Z Jul 11 and 1500Z-2000Z Jul 12 to commemorate the 25th anniversary of the launching of the Telstar satellite. Operations will be in the lower 25 kHz of the General 80-40-20 meter phone bands and the lower 25 kHz of the Novice 10-meter phone band at 15 minutes after the hour. For certificate, send QSL and SASE to Holmdel ARC, Box 205, Holmdel, NJ 07733.

Petersburg, Nebraska: The Buzzard's Roost RC will operate KC8DA on Jul 12 from 1500Z-0000Z on the following phone frequencies: 3.950 7.250 14.295 28.375. This event celebrates the centennial of Petersburg, NE. Send your QSL and SASE to Larry L. Lehmann, KC8DA, 706 West Fairview Ave, Albion, NE 68620.

Mount Clemens, Michigan: NF0Q/8 will operate Jul 12 from 1200Z-2100Z to commemorate the 200th Anniversary of the Northwest Ordinance of 1787. Created by the Continental Congress, this ordinance paved the way for the Bill of Rights and the creation of the states of Michigan, Ohio, Indiana, Illinois, Wisconsin and Minnesota. Suggested frequencies: 7.250 14.325 (secondary frequencies: 21.350 28.410). For certificate, send large SASE to Eric Kock, NF0Q, 2805 Westminster, St Charles, MO 63301.

Spiceland, Indiana: The Henry County ARC will operate N9WB Jul 17 and 18, 1500Z-2400Z each day, to commemorate the Spiceland Freedom Days activities. Suggested frequencies: CW—3.725 7.135; phone—3.870 7.235 14.235. For certificate, send QSL and SASE to HCARC, c/o Civil Defense, 1131 Broad St, New Castle, IN 47362.

Hamburg, New York: The South Towns ARS is proud to participate in the Sesquicentennial of the town of Hamburg, along with the celebration of the 102nd "birthday" of the hamburger's creation. For a special certificate, please contact WB2ELW on Jul 18 between 1500Z-2100Z on the following frequencies: 3.925 7.230 14.255 28.375. Send large SASE to WB2ELW, 5084 Chapman Pkwy, Hamburg, NY 14075.

Sunnyvale, California: The Lockheed Employees ARC will operate their club station, WA6GFY, on Jul 18 to celebrate the 30th anniversary of the club's founding. Look for club members on 15- and 20-meter phone. Send a QSL and large SASE for

certificate to LMSC ARC, Box 3504, Bldg 160, Sunnyvale, CA 94088-3504.

Seneca Falls, NY: The Auburn ARA and the Seneca Co ARES will operate W2CDS Jul 18 and 19 from 1400Z-2000Z each day, during the Convention Days celebration, to be held at the site of the first meeting place for women's suffrage. Visiting YLs are invited to operate the station. Suggested frequencies: CW—7.050 7.125 14.050 21.050 21.150 28.150; phone—7.250 14.250 21.350 28.350. For certificate, send QSL and large SASE to W2CDS, 2485 Lower Lake Rd, Seneca Falls, NY 13148.

Naperville, Illinois: The Bolingbrook ARS will be operating KE9DE on July 18 and 19 from 1400Z-2100Z on the phone frequencies 7.250 and 14.300 to commemorate the Revolutionary War. For certificate, send QSL with no. 10 SASE to Rich Wayne, KE9DE, Box 495, Naperville, IL 60566-1495.

Chattanooga, Tennessee: The Chattanooga ARC will operate W4AM on Jul 18 and 19 from 1200Z-1700Z on 40 meters and at 1700Z-2100Z on 20 meters. The event is to commemorate the 10th anniversary of the Chattanooga Nature Center. For certificate, send your QSL and SASE to K4TNE, Box 12, Wildwood, GA 30757.

Nashua, Iowa: The Great Plains ARC will operate KC0CP from 1400Z Jul 18 to 1700Z Jul 19 from the site of the Little Brown Church in the Vale. Frequencies will be 25 kHz above the lower edges of the General phone bands. For certificate, send QSL and large SASE to D. Muchow, Box 203, Delwin, IA 50662.

Chino, Calif: The Inland Empire ARC will operate a special-event station on Jul 23-25 at 1700Z-0800Z in celebration of the Muscular Dystrophy Association's Trap Shoot and Chili Cookoff-Shooting For A Miracle event. Suggested frequencies: General phone portions of 75-40-20-15. For certificate, send QSL and large SASE via WA6ZEF at *Callbook* address.

Smith Island, Maryland: The Nanticoke ARC in cooperation with the Somerset Co ARES will operate KW3Z from Smith Island, Maryland, in the Chesapeake Bay. Operations from 1700Z Jul 24 to 0500Z Jul 26, in the lower portions of the General and Advanced bands, CW and phone modes. Will count for the Islands On The Air Award, zone NA-83. QSL via Carl M. Dennis, KC3RY, 510 Arbutus Ave, Seaford, DE 19973.

Davenport, Iowa: The Davenport RAC will again operate W0BXR during the Bix Biederbeck Memorial Jazz Festival from 1700Z-2200Z Jul 24 and 1500Z-2300Z Jul 25-26. Operations will be on phone and CW, 80-10 meters, 25 kHz up from lower end of General band edges. Certificates for your QSL and SASE via Davenport RAC, 2131 Myrtle, Davenport, IA 52804.

Pensacola, Florida: The Serious Hams ARC will operate WA4YRN from 1500Z to 2400Z Jul 25 and 26 to commemorate the Pensacola Shark Rodeo. Operation will be in the lower 25 kHz of the General 15- and 20-meter phone bands. For certificate, send QSL and large SASE to SHARC, 1050 W Carlton Rd, Pensacola, FL 32514.

Port Huron, Michigan: The Eastern Michigan ARC will operate K8EPV to commemorate the 62nd Port Huron to Mackinac Island Yacht Race, July 25 and 26, 1400Z to 0200Z each day. Suggested frequencies: CW—3.710 7.110 21.110; phone—3.910 7.235 14.235 28.335. A certificate will be issued upon receipt of a no. 10 SASE and your QSL to K8EPV (*Callbook* address) or 654 Georgia, Marysville, MI 48040.

East Aurora, NY: The Pioneer Radio Operators Society (PROS) will operate W2QFC on Jul 26 from Village Park in celebration of the 14th Annual Racing Day festivities. The town is known as the "trotting horse capital of the world." Suggested frequencies: 3.935 7.235 14.235 from 1400Z-2100Z. Special QSL sent via SASE to W2QFC, 308 Parkdale Ave, East Aurora, NY 14052.

The ARRL Field Organization Forum

CANADA

ALBERTA: SM, Bill Gillespie, VE6ABC—A/SM: VE6AMM. SEC: VE6AFO. OO: VE6TY. STM/DEC/SM: VE6ABC. Thanks to Ed, VE6BOK, and the Northern Alberta Radio Club the Old Timers Hockey event went off without a hitch and all were pleased with the excellent communications provided. The Shack at the new residence of Bill, VE6ABC, is just about completed and when the frost is out of the ground the final sections of tower will be raised and antennas put in place. Spring has arrived in Alberta and band conditions are improving. NARF is hosting a Hamfest just north of Edmonton at the end of May. Looks like its going to be a good one. Traffic: APSN QNI 1636, QTC 20, Informal 182, ATN QNI 289, QTC 63. Personal VE6CHF 121 (Feb. & Mar.), VE6GUS 29, VE6AKY 6.

BRITISH COLUMBIA: SM, Ernie Savage, VE7FB—British Columbia Public Service Net 3727 KHz, at 0130Z Daily, NM Ford, VE7DDF, reports check-ins High 200 Low 164. Total 4935. British Columbia Emergency Net 3550 KHz, 0200Z daily, NM Ferdi, VE7EJU, reports check-ins QNI 966 QTC 353. Ferdi sure would like the net members bring more QTCs to the net to increase activity. Pleased to hear from the East Kootenay ARC, new President Ted, VE7EDT, Secretary Parley, VE7ADI, Treasurer George, VE7OCR. Many thanks to all the club newsletters in BC received this month. Traffic: VE7BNJ 397, VE7EJU 225, VE7EJU 122, VE7ANG 87, VE7FB 72, VE7XA 42, VE7FME 21, VE7CTJ 12, VE7BVZ 9, VE7EGM 7, VE7BZ 6, VE7DJ 6.

MANITOBA: SM, Jack Adams, VE4AJE—It's that time of the year when flea markets, garage and yard sales, even Hamfests are flourishing. Field Day will be history when this report is published. Hope everyone enjoyed themselves especially those who participated for the first time. Locally here in Dauphin, the National Ukrainian Festival which starts July 31 and runs thru to Aug. 2 should be a very enjoyable experience to all. Listen for VE4NUP the Dauphin Amateur Club call which will be operating from the festival site using DPN...146.40 and Baldy 147.03. John VE4AOR with the help of yours truly and Stu Martin VE4??? (hopes to write in June) dug and poured a 4'-4'-4" deep concrete base for John's new tower installation. John who gets around only by wheel chair (1) Manuel and the other electric does his traveling around the area by this mode of transportation. Hopefully in the near future we will equip his go-cart with a 2-meter rig. John due to his inability to get around was off the air for 13 years until we found out that he was a ham radio operator. Now open to a few locals here, John is back on the air. Net reports: MMWV, session 30, QNI-554, QTC-20. MEPPN-30 sessions, QNI 981, QTC-38. MTN-22 sessions, QNI 160, QTC 60. WRIN 8 sessions QNI 850. Traffic: VE4LB 60, VE4RO 46, VE4JAE 49, VE4TE 38, VE4IX 45.

MARITIME-NEWFOUNDLAND: SM, Leigh Hawkes, VE1GA—Many section amateur training classes have now finished. Welcome to all new amateurs. QSL Buro Mgr VE1ASJ reports mni cards unclaimed. CRRF Annual General Meeting next month. Contact ur director, VE1SH, if u have any concerns u wish addressed. For those on 20 M, please try to avoid tx on 14.100 MHz. A world-wide beacon system operates on this freq. On too many occasions, it is being rendered almost useless due to packet RRM. Write to get details on it's operation. Hosp: VE1GQ. SK: VE1QT, VE1AOK, VE1AYQ. APN Net Mgr VE1BKM reports APN Tlc for April. Traffic: VE1BKM 65, VE1BX 15, VE1BXD 10, VE1BPM 7, VE1BXA 6, VE1ALU 2, VE1QX 1.

ONTARIO: SM, Larry Thivierge, VE3GT—A/SM: VE3GT. SEC: VE3GV. STM: VE3CYR. TC: VE3EQO. Congratulations to Jim Swail, VE3KF, who was recently named to the new Order of Ontario for his work in the development of devices that the blind. Jim was included among the first 20 to be so honoured. VE3HSF, EC for Metro Toronto, has been very active promoting emergency communications. Gord has spoken at 7 local clubs and his enthusiasm has seen an increase in ARES registration in the area. Regrettably I announce that VE3BZQ and VE3TIZ have become Silent Keys. Winners in the Ottawa ARC's homebrew night were VE3NPC VE3FM VE2PJC. VE3MOL has been appointed as an OBS and can be heard on repeater VE3SSM in the 'Soo. VE3DBG has been noticed checking into the CW traffic nets again after a long absence. KWARC Coffee Club membership is up to 36 with addition of VE3DZ and VE3NEF. At a recent banquet and reception held at Queen's Park VE3ILN was presented with a Special Achievement Award along with a beautiful pen and pencil set. Weldon was chosen for a Student of the Year award for 1986 from out of 100,000 students. The Old Timers Club (OTC) award, sponsored by ARRL, has been very popular. If you've held an amateur license 20 or more years ago (lapses permitted) you qualify. Send an SASE to Newington with the date of your first amateur licence and your call sign for your certificate. The Heritage Club (Cobourg, Ontario) will be using the special prefix VX3 from June 22 until July 5 commemorating the Cobourg Sesquicentennial. A special QSL will be available. Activity will be on cw, ssb, rty and packet. Check 3.550, 3.800, 14.050, 14.180, 14.200, 21.025 and 21.250 MHz. Traffic: VE3FA 329, VE3GSG 250, VE3GFW 142, VE3JW 11, VE3KJ 37, VE3VW 33, VE3ORN 99, VE3DPO 43, VE3CYR 78, VE3BZC 65, VE3BUD 63, VE3VW 43, VE3EAM 39, VE3WM 36, VE3DQK 33, VE3POJ 29, VE3KXB 28, VE3AJN 17, VE3BAJ 15, VE3FGU 12, VE3KCZ 11, VE3MCO 11.

QUEBEC: SM, Harold Moreau, VE2BP—STM: VE2EDO. BM: VE2ALE. NM: VE2EDO. OO: VE2DNH. TC: VE2ED. I need more input for this column from clubs and anyone, please send before the 1st of the month. The West Island auction drew a good crowd and a lot of equipment changed home. The Burlington VT hamfest will be at Essex Junction on 8-9 August. Le réseau des Joyeux Copains (3765 MHz), tous les jours, celebre son 14ieme anniversaire ce mois-ci. Traffic: VE2EDO 78, VE2BP 57, VE2WH 35, VE2EC 26, VE2JN 20.

ATLANTIC DIVISION

DELAWARE: SM, Harold K. Low, WA3WII—SEC: KC3TI. DELAC: K3PFW & K3PDL. EC: KC3JM, K3ALNK, WA3EWK, WA3PHT, WA3VDJ. STM: KA3GRQ. PIO: WB3DPJ. SGL: AF3R. PSHR: K3JL. KA3IXV had to resign as STM due to health. KA3GRQ is taking over the job. Sorry to lose you, Jim. Thanks to Bill for jumping in. We also have a new EC for western Sussex Co. WA3VDJ. Delaware Hamfest will be August 16 in Georgetown. VE exams will be given by the Pro's

and Nanticoke ARC. Mark your Calendars. Congrats to Joyce, N3FGX, also to KA3QOV on upgrading. New member Nanticoke ARC N3EZY. DTN Stations 341 Traffic 29 in 22 sessions. DEPN Stations 42 Traffic 12 in 4 sessions. SEN Stations 57 Traffic 1 in 4 sessions. SEN Stations 52 Traffic 3 in 4 sessions. Traffic: W3QQ 35, WB3DUG 30, KA3GRQ 19, WA3WII 19, K3JL 16, W3PVO 12. (Mar.) KC3JM 7.

EASTERN PENNSYLVANIA: SM, Kay Craigie, KC3LM—ASM: WA3PZO. KASA, KQ3B, K3ZFD. SEC: WA3PZO. ACC: KC3QB. SGL: WA3IAO. STM: KB3UD. PIO: WA3AMQ. TC: W3FAF. This month, wave the flag for Public Information Assistants in the EPA Field Organization: WB3AIG, W3COG, KC3FO, K3AKNA, NE3W, and K3WPL. Your club's PR chairman is invited to contact KC3LM for info on the PIA appointment. Like his dad NC3C, we're proud of Andy Schin, N3FGU, a 2nd prize winner in ARRL's Youth Art Contest. Enjoy the month's hamfests, presented by Harrisburg RAC July 4, Murgas ARC July 5, and Penn Wireless July 12. KC3LM will be in Atlanta for the ARRL National Convention and a speech to the Ga. Power Co. Employees ARS. Thanks to SE Div. Director W4RHF for okaying this club visit. Welcome W3FM to the Asst. TC roster. ATC K3TW3's technical help service on PARA's K3DSM PBBS (145.09) is good stuff. Address queries to "TEK" with a title indicating the subject and get an answer soon. West Branch Area put W3AVK PBBS on the air. Also in club news, OC W3S spoke to Harrisburg RAC about the Amateur Auxiliary. Delmont RC now has a repeater on 147.165. Delaware-Lehigh has their own WAS award. Frankford members are flocking to packet radio and have their own BBS. Our Director W3ABC visited the June Phil-Mont meeting. That club has moved their 10m net down into the Novice voice band. Be on the lookout for Bicentennial of the Constitution station K3MTK in Philadelphia. In ARES Dist. 5, Monroe Co. ARES responded to a weather emergency; thanks to the combined RACES/ARES effort, local officials were kept informed on rising storm levels by DEC5 N3BFL, EC N3EPW, and the group. Also in Dist. 5, Wayne EC KC3AX says the door's been opened to Novices via a 28.465.5 MHz relay frequency for the 2m net. He told all ARES groups will be possible to Novice 2m. In Dist. 6, NM WA3KA is now an Extra Luzerne EC KB3JK got a letter from the Lt. Governor commending ARES on the Nanticoke evac last winter. KA3DYY stepped down as DEC1 this spring. Thanks for everything, Bob. Thanks to all who sent SM messages on Field Day. We are looking for stations to serve as liaisons between NTS Section packet node KB3UD PBBS and the EPA phone/CW nets. We also encourage PBBS sysops to report NTS status to the 3RN packet mgr., our own KB3UD. To find out about NTS on packet and how you can participate, contact KB3UD. Traffic (March): N3AZW 409, N3COY 252, N3GCD 144, N3DRM 125, W3IPX 119, W3JXK 94, W4UQ 81, KB3AO 75, AA3B 58, W3KAG 58, KA3DLY 56, KB3UD 54, KB3FW 49, K3TX 48, WB3KPE 41, K3WPL 38, K3UR 34, W3DP 25, KB3W 22, WA3CA 22, W3ACN 20, W3WV 17, W3CL 15, W3EUV 15, W3ADE 12, K3YM 10, W3FAF 8, K3EBZ 5, NETS, March (QNI/ QTC): D3ARES 110/33, MARCTN 167/43, D3ARES 106/7, MARCARES 95/14, D3ESN 116/7, D3ARES 72/3, STAR 367/72, PTN 245/60, EA41/159, EPAEPTN 574/169. PBBS: KB3UD 22, AG3F 6.

MARYLAND-DC: SM, John A. Barolet, KJ3E—It's that time again, time to nominate a Section Manager for Maryland-DC. The SM term will be for 18 months, from January 1, 1988 until July 1, 1989. See HAPPENINGS column in this QST for information and instruction on the nomination procedure. KJ3E is not a candidate for reelection. A big welcome to MADRAS in Gaithersburg, our newest affiliated club. They made a DXpedition to Tangier Island in May. KJ3E is acting Affiliated Club Coordinator until an interested applicant shows up! Club officials, please call on me for services! KN3J, Montgomery County RACES Officer and Emergency Coordinator, has been appointed Maryland-DC Section Emergency Coordinator. He is a planner and a writer of numerous papers on emergency preparedness and is eminently qualified for the position. W3SQG has established a packet digipeater on the mountain west of Frederick; it has tremendous coverage and has opened up western Frederick County and Washington County to the KA3T full-service packet bulletin board at Mount Airy. WB3DNG in Hagerstown is operating a limited-service packet mailbox on the same frequency. Packet has also expanded on the Eastern Shore, with K3TKJ in Hurlock (Dorchester County) and NF3A in Salisbury operating mailboxes. So, the MDG packet networks span nearly the whole section now. W3QCL, Laurel Area EC, is organizing EC jurisdiction around Laurel with KN3J, WA1QAA, WA3TOY and KA3DUE. ECs for Montgomery, Howard, Anne Arundel and Prince George's Counties, respectively. And reports from EC KC3FK in Carroll County indicate that ARES is alive there. In addition to a 2-meter net on 145.41 MHz KC3FK operates a slow-speed CW net on 28.190 MHz, Thursdays at 1930 local time, but it is lonely there, John says. From the MARC and SMARC newsletters I learned that at least two computer bulletin boards operating in the DC area are devoted to amateur radio, one by W3INK on 301-670-9621 and another by non-ham Kim Wells on 301-350-1299. I must learn how to use my landline modern and call in! Appointments: KN3U SEC: WB3LOI RRS We're aboard with THE NETS. NetMtr, NetMtr, QTC/OCTO, MDD/WFA 60206/468 (MDD Brass: W3COA/103 W3FA/100 KJ3E/66 K3NNI/64, MEPPN/3EGF 31/128/1023, MSN/KC3Y 39/57/375, W3PNS/WB3BFK 20/22/249, MDCPON/W3OYY 5/4/74, HOOCAPOES/K3NNI 2/8/28, SMEN/KJ3E 1/3/7, PSHR/W3FA 118, N3EGF 92, KJ3E 82, K3NNI 81, KC3Y 79, WA3YLO 78, WA3UZI 73, Traffic: W3FA 161, KC3Y 149, KJ3E 129, N3EGF 107, NC3Z 97, W3LDD 78, WA3YLO 76, WA3UZI 72, N3DE 60, K3NNI 53, K2EB 45, WB3LQT 30, WB3BFK 30, WB3GYW 28, N3RO 24, K3XU 24, W3YVQ 22, K3ZJ 17, W3FZV 13, W3ZNV 8, NF3X 8, N3BP 8, WA1QAA 7, KK3F 5, KT3T 5, W3ERB 5, W3DQI 4, KC3FK 4, K3EP 3, KC3DW 2, WA3VPL 2.

SOUTHERN NEW JERSEY: SM, Richard Baier, WA2HEB—SEC: K2QJL. STM: WB2UVB. ACC: K2XIE. TC: KA2RAF. PIO: VACANT. SGL: KA2KMU. BM: WB2UVB. OOC: WA2HEB. ATC's N2BOT, K2JF, KA2RJA and WB2MNF. DVQ: WA2HEB. We're conducting VE tests on July 18, 12:30 PM at the Hopewell branch of the Mercer County Library in Pennington. For pre-registration or further information, contact Don Wright, AA2F at (609)737-1723. The Cape May County ARC also will be giving tests on July 25 in Cape May Court House at the Library Bldg., Mechanic St. (just off Rt. 9) from 10 AM sharp.

For further info contact Mary Petrucci, AE2Y, 16 Rose Lane, Villas, NJ 08251. Now that our Novices and Technicians have expanded privileges on the HF bands, a couple of clubs have organized SSB nets on 10 meters. SJRA has a net on Thursday evenings at 8 PM local on 28.400 MHz with WA2AWS as the Net Control. JSARS has a net meeting daily at 7:45 PM local. Why not give either or both of these nets a listen and welcome our Novice and Techs the SNI way? Next month is the annual NJ QSO party. Details next month. Until then, 73. Traffic: N2GER 76.

WESTERN NEW YORK: SM, William W. Thompson, W2MTA—SEC: NN2H. BM: W2GLH. ACC: N2EH. OOC: W2AET. PIO: W2APUJ. TC: K2QR. SGL: WB3CUF. STM (acting): W2MTA. APPTS: EC: K2ZJ-Clinton, WA2TOL-Corlaid, (NM) WB2OWO-WDN, WB2HLY-OCTEN, (OBS) WB2DSR, K2KWK, WA2ZPE, (OBS) VE2FMQ, K2GD, W2ICE, K2IUT, WB2OWO, WB2RBA. THANKS: WA2VAM for past services as EC. K2KWK OBS SKED: Sunday 2045 on 146.79/88; Tues. 1930 on 145.31 & at 20:15 on 146.76, 145.19, 223.5, 224.68, 443.6 MHz. CLUB OFFICERS: Allegany Highlanders W2BYO KW2J WA2RPO K2UOB; Auburn N2DTG N2FQJ KA2HUO K2ZDD; Roch. VHF Group WB2QJ WA2YTM WB2JIEY KD2TJ; RAGS K2SDD KD2QO WA2PUJ. Oswego STARC Ham-of-the-Year award to KB2KW. April BPL: N3DPF, WB2OWO, KA2UBD. PSHR: N2ABA N3DPF N2EIA N2EIVG WA2FJU W2FNI N2H W2MTA WB2OWO WB2RBA N2DS KA2TUX KA2UD N2WV K2VNL KA2ZKM KA2ZM. March BRVSN 329-007-31. SM had FB trip thru Midwest and had chats with K9GDF, SM Wisconsin, and KC8T, SM Minnesota, and with mentor W9DYG in Milwaukee, TX ALLI Visit to Golden Valley HANDI-HAM Center and to the EAA HO and Museum in Oshkosh were inspirational with a message we should all receive!

NET NAME	QNI-QSP-QND	BLUE LINE	189-023-23
NYSEMO	093-007-04	JGRACN	365-018-29
NYSRaces	018-005-04	NYSE*	382-236-30
NYS/M*	337-262-30	WDNE*	430-242-30
WDN/M*	312-157-30	BRVSN	233-008-30
Mike Farad	153-021-22	LCARES	043-000-04
WYPMON*	642-432-30	VHF THIN	038-001-04
ESS	316-064-30	CNYTN*	233-054-30
NYSPTEN	502-039-30	OCTEN/L*	258-107-30
OCTEN/E*	622-147-30	WDN/L*	380-158-30
Q Net	347-002-30	NYS/L*	357-348-30
STAR	345-079-30		
MVTN	008-040-08	*NTS Net.	

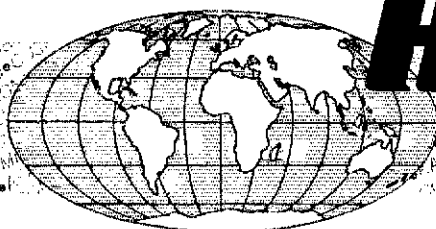
Other ARES/RACES nets are operating in Clinton, Chemung, Steuben, etc. Reports forwarded to the Section Manager will be listed in this column. FIFTY YEAR AWARD to W2RME—CONGRATS. Dunc joins a lot of other great WNY operators with this award—such as, WNY SCM 1937-39, W2RIZ, and QES W2PHQ. All 50 year members of ARRL should have a

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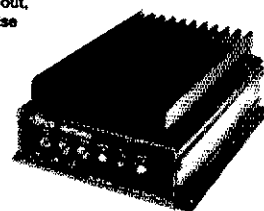
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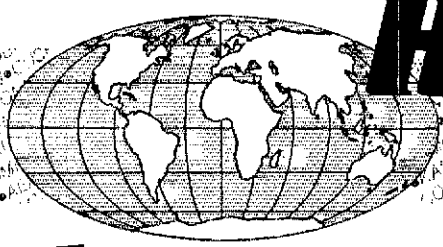
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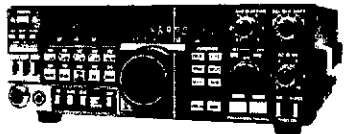


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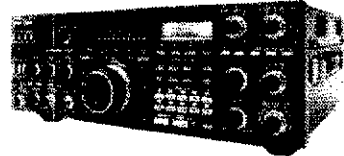
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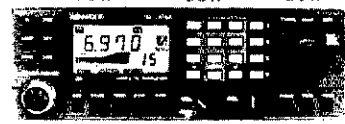
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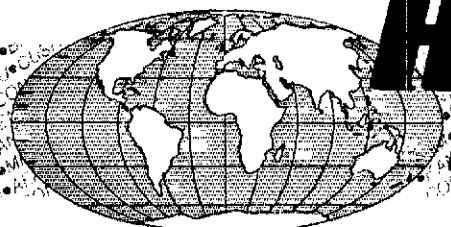


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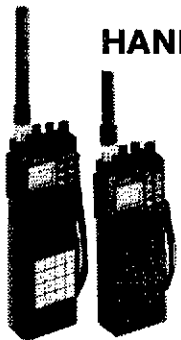
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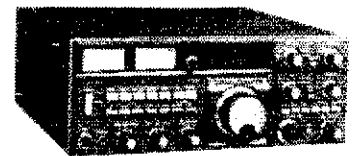
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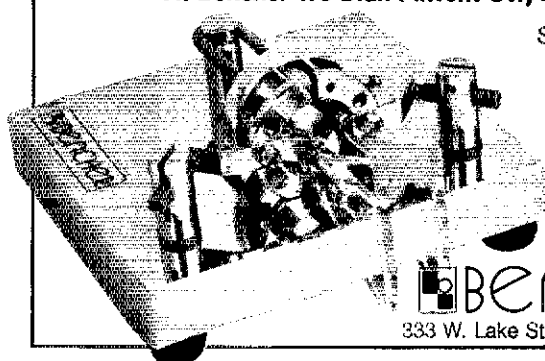
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 4 reports 100% IN, thru to K9BYB, N9HZ, K9J, W9UJL,
 WA9QCF, J9J9, W9BUYU, K9WJWJ. OO report rec'd from
 K9LMM. The list of stations copying my weekly Indiana bulletins
 keeps growing. Most are copying thru the statewide packet
 system; others copy them either on local repeaters where
 OBS' read them or on ITN. If you are an OBS or ORS and
 will read the bulletins on your repeater, contact me and I'll
 add you to my mailing list. Our statewide packet system
 continues to grow. W9BMD and K9DER are putting together
 lists of local packet contacts to help them find their areas
 via their local packet BBS. If you'd like to be part
 of one of them. This system works in other sections. If I work
 here too! Don't forget the APRIL Convention at the Indy
 Hamfest, July 11/12. A full day of activity is planned on the
 11th, including the banquet that evening. Join us! Keep your
 ears open for special events stations W9PAX and W9AB.
 These are really big happenings this month and next. ECs
 be on the lookout for the new Indiana Emergency Response
 Plan. Final touches are under way and I hope to have the Plan
 out by the time you read this. Our Special Service Clubs are
 active just as the program was intended to do, promote
 activity and provide a good service to the community. I
 like the SSCs are the "growing groups" in the state! It's
 really true: activity breeds activity. If your club is interested,
 contact me for details. Where are all our OO's? Haven't been
 receiving many reports. Station reports for April, W9UJL 388.

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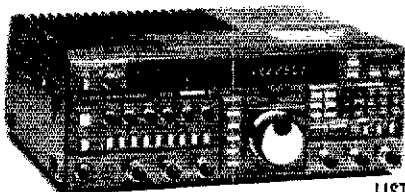
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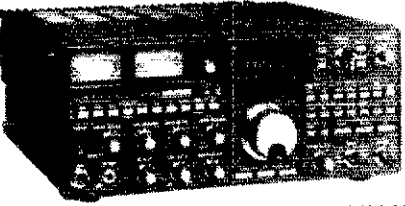
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KY-ONE Keyer unit	50.00
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FT-980 9-band CAT Xcvr/SW Rcvr	\$1795.00
SP-980 Speaker with audio filter	99.95
SP-980P Speaker/patch	99.95
FC-757AT Automatic ant. tuner w/memory	359.00
FAS-1-4R Remote antenna selector	79.95
E-980 Interface cable; FT-980/757AT	46.50
XF-89HC 600 Hz CW filter (1st IF)	50.00
XF455.8MCN 300 Hz CW filter (2nd IF)	59.95
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FIF-65 Computer interface; Apple IIe	69.95
FIF-80 Interface; NEC PC-8001	119.95
FIF-232C for VIC-20/TLI/most RS-232	79.95
FRB-1 External relay box	20.00
GC-980 General coverage kit	14.95

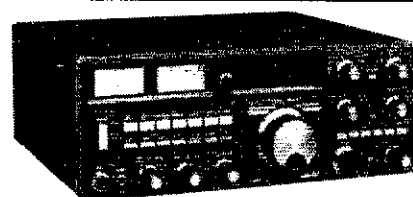


FT-757GX 9-band Xcvr/SW Rcvr/mic	\$995.00
FP-757HD Heavy duty supply with fan	249.00
FP-757GX Compact power supply	235.00
FP-700 Power supply	209.95
FRB-757 External relay box	10.00
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FT-757GX accessories - cont.	LIST
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6M/FTV 6m module only	139.00
70 cm/FTV 430 module only	255.00
Misc. accessories	LIST
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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
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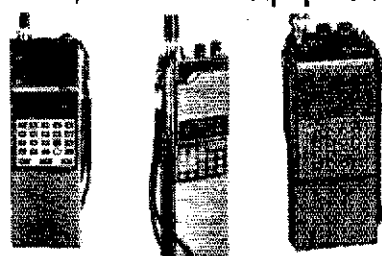
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HF-726 10-12.15m unit	289.95
6M/726 6m unit	269.95
430/726 430-440 MHz unit (OSCAR)	329.95
440/726 440-450 MHz unit (FM band)	329.95
SU-726 Satellite duplex module	129.95
XF-455MC 600 Hz CW filter	69.95
DC-726 DC cable for FT-726R	10.05
FTE-36 Tone 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/TTP mic	439.95
FT-2700RH 25w 2m/440 FM w/TTP mic	599.95
FTS-8 Encoder/decoder	49.95
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AD-2 50w 2m/440 duplexer	34.95
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FT-709R 4w 440 FM HT/TTP/batt/cgr	359.95
FT-727R 5w 2m/440 HT/TTP New CPU!	499.95
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FT-23R/TTP 2.5w 2m compact HT w/TTP	299.95
FT-73R 2w 440 compact HT	279.95
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FTS-7 Encoder/decoder; 03-series	*29.95
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MH-12A2B Speaker/microphone	39.95
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NC-15 Desk quick charger/AC ps	89.95
NC-18B Wall charger for FNB-4	9.95
MMB-21 Mobile bracket	14.95
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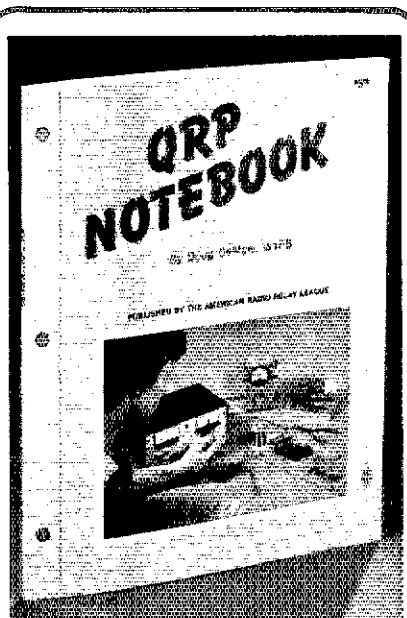
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Doug DeMaw's QRP Notebook!

Doug DeMaw, W1FB, has been writing articles about QRP operating and equipment construction for many years. In this ARRL publication, Doug presents construction projects for the QRP operator, from a simple one-watt crystal-controlled transmitter to more complex transceiver designs. Rather than simply presenting a collection of completed units, Doug guides you through the project "building-block" style. This way, you gain an understanding of how the circuits operate and learn how the building blocks might be put together in other configurations.

Experimentation and low-power operating go hand in hand. Construction of a complete modern transceiver is a major undertaking, but some of the circuits in this book can be put together in an evening or a weekend from a few dollars' worth of parts. Once built, the equipment can be tested and improved as your understanding and skill grow. Many of the simpler circuits can be used later as parts of the more complex projects.

The QRP Notebook contains 112 pages. #0348, copyright 1986, \$5.00, plus \$2.50 postage and handling (\$3.50 for UPS).

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MRF239	30W	136-174	15.00	35.00	
MRF240, A	40W	136-174	15.00	35.00	
MRF245	80W	136-174	28.00	65.00	
MRF247	75W	136-174	27.00	63.00	
MRF248	80W	136-174	33.00	71.00	
MRF641	15W	407-512	22.00	49.00	
MRF644	25W	407-512	24.00	54.00	
MRF646	40W	407-512	26.50	59.00	
MRF648	60W	407-512	33.00	69.00	
SD1441	150W	136-174	74.50	170.00	
SD1447	100W	136-174	32.50	78.00	
2N6080	4W	136-174	6.25	—	
2N6081	15W	136-174	8.00	—	
2N6082	25W	136-174	9.50	—	
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MRF140	89.00	2N5642	11.00		
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KB5CX, SEC: NSADF, ACC: K5DPG, SGL: KD5SL, TC: N5JIM, OCC: K5SJK, PACKET: N5ES, New Officers of the Delta DX Assoc. (New Orleans), Pres: "Wandy" K5KRP, V.P.: W5SSD, Sec: John K5VE, Treas: Jim W5AOD. The Baton Rouge ARC Hamfest held on the LSU Campus was bigger, better and a tremendous success thanks to John K5PGW and Rick N5VA and all their tireless helpers. This was the Baton Rouge ARC 50th anniversary celebration as they proudly displayed a 50 year old tube door prize awarded at their first meeting in 1937 and the display of their ARRL Certificate of Affiliation awarded in 1938. At the Saturday night Cajun Band and Crawfish dinner, John K5PGW presented Charter Member 50 year plaques to Jim N5VF, Jack W5HEZ, Doc W5DQ, Fenton W5GEF and Don W5FVK. The Baton Rouge ARC 1987 Good Samaritan Award went to Ray Sloss K5ZFN. Their Meritorious Service award went to Carl Schroeder W5SKM. On my way to the Baton Rouge Hamfest, an impressive demonstration of repeater linking occurred while I was mobile at Gramercy working the KD5SL repeater in Baton Rouge. Sheldahl KD5SL joined in and asked if I would like to link to Alexandria. Following a few short tone bursts, I was linked to the Alexandria repeater and soon had a chat with Guy W5VF just leaving Alex for the hamfest. Just think of the possibilities selective repeater linking offers in emergencies, storm warnings, public service and a statewide vhf net.

MISSISSIPPI: SM, Jim Davis, KK5Z—ASM: W5TRD, SEC: W5SIKD, SGL: NCSY, ACC: K5VXV, PIO: W5NM, BM: AJDX, TC: W5SXX, OCC: KK5K, STM: N5AMK, VHF coord: N5DWU. Congrats to Rankin County ARC for new digipeater on 145.07; to WJSP on APMT as UHF/VHF awards mgr joining N5JGW; to MS Coast ARC on receipt of Special Services Club status; to KASBBK and N5IWH upgrade to Extra. K5SBC to Tech. Maria Jones, XE1MMJ (EX-XE1CVY) v/split Tupelo ARRL 23g, Maria v/s active during 50th in TX and to Gulf Coast hams for representation w/split booth at beach front festival sponsored by city of bay St. Louis on 7 June. Addnl hams assisting Jones County tornado: KA5WFM, N5JYK, N5IEL, N5GRW, N5AKZ, N5ILU, KA5ZLB and KA5UB, CAND (W5KLV) sess 30 QTC 663; MS rep 100% by N5AMK, DRNS (W5YDD) sess 60 QTC 725, MS rep 100% by N5AMK, KT5Z, W5HKW, KB5W, KE5EC, K5ZSM, N5HGN, MSBN (WJ5P) sess 30 QNI 213 QTC 90; MTN (KB5W) sess 30, QNI 146 QTC 70; MMN (WJ5L) sess 30 QTC 780 QNI 07; MISS/LOU EMER/NET (WD5O) sess 4 QNI 117; ARRL Info net (KK5Z) sess 4 QNI 51; MS Slo Net (W5YRX) sess 22 QNI 79 QTC 23; NE MS FM NET (N55M) sess 30 QNI 215 QNI 5; Traffic: WQ5H 72, W5LHA 29, WB7CQZ 6, KT5Z 124, K5WZ 23, K5WZ 74, N5AMK recd 286 sent 191, total 478; PSHR: N5AMK: 130, 2-30, 5-12, 4-12, 3-12, 2-12, 1-12, 101. Got ur activity reports into N5AMK/K5Z before 6th of month to be listed in "QST".

TENNESSEE: SM, John C. Brown, N4O4—ASM: WA4GLS, ACC: WA4GLS, OCC: W5ZL, SEC: WA4GZO, SGL: WA4GZZ, STM: NG4J & STC: WA4HK, Will looks like we have gotten into the summer with no bad-weather. That can change over night this time of the year. Might remind you that just turning the coax switch to ground will not do the job. You gotta take the coax loose and get several, I mean several, inches from the equipment or else it will jump across and still do as much damage. I am getting some very good reports from some clubs about their activity with various civic activities where they are furnishing much needed route reports on things like marathons, bike races, boat and other kinds of slow speed races. That can do much to give a good public image of the amateur hobby and what it is all about. I find that is our greatest problem. Public awareness of just what is "Amateur Radio." It is suggested that all take advantage of the opportunity to tell our story wherever you can. Sometimes we have to make a change. A very good theme to follow is that we are called amateurs, but in fact we are very much professionals. We just cannot not receive compensation for our SERVICES. It then becomes a very easy topic to discuss and not get in the realm of unknown for the audience. We could all do with some public speaking practice. Our section packet activity is still going at a frantic pace. We are also well on the way to getting our new mode of communication and traffic handling organized. As a matter of fact we are well ahead of our adjoining states in this endeavor. It appears that our biggest problem is not adhering to the plans that have been suggested by our diligent workers. Many are still trying to operate in a vacuum when in the packet mode. Attend the meetings and support the effort to get things operational. Section activity for this period is as follows: LF Sessions-76, QNI-4700, QTC-129; VHF Sessions-19, QNI-2367, QTC-546; CW Sessions-40, QNI-239, QTC-48. It would appear that the VHF nets are not reporting the activity again. Come on fellows, let's have the reports and show the activity of your net. Individual station activity for the period is as follows: W9FZV 174, W4FMR 116, W4DD 112, K4WVO 84, N4AS 46, K4SKB 44, W4PFP 34, W4LBT 21, W4LBT 8, N4D 7, N4OZB 6, K4ABSG 5 and W4EWR 4. Thanks fellows and gals. CW honor roll - N4OZB, W4LBT and NG4J. NICE.

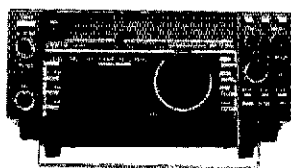
GREAT LAKES DIVISION

KENTUCKY: SM, John Themas, WM4T—This being my first "Section News," I want to thank Dale Bennett, WA4JTE, for the fine job he has done in the past, and the smooth transition. Dale has accepted the position of Asst. Net Mgr. with emphasis on Packet. You may reach me via packet thru K4IUN or KD9PU BBS. Enjoyed seeing everyone at Cava City & Elizabethtown hamfests. Will look for you at Georgetown on August 9th. Russ, K4AGBZ has asked for a break from Net Mgr. of KTN. Russ has done a fine job, and we all owe him for his replacement. Russ has been a real help. Russ, K4AGBZ is working on our emergency readiness. If you are interested in this work, contact your EC, DEC, or SEC. NET QNI QTC SESS MGR MKPN 1266 122 30 WD4RWU KTN 1116 37 30 K4AGBZ KNTN 191 37 38 KB4DZ KYN 306 82 59 K4VX/KZBQ Traffic (April): WD4RWU 184, K4VHF 74, K4IQH 68, K4MTX 35, K4AVX 31, K4ASAA 14, WA4AVV-11, K4HOE 8, W4PKX 5. PSHR: K4AMTX 76, K4IQH 68.

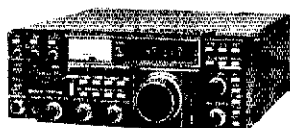
MICHIGAN: SM, James R. Seeley, WB8MTD—This column is being prepared by WB8BGY, ASM-SEC. Recognition for a job well done to a retiring EC's: Genesee Co., WB8UIN. Shiawassee Co., KU8H, Berrien Co., W8KSX, Houghton Co., WB8ZYL. These ECs have provided a combined service of 21 years in Michigan. New EC appointments: N8HZH, Houghton and Keweenaw Co.'s, WD8JLM, Shiawassee Co.; WD8JCN, Genesee Co.; Mt. TC, WB7Z, and W8LBT, the road around the Nation with his transmission line program. Contact Dave if you would like to have him for a club program. State RACES Director, WD8DHS, reports that the SS-2 home study course materials are available directly from: Federal Emergency Management Agency, Home Study Program, Emergency Management Institute, 16225 S. Seton Avenue, Emmitsburg, Md., 21727. With my new appointment as ASM,

ICOM

KENWOOD



IC-735



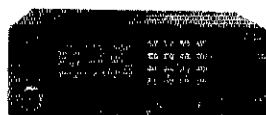
IC-751A



TS-711
TS-811



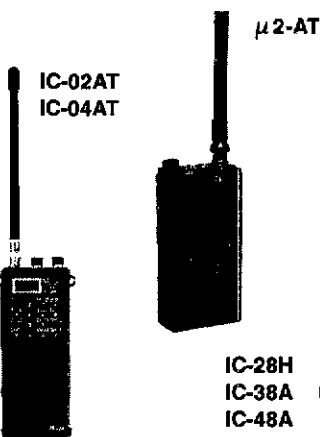
TS-940S



TM-2550A
TM-3530A



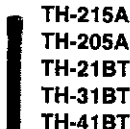
TS-440S
TS-430S



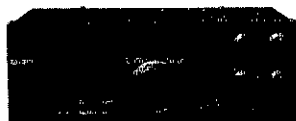
IC-02AT
IC-04AT



IC-R7000



TH-215A
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R-5000
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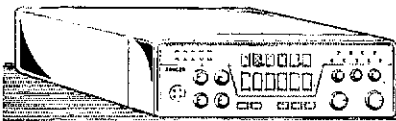


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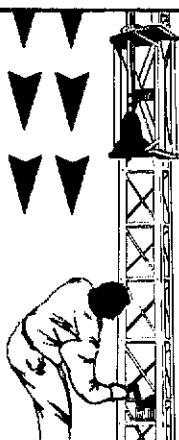
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I have become active in the MI. NTS. Being absent from the NTS for some period of time, I quickly rediscovered how proficient and dedicated the members of the MI. NTS are. In any system there are voids. You would expect some problem with traffic delivery to remote unpopulated areas, but not to major Ham populated areas! Lets face it, traffic handling is not for everyone. We need to recruit new blood and acquaint them to this self rewarding part of "Ham Radio." It approached properly, there could be a cadre of "NEV" traffic handlers on the horizon. All over the state, VHF packet radio stations are on the uprise. There are SSB operations that forward messages between themselves every day. This mini traffic system seems to be operating in parallel with the NTS here in MI. Recruitment, education, and training are the keys to involve these operators in the NTS. Seminars and Club Programs would go a long way toward developing these goals. In a recent letter from W8KQC, MI. QMN Net Manager, his thoughts seem to sum it up and give direction. "I do not think it is realistic to expect that when the traffic arrives, delivery outlets will magically come out of the woodwork. Nor is it reasonable to count on the existing NTS outlets to take up the slack. Most of our NTS stations are not packet equipped. I should think that the best way to build a packet traffic handling network would be from the ground up. Local outlets could be recruited and encouraged to form as the prevailing attitudes didn't get too 'competitive.' The evolving packet system could interface harmoniously with the existing NTS, to their mutual advantage." April Traffic Totals: K8CPS 470, W8KQC 100, K8HAF 63, N8HHH 63, W8BSYA 61, N8CNY 58, W8BRRH 55, W8BDB 43, W8BBG 39, K8UPE 39, W8SCW 34, W8EIO 29, W8HIX 28, N8JX 26, W8YIO 25, N8HWL 22, K8OCP 21, W8URN 15, W8BZL 14, K8Q 13, N8EXS 11, W8CUP 10, W8YZ 7, K8ZJU 7, W8AMHV 6, W8BWW 5, W8VIZ 5.

OHIO: SM, Jeffrey A. Maass, K8NC—ASM: N8AUH, SEC: W8BMPV, STM: KF8J, BM: W8ZM, KC: KJ30, TC: K8BMU, OOC: AD8I, SGL: N8CVK.

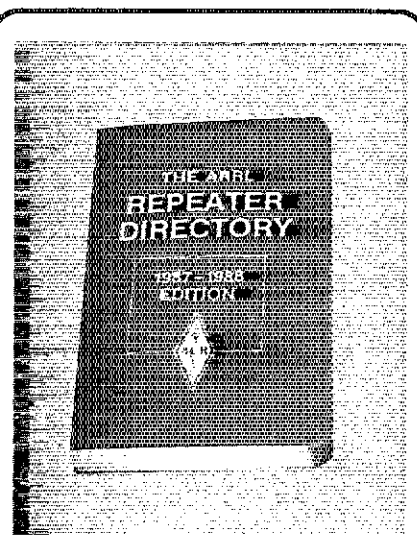
NET	QNI	QTC	SESS	Time(Local)	FREQ	MGR
BN(E)	302	144	30	1845	3.577	N8EVC
BN(L)	223	132	30	2200	3.577	K8TVG
BNR	224	90	30	1800	3.605	W8FK
BSSN	407	334	60	0945,1900	3.678	K8CZ
ONN	214	32	29	1820	3.708	W8KBW
OSN	335	106	30	1810	3.577	N8AEH
OSSN	2301	1035	90	1030,1615, 1830	3.9725	W8BJGW

OSSN 236 93 30 0645 M-F 3.577 K8QJV
 0800 S-Sn 3.577 K8BQV

Ohio Section ARES Net 1500 Sun. 3.875 WD7MPV
 Hamfests in July: Wood County (Bowling Green), July 12, Lancaster, July 12; Wheeling (WVa), July 19; and NOARSFEST (Loram), July 25. VE exam sessions: Portsmouth 7/5; Columbus 7/11; Maumee 7/11; Akron 7/18. Contact me for details. A reminder: you should pre-register with VE Teams if at all possible! I can provide names and telephone numbers for coaching the VE teams offering listed in this column. On August 9, the Third Annual ARRL Ohio Section Conference and Picnic will be held in the Central Ohio area: mark your calendar! This year, in response to your comments, we will plan the event to allow more time for informal socializing and playing, and less time in meetings! This is a family event, so bring the family. In addition, I will arrange for none of the rain that afflicted us last August! More information will follow in the Ohio Section Journal. Of course, the big event in Ohio during April was the Dayton Hamvention, with a record crowd reported (as always!) If you noticed a larger number of youthful attendees than usual, the reason may lie in a program that several area hamfests have begun. The Dayton Amateur Radio Association (DARA), sponsor and host of the Hamvention, distributed 5000 free tickets to 78 area high schools and middle schools. Several of the schools receiving tickets brought students to Hara Arena in their school buses. This is an excellent way to introduce the many facets of Amateur Radio to young people, and it will work for your local hamfest, too! You have nothing to lose, and more Amateurs to gain! Congratulations to Bill Simpson, K14QJ, who was selected as the OH-KY-IN club's "Ham of the Year"! W8BWW and the Trumbull County ARES group provided 120 man-hours of support for their local March-Of-Dimes Walkathon, with 16 operators participating! These local events have many benefits, including training for the operators and increased visibility for Amateur Radio in the community. Every club, and every ARES organization should seek out such events and volunteer to assist! Congratulations to Bob Libbin, AE8L, who has been named as the ARES District Emergency Coordinator (DEC) for ARES District 4 (Southwestern Ohio, including Cincinnati). This area has a long history of strong service by Amateur Radio to the public, and improving its readiness will be a real challenge for Bob! 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 April 1987: Traffic: W8PMU 24, N8GEC 303, W8JGU 27, K8BQV 271, K8BQV 271, W8BQV 251, N8BS 246, W8FPA 234, W8BQ 225, W8KFN 210, W8ZLO 195, K8VQ 187, K8QK 176, W8BQX 168, K8CMA 150, K8GJV 150, K8ND 147, N8AKS 143, W8SKP 134, W8OZK 132, W8BWW 130, N8BB 124, W8EK 102, K8CGF 97, K8BHB 93, N8EVC 92, K8DKR 87, N8EFB 85, N8AUG 77, W8BKC 74, W8BDMF 68, K8BFW 68, W8BIB 64, W8BKW 63, K8BIC 61, W8SSI 54, K8BYV 54, K8BQV 52, W8BKW 52, N8FWA 49, W8WEG 42, K8QKY 40, W8HED 40, W8BLD 39, K8ES 36, K8BANC 32, W8BDS 32, K8RC 32, K8BXL 32, K8BRIX 31, N8BA 29, K8BWI 27, K8BDH 26, K8BOW 26, W8BHL 23, N8PFF 22, W8SWM 22, W8BUE 21, K8BNT 21, K8LQM 20, W8BMR 20, K8BAG 18, K8BOW 18, N8CJB 17, W8BHZ 17, W8BOW 16, K8BOW 16, W8BOW 16, W8BOW 16, W8BOW 16, N8BFC 14, W8BKW 14, K8BNO 13, K8BOM 13, W8ZM 12, N8HWF 12, K8BYM 12, N8BFE 11, K8VOY 11, K8ZOW 11, K8EF 10, N8BOB 10, K8VYT 10, W8BSP 9, K8DRR 9, K8DXZ 9, N8AJU 8, N8KB 8, W8BHL 8, K8ASZ 8, K8BWH 8, N8CDN 7, W8BQZM 7, K8BWM 7, N8BRW 6, N8BQ 6, K8AYT 6, N8CIV 5, N8CW 5, K8BD 5, N8GUP 5, N8BHF 5, W8BCK 4, N8GIV 4, W8BYFD 3, N8UB 2, N8DQ 2, W8BFLM 2, K8BYSC 2, K8EEN 1, N8GIO 1, W8WU 1.

HUDSON DIVISION

EASTERN NEW YORK: SM, Paul S. Vydarenny, W8ZVUK—ASM & STM: K2ZM, SEC: W8ZVYM, BM: W8ZVAG, PIO: K8BTM, TC & OO/R: K2CZO, ATC: W8ZVGM, SGL: K8BHQ, Newsletter Editor: W8ZVNH, NET LISTING(S)/QSP: AESN 63/3 CDN 565/58 ESS 316/64 NYPON 642/432 NYS/E 382/236 NYS/L 357/346 NYS/M 337/262 SDN 303/96. CLUB NEWS: Albany ARA had enjoyable dinner on May 1. They also report K2FJR new member, Catskill Mtn ARA held elections: N2CRJ-Pres, N2EUT-VP, W8ZVNO-Treas, W8ZVYO-Sec. CNRR heard a paramedic talk about first aid and emergencies. ARA heard W2JQS talk about his experiences in the Signal Corps and how ham radio helped. WECA will hold elections and will hear K2RRI talk about his experiences down under. ARA and SARA jointly provided communications for Price Chopperthon



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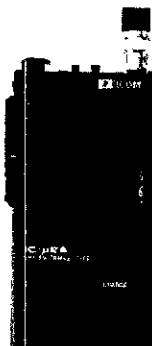
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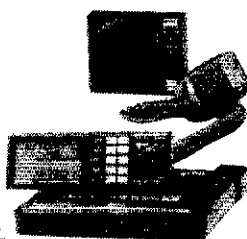
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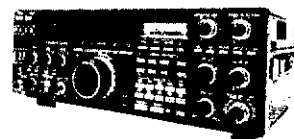
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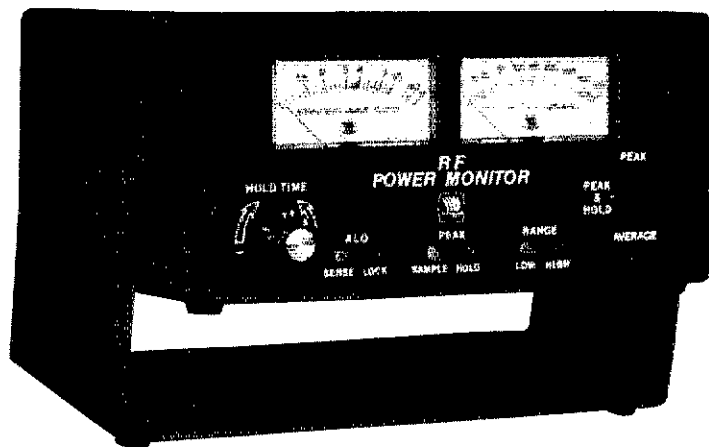
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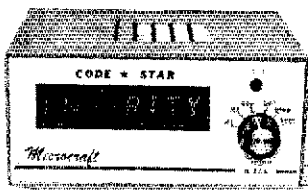
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N2CNZ N2GXH KA2ZPX N2EJU WA2WQZ WB2FMB
W2CJO KA2OWW KB2AFR KA2MJL AARA also did March
of Dimes Walk America with WA2YBM KA2MBA N2ENX
WD2AUS WB2FMB WA2WQZ WA2NCA WA2KQJ WB2WJX
KB2CT N2CZH KB2AFR N2BDO N2BYN WA2VLC KN2J
N2CKV KM2I WD2AER WB2SBO KA2MJL WA2QAD
KA2VAH KA2VAR KB2FC KB2AFR. Note these two lists above
and the duplicate calls. In general, it is the same people out
helping. Everyone should get out there and assist their local
club in at least one public service activity per year. The VHF
nets are extremely vital to the flow of traffic down to the local
areas. Please support your local VHF net. It only takes a few
minutes each day and will make the net manager's job alot
easier. Hope to hear you all on Field Day. Everyone have a
safe and enjoyable summer. April PSHR: WB2EAG NQ2H
KA2MYJ K2ZVI N2EQM WB2VUK KC2ZO. April Traffic:
WB2EAG 229, WB2VUK 227, KC2ZO 156, NQ2H 138, K2ZVI
105, W2VSS 98, KA2MYJ 66, K2ZM 65, N2EQM 49, N2CFT
37, KA2TQW 18, KA2NGJ 13, N2FSJ 11, K2HNW 8, W2CJO
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NEW YORK CITY-LONG ISLAND: SM: Walter Wenzel,
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KA2LD OOC: NB2T TC/HF: WA2YK STC: K2MT SGL:
WA2HYS. The following are traffic nets in and around the
section:

NCVHF 146/745/r	1930 m-t	K2HPG mgr
BAVMF 146.670/r	2000 m-t	K2YQK mgr
SCVMF 145.370/r	2000 m-t, sun.	KA2JMA mgr
NYS/M 3677khs	1000 daily	WB2EAG mgr
NYS/E 3677khs	1900 daily	KU2N mgr
NYS/L 3677khs	2200 daily	KU2N mgr
NYFON 3913khs	1700 daily	KA2UBD mgr
ESS 3590khs	1800 daily	W2VSS mgr
BBS 145.010		Packet Node Station A12Q

All times are local. Please note that A12Q is the Packet Node
Station and that all incoming NTS traffic should be routed
through him. LIMARC will continue to conduct examination
sessions on the second Saturday of the month at the N.Y. Inst.
of Technology, Rt. 25A, Old Westbury, in Salten Mall, RM.
2. Applicants are reminded to bring 2 forms of ID, original and
a copy of their FCC license, check for \$4.50 made payable
to ARRL/VEC, 2 pens/pencils and a calculator for the math
questions. For further info, please contact Joe Kolb, W2NL.
Besides bring the ACC for the section, KA2WJL has been
appointed by Hudson Division Director Steve Mendelsohn
WA2DHF, as the Division speaker coordinator. If you need
a guest speaker for your club meeting or are interested in
speaking to clubs or other large groups, please contact
KA2WJL. Officers for Metroplex are: WA2CJD and WA2JZN
Cochairpersons, WA2LOC Treas., N2FLU Corres. Sec.,
W2KOL Rec. Sec., K2RR/W2CJ Program. Please note the
additional license schedule: GARC has scheduled for the first
Wed. of the month starting Sept. 2; the exams start at 1700
local and any "walk-in" if requested to arrive before 1830.
For further info, call Howard W2QUV at 516-354-6861. Also
on the second Saturday of the month, at the Islip Arts Bldg.
Rm 106 at Suffolk Community College in Selden. For further
info, call George, WA2VNV, at 516-751-0894. New time for
the Kins County ARS net is 2100 local on Thurs.; net control
is Rich, K2TWZ, N.Y.C. Dist. Coordinator for ARS. It's getting
near that time again, NYC Marathon time. If you can help out
in any way, please contact our Division Director, Steve
Mendelsohn WA2DHF. There are still plenty of choice
locations left from which to view the marathon, guaranteed
front row and no parking problems. Traffic: N2AKZ 266,
K2YQK 173, WB2EVF 119, NF2N 112, KB2BKE 58, K2MT
57, KA2ZYX 51, N2GPA 48, NB2D 42, KB2AKY 38, K2HPG
36, N2FLS 28, N2GNQ 20, K2TWZ 19, KA2JMA 18, N2GQS
17, KA2IIV 12.

NORTHERN NEW JERSEY: SM: Robert R. Anderson,
K2BJG—ASM: (VE Liaison) N2XJ. ASM: (FO Info) N2BFG.
SEC: N2BMN. STM: KA2F. OQ/AAC: KA2BZS. ACC: KY28.
PIO: WB2NQV. SGL: W2KB. TC: K2BLA. BM: N2CXX. April
appointments are: ORSs N2CJO, NR2O, W2KWW, W2NPT,
AND WB2RAG, W2QNL as manager of NNJ packet NTS net
liaison activity via the WA2SNA PNS. This is a NM position.
ORSs with packet capability are needed and are requested
to contact W2QNL to coordinate NTS net/PNS liaison
schedule assignments. Contact Lee, W2QNL, at 791-0162 or
via packet at WA2SNA-1. The NJ Traffic Handlers picnic will
be held on July 25th at Holmdel park. The Ramapo Mountain
ARC participated as an exhibitor at "A Look at the Future -
Today" a symposium for middle school students held at the
NJ Ramapo College. Also as part of this event Jeannine
Duane, WB2NBW, NASA Space Ambassador from Long
Valley NJ presented "The Teacher in Space Program." A cer-
tificate of ARRL affiliation was presented to the Chestnut Ridge
Radio Club by SM K2BJG on May 4th. The Sussex County
ARC hamfest will be held on July 19th. Clubs please note:
Director Mendelsohn, WA2DHF as part of his preparations for
the July ARRL Board of Directors meeting will be at the June
20th meeting of the Hudson Amateur Radio Council (HARC).
One of the original purposes of our division council that is still
true today is to provide a means for ARRL members to
communicate their views on current issues via their club
delegate directly to the division director prior to ARRL Director
meetings. Your input is requested. Congratulations to the
following who were newly licensed or upgraded during April
sessions conducted by: NNJ VE Board, Ramapo Mountain
ARC, and Old Bridge RA. Novice: (none). Technician:
KB2COX, KB2CCJ, KB2BZX, KA2RLP, D. Ragno, A. Tences,
J. Sironak, KA2HFA, and KB2CMF. General: KB2CBH, and
KA2WGY. Advanced: N2ATZ, NE2AG, W2DHF, N2DSB,
N2GZU, KA2WJL, and N2HJ. Extra: N2DTL, and N2ARY.
Traffic Data: /P indicates VHF Packet Liaison.

Net	Mgr	Freq	Time	Sess	SES	OSP	QNI
NIJM	WB2ZJF	3695	1000	Dy	30	171	215
NIJPN	W2CC	3950	1800	Dy	34	193	361
NIJNE	KA2F	3695	1900	Dy/P	29	148	207
NIJNL	KA2F	3695	2200	Dy/P	27	91	114
OBTTN	K2SC	147.12	2000	Dy	30	190	313
TCETN	WD2AHD	145.685	1930	Dy	25	29	122
NJVN/E	WB2FTX	145.895	1930	Dy/P	29	58	165
NJVN/L	WB2ANK	145.49	2230	Dy/P	27	58	165
NIJTTN	WA2EPI	223.88	2130	Dy	25	47	132
NJWSN	WB2PKG	3735	1830	Dy	30	133	191
NIJ/PL	W2QNL	145.01	2147	via WA2SNA-1	PBBS		

NNJ Amateur Radio Public Info Line: 201-735-8570
SAR/PSHR: N2DXP 76/64, N2XJ 302/106, W2RRX 92/77,
KA2F 189/116, WB2QMP 34/81, WD2AHD 88/72, W2QNL
195/100, K2VX 100/102, KB2WI 19/, WA2EPI 88/103,
WB2FTX 21/, KA2INE 48/81, W2XO 16/, K2SC 34/, W2CC 23/.

MIDWEST DIVISION

IOWA: SM: Wade Walstrom, W6EJ—ASM: WB2AVW. SEC:
KD8BG. STM: KD8XL. OOC: W6VX. ACC: N8UP. BM: K6IR.
TC: KD8AS. I enjoyed the Dayton HAMvention this year and
was pleased to see Iowa so well represented. KD8BG was
recognized at the Governor's Annual Volunteer Recognition
Ceremony on May 19 for his emergency coordination activities.
Well done, Don! WB2AVW and KB8RE have been elected net

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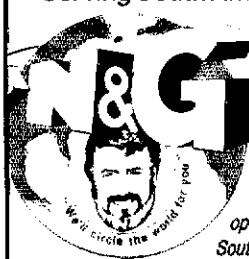
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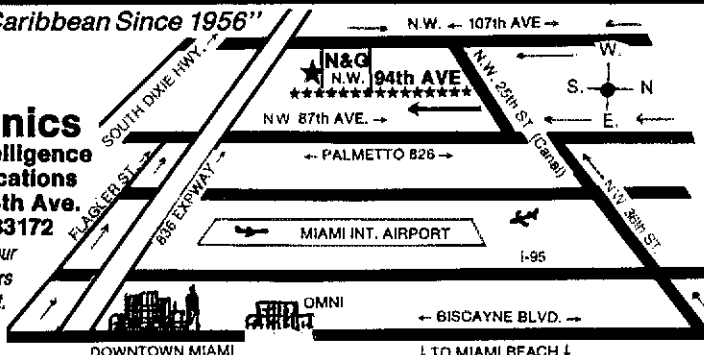
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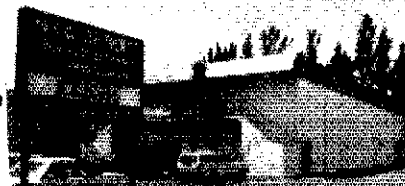
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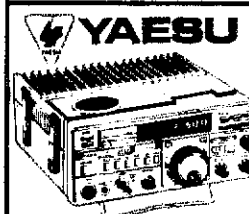


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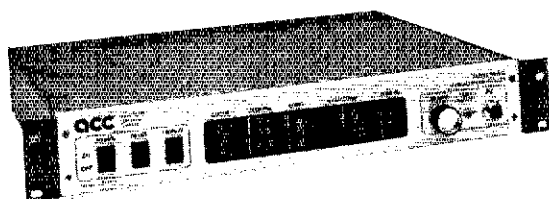


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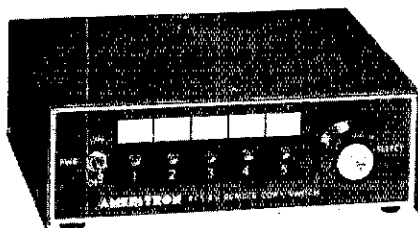
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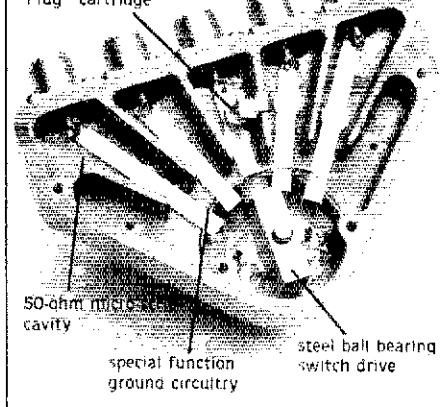
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managers for the Iowa 75 meter net noon and evening sessions, respectively. Former SCM W0LFF is now a Silent QSO Party. Other Iowa participants participating include N0BZ, KE6Y, W0EJ, K0H0E, K0CY, W0AK, K0COP and W0TC. It would be great to have a large Iowa turnout in the IARU HF Championship on July 11 and 12. Congratulations to the following who upgraded to Extra: N2FY0, W0NTN, and W09YZN; to Advanced: K0BCW, K0RRY, and W0H0K; to General: K0MOH and K0YWM; and to Technician: K0GCSY and K0YQY. N0B0 is sporting a brand new tower and beam at his new rural QTH.

NET QNI QTC FREQ TIME DAY MGR
TLCN 226 79 3580 0030 Dy W0YLS
1st 75M Noon 1248 81 3970 1830 Dy W0JFF
Eve 362 88 3970 0000 Dy N0B0
Traffic: W0SS 248, K0GP 117, W0YLS 99, N0FYVB 95, K0ADF 81, K0GSA 64, W4JL 55, K0CXL 55, K0IPT 40, W0BAVW 29, W0JFF 29, W0BMCX 22, K0WOW 21, K0BRE 20, W0BW 3, K0VBA 3, K0DQA 2.

KANSAS: SM, Robert M. Summers, K0BXF—SEC: N0BLD, STM: W0YH. Net Manager K0BN/KPN, W0FRK, Net QKS, W0BZCN, K0 RTTY Mgr, K0CUF. District Emergency Coordinators are W0OAG, W0BYJT, and W0EB. STATE Govt Liaison is N0BLD. Tech. Coord is W0BQM. Bulletin Mgr. K0JDD, ACC, K0BXF and Manager of QKS-SS is W0MYM. Packet Radio is coordinated for KS by N0B0 and the WX NET by W0HOZ. Sorry to report another SILENT KEY, Dick Cobb of Wichita. Dick was one of our more active CW ops in KS and very active in the NTS also. Our deepest sympathy to Dick's family. On the sick list the past month has been W0PKD, Joe. THE PHD hamfest for '87 was a success again, well attended by many KS Hams. ARE YOU A PACKET RADIO OPERATOR? ARE YOU INTERESTED in traffic? Drop your SM a note as to your particular interest in PR operation. Net activity for March: K0BN QNI 1301 QTC 98, KPN QNI 548 QTC 35, K0WVN QNI 764 QTC 691, KWN QNI 913 QTC 716, CSTN QNI 2315 QTC 31, QKS QNI 287 QTC 80, QKS-SS QNI 41 QTC 12. Last but not least—We are nearing completion of the first draft of ARES re-zoning structure. A number of new Emergency Coordinators will be needed. Hopefully each active club in KS will submit a name for consideration. Traffic: W0FRK 489, W0FIR 170, K0BU 148, N0BZ 83, K0BXF 83, W0YH 67, W0HOZ 66, W0FJD 64, W0QMT 54, W0BZCN 49, N0GZT 20, W0MYM 13, W0CHJ 12, W0PB 2, N0LL 2.

MISSOURI: SM, Ben Smith, K0PCK—Elected club officers for 1987-88 of the Jefferson Barracks ARC are: Pres. W0EHS, VP. W0SLK, Sec. W0MKJ and Tres. W0ADS. The Heart of America ARC provided state communications for the St. Patrick's Day Run. Club members participating were: K0ML, K0UAA, K0BSX, K0ORB, and K0BZY. The state operation was organized by K0BUH and W0EJJ. The Central Missouri Radio Association was invited by the Great Rivers Council of Boy Scouts to have an Amateur Radio demonstration at the Scout Jamboree. HF, VHF and ATV were demonstrated. The project was coordinated by W0BTEG and other club members assisting were: A0B0, N0PPE, N0BEF, K0ONL, N0DN, K0HJP, N0CBZ and K0PCK. With Novices now being able to operate 10 meter phone different clubs are starting nets with everyone welcome to check in. On Wednesday evening the PHD has a net in the Kansas City area from 9 to 10 PM 28.43 and the Mid-MO ARC has a net on Sunday evening at 8 PM on 28.325. Silent Keys reported: N0CSB and K0WOL. Field appointments made in April were K0YJE, OES.

NET	Ses	QNI	QTC	Day	Time(PM)	Freq(MHz)	MGR
MON	60	239	283	Dly	7:00/9:45	3.585	K0SI
MOSSB	30	673	84	Dly	6:00	3.963	K0CRB
MEOW	30	554	71	Dly	5:30	3.963	K0DSQ
HBN	21	284	24	Mon-Fri	12:05	3.880	K0DSQ
MTTN	18	31	6	Mon-Sat	6:30	3.370	N0BKE
MOFON	5	96	6	Wed	9:15	222.42/02	A0B0
RRABN	27	338	5	Dly	9:00	148.13/17	K0BLL
SLAN	4	289	5	Mon	8:00	148.31/91	K0WEX
ARES	5	49	4	Thu	9:00	147.85/255	N0PCW
ZAEN	4	81	2	Tue	9:00	147.84/24	N0B0E
JCCCN	5	57	1	Wed	9:00	148.40/70	W0ORI
LOZBC	26	476	0	Mon-Sat	6:00 AM	148.13/13	W0RTL
SAWAC	4	91	0	Tue	7:00	148.31/91	K0BUD
CMEN	5	87	0	Wed	9:00	148.18/76	K0PCK
LOZFM	4	76	0	Fri	9:00	148.13/13	W0RTL
SAHN	4	41	0	Tue	9:00	148.43/73	W0ENW
MARC	3	18	0	Sun	8:00	28.325	N0B0

Traffic: W0BMA 410, A0B0 253, K0SI 176, N0DN 149, W0HTN 136, K0PCK 107, K0CRB 69, N0SS 69, W0BYJX 66, W0BUD 48, K0OCU 39, N0BKE 35, N0R 24, W0ELL 14.

NEBRASKA: SM, Varn Wirka, W0BQGM—STM: Jerry Kohn, W0BEGK, SEC: Michael Ruhrdanz, N0FER. The Victoria Springs Hamfest is the weekend of July 25-26. The Victoria Springs Hamfest is one of the largest yearly gatherings of radio amateurs in Nebraska. The hamfest offers a chance to meet people from across Nebraska and there are even people from some of the adjoining states that attend each year. The hamfest is held at the Victoria Springs State Recreation near Anselmo, Nebraska. Since this is a state recreation area, a state park vehicle permit is required. The huge steak-ry set for July 26 is one of the best bargains around. Hope to see you at Victoria Springs this year. The Nebraska Section Emergency Coordinator, Michael Ruhrdanz, N0FER, has put together a package of materials for the emergency coordinators across the state to better organize our ARES communication capabilities. If you would like to get involved with ARES, contact your local EC, or if you don't know your local EC, contact N0FER. There are two new appointments in the section, Jim Parka, W0BQGM of Gering and now the District Emergency Coordinator for Western Nebraska. W0BQGM will continue to serve as the EC for Scottsbluff County. Everett Draks, W0KFE of Crete is the new Emergency Coordinator for Saline County. If you would like to become involved in your section field organization, please contact your Section Manager. Traffic: K0DKM 272, W0KK 129, N0B 14, W0BQGM 10, W0BQGM 9, W0BQGM 3.

NEW ENGLAND DIVISION

CONNECTICUT: SM, John Ronan, K3ZJJ—STM: K1EIC, SEC: K1ECL, ACC: K3GM, OOC: N41I, TC: W1HAD, BM: K3ZJJ, PIO: KX1B, SGL: W1AH.

NET	SESS	QNI	QTC	MGR
WESCONN	30	318	184	W0TQXZ
ON	56	288	184	K1EIR
CPN	30	289	105	K1BHT
NUTMEG	23	197	47	K1CE
CSN	22	171	76	W0TQXZ
IMRCN	4	60	3	KB1XD

Amateur Radio is at its best when we respond, at times of disaster, to provide emergency communication. On April 24 the L'Ambiance Plaza Building in Bridgeport collapsed, trapping 69 construction workers under a tangle of steel and a mountain of fractured concrete. Although 41 survived, 28 perished beneath the rubble. As the rescue effort proceeded, it became painfully clear that available radio communication was inadequate. N4GAA from the Red Cross pleaded for help

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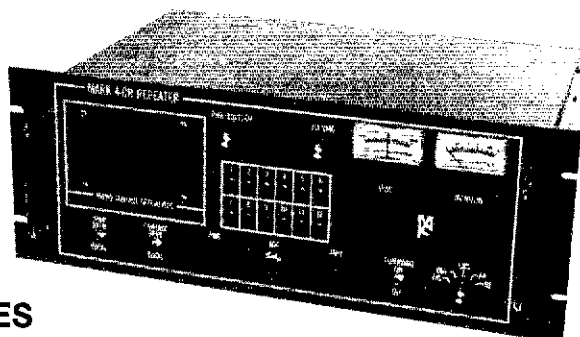
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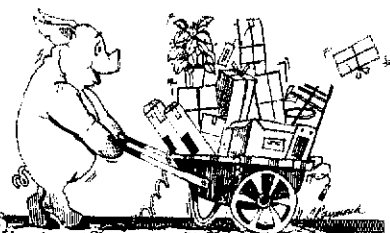
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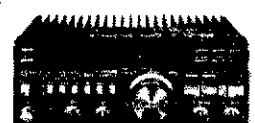


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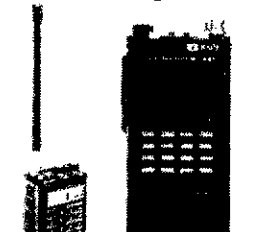
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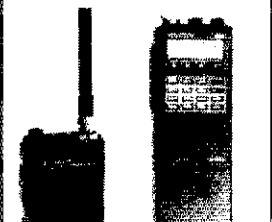
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NEW HAMPSHIRE: SM, Bill Burden, WB1BFE---OOO: N1NHH.
PT: WA2MBQK. This month began and ended with emergency
situations in which local and regional ARES groups provided
vital support. Severe rains caused flooding in the Southern
part of NH. W1FYR, the EC for Cheshire Co was alerted and
the ARES was activated to provide shelter comm. Two dams in
the Keene area were in danger of bursting and ARES set
up a 2M SSB link to report the minute- by-minute height of
the water to city officials. Fortunately, the dams held and, after
51 hrs, the crisis had passed and the alert was terminated.
As a followup, Alan reports that the local Corp on Engineers
now wants to write ARES into their contingency planning!!
ARES nets in Nashua and Salem provided flood comm support
in shelters and on-site data gathering. Other groups around
the state work standby and estimate that over 100 homes
were salvaged! Three weeks later, the Hillsborough City area
was hit with a devastating snow storm with up to 24" of heavy,
wet snow that downed tel and power lines and closed many
businesses. ARES was activated in Nashua by EC KA1GOZ who
with NCS WA1UXA. With the vital "911" lines out, Hams were
assigned to hospitals, nursing homes, and neighboring police
stations. An operator at the local Public Service office allow-
ed the city officials to call in downed wires as tel comm was
out. Several new Novices were able to help via the local J20U
repeat in Nashua. Souhegan Valley club pres W1FJHN
reported that the group provided comm services to local towns
and agencies during the emergency. Thanks to all who helped
their local communities during these emergencies. Far from
the rain and snow, Dave K1DTC of the White City club
in St. Michaels, ME, took a trip to Little Denmark, where a cat with
a bit of blood and he were having a ball on the political front.
Dan of 30mhz and the Federal Comm Privacy Act was intro-
duced in the NH Leg. Thanks to efforts of our Ham legislators
and other concerned Hams, this misguided bill was killed in
committees. Thanks to KB1MK for publicizing it and to SGLG
N1ADX and our Ham legislators for watching our interests. The
Manchester Amateur 4H club is now active on 10M SSB or on
Friday evenings and the Hillsborough County Extension
publication featured an article on club member Sean Dulosco
KA1KGB about his participation in the ARRL youth forum at
Boxborough-86. CNHARC pres NILT spoke to Boy Scout
Troop 65 about Amateur Radio and communications. N1EECB
spoke about the role of Amateur Radio in the community. There
they "captured" the scouts' handling of the situation. The
state representative, who's efforts resulted in the NH House
of Representatives passing a resolution honoring the ham
community for years of community service. Volunteer exams
were sponsored by the Concord Brassponders and the Mt
Moriah Repeater Society with continued heavy demand for
scheduled exams. As for my activities, I had a great time
visiting the GSARA in Manchester and Dot and I had fun at
the FAREX and banquet in Portsmouth. Locally we have
been using the Nashua 220 repeater. Interestingly, new hams
(and some old timers) to the RS-5 and RS-7 satellites during
the morning commute time. We have put about 10 operators
on for their first satellite contacts and hope to give many
Novices and new hams a taste of satellite operation and even
DX on the low bands while they commute to work! Finally,
we again had 100% on FRN in April thanks to a lot of hard work
by REPEATER TRUSTEES. We would like to get reports or
emergency calls on your repeaters during each month. Please
send me to W1TN-we need that public service evidence!

NET	TIME	FREQ	MGR
GSPN	6 PM	3942	WA1YZN
N1NHH	7 PM	2840	KB1XI
GSFM	8:30 PM	146.75	K6UXO
GSFM	8:30 PM	146.475	K6UXO

Traffic: GSFN 291, N1NHH 118, GSPN 116, N1NHH 20, W1PXE
702, N1CPFX 503, W1FYR 343-BPL, WA1FHB 160, W1PXE
126, N1AKS 126, W1ALE 117, KK1IE 110, NE1-J 30, KA1NTX
85, K1QTQ 80, K6UXO 70, WB1HBE 55, K1PQV 47, WA1YZZ 47
43, KB1XI 42, WA1JYV 40, KA1IMR 36, KA1HPD 18, KA1OU 17
17, WB1JYV 40, K1LMR 36, KA1HPD 18, KA1OU 17
WB1TXM 15, K1LTM 11, K1QIQ 9, K1APFS 7, N1DQA 6
(KA1PFS is a brand new Novice).

VERMONT: SM, Frank I. Sulitor, W1CTM---ASM: KD1R. STM:
AE1T. SEC: WK1RP. PT: WA1YOY. Public Service without
our section is now in full swing. Many worthwhile causes have
come to depend on us to supply communications for their
public events. Walk-A-Mare activities were supported by the
following BARC, CVARC members: KA1CSB, KE1LD, VE1
K2KB7, K11AB, N1B1O, N1B1O, N1B1O, N1B1O, N1B1O, EBT
W1UR, WA1BM, CTM, DOC, PMH, WA1PDN, UVW & WB1ABG.
If U or UAR call support such activities, pse let me know so
I can give you the credit you deserve. Twin State RC had a
Dxpedition presentation by KA1CRP who operated from Ft
land (St. Pierre) & the TSEN has a new Net Manager---K1TQY.
W1BD autopatch is now in use for 223 & 229 exchanges.
Traffic summary report from WB2JSJ & N1QG says 30
hams plus ham dealers were again able to afflict total chaos
on a community of 200 K people---and enjoyed every minut
of it! I hope that the BARC hamfest on August 8-9 can do the
same thing some day. New CVARC officers elected are
N1EBT: K1BKX, WA1PDN, KA1OOI, KH1KH, KA1LD, KC1U
& KB1UF. V1TN continues to do a great job handling section
traffic and K1K1O seems to be big welcome to newcomers
K1DQD, K1TK & WA1TT1. U have an open invitation to check
in on 3539 kHz daily at 1900 L. Hot off the press upgrades
Extras KA1PEZ, N1EBT; Advanced NT1KM; General KA1OVS
KA1PIR, KA1PUJP, Tech. KA1MTO, KA1PGY, KA2KDQD
WB2JIX, KB2CJC, KB2CJM. Next VE exams are scheduled
for August 9 at BARC hamfest. To obtain a Section Net guide
send an sase to AE1T. Section Net reports: VTN 30/205/19
VBSN 26/207/68, VTPHN 4/68/5, GMM 26/449/34, CA
26/587/49, CVMFN 4/72/5, TSEN 4/44/6, BARCSN 4/55/52
Traffic: K1TQ 792, WA2SP1 471, AE1T 169, WA1JVY 156
N1DHT 103, K2KB7 67, NB1A 12, W1KRVR 11, CU at hamfest.

WESTERN MASSACHUSETTS: SM, Bill Voedsich, W1UD--
STM: KA1EXJ. TC: KA1JJM. PIO/AOC: K1BE. SEC/SGLG: W1BH1H.
This month was very active with emergencies at bot-
toms of the section. MARA members, under the direction o
K1JHC, the Leominster CD with flood control. A dam watch
was established for three dams in the area. Road washouts
necessitated constant surveillance after nine inches of rain
fell between 10:00 AM and 1:00 PM. A road crew was sent
via ham radio. NOBARC members, via K1FFXR, patrolled the
Mobile Home Park in Williamstown, CD and Red Cross laison
was established on a round the clock basis. NEJC has been

appointed APIO and Kevin WA1KLM EC for Worcester City Area. Thanks to the gang at Mt Tom ARC for an enjoyable evening. W1KK demonstrated an operating spark transmitter and explained the operation of each component and how many of them were "home brewed." W1KK informed me that rare grid square FN51 will be active during the VHF Contest, 6,2,220,432, and 1296 will be used. Each Sunday at 8:00 PM CMTA, via W1BIM/R 46.97, holds an info net for amateur operators in the Worcester County area. Tune out after 10:00 PM. W1JUD 133, KAI1 122, W1KK 98, KATEXJ 90, KATEQ 38, W1BHIH 30, W1SVJ 24, W1AOPN 17.

NORTHWESTERN DIVISION

IDAHO: SM, Don Clower, KACT—SEC: K7REX, STM: W7GHT; OOC: W87CYO, ACC: N7BI, PIO: W87PQ. Twin Falls ARC conducted the communications for the "March of Dimes" walk-a-thon in Apr. S.W. Idaho ARES group had a large turnout at the Apr. 15th meeting at the Civil Defence building. Lots of good ideas were discussed, and many plans were made. A Big Field Day station is going to be set up at the Old Penitentiary near Boise with emphasis on Novice operations. If there are really good stations for amateur radio, let's talk in on 46.52, traffic: N7BHL 145, W7JMH 116, W7GHT 219, KAT10H 28, SE7K 22, K7CXG 13. PSHR: N7BHL, NW7K, W7GHT

NET	FREQ	TIME	SWSS	QNI	QTC
ID CD	3.990	0810 AM	22	843	48
IMN	3635	9 PM	29	220	89
FARM	3937	8 PM	30	1930	15
NW7N	146.38/98	7:30 PM	30	967	45

General: We are looking for a few good hams for OO duty, if you are interested contact W87CYO, 73, Don.

MONTANA: SM, Ken Kopp, KBPP—New Sect Asms: ASM: N7AIK, ACC: N7KRW, BM: K7KCR, PIO: N7HAZ, SEC: K7CHP, STM: K7FR, SGL: W7JMX, TC: K7YD, ATC: KB7KS, N7B. Volunteer needed for OO position. K7CHP needs EC's. K7ATC, K7ZJZ, KB7K, K7BRC, K7BRS, K7A5QJ, K7BRC, "Proctor Good Turn" Father's Day picnic in Sydney June 20/21. Info in Lef, KA7MUJ (482-1481), Drs. Glacier Waterfront H'test July 17/18/19. Info in Shirley, K7COA (482-6958), RACOM 87788 Officers, Chair: KB7KS, V'Chair: N7GXW, Sec/Treas: KBPP. Traffic: W87WVD 58, PSHR: W87WVD

NET	SWSS	QNI	QTC
IMN	29	220	89
MSN	4	71	0
MTN	30	1650	154

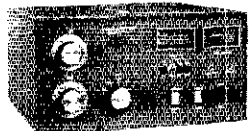
OREGON: SM, Randy Stimson, KZ7T—STM: W7VSE, SEC: N7KAT, PIO: K7C7N, SGL: KA7K8K, ACC: W87TWD, RFI: AK7T, OO: N7SFC, STC: N7ENI. I would like to welcome two new appointees Don Thiessen, W8BBS, as an official observer and Brenda Gray, KM7R, as Assistant Section Manager. Brenda will take on the task of establishing a state wide network of packet radio stations to begin to handle messages. This eventually will be linked with other states to develop a national traffic system for packet. If any of you packeters would like to get involved, please write or call me and I will relay to Brenda. My wife, Lorna, KA7FED, and I had a delightful time at the Mt. Hood Amateur Radio Club Spring banquet, just a great group of people. I also enjoyed my visits with the Tillamook ARC and the Radio Amateurs Of The Gorge in Hood River. RAQ's sure put out the longest news letter I have ever seen. We are also working on a RFI committee in the Portland area. It will be called Lower Columbia Interference Committee, but one on the next month. One other item we need emergency coordinators for Washington and Yamhill Counties. If you have any interest please contact N7CPA, or myself. Traffic: W7VSE 443, N7BGW 314, N7FXJ, 80 W87VSN 79, N7APC 58, KA7EEF 41, N7ELF 28, W87BP 21, KA7AID 17, W7LNE 6, (Mar.) N7LEF 76.

WASHINGTON: SM, Brad Wells, K7BL—STM: KD7ME, SEC: KA7INX, BM: N7CAK, TC: W7BUN, OOC: N7DVR, ACC/IASM: K7C7P, SGL: KD7AC, ASM: KD7G. The amateur radio bill in the Washington Legislature is dead for this session. Despite heroic efforts on the part of many hams, the legislation died in committee. However, many of our Senators and Representatives have begun to realize that we can be a potent and vocal political force. If, between now and the next session of the Legislature, we do our homework and advise our local politicians of our club and civic activities, the chances are good that legislation benefiting amateur radio can be pushed through the next session of the Legislature. Many thanks to all who made use of the toll-free "hot line" and to those who appeared at the various Committee hearings. Plans to attend the Northwest DX Convention July 25 & 26 in Beaverton, Oregon. This is an annual event, hosted alternately by the three largest NW DX clubs. It's an opportunity to meet "big-gun" DXer's, attend seminars, renew old friendships and have fun. Contact the W7WDXC or check the 147.00 rpt for further info. Public Service activities this month: W7WDXC (208-271-5314) and the six Seafair Community Parks—contact WA7EBH (206-392-5303). KA7CRO is the "Ham-of-the-Year" of the LCARA. Marlene garnered this award for her long-term commitment to public service. N7ELK is the new EC for Asotin county. N7IZX is the new EC for the State DEMO Yakima ARC provided communications for the Tree Top Classic Bike Race. Olympia ARS has renewed as an ARRL Special Service Club. N7EU, WA7YCM, and WA7SPR are running code practice sessions simultaneously on 29.290 and 22.4.10 MHz. These sessions are Monday thru Saturday at 2 PM local time and are available to any ham in western Washington. There is also an opportunity to discuss amateur related topics after each session. Other nets of note: San Juan County Novice Tech Net—Sunday at 8 PM on 28.450 MHz; Kitsap Traffic Handling Training Net on 28.400 MHz at 8 PM Wednesdays; Slow Speed Training Net on 21.125 MHz at 7:30 PM on Wednesdays; Thurston County ARES every Tuesdays at 7 PM on 22.4.6 MHz and 7:15 PM on 147.36 MHz, both followed by the OARS Info net at 7:30 PM; Yakima ARES first Monday on 148.85 MHz at 8 PM. WA7Q net every Monday 7:30 PM on 148.85 MHz; Pierce ARES Tuesdays at 7 PM on 147.28 MHz; Kitsap ARES Sundays at 7:30 PM on 145.31 MHz. K7WZJ, WA7ES Monday 7 PM on 147.28 MHz. Please send your net info to me, SEC: KA7INX, traffic: W7WDXC, K7CZK 120, K7R7, 192 W7GIC 187, W87WNO 176, W87CBN 170, W7GB 121, N6E0Z 103, N7GQJ 66, W7APM 63, K7SLX 49, W7LBK 42, W7APN 22, N7DIP 19, KA7PML 19, KE7PI 12, W7UE 8, KD7ME, KA7FL.

PACIFIC DIVISION

EAST BAY: SM, Bob Valtio, W6RGG—ASMs: W6ZFR, N8DHN, EC: W6LKE, OOC: NY6Z, TC: N6AMG, STM: K6APV, reports Lawrence Berkeley Lab had an earthquake preparedness drill in which 7 amateur operators took part. Our new Section Novice is KB6CP, who makes 15 to 20 WPI calls a day. Future Novice LARK membership is at an all time high of 115, including these newest members: KB6DOW, KA7II, KB6PFI, and N6AS, FB6RC had AMSAT Area

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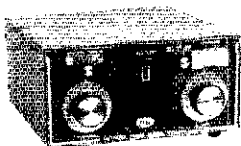
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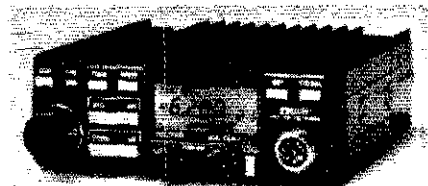
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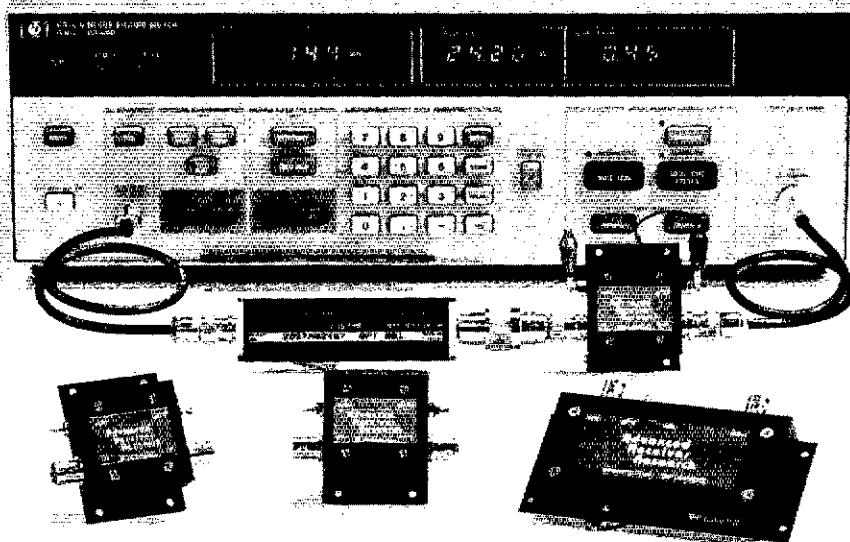
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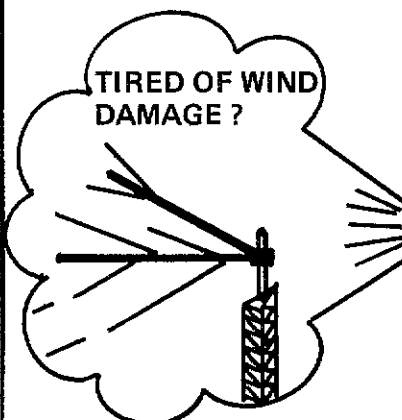
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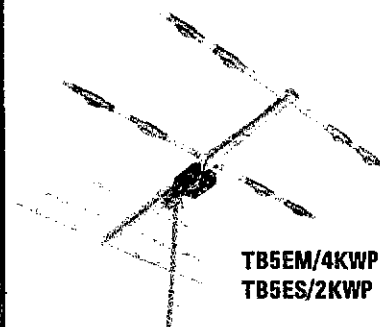
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Coordinator WB6GFJ as their guest speaker. They welcomed new members KL7JZ, N6AVB and Jerry Fox, all of whom will take part in celebrating the club's 40th anniversary this year. 1947 must have been a banner year for Amateur Radio, as MDARC is also celebrating their 40th anniversary this year! BARC can take great pride in the opening of the Benicia Amateur Radio Emergency Operations Center at City Hall Complex. Congrats to this very active group. HARC's new officers are N6MOM, Pres; K6GMH, VP; N6MQQ, Sec; WA6BLG, Treas; N6HWJ, Sgt at Arms; N6BNY, EC; N6DOC, Editor. Traffic: WB6DOB 165, K6APW 95, WB6UZX 30.

NEVADA: SM, Joe Lambert, WB8XD—Many thanks to all who contributed during my first term as SM. During this period there has been great progress with the EC directed by K7HRW. I am also happy to see increased club activity, VEC exams, training and statewide coordination. Look for big improvements in traffic handling and NTS integration soon. Our improved packet capability will play a key role here. I am counting on your continued support in the next two years. TARA reports election results: Pres: WB6PSZ, Vice-Pres: N7EQU, Sec: N6ELV, Treas: WA6SIM, Board: K6SPD, W6CSP, WA6EWW, NX6W, N6ELV. They are preparing for another great Field Day. In Southern Nevada, field days are being organized by N7CXD, and by FARS (Contact WA7JJO). Plan now to attend the Pac. Div. Convention in S.J. Oct. 2-4. Southwest Div. in Scottsdale following weekend. Flagstaff Hamfest July 24-26. Congrats to K07YZ who was successful in the Boston Marathon run.

PACIFIC: SM, Army Durt, AH6P—Aloha and hafa adai to all of the Pacific, especially our newest volunteer, Bob McFerron, WH2AEN, as EC for Guam. Lots of upgrades and new licenses. From Maui, NH6HD from Gen to Adv, WH6BLZ from Nov to Tech, and NH6FT from Tech to Gen. From Hilo, NH6HS and NH6GG from Gen to Adv, WH6BJE from Tech to Gen, WH6BIR, WH6BLJ, WH6BLH, and WH6BLO from Nov to Tech, WH6BFF from Nov to Gen, WH6GV and NH6FO from Adv to Extra. From Kauai, KH6FK from Adv to Extra. That is absolutely outstanding! KH6BS reports growing activity on 1890 kHz AM, most with homebrew gear. On Maui, AH6GU, VEGGQ, KH6H, KH6HHG, KH6JLS, KH6MX, KH6NO, N6HPC, NH6EW, KH6HD, WH6BFT, and WH6BLZ provided comm for March of Dimes WalkAmerica. In Hilo, AH6P, NH6FF, NH6GP, K6ZIXG, NH6FN, KH6LE, NH6ET, NH6GN, AH6GO, WH6BIR, KH6FKG, AH6GO, and WH6BOI did the same. Traffic: KH6S 27, KH6H 24.

SACRAMENTO VALLEY: SM, Bob Watson, W6IEW—This is the Yuba/Sutter ARC month. First, thanks to them for the use of their repeater for the monthly section net and thanks to them for again sponsoring the mid-year Section Meeting in their area on Sunday, July 12. Check in on their repeater for directions to the Section Meeting. SECTION NET: First Sunday each month, 8 PM on 146.085, input up, Yuba/Sutter repeater W6AXMR. Not Control: W6IEW or W6RFF. Net participation has been very poor. Shall we call it off, move it to another time, or what? Continuing with Yuba/Sutter ARC's secretary, Bob, WA6OWH, now has a third ham in the family, his daughter Kristin has just become KB6RLH. Congratulations to her and to the other seven new Novices that resulted from the club sponsored classes. Bob is also running Tech upgrade classes with 16 students ranging in age from 9 years old to 60 and the club will soon be holding their first ARRL VEC sponsored exams. The public service activities by SV Section clubs are too numerous to cover but I do want to mention that the Amador County ARC is again providing communication support to the Search and Rescue activities of the Sheriff's department. Having a newly upgraded Ham, Dave, KB6PNT, who is also deputy Sheriff brought in traffic: N6LUV 350, WA6WJZ 119, K6SRF 99, N6LAM 26, WA6ZUD 17, W6RFF 13, K6GW 12, KB6COH 7, WB6SRQ 4.

SAN FRANCISCO: SM, Bob Smith, N6ST—April was the Annual DISASTER DRILL MONTH for the SF Section with 6 clubs participating in disaster drills within their county ARES-RACES Groups. This is the place where we find out how to help, what to do, and where our groups need more preparation. Get out an support your local clubs in the A-thons, drills, and demonstrations. This is what Amateur Radio is all about! N6IT, MARC member is waiting to talk his Bar Exam, now they have a resident lawyer in there fold. How many other clubs in the section have GOOD LEGAL ADVICE? Congrats to W6RNL, Bob, on his 80th Birthday, of which 60 years as a HAMI MARC is helping with 9 public Service Events this summer and NEED help from the local hams any volunteers? See K6LRN, MAC, K6EXDA, as OARCA will be participating in ARMED FORCES DAY operations at Skaggs Island, what a neat way to RUN real POWER! N6CJ really believes in QRP—He just qualified for the DXCC Golden Jubilee Award with 100 dx contacts with FIVE WATTS! Don Nelson, WA6NBG, is the new chairman of the Board for FWRA. Pete Spruance, KE6LF, is back as DEC for Humboldt County. Look for the new DIGI on 154.01 from Mt. Pratt in So. Humboldt County in early May. SCRA is in the Packet Business now with a donated digi from an anonymous person and funding from the club to install it. Wouldn't it be nice for every club to have an ANONYMOUS person like SCRA and MARC have for equipment? The traffic count from non-packet stations is not a trade. I would like anyone handle NTS traffic in the section on phone or CW? If you do let me know for the traffic report. Traffic: N6FWG 36.

SAN JOAQUIN VALLEY: SM, Charles McConnell, W6DPD—SEC: W6CJU, STM: N6AWL, TC: WA6EXV, ACC: W6DPD, Asst. SMs: W6TRP and K6YK. Appointments renewed: EC: WA6OYF, WA6JOR, and W6BSPY; CC: W6BITM; ORS: NM N6AWH, N6ECH is Extra. WB6FYU and WA6YAB are Advanced. KB6INU is Tech. N6NLU is AA6AZ. KB6MO is N6PDE. W6DPD has an IC Q3AT. AF6Y has a TS 440 and a new QTH. W6BGVS has a TS 130. If you want upcoming events listed in this column, please send me the information at least 3 months in advance of the event. The Pacific Division Convention is in October in San Jose. Traffic: N6MCY 101, WA6YAB 20, W6DPD 17, N6MXG 5, W6BITM 2.

SANTA CLARA VALLEY: SM, Glenn Thomas, W6BW, SEC: WA6OCV, TC: WA6PWW, STM: N6JLL, PIO: W6BNA, ASM: N6JQJ & N6SN, ACC: W6MKM, BM: (vacant) OOC: (vacant) Congratulations to our newest DEC, Sharon Moerner N6MWD. Sharon took over the job on July 1 and unifies the ARES in Santa Clara County for the first time in some years. Special thanks go to our two "retiring" DECs, Bill, W6BOAL, and Rick, W6SVUL. The ARES in Santa Clara County grew into one of the finest ARES groups in the nation under their guidance...not that they're really retiring, they both have plans to remain very active in the ARES...Bill, W6BOAL was honored by the City of Saratoga at their Volunteer Luncheon for his many years of service and leadership. We can only say, AMEN!...the Redwood City/Santa Carlos ARES group, the Bay Area Skyward Group, and the National Weather Service have announced a Severe Weather Workshop for Amateur Radio Operators to be held on July 25 at the SLAC auditorium. The agenda reads like a continuation of the Emergency Responder Institute recently held and it looks to be an excellent opportunity. The deadline for registration is July 11 and the cost is \$10. Contact W6DGT & N7EQN on packet or KE6AD on the SPECS repeater (145.27-), the SVECS repeater (146.115 +),



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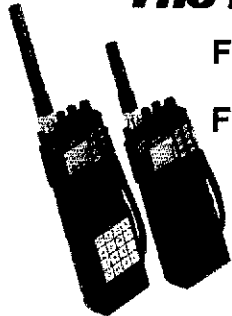
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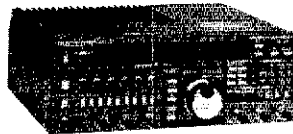


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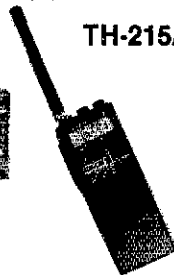
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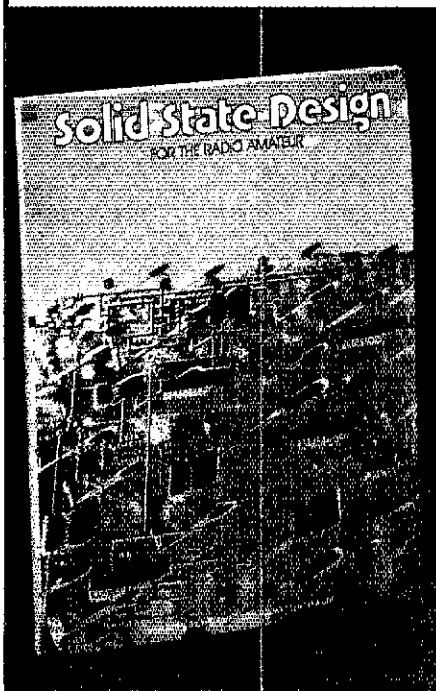
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Solid State Design for the Radio Amateur was first released in 1977 as a theoretical and practical guide for the radio amateur interested in using solid-state devices in RF design work. In the just released second printing, the occasional errors and omissions which inevitably creep into a work of this magnitude have been corrected, making this publication even more valuable not only to amateurs, but professional RF designers as well.

Solid State Design is among the select few technical books that have sold more than 50,000 copies. Why has it achieved this enviable sales milestone? For one thing, its 9 chapters and 256 pages are chock full of good basic information on circuit designs and their applications. Much of the data such as transistor modeling, cannot be found in other publications. Some of the topics covered are: basics of transmitter design, power amplifiers, matching networks, receiver design basics, advanced receiver concepts, modulation methods and test equipment. 1st edition, 2nd printing. \$12.00 in US funds. Add \$2.50 for shipping and handling (\$3.50 for UPS).

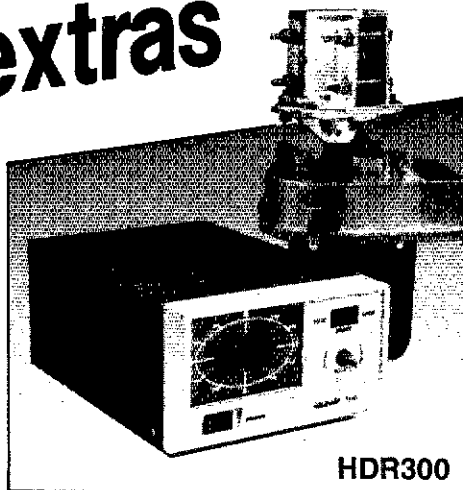
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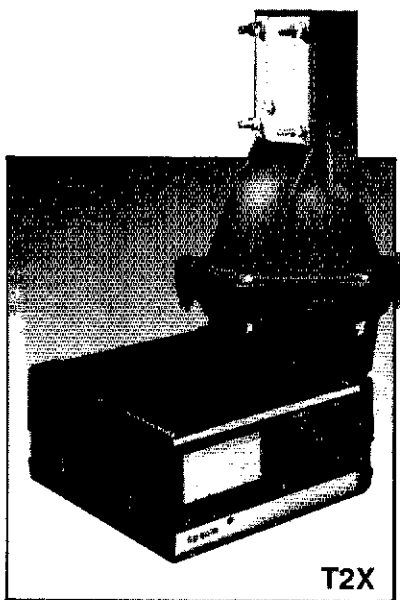
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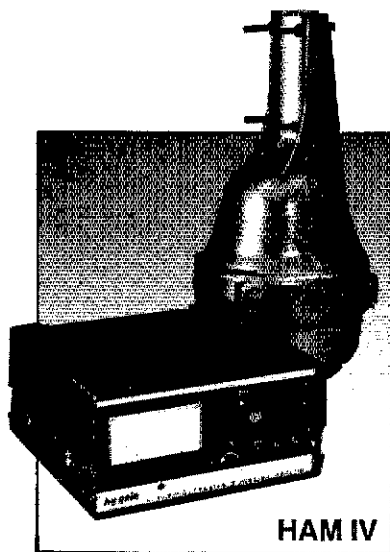


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or Coasts (146925-), or K16IW (415) 369-0167, or K6ANN (415) 593-8952 for more info... Amateur Radio supported several bike rides. These are both a fun outing (I spent a very pleasant morning atop Mt. Diablo) and a valuable source of training and experience for things less well planned, like disasters! I urge you all to do at least one or two of these events each year...the city of Palo Alto had a drill involving a simulated HAZMAT spill, including the evacuation of residents and the establishment of shelters. WA6NIL and the Palo Alto ARES play an important role in this...I still feel that there are many of you out there who would qualify for Public Service Honor Roll if only you'd send me a report! I really would like to acknowledge all of you for your superb work. Is PSRR the appropriate vehicle for this? Let me know what sort of acknowledgment you would like. I can be directly to Div. (il) PSRR: W6NJR, N6MWD, K16AP. QO reports: K6AYB, Traffic: W6YBV 338, W6KZJ 120, N6JLJ 39, K6ASXW 21, W6PRI 15, K6BIWG 11, W6HAD 10.

ROANOKE DIVISION

NORTH CAROLINA: SM, Rae Everhart, K4SWN—SEC: AB4W. STM: K4NLK. BM: K4IWW. ACC: WC4T. PIO: WA4OBR. TC: K4ITL. SGL: KE4ML. Top NEWS this month is the ARRL NATIONAL CONVENTION in Atlanta, GA 10-12. Its close to this section, so hope that everyone that can will attend. HQ has just announced that the PSRR count each month will continue as before—NO CHANGES. ARRL has now authorized Volunteer Examiners to apply for Call Sign Badges under the badge program. You can apply directly to Div. Director. Nice to see everyone Raleigh Hamfest and at the NTS/ARES meeting. Novices are populating 10M, heavily in section. Lets make them welcome. K4NLK and K4IWW responded to survey from HQ regarding Packet Radio in the NTS. Get on the bandwagon. NOW!! WANTED: Stations in Greensboro, Winston-Salem, and other metropolitan areas to help NTS on regular basis. Any volunteers? Let STM or NM hear from you. SILENT KEYS: K4AUI, K4DGP, W4EL, WA4IUU, WB4UJH. Vacation time is here and if you're taking one, don't announce on the air you're going to be gone. Lots of bad ears are listening. Fine report this month from O's KARP and WD0DOL. Congrats to K4NLK on PSRR wallpaper. This month will have lot of activity. The Olympic Games trials will be held in Raleigh, Chapel Hill and Greensboro. ARES will help with communications. Greensboro ARC provided communications for the Soccer Games. Hamfests: Cary July 18. Have you got your State Registration Amateur Radio License Plate yet? Write SM if you need application. If you have a problem with your application or renewal contact Betty Lewis at DMV in Raleigh. N4UH has his DXCC Golden Jubilee Award. Just work 100 different countries in 1987—NO QSLs required. Apply to HQ on correct application form. With all the snow this past winter, I hope everyone enjoys the summer and vacations. Take Amateur Radio with you. Traffic: K4NLK 418, N4JL 158, AA4MP 153, AB4Y 151, K4AEX 137, K4AEX 118, K4IWW 117, AA4TE 108, WD4TE 79, KA4TLC 70, WB4WII 67, K4SWN 64, WB4N 44, WA4MNR 36, K4YV 33, NE4J 31, N4CJ 26, AJ5F 22, WB4CYN 20, N4MMM 20, WD4EQK 18, N4TN 16, N4LUO 15, WD4MRD 14, WD0DOL 11, NT4K 10, WD4RMQ 9, KA4SFJ 7, N4JEO 2. Total: 29 SARS 11 PSRRs. K4JHF now AA4ZV.

SOUTH CAROLINA: SM, Jimmy Walker, WD4HLZ—The nets in our Section need your support and participation—even during the summer when the weather may be nice outside. It takes only a few minutes for you to check in, see if there is traffic for you, your area or other nets you intend to visit, and then be on your way. Although it's nice to stay longer for the informal part of the net, it is always optional. This month and next, this column will feature information concerning the two Section nets which would be grateful for your participation. For those of you who at home during the morning plan to check the Noon Net which meets on 3505 M-SAT at noon and 12:30 PM on Sunday, Barbara, K4AUIV, is Net Manager and the net frequently is in session for only 10 to 20 minutes. Representation from all points in the Section is needed to route traffic which the previous evening local nets have designated for other parts of the Section, or traffic which is leaving the Section. PLEASE HELP! Traffic: K4ZN 179, W4ANK 143, KB4BZA 114, W4FMZ 75, W0IKT 69, KA4LRM 44, WB4UDK 42, W4DRF 29.

VIRGINIA: SM, Claude Feigley, W3ATQ—STM: KB4WT. SEC: N4EXQ. ACC: NT4S. OOC: W4HU. BM: AB4U. TC: WB4MAE. SGL: W4UMC. PIO: AA4VP.

VTN	1 PM	3907	KB4NGO
VSN	6 PM	3947	KI4BR
VSN	6:30 PM	3680	N4KSO
VN (EARLY)	7 PM	3680	N4GHI
VN (LATE)	10 PM	3680	WB4MSG
VLN	10:15 PM	3947	K4JMF
SVEN	7:15 PM	146.82	NT4S

Thanks to W4UMC and W4JX for sending me copies of their replies to FCC Docket 87-14 regarding loss of 2 MHz of the 220 MHz band. I hope that many more of you have expressed your concern to FCC. Our SEC, N4EXQ, announces N4HCP as EC for Alexandria replacing WD4RFS, KB4CWI as EC FOR Portsmouth and KA4TWI will be assisting WB4AXY with his DEC duties. Many amateurs in the Tidewater Area participated in the 2 day NDMS exercise using both voice and Packet communications. The section has 951 Hams enrolled in the ARRL program; this is an increase of 49 members since January 1987. We regret to report W4DP as a Silent Key. N4EXQ reports approximately 100 Hams handled communications for the State Special Olympics in Richmond in which 4000 handicapped persons participated. Again, a reminder to all Affiliated Clubs to submit their 1987 Annual Reports. Reports received so far are far below those received last year. These reports are essential if you wish to remain on active status. W4HU reports KC4VIR as a new OO/Auxiliary station with WD4MVZ and K4KPT taking their qualifying exams. K4KPT has joined the ranks of the Assistant Technical Coordinator stations (ATC). AB4U sez OBS stations KP4PW, W4PVA and KB4WT are active sending WIAW bulletins with KB4WT and W3ATQ putting the bulletins in Packet bulletin boards. If interested in this program contact AB4U thru the courtesy of NK4U the following VE exams are listed: July 11, Virginia Beach ARC—July 18, Richmond ARC—August 2, SVARC Hamfest—August 22, Vienna Wireless Society—August 23, Hampton Roads Radio Assn. For additional info contact NK4U or the SM W3ATQ. STM KB4WT reports traffic for the month as: 42 stations submitting reports and the total traffic count of 5698. Mark your calendars for the SVARC Hamfest at Berryville on August 2 and the Virginia Section Convention at Virginia Beach October 3-4. The July issue of the "Virginia Ham," the Section newsletter should be in your hands shortly. The newsletter is sent to all section ARRL appointees, Affiliated "Active" Clubs and other interested hams. If you would like to receive the "Ham" contact the SM. Traffic: K4DOR 848, N4EXQ 709, N4GHI 638, AA4AT 282, WD4FTK 258, KB4WT 226, K4MTX 223, AA4GL 218, WB4PNY 210, W3ATQ 202, W4JLS 190, WD4MIS 161, K4JST

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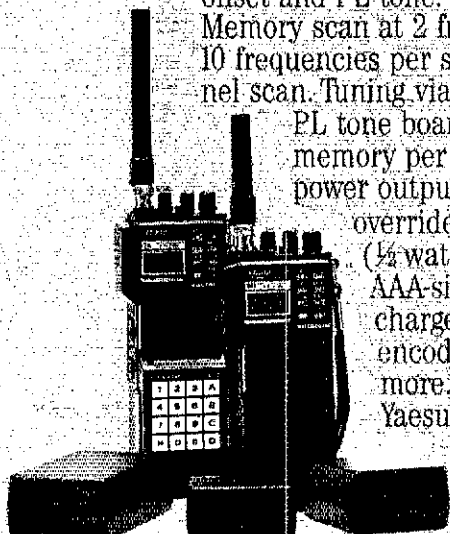
Let's face it. It's easy to bump, drop, or get rain on an HT. ■ But if your HT is Yaesu's mini 2-meter FT-23R or 440-MHz FT-73R, such mishaps are a lot less worrisome. ■ They're built to last, with rugged aluminum-alloy cases that prove themselves reliable in a one-meter drop test onto solid concrete. Plus, their moisture-resistant seals really help keep the rain out.

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Personal Computers and ICOM Transceivers: The Perfect Match

The widespread popularity of personal computers is truly undeniable, and ICOM proudly supports their use with a glamorous array of computer-interfacing transceivers. Microprocessor control and digital operating techniques are not new aspects in ICOM's industry-leading designs; they've simply become more applications-apparent during recent times. During the era of vacuum tube finals and capacitor-tuned VFOs, for example, ICOM transceivers incorporated broadband/no tune solid state circuits and frequency controlling microprocessors. They marked the cutting edge of modern technology.

Today's new generation ICOM transceivers continue that pacesetting tradition with **full internal microprocessor to external computer interfacing capabilities**. The resultant computerized amateur setup yields direct keyboard control of band, frequency, and mode selection. These capabilities also include programming and movement of data between VFOs and memories, plus numerous contest operating and shortwave scanning features creative amateurs can include in their own softwares. Likewise, an "all ICOM setup" including IC-2KL amplifier and automatic antenna tuner "follows" its computer-controlled transceiver's operations. It's an amateur's dream, a computer enthusiast's delight, and you can include these exciting capabilities in your ICOM station in an easy manner.

Interfacing an amateur transceiver and personal computer

basically involves two interrelated steps: electric interconnecting the two units and programming the computer for desired functions. Interconnections must utilize compatible data levels or include level conditioning to sidestep the classic "blown chip" syndrome. The two popular voltage levels used in computer systems are specified as **TTL** (+5 volts and 0 volts designate binary 1 and 0) and **RS232** (+12 volts and -12 volts designate binary 1 and 0). Computers operate internally at **TTL** levels (and data interfacing is provided at memory expansion/software defined user ports). Peripheral Interface Adapter circuits are used at **RS232** ports. ICOM transceivers utilize **TTL** levels internally and externally, thus interfacing at a computer's own level.

The previously mentioned programming measure is necessary because those instructions also stipulate the computer's I/O port and data format used in transceiver interconnection. Additional information regarding this area is included in a computer's Technical Reference Manual. That booklet is usually available from its manufacturer.

The present availability of transceiver operating programs is directly related to the popularity of various computer models used by today's amateurs (they write the programs!). Development of these software programs represents a golden opportunity for enterprising amateurs. Considering the previously discussed facts, let's now overview some simple and ready-to-use methods of

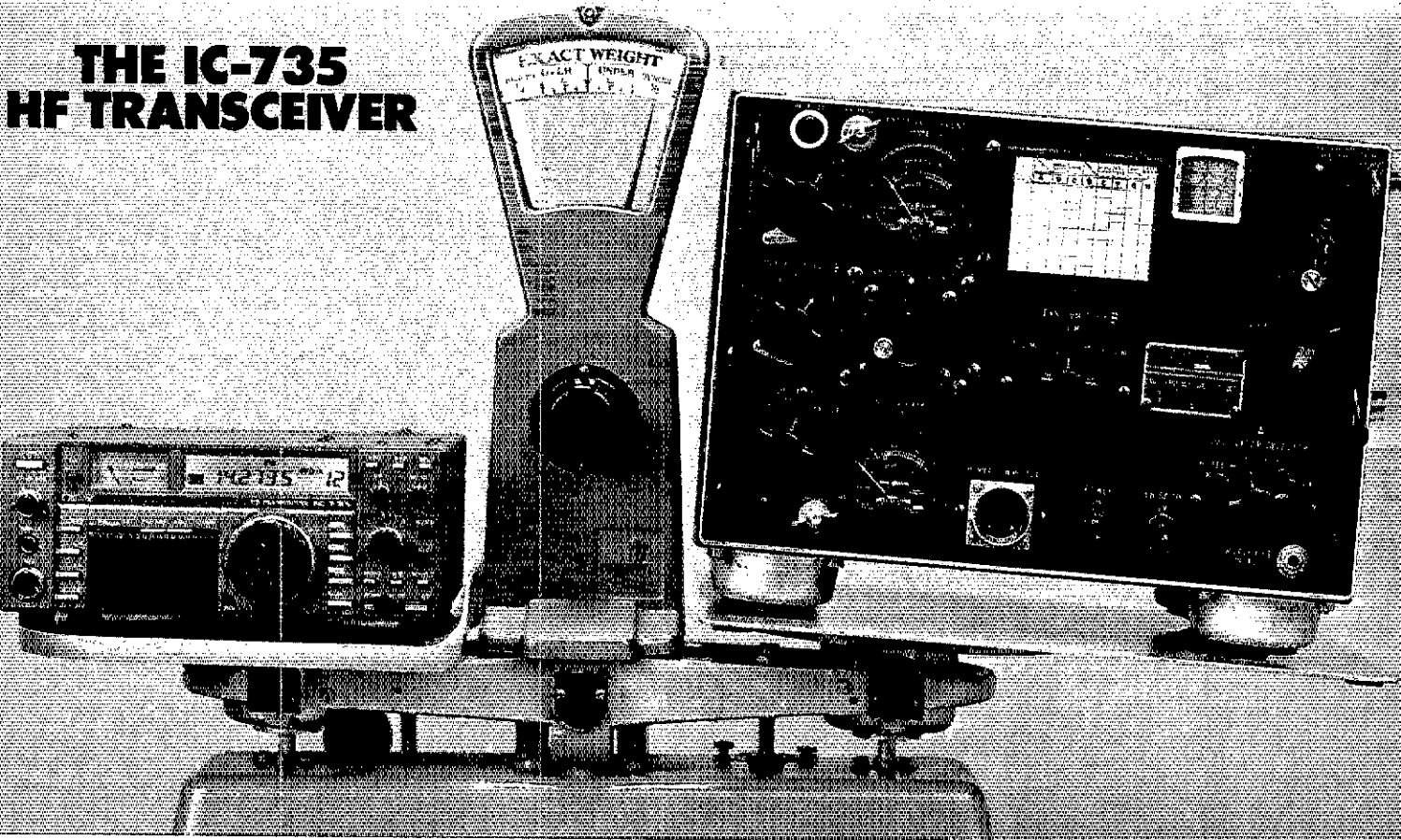
computer-interfacing ICOM transceivers.

ICOM's superb IC-751/751A, IC-271A/H, IC-471A/H, and IC-1271 transceivers and IC-R71 receiver are computer-interfaced via their optional EX-309 adapter. An eight bit/wire cable then connects to your computer's **TTL** I/O port, software is loaded in the computer, and the system is ready for operation. A fully detailed article and ready-to-use Commodore 64 program for the previous ICOM units was written by N7HGE, and appeared in October 1985 Popular Communications magazine. **Reprints of that assisting information are available from ICOM America upon request.**

ICOM's innovative IC-735, IC-275, IC-375, IC-475, IC-575, IC-R7000, and the revolutionary IC-761 are directly computer-interfacing using a simple **serial TTL** buss. A single resistor is used in interconnection to a Commodore 64's user port. **A complete interfacing description and complimenting Commodore 64 program written by N7ICW is also available from ICOM America upon request.**

Computer-interfaced operations are only one part of ICOM's transceiver picture. The full view includes superb circuit designs, top performance, maximum reliability, and uncompromised customer support. That overall package assures long-term enjoyment and truly reflects ICOM's dedication to providing top quality equipment to the amateur radio world.

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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.

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12 Memories. Frequency and MODE may be easily stored and retrieved in the 12 tunable memories.

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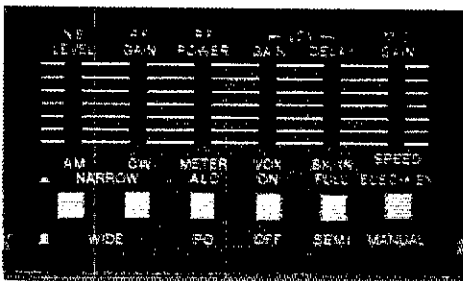
Simplified Front Panel. Controls which require infrequent adjustment are placed behind a unique hatch cover on the front panel of the radio. The hatch cover is designed to protect seldom used controls from being accidentally knocked off line, but also provides easy access. The large LCD readout and con-

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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.

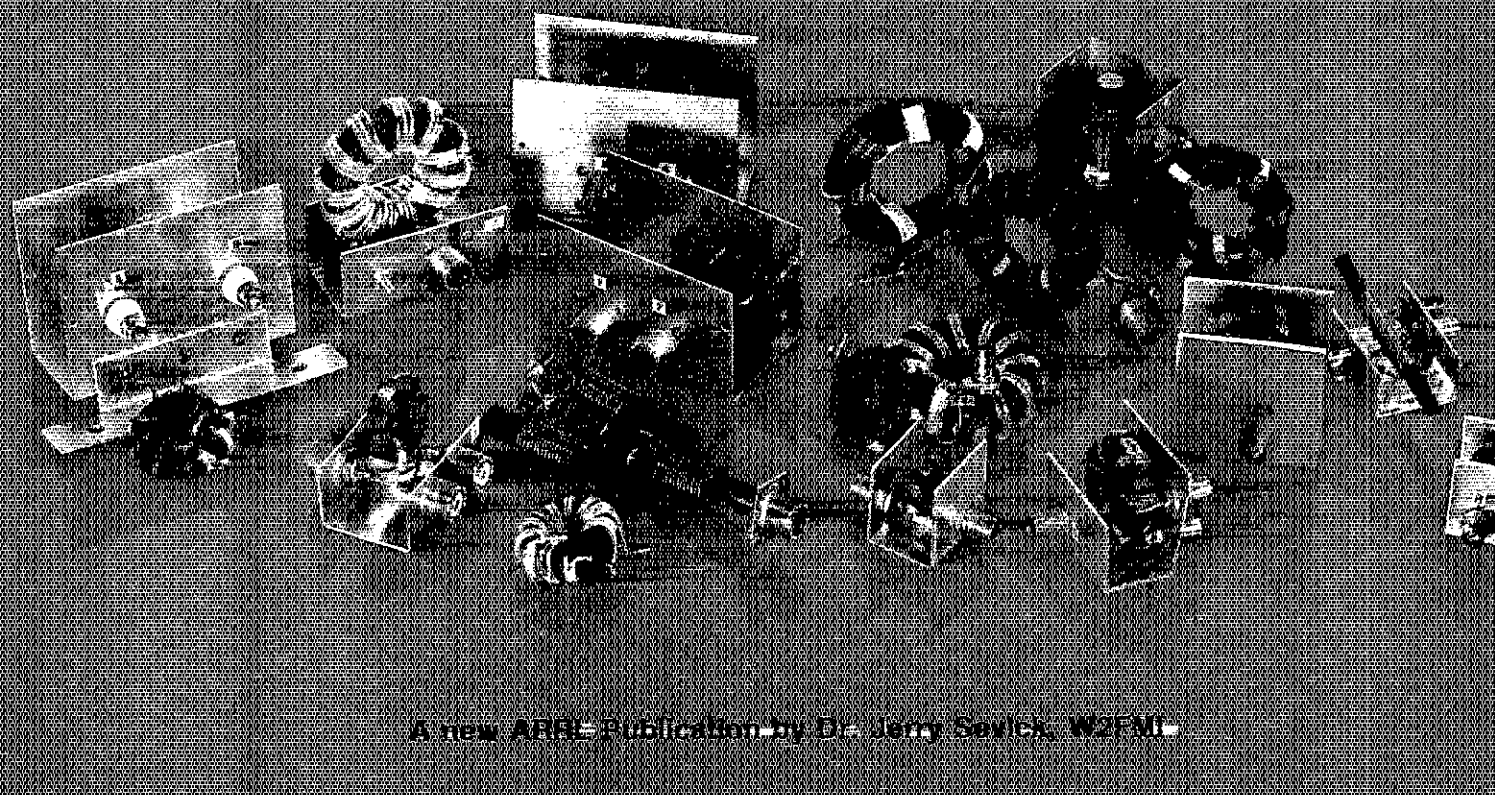
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TRANSMISSION LINE TRANSFORMERS



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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A Simple Analysis
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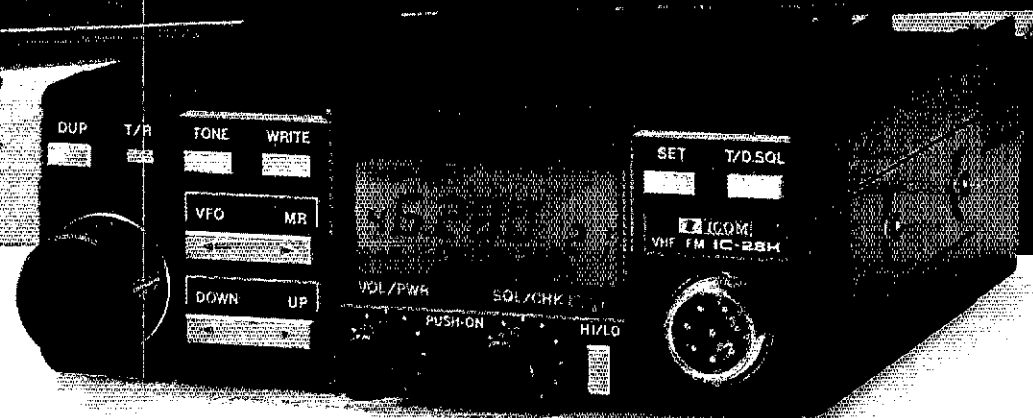
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The American Radio Relay League, Inc
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**20MHz IC-38A
440MHz IC-48A
Now Available!**



ICOM IC-28A/H

THE ONE FOR THE ROAD

- **Compact Size**
- **Simple to Operate**
- **Large LCD Readout**
- **25 Watt IC-28A**
- **45 Watt IC-28H**
- **Packet Compatible**
- **21 Memory Channels**

The IC-28H has all the features you need for carefree 2-meter mobile operation. The only thing it doesn't have is a big price.

45 Watts. The IC-28H provides a full 45 watts of powerful output. The IC-28A 25-watt version is also available. Both units have a selectable low power.

Large LCD readout. A wide-view LCD readout can be easily read even in bright sunlight. An automatic dimmer circuit reduces the brightness for evening operation.

Wideband Coverage. The IC-28H performs from 138-174MHz (specifications guaranteed from 144.00-148MHz) and includes weather channels. Ideal for MARS and CAP operation.

Compact Size. The IC-28H measures only 2 inches high by 5½ inches wide by 7¼ inches deep (IC-28A is 5¼

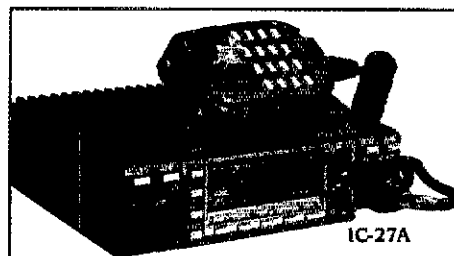
inches deep). Great for mobile installations where space is limited.

21 Memory Channels. Store 21 frequencies into memory, or lock out certain memory channels. All memories are backed up with a lithium battery.

Scanning. Scan the entire band or the memory channels from the provided HM-12 mic.

Easy to Operate. With only 11 front panel controls, the IC-28H is simple to operate.

Available Options. IC-HM14 DTMF mic, PS-45 13.8V 8A power supply, UT-29 tone squelch unit, SP-10 external speaker, IC-HM16 speaker mic and HS-15/HS-15SB flexible boom mic and PTT switchbox.



The IC-27H 45 watt and IC-27A 25 watt ultra compact 2-meter mobiles continue to be available.

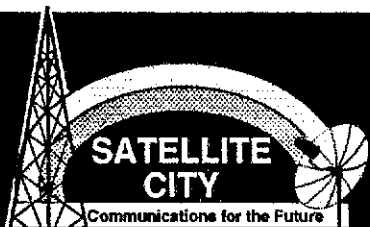
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All stated specifications are approximate and subject to change without notice or obligation. All radios significantly exceed FCC regulations limiting spurious emissions. 28H986



Dan "KB0XC" • Dave "WB0SNM" •
Denise "XL" • Maline "YXL" • Mike "SOON"

YAESU

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FT-767 GX Deluxe XCVR	1895	Call
MH-1B8 • Keyer • CW Filter •		
Ant-tuner Included		
6M/767	179	Call
2M/767	179	Call
430/767	219	Call
440/767	219	Call

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FRG-8800 .150-30 MHz	599	Call
FRV-8800 118-174 MHz CNVTR	129	Call
FRA-7700 ACTV ANT	59	Call
FRT-7700 ANT TUNER	64	Call
FRG-9600 60-905 MHz	679	Call
UV-9600 N.T.S.C. VID/CNVTR	25	Call
SP-55 Remote SPKR	24	Call

HANDI-TALKIES

FT23R		
FT23R/TT		
FT73R		
FT73R/TT		
FTT4 DTMF		
FTS12 CTCSS		
NC29 Quick Charger		
FNB10 600 mAh @ 7.2V		
FNB11 600 mAh @ 12V		
FBA10 "AA" Cell Holder	12	Call

FT109 RH 220 MHz		
FT209 RH 2 MTR		
FT709 RH 440 MHz		
FT727 NEW Dual Bz		
FNB4 "09" Family		
FNB4A "727" 500 Hz		
NC15 Quick Charger		
PA3 Mobile Adapter		
FTS-6 CTCSS Unit		

MOBILE/PORTABLE

FT-290RVII 2 MTR All Mode	579	Call
FT-690RVII 6 MTR All Mode	569	Call
FB4-8 Cell Holder	26	Call
FT-270 RH 2 Mtr-45Wt W-FTS8	439	Call
FT-770 RH 440 Version	479	Call
FT-2700 RH Dual Band	599	Call
NEW FT211-R-711-R-311R	479	Call

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ALR 206T 2 MTR Mobile		
ALR 22T 2 MTR Mobile		
ELH 230D 2 MTR Amp 3		
ELH 230G 2 MTR Amp		
ELH 260D 2 MTR 50 W		
ELH 730D 440 MHz 30 W		

ARRL BOOKS

Technician/General Class	0143	Call
Advanced Class	016X	Call
Extra Class	0178	Call
Antenna Book	4149	Call
1987 ARRL Handbook	064X	Call

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139, K1ABR 131, WB4SKG 116, WB4EDB 107, WB4ZBN 101, KB4NGO 82, WA4LTO 76, KA4TWI 69, K4JMM 67, WD4OCW 58, WB4ZTR 56, N6ANO 49, K4BQZ 43, K4VWK 36, NT4S 35, W4T2C 35, K4NSO 34, NN41 31, K4GR 29, K4JUM 29, K4AXF 21, K4MLC 19, WB4KIT 12, NW40 10, K14W 10, W4YE 7, W4ATVS 6, N4FNT 3, N3RC 3, W4VRL 1.

WEST VIRGINIA: SM, Karl S. Thompson, KB8KT-SEC: K9QEW. STM: N8FXH. ACC: WA8CTO. SGL: KB8S. TC: K8GC. Rptr. Coordinator. W8DBOZ. New STM for WV is Hal Tate, N8FXH. Many tnx. to K8BG, who resigned, for his dedicated svc. since Aug. 1990. W8HZA continues to improve, and is now active again on WVN. Nice swapest in St. Albans on 5/3.

NET	FREQ	TIME	QNI	QTC	SESS	NM
WVFN	3580	6:00	1102	424	30	WBVP
WVMD	7235	11:45	777	42	29	WBFPZ
Hillbilly	14290	Noon su	134	14		W8Y
WVFN	3567	7:00	291	103	31	K2BQ
WVNN	3730	5:15	121	27	28	WB8LDY
WVNR	3640	6:30	241	19	30	K8LG

Traffic: KA8WNO 426, K8TPF 228, WB8Y 196, KB8FI 130, K2BQ 130, KA8TKI 103, W8FPZ 100, KB8QUY 54, N8FXH 50, WD8LDY 48, K8BQW 39, W8BHC 38, NC8G 32, W8JWX 11, KA8OGF 10, WD8DSR 4.

ROCKY MOUNTAIN DIVISION

COLORADO: SM, Bill Sheffield, KQ8J-ASM: KA8MQA. SEC: KB8FQB. STM: KB8Z. ACC: WB8DUV. OOC: KB8UD. BM: KA8CZV. PIO: N8FOE. TC: N8CF. SGL: W8GGL. The past few weeks have been busy for the Section Leaders trying to get the word around that we needed letters of comments to the Rocky Mountain Region of the USDA Forest Service proposal to increase rental fees for repeater sites on Nat'l Forest land to \$1,000 a year. This amount of rent is a whopping increase that most repeater groups will be unable to afford. The final fee schedule will not be published until August 1st or later. My thanks to all of the amateurs who sent their letters of protest against this increased rental fee. We can hope that the Regional Forester of the Rocky Mountain Region will have re-evaluated the fee schedule for amateur repeater sites. Congrats to WB4ETT for coordinating the communications for the Red Cross Convention. The annual Mt. AFR Swapfest and Campout will be held July 25th and 26th in Red Rocks Campground near Woodstock Park. NET: CWN; QNI: 80. QTC: 74. QNF 408, 27 sess. HNN: QNI 1901. QTC 113-141 408. QNF 2029, 30 sess. COL: QNI 1125. QTC 58-114 408. QNF 1134, 30 sess. CWN: QNI 2507. QTC 4206. QNF 1800, 30 sess. NCTN: QNI 298. QTC 124. QNF 372, 35 sess. SCTN: QNI 314. QTC 46. QNF 361, 25 sess. Traffic: N8BQP 1874, N8HMX 170, WA8OYI 138, KB8Z 124, NX8J 90, WD8FFV 87, WD8BSZ 86, N8HMR 52, N8DZA 43, A8W 18, W8NFW 9.

NEW MEXICO: SM, Joe T. Knight, W5PDY-ASM: K5BIS. SEC: K5YJR. DEC: WD5HCB. STM: ND5T. NMS: WASUNO K6LL. W5QNR. TC: WB5Y. ACC: KA5BEM. Southwest Net (SWN) meets daily on 3583/7083 at 0230 UTC and handled 140 msgs with 219 checkins. New Mexico Roadrunner Net meets daily on 3939 at 0100 UTC and handled 61 msgs with 1278 checkins. New Mexico Breakfast Club meets daily on 3939 and handled 151 msgs with 965 checkins. Yucca 2-mtr Net 78/18 handled 10 msgs with 433 checkins. Caravan Club 2-mtr Net 66/06 handled 6 msgs with 144 checkins. 13/73 with 101 checkins. BEANFEED was successful with a smaller than normal attendance, but made up for by the beautiful weather and the good chili and beans. Nice to have AG8X and W8HD attend. W5VYC won the FT727 HT. Also good to have K8STU & XYL from Florida & N7CYY and visitors from San Francisco. Traffic: W6DAD 164, W5FZ 7.

UTAH: SM, Jim Brown, N7AGZ-SEC: Rich Fisher, N87K. STM: John Sampson, W7OCX. Welcome to Dale Wellington, N270, who recently moved to Fielding (in Tremont). W7CKD is moving to Ivins (in St. George). Several clubs are offering Novice and upgrade license classes. Check with your club for more info. Thanks to these clubs for their fine efforts in this area. 73 de N7AGZ. Traffic: W47KE 137, W47ME 55, N7AG 26, N57Y 20, N7ASY 19, W7OCX 10.

WYOMING: SM, Jim Raiser, N7GVV-ASM: Steve Cochran, K7AWS. SEC: Jim Anderson, W7TVK. NM: Dick Murdoch, K7CAR. NM: Morris Morgensen, W7MZW. Thanks to the above for agreement to continue their appointments. I would appreciate if you have an interest in appointing me to give the call. Dick Wunder, W4YVFC, will continue as the Repeater Coordinator for WY. Remember the WY HAMFEST July 10-12 in Douglas. Your QSL card is the registration fee. A packet demo is planned. Prison inmates helped Rawlins Club with construction and erection of tower and antenna. Traffic: NN7H 227.

NET	FREQ	Sessions	QNI	QTC
Cowboy	3923	22	822	1
Albany ARES			35	0

SOUTHEASTERN DIVISION

ALABAMA: SM, Joseph E. Smith, W4ARNP-STM: N4JAW. SGL: KA4WVU. BM: KF4VV. OOA AUX: AA4L. TC: N4AU. ATC: WB4BYQ. ACC: W4ARNP. "act" SEC: W4ARNP. I hope to see a lot of you at the Atlanta "Fest" and ARRL National Convention this month on the 11th and 12th. I trust that everyone did well and learned a lot about "working in the wilderness" last month otherwise known as "Field Day 87". The 87th officers of the Birmingham Amateur Radio Club are: President W4VUP, Vice President W4VUP, Secretary W4VUP, Larry Woods; Secretary KA4PWP, Bill Barnes; and treasurer KK4EC, Doug Cook. Next month the place to be is the Huntsville Hamfest, and I hope to see you there. Traffic: CAND reports 663 messages in 30 sessions with DRN5 rep 100 by W4AJDH, W4CKS, and NW4X. DRN5 reports 725 messages in 60 sessions with Alabama rep 98 by W4AJDH, W4CKS, NW4X, and W4WJF. AEND reports 32 messages passed in 30 sessions with other nets represented by W4AJDH, W4CKS, NW4X, AA4YJ, WD5NYL, and N4DCS. AEND reports 56 messages passed in 30 sessions with RNS rep by W4AJDH, W4CKS, NW4X, W4FAT, AA4YJ, W4A2PZ, and W4QAT. AEND reports 103 messages passed in 34 sessions: Brass Pounders League, W4AJDH, PSR: W4AJDH, W4CKS, and W4ARNP. Totals: W4AJDH 1087, W4CKS 158, KA4OZ 52, W4ARNP 50, W4WJF 36, KB4RWC 30, W4GJH 10, and W4TYY 10. Thanks and very seven three Joe Smith Alabama.

GEORGIA: SM, Eddy Kosobucki, K4JNL-SEC: NC4E. STM: WB4WQL. ACC: W4A4BY. BM: WB2OJ. OOC: N4A1. PIO: WB4DEB. SGL: W4B7Z. TC: W4DAP. This is the month of the big one, the ARRL National Convention & Atlanta Hamfestival. If I have never been to one, this is my best opportunity. I won't have to go far because it's right in our back yard. The dates are July 10, 11 & 12. The place, World Congress Center in Atlanta. "CU there?" WB4DYZ, AA4JV, WB4WQL, W4PIM, WA4LE, KF4GF, KA4HHE, KB4JPN & W4HON made the PSRR Honor Roll for the mo of April. Our sympathies go to the families of Dan Britt, K4URK, & Hal DeVaux, W4FIZ, who became Silent Keys during the month of April. If I hear of a Silent Key please notify me so that it

can be put into print. It may not be the biggest club, but the Rutledge Radio Club is planning big things. Their elected officers are: Pres: N4DOM. VP: W4GFM. Sec/Treas: WB4ZVX. PR: N4LGF. Act: N4NVZ & Sec Dir: WB4DKY. Gud luk. By the way their motto is: "LET'S PUT FUN BACK INTO AMATEUR RADIO." Makes good sense. Let's all try it. The FCC is getting TOUGH on obscene language, in fact the broadcast boys have to be real careful with their words if u know of somebody in that category I might want to help him now before it's too late. Field Day '87 is now history. Let's get our reports into ARRL HQ so that they can start compiling Scores. The new Novice Enhancement is catching on. There are many youngsters out there who are needing a helping hand. Won't u see if u can get one started in this great hobby that we're in? Traffic: WB4DZV 151, W4PIM 138, WB4WQL 98, WA4LLE 80, W4WXA 64, AA4JY 63, W4QO 58, KF4GF 56, W4ACBP 45, KA4HHE 31, W4HON 28, KA4ATM 25, N4MWR 16, WB4ABE 11, N4UZ 8, N4DOM 6.

NORTHERN FLORIDA: SM, Roy Mackey, N4ADI-SGL: KC4NI. PIO: W44PUO. ACC: WD4RIQ. SEC: W44PDI. BM: KB4LB. OOC: K4JJE. STM: KB8LT. This month I want to give praise and thanks to a few of our fellow hams, who work very hard every month to publish and distribute their club Newsletters! I am privileged to receive almost a dozen of these each month and I wish to thank the editors or club secretaries or presidents for sending them to me. I wish more of them would do the same. Tnx to: Margie, KB4WJ, the BLURB from HCRP, Bill, N4UF, the HAMMANCED MODULATOR of NOFARS, Buzz, W4UJL the HAMM-RAMM NEWS, Charlie, NE4I for KEYED-UP of LMARS, Tracy N4LGH, THE LISTENING POST of OARC, Fred, WB4MMH, and Patti, WB4FAJ, for RANDOM WIRE of BARS, Rick, AA4W, the SHARC from Seripus Hams ARC in Pensacola, Larry, W1ZYR, for SHARC NET of Spring Hill ARC, Fran, K2CEP, for SHARC TALES of Sky High ARC in Citrus County, Jack, KB4B, for THE SQUELCH TALE from the Jax Range Assn; and to Chuck, K4EVA, for WEST SIDE STORY from West Volusia AFS in Deland. It gives a good picture of how all these clubs are working to advance ham radio in their areas and to get ideas for programs and projects. Several of the clubs above are exchanging their newsletters and that too is a big help in keeping all the club members informed about what's going on in the Section. So, if your club has a paper that isn't listed above, let this be my invitation to you to see that your publication gets to me, next month and in the future. 73, Roy, N4ADI. Traffic: WD4IO 855, W4XH 631, N4PL 541, W4AOX 418, KB9LT 377, K4VVK 200, AA4HT 198, N4GML 142, KB4FIY 121, W4EYU 119, K4CY 112, N4JQ 98, KB4LB 96, W7YWF 92, W4KIX 82, W4C4D 81, K4CQ 73, NF4O 67, W4MGO 68, N4ADI 57, N4JHI 44, KA4KAX 41, W4DTV 33, NS4C 32, N4Q4 27, N2AOX 25, W4SWX 23, WB4TZR 22, W4GUL 15, N4DY 14, W4APUP 14, KF4GJ 13, WB4WAG 12, WD4RJ 10, WD4GHO 8, W8IM 4, WD4FJY.

SOUTHERN FLORIDA: SM, Richard D. Hill, W4APFK-SEC: W4SS. STM: K4ZK. TC: K4AT. BM: WD4KBW. PIO: W4WYR. SGL: KC4N. OOC: W4TAH. ACC: UNFILED. WD4KBW reports 68 bulletins received and 138 sent by AA4BN 21, W4DL 56, W4EIC 45, KA4GUS 14, WD4KWP 22, AA4M 22 and WA4RLV 24. Congrats to the Tampa Bay Repeater Association which has been officially designated as a Special Service Club. WB4SOU reports that the EAA Sun and Fun Fly-In is the second largest in the United States with an estimated 150,000 in attendance. W4TJM made BPL with the 308 origins from the Fly-In. KA4YHS now has over 3 years of QNI with the Southeast Florida Traffic Net with no misses - a couple of near ones though - one QNI was from the top of the Thomas B. Manuel Memorial Bridge on the turnpike in Martin County down into Broward County putting 50 watts into a collinear. KA4 sent his SAR with a note that he is going to the Dayton Hamfest. Thanks to W4KBW for taking over as manager of the FAST net. FAST meets on 3940 KHz at 8 PM and 1030 PM daily - the late session is usually around 3942 to avoid QRM. WD4KBW is not only Fast net manager but also Bulletin Manager and manager of the Florida Medium Speed Net. Many thanks to W4SME who was manager of FAST for several months and has now returned to Maine for the summer. He will no doubt be active with the Sea Gull Net while up there. 73 de W4APFK. Traffic: W3CUL 3107, W3VNR 1118, W4APFK 403, KF4JA 324, K4EUC 299, W4WFK 273, K4ZK 267, K4SCL 239, W4DL 227, W4ARUE 226, K4WJ 195, W4EIC 189, K4IA 181, K4ZV 174, K4AFZ 169, W4SVND 167, W4WYV 158, AA4BN 153, K4GUS 136, N4ET 132, K4KQV 111, W4DABK 98, W4WVU 95, W4TAH 90, W4ARLV 85, N4MML 71, WD4CH 66, KB4MOM 62, KF4RL 55, K4V15 53, KA4YHS 50, WD4NKK 45, W4SME 43, WD4AEP 41, W4A4ID 41, W4TF4 39, N4ORZ 34, K4A5H 33, K5IHK 32, W3JIR 31, W4MPV 30, W4BGCK 30, N4KB 30, W4WVW 25, K4YB 24, K4B4F 23, K4OVC 20, KB4LPL 18, AA4CH 17, K4FOU 15, W3TLV 14, W4WVW 13, W4SML 11, KB4KAW 11, K9EHP 11, K4SAKY 10, W4K4F 9, K4DGR 8, KA4GDW 6, N4NZ1 5, N4X50 4, N4OIA 3, N4ORH 3, N4PSV 3, N2PEL 2, KB4EWO 1, N4PQ 1. (Mar.) W4TJM 627, K4SCL 249, K4Y8 18.

SOUTHWESTERN DIVISION

ARIZONA: SM, Jim Swafford, W7FE-STM: W7EP. NMs: K6LL, KA7HEV, WB7CAG. KA7HEV is re-locating to St. Louis, Mo. area and has had to resign his N.M. job on A.T.E.N. We'll miss you, you've done a FB job. Ben, Bob, K7PQF has taken over and will be the new N.M. for this NTS net. Walt, K7KYW, and Doris, K7CAQ, continue doing a FB job in the Tucson area in organizing ham radio communications support for the many public service events. This good work gives good exposure to the public of ham radio operators helping their fellow citizens. Coconino Co. ARC has volunteered again to help your SM at ARRL booth at upcoming Ft. Tullinn hamfest. These folks really are great to work with. Drop by and say "hello" or chew the rag in N7GLT, et al. See you on Flag July 24-25. Carrie, KA7FE, advises that the Cactus Keys (JFK club) will have a picnic May 9 in Mesa. Will miss it due to a trip to the east coast, but hope everyone has a good time. Our Division Director, W6WZO, passed thru Tucson en route to the CARRA hamfest at Sierra Vista on May 2nd. Your SM missed this event due to trip to east as mentioned above. Heard it was a great success. Congratulations to Roy, K7QWR, Phoenix who has just been appointed Asst. Director, SW Div'n, by W6WZO. KA7VUX is working closely with Holbrook Emergency Services Dir. relative to setting up RACES organization there. W1RGH reports eighty-eight hams now in Sun City West. Contact him if you have questions about antenna restrictions there. Understand Gert, W7KQY, is having a great recovery from recent surgery. Sun City newsletter, "Short Skip" edited by Ray Summer, NW7R, is a FB update for hams in that area. Incidentally, Ray is the OM of K12Z, our erstwhile executive VP of the ARRL. You do good work, Ray! One more reminder about the Scottsdale ARA hosting the Southwest Div'n Convention at Scottsdale, Oct. 9-11. Barry Goldwater, K7UGA, will be speaker at banquet as well as host for visit to his mountaintop ham shack. CU there-73, JIM.

NET	QTC	QNI	SESS
ATEN	156	844	30

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.

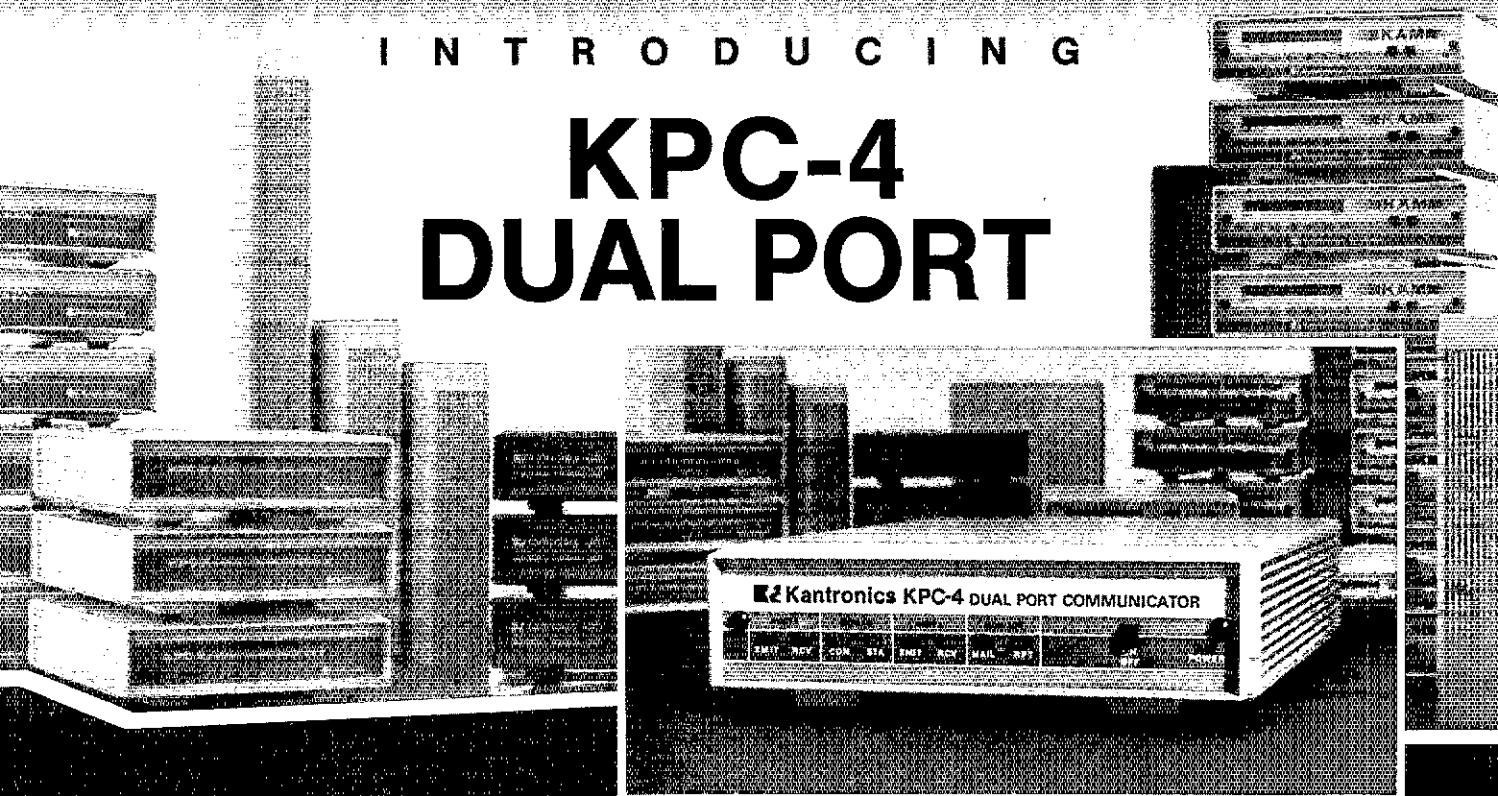


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All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions. 761487

I N T R O D U C I N G

KPC-4 DUAL PORT



KPC-4 Gives Simultaneous Connects, Digipeating, and Gateway On Two VHF Radio Ports

KPC-4™ is your GATEWAY into VHF Packet flexibility. KPC-4 features **two fully functional packet ports**, digipeating on each port, VHF gateway between ports, and an RS-232 computer port.

What's more — digipeating and gateway operations occur simultaneously while you're connected on one or both ports.

KPC-4's RS-232/TTL terminal interfacing provides universal compatibility to all computers, including Commodores and PC compatibles. Stream switching provides for access to both radio ports; each of which

supports the ARRL adopted AX.25 protocol.

KPC-4 also contains the popular Personal Packet Mailbox™ feature, (optional on all other Kantronics Packet Communicators). You or others can leave and retrieve messages from the Personal Packet Mailbox.

Only KPC-4 lets you bridge two frequencies on one band, and operate crossband. For more information about KPC-4 Dual Port Communicator, contact Kantronics or your Kantronics dealer.

Suggested Retail \$329.00.

KPC-4 Dual Port Features

- Two simultaneous operable VHF radio ports, both ports operating at 1200 baud.
- Automatic gateway operation between ports.
- Command driven, like KPC-2 or KAM, with over 100 software commands.
- Kantronics Personal Packet Mailbox feature included.
- External modem connection point provided for future use.
- RS-232 or TTL level operation by jumper selection.
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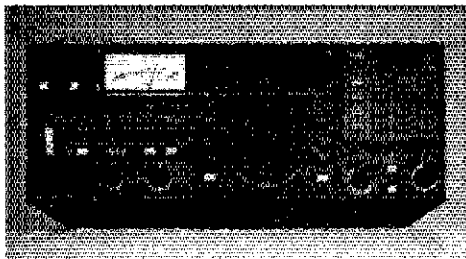
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* Specifications of IC-R7000 guaranteed from 25-100MHz and 1260-1300MHz. No coverage from 1000-1025MHz.

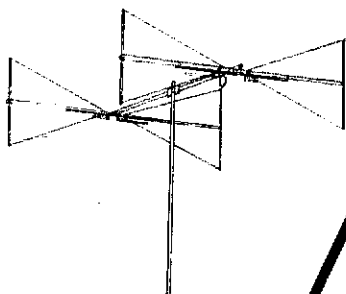


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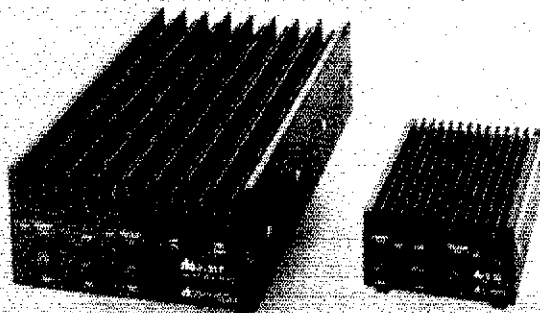
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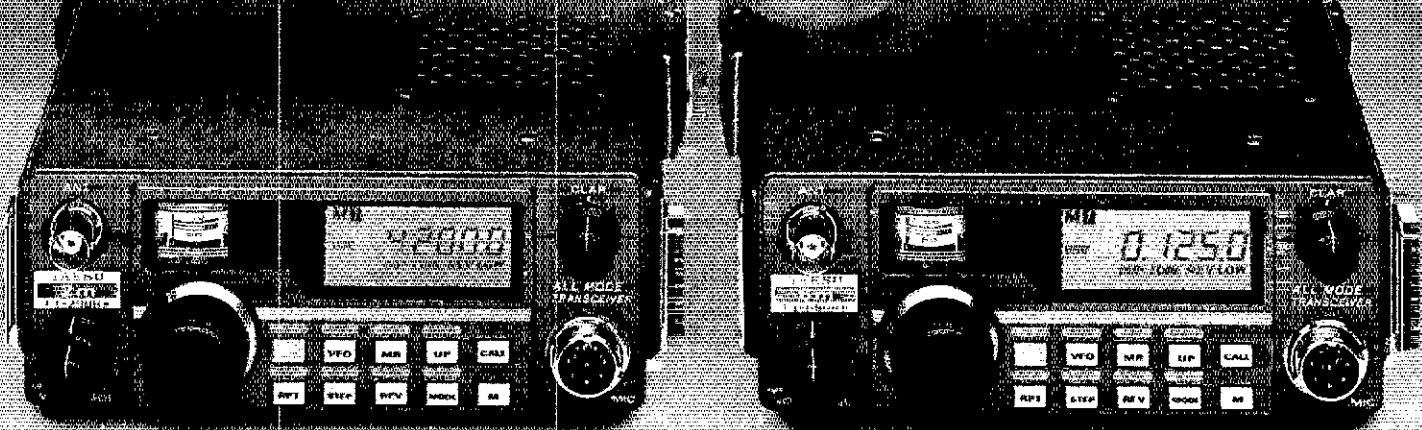
ACN/HF 81 615 30

ACN/VHF 61 294 30

Traffic: KA7MUL 529, K6LL 201, W7EP 172, W7KCM 165, KB7FE 144, KN7U 91, W7LVB 59, KE7KZ 51, K7JKM 25, K7POF 17, W7KXE 11. (Mar.) KB7FE 111.

LOS ANGELES: SM, Bob Poole, AJ6F—ASM: K6IYK. SEC: AKBY. STM: W6INH. PIO: VACANT. SGL: K6KSY. OOC: VACANT. TC: VACANT. ACC: KB6AKK. Welcome to Joe Gira, KB6AKK, our new Affiliated Clubs Coordinator. Joe brings his enthusiasm and genuine concern to the ranks of the LAX Section Staff. Be prepared to hear from Joe in regard to Club Programs. The Palos Verdes Club provided communications services to the 10K Library Run, W6OXX organized the event. K1DFO and a similar contingent of PV Clubbers will have performed the communications for the PV Marathon by the time this is in print. While checking out a potential field day site, NZ6N (while seeking a lost pooch) managed to become disoriented in the wilderness north of the LA area; not to worry, though, Randy was able to summon aid via VHF hand-held and was rescued by the LASO helicopter that was dispatched to the area (thanks to KB6BLZ for this news item). Thanks to ORV, WB6WEY, the SCDOC (packet), newsletter is regularly sent to the SCDOC membership and electronically transmitted via packet radio for all to see; this journal contains important network happenings and other technical and informational articles. Contact SCDOC, Box 6026, Mission Hills, CA 91345, for info. For those few day stations wishing to message to the SM, I remind you that you may initiate a message via packet radio on AJ6F-1 or any of the linked BBS/MailBox Stations in the area including NK6K-2, WB6YMH-2, N6CUS-1, W6AXM-1, N6LUC-1, or N6BGW-9; just address the message to AJ6F @ AJ6F and it will be forwarded automatically (Good luck in the contest!). April 25th celebrated another WalkAmerica event that was so widely supported by amateurs in the section that there is, again, not enough room for the desired accolades; thanks to the public-spirited individuals who participated. Second-Saturdays are the General Dynamics Swapmeet (North of I-10 on Haven, in Pomona). Thanks to the Pasadena (W6KA) bulletin for the following chart of license exams: Locked - 1st Sat - Burbank - Marie - 818 848-9340 - C.A.V.E. - Last Thurs - Long Beach - Rex - 213 434-8278 - SFVARC - 1st Sat - Van Nuys - Bill - 818 762-5095 - Northrop - Last Sat - Hawthorne - Paul - 213 316-2758 (odd months only) PVARC - Second Sat - Rancho Palos Verdes - Bob - 213 326-2801. The DARC Club Communications Van was again the selected centerpiece for several community events including the Downey Fire Service Day and the Dominguez Hills annual Boy Scouts Camporee; nice going, DARC. TARA (Torrance Amateur Radio Association), the ad-hoc committee to deal with antenna ordinances in the City of Torrance, reports that a first draft recommendation to the city attorney had been prepared; thanks to those involved in this important activity. Other municipalities in the section are being indoctrinated as to the positive benefits of amateur radio by example of Torrance and others. Now for the report on activities of the W6FNO/R repeater system: In addition to the MOD WalkAmerica activities, the group handled 215 vehicular, 10 fire and 7 medical emergencies for the month of April. Thanks to KB6LTL, the annual report is being submitted to ARRL HQ for the appropriate recognition of recipients of the public service awards. RHARC and the SubClub have been busy in the area of public service; The Kaiser-Permanente Whittier Bike Challenge and the Whittier Centennial Parade are just a couple of things to the credit of the two clubs. As you might note from the header to this column, I am interested in acquainting any and all with the mission and purpose of the NEW ARRL field organization. I can't do it all myself, so if you have the slightest interest in helping or know someone who can, please give me a call. Details on page 8. Traffic News: Easter traffic went very well this year. We do not have the load of previous years due to the Packet activity. Seems that most section messages are being routed via packet now. Lets hope that they don't invade the long haul nets or we can hang up our keys. Traffic: K6UYK 711, W6INH 264, N6LHE 216, N7CZF 172, WB6VPY 66, W6NKE 27.

ORANGE: SM, Joe H. Brown, W6UBQ—ASM: Riv. Co. W6LKN, Bob (714-686-3823). ASM: Org Co, Ralph, WB6JBI (714-776-9272). ASM: San Ber. Co, Tony, WB6QHB (714-381-1836). Congratulations are in order to Sandi Heyn, W6VZLN, on her appointment to the post of Affiliated Clubs Coordinator. She is also Pres of the Org Cnty Council of Am Radio Org. and I know she will do an outstanding job. Congrats also in order to Allen Smith, N6GVO, on his appointment to RACES Officer for Orange County RACES and ARES DEC. The newsletters this month are packed with Field Day surveys—looks like everyone is gearing up at high speed for this annual event. By the time you read this Field Day will probably be over. I hope yours was successful, educational, and most of all FUN! The newsletters were also packed with reports of successful community service events—seems as if ham support of the March of Dimes Walkathons is nearly universal and April/May is a heavy period of events to support. Hats off to the Inland Empire club for supporting our events all in one weekend! The Lee DeForest club made their great antenna test results public with Stan, W6WJ, showing a whopping 87.9% efficiency from the front. Seems as if a lot of food provided by some of the YL's was tasted as well. The South Org ARRA had a great April newsletter by "April, K6BOL." I never did find "page 7" though. From the OCGARRO bulletin—anyone interested in operation of W6RO for visitors at the Queen Mary should contact W6TNB at (213)597-6544. Your SM has recently gotten a TNC and suddenly realized what the packet racket was really about. So Cal has a great network with all sorts of activity. Message forwarding by the BBS's is booming. One nearby BBS put his log summary in a bulletin for users to read and done stated we were desperate for a BBS that is not heavily used. During the month of April 176 messages were entered, 79 of which were relayed to other BBS's for delivery. Most of the remaining 97 were either bulletins or messages already received by the addressee at that BBS. Even more amazing was the fact that the system was idle (available, but not in use by a user) 86.5% of the total time it was online. This particular log only covered a 7 day period too! That's quite a feat for only a week of message handling. I would like to see more log summaries from other BBS's in the Section so I can show their activity in future columns. If you haven't gotten into packet visit a friend who has and see what's there. The wealth of information available in files and the message handling capabilities are astounding. You can forward the log summaries and any other messages to me at the KD7XG-1 BBS on 145.05. Work continues within the Section in preparation for the SKIPNET STA which anticipates automatic message forwarding around the country via HF. The KD6SQ HF/VHF BBS is maintaining semi-automatic operation at the KD7XG QTH until sometime in late May or early June when it should return to its home in the new shack of KD6SQ. They are chomping at the bit for full automatic operation under the proposed STA. Future plans include message forwarding via satellite to supplement the HF network. In the NTS arena: STM is Ernie W6QCA. PSHR:



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I hope to see you (or your club's) call sign on the air on Field Day, 7/3. Joe. Traffic: WFO80 722, K4BJKJKT 125, WA6QCA 105, W6BQZ 104, AD9A 96, K6ZCE 83, NG6GT 82, W6CPB 31, K6STND 26, W5TZR 20, W6SX 13, W6NTN 8, K4HMS 6.

SAN DIEGO: SM, Arthur R. Smith, W6INI—July is "Visit your local radio club" month. Here's where to go. Conway ARC meets first Thur at 1930, Conway Rec Cen. Cubic ARC, 3rd Thur. 1200 noon. 9223 Balboa Ave. B D DX, 4th Wed. 2000, Hind Quarter Rest., 7040 Miramar Rd., Escondido ARC, 4th Mon. 1930, SDG&E. Mission & Citracado, Escondido. ARC of El Cajon, 2nd Thur. 1930, Parkway Jr. Hi. Dallas & Fletcher Pky. North Shores ARC, 1st Tue. 1930, S. Clairemont Rec Cen. 36D5 Clairemont Dr. Pt Loma ARC, 3rd Wed. 1130, Bldg 33, NOSC. Palomar ARC, 1st Wed. 1930, Lincoln Mid Sch, Escondido Ave. Vista. Poway ARC, 3rd Tue. 1930, Fire Stn 1, Poway. COVIA, call W6B3A, 582-7083, S. D. Rptr. Asen (SANDRA), 3rd Thur. 1930, Ed. Cal. 640, Linda Vista Rd. So Bay ARC, 1st Thur. 1930, Norman Cen. F. St. Chula Vista. 2nd Club, 2nd Mon. 1930, Serra Mesa Rec Cen. 9020 Village Glen Dr. Coronado ARC, call K8QCS, 435-8483, Ditter Daughters & Sons ARC. Sun 1900, 1434 E 24th St. National City. SANDPAC, 2nd Tue. 1900 MIA COM, 3033 Science Park Rd. Imperial Valley ARA, call WK6M, 344-4158, NCTN sessions 29, 4c 43. ARES CW sessions 4, 1c 2, ckins 14. Traffic: N4KRA 102, N6GW 57.

SANTA BARBARA: Byron Looney, K6FI—Many new novices with the added incentive of 220 operations. Santa Ynez Class had 17 starters, 15 finished and 13 passed test. Outstanding! It is with deep sorrow that we record K6EVQ as Silent Key. Bill Long will be missed. Listen for W6LKF on Field Day, Paso Robles ARC is polishing its act for an even greater performance. K6FI has agreed to act as SM until a new one is appointed or we actually move to AZ. Least one Skyline graduate is N6LJF. Marilyn is Lompoc area EC. SBAR County ECs met with DEC, N6A1A, in Solvang to better define their responsibilities and goals. Fire Season started May 1. Below average rainfall may make this a long and busy summer. Are you and your equipment prepared? Have you signed up with the CDF VIP program? Traffic: W6NOR 116, K6BEC 31, N6FOU 17.

WEST GULF DIVISION

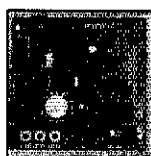
NORTHERN TEXAS: SM, Phil Clements, K5PC—Aset. SM: K5MXQ. STM: W5VMP. SEC: W5GPO. ACC: W5UHI. BM: W5QXK. PIO: K5HGL. OOC: W5BJBP. We still have an opening on our Section Staff for State government liaison. Those of you who keep up with the going on down at the State Capitol, especially the introduction of new legislation that may favorably or adversely affect amateur radio would be ideally suited for this vital position. As we have found in the past, time is of the essence in getting our input into these bills before they leave the committee level. Let me know if you are interested in becoming our SGL. A big welcome back to Art Evans, W5VMP, who returns to his old job as our Section Traffic Mgr. Art will be taking all net reports and administering the Official Relay Station appointments, in addition to his regular duties as STM. Welcome aboard to Dan Dansby, W5UHI, who is our new Affiliated Club Coordinator. We now have over 25 affiliated clubs in our Section, and growing. Dan will be servicing the existing clubs, and signing up new clubs into the program. He is also the trustee of K2BSA, the Boy Scouts of America Station. Congrats to Dana Knight, KASPT on passing her T-2 (Second Class Radioteletype) to us old timers Commercial License exam! The Tyler ARC now boasts 74 members and growing, with 20 new grads from a recent licensing class. Not bad for a club that is only 3 months old! Their Club Newsletter, "The Ground Wire" is one of the best I have seen! Thanks to Guy Martin, K5WMM, for sending me a copy: I hope you will put me on your mailing list, Guy! PSHR for April: K5MXQ K5UPL K5BADE W5VMP K5YUW K5ML W5EHL KASPT K5QYV. Traffic: K5QYV, W5TNT 334, W5VZ 177, K5MXQ 188, K5DRC 154, W5QYV 149, K5UPN 136, W5QYV 119, W5VMP 115, K5AZK 102, K5BADE 98, N6GFW 77, K5L 69, K5YUW 35, K5JHF 32, W5EEN 23, N5UIJ 23, K5CNG 20, K5QYV 14.

OKLAHOMA: SM, Bill Goswick, K5WG—ASM&ACC: NBSN. BM: W5AS. OOC: K5WG. PIO: W5BSY. SEC: W5ZTN. SGL: W5N2S. STM: K5VX. TC: W5QMJ. We were deeply saddened to learn of the passing of Bill Mallicoat, N5Y, Bill was a tireless worker in the Oklahoma/Henryetta area and his work as a VE enabled many area amateurs to upgrade. He will be sorely missed. The Broken Arrow ARC has mailed out a nicely prepared flyer titled, "This is the B.A.A.R.C.," in an effort to introduce potential members to the club. It was signed up several new members as a result of the mailout. This method is definitely worth a try if you would like to bolster your club's membership. For details contact B.A.A.R.C. president, Dave Cox, K5GSI. The Bartlesville repeater is now operating on an output frequency of 146.655 with a -600 kHz offset; they have a 10 meter repeater under construction which should provide many interesting contacts as the sunspot cycle edges upward. Traffic: W5AS 28B, K5VX 165, W5RB 130, K5GBN 115, W5OUV 101, K5ASWGS 92, N5IKN 68, W5SRX 45, K5FHD 43, W5IFB 41, W5VOR 31, W5ZOO 27, W5GGC 26, W5VLW 26, K5CAY 19, N5IB 6. (Mar.) W5BSRX 304, K5ASWGS 108, W5RB 85, W5IFB 43, N5IB 6, W5J 1. Congrats to W5AS who has made BPL for three consecutive months!

SOUTHERN TEXAS: SM, Art Ross, W5KR—ASM: N5TC. STM: K5QEW. SEC: K5DQ. PIO: W5U2B. ACC: W5B5YDD. OOC: W5ZVJL. BM: K5CVD. SGL: K5KJN. TC: N25U. Beaumont ARC, Univ of Texas ARC and San Benito ARC designated SSC. Great going. San Antonio ARC rpts W5ASR and W5B5D were shown on TV as they operated at the Nat'l Wx Service office during a SKYWARN alert; K5SHA and K5MM will share operating time in wedded bliss; K5HCR, W5ZJC, W5FSR, K5YFP, K3WGF, K5DKO and K5IJ provided communication for cross-country equestrian competition at Mortgage Hill. Before leaving to participate in the Second World Folk Dance Festival in England and Spain, PIO W5U2B rptd W5NOL is new PIO; he also advises that ARRL HQ has pre-printed News Release forms available thru WA1VMC. Hill Country ARC, Kerrville, provided communication for a cold, wet and successful March of Dimes Walkathon with K5ZVW, W3IOA, K5CST, N5ASQ, K5FGA, K5ACIC, W5LJL, W5CFK on radio and W5YXQ on telephone. CC N5KAO rpts that he, along with W5LOB and W5QZ, represented ARES at an Emergency Management session conducted by McCulloch County Judge Day; the ARES team is planning an Amateur Radio demonstration for a group of Boy Scouts and will sponsor a weather safety class with the National Wx Service in Brady. DRNS NM W5B5YDD April rpt passed 728 messages in 60 sessions; STX represented 98% by W5CTZ, N5DFO, W5KLK, K5RG, W5VX, K5WOB, N25U,

W5EPA, W5B5FQ, W5SJJY, N5BHQ, K5QEW, W5B5H24 and W5B5YDD. K5A01Z, who has celebrated her 39th birthday 39+ times, upgraded to General and is now N5KGQ. WOW! OOC W5ZVJL reports speaking to one more 6th grade class; also reports that his son, K5YUW, attended Hugh O'Brian Foundation Seminar in Austin. OBS W5KLK rpts in April 6 ARRL bulletins, 30 satellite bulletins, 5 propagation forecasts, 4 DX bulletins, 2 CHRL bulletins given 149 readings on 9 nets. K5SV reports he and KY9V operating Central Traffic Net on 147.140 MHz repeater of New Braunfels daily at 6:30 PM. CAND NM W5KLK April report: 683 messages in 30 sessions; DRNS represented 100%; STX stations helping were N5XV, W5B5YDD, N5DFO, W5EPA, W5B5FQ, W5KLK. PIA N5IKW reports Sam Houston ARK, Cleveland, getting set for FD87; Education Committee had 8 students at first Technician class, more expected later. Northwest ARS (NARS, Houston) has K6JDT rptg club busy with equestrian jumping event in Bellville and PIA N5FJL rptg communication service for 18th Annual Fleeting Canoe and Kayak Races to help clean up Buffalo Bayou; K5AEF, K5BAEJ, N5HF, N5FX, K5BIC, K6JDT, N5KLU, K5F00, K5VIZ made up the operating crew; NARS ops also provided communication for the March of Dimes Walk and will "do" the American Lung Association Bike Ride in May. What do they do in their spare time? Traffic: W5KLK 507, W5CTZ 289, W5B5YDD 284, W5D5GK 220, AJ5K 203, W5SHN 187, W5B5FQ 115, AC5Z 82, W5EPA 76, W5B5 36, W5ZVJL 24, W5KR 14, N25J 5, K5UUVY 4. (Mar.) W5SHN 22.

WEST TEXAS: SM, Gene Smith, AE5I—By the time this goes into print, we should know who our elected SM is going to be. The new West Texas section is alive and well. Had an EC report from N5FHR out in El Paso County. Reporting 4 net sessions and 16 ARES members. New EC in Taylor County. Bill Jones, N5DOX. We have packet mail service, when conditions permit, from Lubbock to Abilene then on to the DFW area on 145.01 MHz. Could use more West Texans on the NTS. Tex CW Net meets daily at 7 PM and 10 PM Texas time on 3697 KHz. Need more West Texas CW operators. Received newsletter from the Lubbock club. Thanks. Looking forward to meeting some of you at the Abilene Drive-in/ly in swapnet on May 16 and 17. Traffic: AE5I 159, W5ERT 31.



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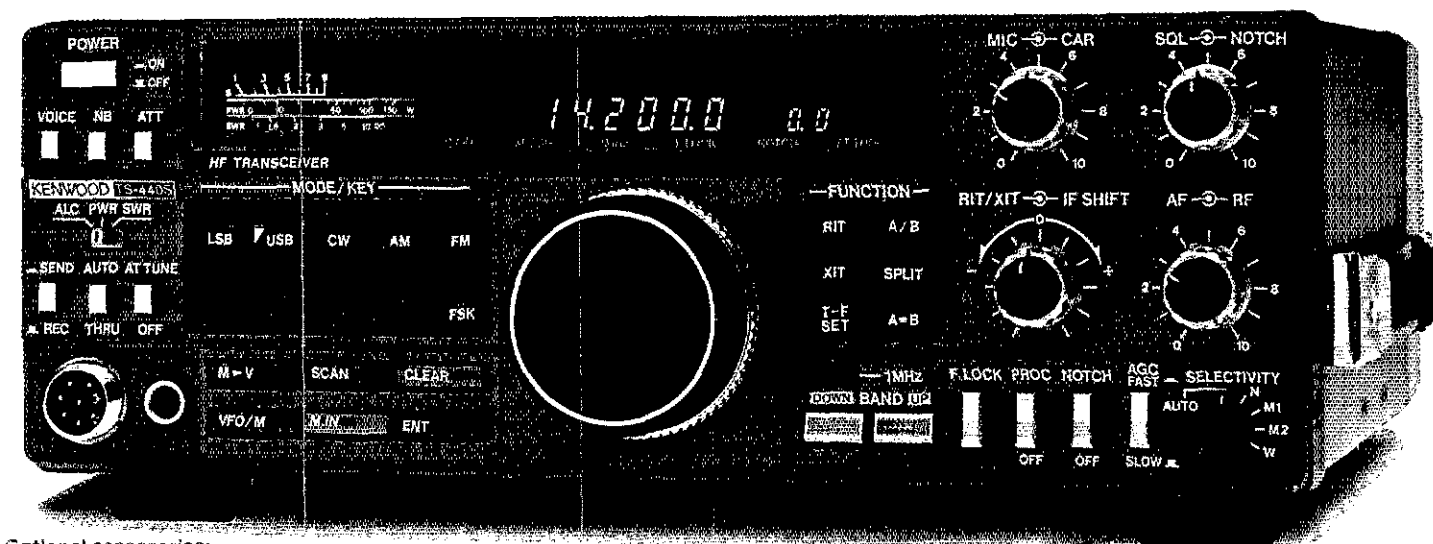
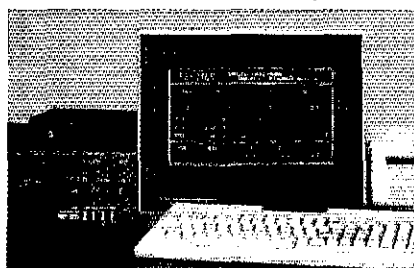
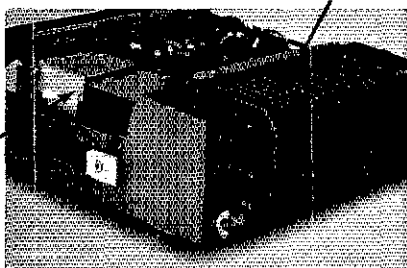
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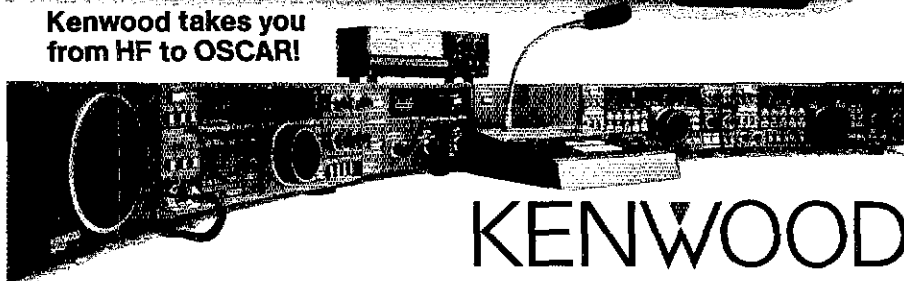
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- PS-430/PS-30 DC power supply
- SP-430 external speaker
- MB-430 mobile mounting bracket
- YK-88C/88CN 500 Hz/270 Hz CW filters
- YK-88S/88SN 2.4 kHz/1.8 kHz SSB filters
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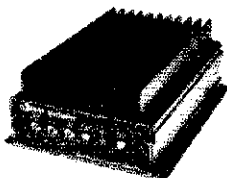
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IMRA-International Mission Radio Association Helps missionaries by supplying equipment and running a net for them daily except Sunday, 14.280 MHz, 1900-2000 GMT. Br. Bernard Frey, 1 Pryor Manor Rd., Larchmont, NY 10538.

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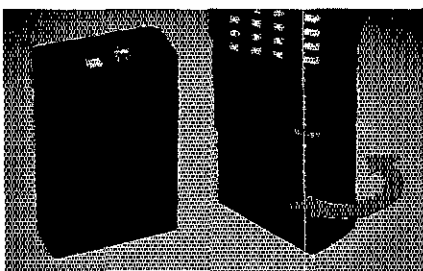
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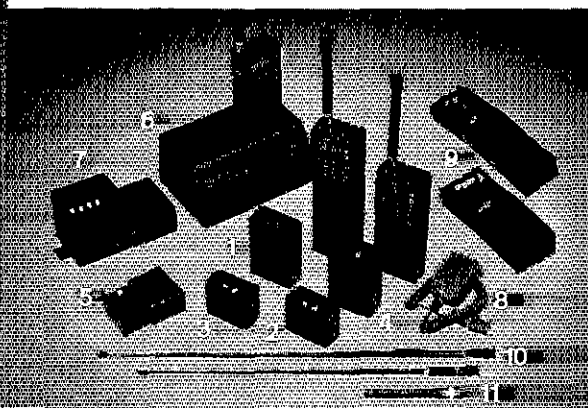
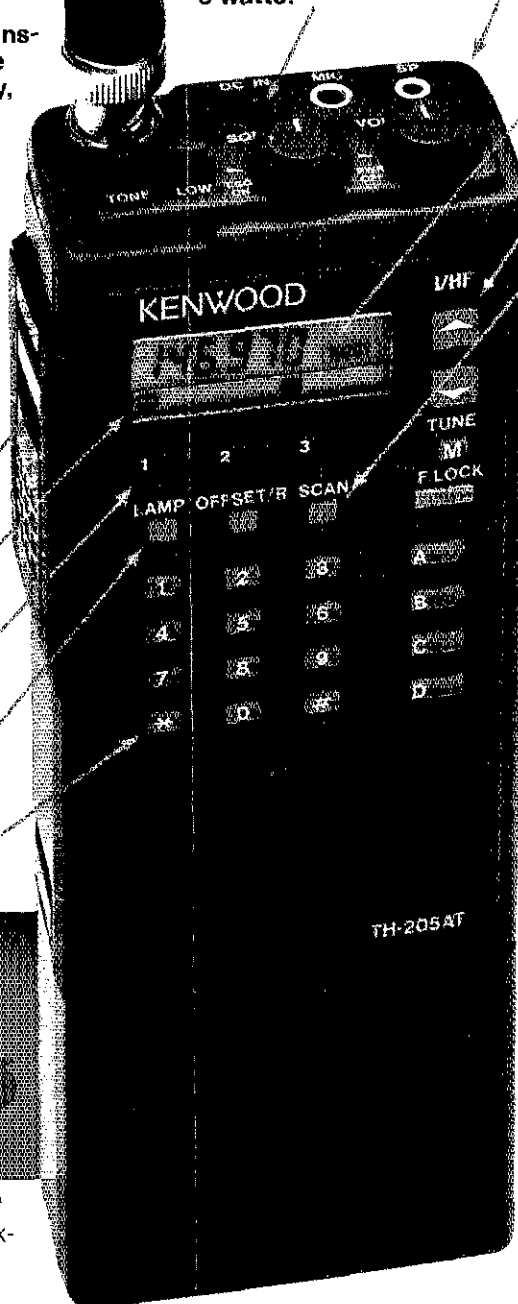


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- * Scanwood 15-440/940, 100m IC-735
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Use of this device with a transceiver operating in the 2 meter band or on any frequency below 220.5 Mhz is not permitted unless a separate control link is provided.

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MAKE PLANS for the Butler, PA Hamfest on Sept. 13, 1987. K3HJH.

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QSLs-1) FAMOUS KRAAB custom collection. 2) Railroad employees and railfan's specials. 3) Front report styles. 4) Multiple call signs. 5) Ham business cards. State your sample wants. 39 cents self addressed business size envelope required. Marv Mahre, W8MGI, 2095 Prosperity Ave., St. Paul, MN 55109-3621.

QSLs SAMPLES 40 cents (stamps OK) Fred Leyden, W1NZJ, 454 Proctor Ave., Rye, MA 02151.

BE SURPRISED-get a variety of cards - 100 for \$8 or 200 for \$13. Samples \$1 refundable. All three colors, fast service, satisfaction guaranteed. Constantine, 1219 Ellington, Myrtle Beach, SC 29577.

FREE, 100 QSLs with first order. Samples 50¢. Gazebo Press, Rt. 4 Box 4148, LaPlata, MD 20646.

ENGRAVING: CALLSIGN name badges by W8LQV, SASE for price sheet. Box 4133, Overland Park, KS 66204.

CADILLAC of QSLs—Completely different! Samples \$1. (refundable). Mac's Shack, P.O. Box 43175, Seven Points, TX 75143.

QSLs QUALITY and Fast Service for 28 years. Include Call for Decal. Samples 50¢. Ray K7HLR, Box 331, Clearfield, UT 84015.

BROWNIE QSLs since 1939. Catalog & Samples \$1 (refundable) with order 3035 Lehigh Street, Allentown, PA 18103.

QSL CARDS - Look good with top quality printing. Choose standard designs or fully customized cards. Better cards mean more returns to you. Free brochure, samples. Stamps appreciated. Chester QSL's, Dept. B, 310 Commercial, Emporia, KS 66801.

QSL CARDS. High Quality. Low Cost. Fast Service. Free Samples. Shell Printing, KD9KW, P.O. Box 50, Rockton, IL 61072.

QSL SAMPLES send \$1 (refundable with order) Box 1922 Point Roberts, WA 98281.

MAGNETIC CALLSIGN... 2" x 8" Instant transfer car to car! Your call in lettering Black, Blue, Green or Red (white background). Each sign only \$8.50 ppd. Sign-On, Dept. T, 1923 Edward Lane, Merrick, NY 11566.

QSLs, QSLs, Rusprint QSLs Quantities of 100, 200, 300 more Full color Old Glory and cartoon also Parchment, Golden Eagle and others. SASE appreciated, Rt. 1, Box 383-QST, Spring Hill, KS 66083.

QSL samples - 26 cents Samcards - 48 Monte Carlo Drive, Pittsburgh, PA 15239.

COLORFUL QSLs by WA7LNW - Improve your QSL returns! Revolutionary printing process combines brilliant rainbow colors with sparkling metallic inks. The ultimate QSLs! Free samples, stamps appreciated. COLORFUL QSLs, P.O. Box 5358, Glendale, AZ 85312-5358.

FREE QSL card samples-quality cards at low prices, wide selection, design your own. 100 FREE miniature cards with each order. KETGY, Insta-Copy, Rt. 1, Box 1486, Roosevelt, UT 84066.

POST CARD QSL KIT—Converts Post Cards, Photos, to QSLs! Stamp pictures circular. My Type Shop, P.O. Box 172, Leeds, NY 12451.

QSL CARDS: Have us make your call into a personalized emblem for QSLs and stickers, or choose from our selection of high quality illustrated cards. For brochure send 22 cent stamp to: Select Design Cards, P.O. Box 1012, Palo Alto, CA 94302.

FREE QSLs... Just passed your Novice exam, waiting for your license? Send name and address for 25 "Fill In" cards so you can send QSLs as soon as your ticket arrives. One card is specially printed to reflect the fact that it is your First Card. Offer good thru August 1, 1987. QSLs By W4MPY, 705 Audubon Circle, Belvedere, SC 29841.

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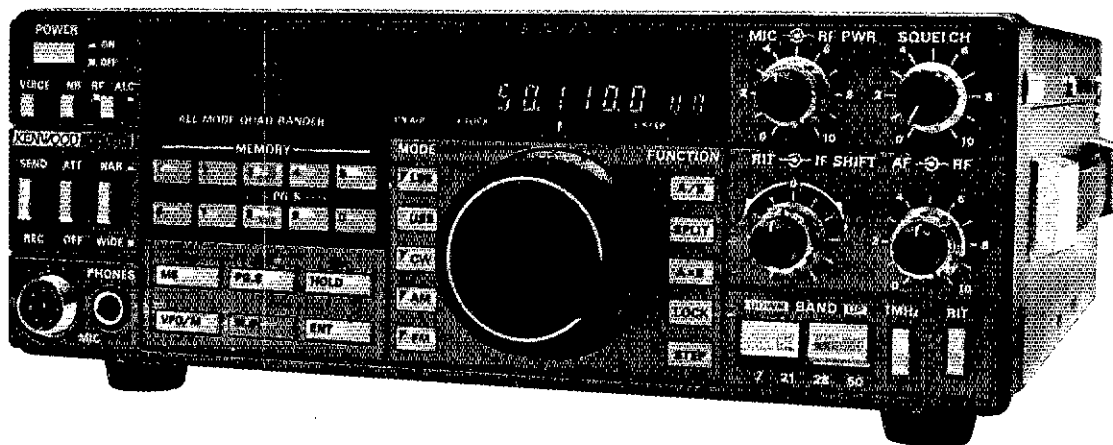
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- QRP 10 W operation



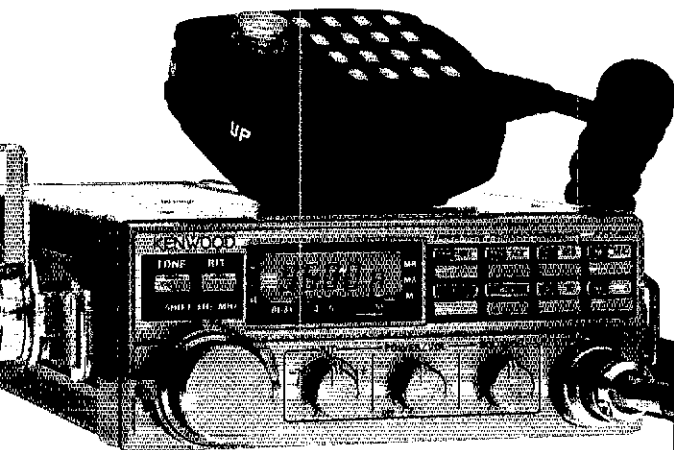
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**The perfect portable
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- 1 watt output
- LCD frequency readout with S & RF power meter
- 5 memory channels

- Odd split on memory channel 5
- Includes: Battery set, charger, external power cable, 16-key DTMF hand microphone, sleeve antenna with adjustable mount, shoulder strap.



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- **TM-221A:** 2 m, 45 W, with expanded receiver coverage (138-174 MHz).
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- Built-in front panel-selectable CTCSS encoder. Decode optional.
- Famous high performance Kenwood GaAs FET front end.
- 14 full-function memory channels, 2 channels for odd split operation.
- 16-key DTMF mic., mic. hook, mounting bracket, and DC cable included.
- Remote control telephone-style handset option (model RC-10).

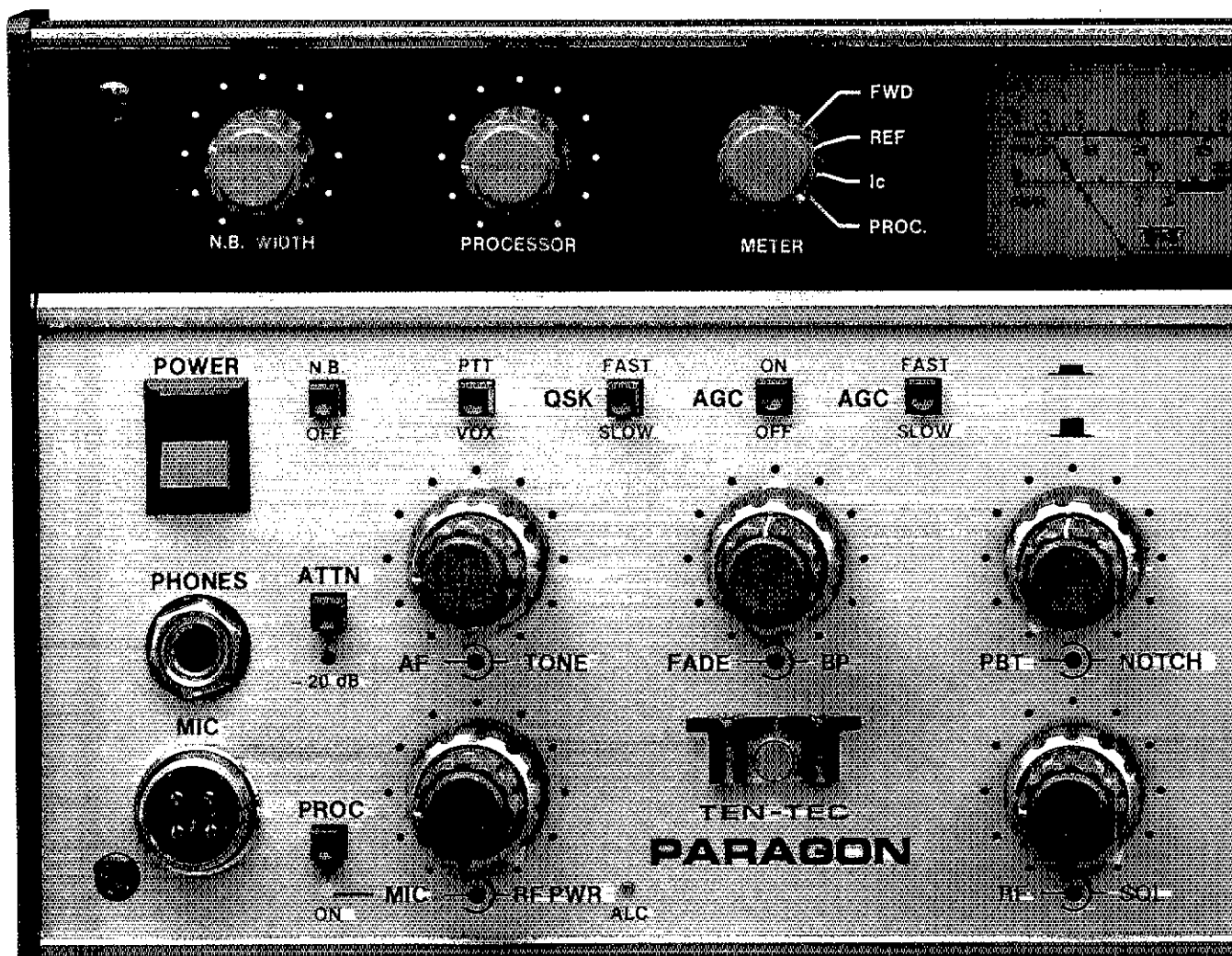


TM-221A 2 m version shown

KENWOOD

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A complete line of accessories is available for these transceivers.
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Complete service manuals are available for all Kenwood transceivers and most accessories.



You're face to face

Meet America's Newest, the Ten-Tec Paragon, Model 585

PARAGON HF TRANSCEIVER, Model 585 . . . \$1995

The Paragon Model 585 is a full featured, synthesized transceiver. General coverage all mode receiver tunes from 100 kHz to 29.999.99 MHz. Transmit at 100 watts output on all authorized frequencies from 1.8 to 29.999.99 MHz. SSB, CW, FSK and optional FM. Noise blanker and speech processor are standard equipment. Dual VFOs, RX offset, TX offset, QSK with a changeover time of less than 30 ms, five I-F filters (standard 6 kHz AM and 2.4 kHz SSB, optional 1.8 kHz, 500 Hz and 250 Hz) that are front panel selectable independent of mode, selectable tuning rates with automatic speed-up at rapid tuning knob rotation, passband tuning, audio bandpass filtering, tone control, squelch, notch filtering and more!

Sixty-two programmable memories that include frequency, mode, filter selected, channel number and a 7 character alpha-numeric tag for entering a net name, call sign or I.D. of your choice. As the memory channels are scanned, all of the information is displayed (what a light show!) and the receiver automatically sets up mode, filters, tag and frequency as stored in each channel. Channels scanned are totally controllable with global lock-out, global reset and individual lock-out and reset.

The construction is impressive too. All circuit boards are glass epoxy (G-10) and all of them can be removed without desoldering. The front panel is hinged to provide access to all sections of the chassis. All aluminum construction keeps the weight of the rig reasonable too. And of course, the front panel is a spacious arrangement which makes the critical controls easy to use.

Frequency selection can be made using the main tuning knob, keypad direct entry or up/down buttons that can shift one MHz or to the next ham band. Frequency readout is selectable to display to 100 Hz or 10 Hz. Front panel clock is in 24 hour format. Rear panel input and output provisions keep the all-mode operator in mind too. Fixed level audio out and FSK keying (170 Hz shift), auxiliary dc jack, amplifier control circuits plus all the other connections that you could possibly need, including RS-232 computer interface option.

The Paragon is the end result of a three year engineering effort. Much of that effort was invested in improving the receiver performance and controlling the phase noise inherent in a PLL oscillator. We are proud of the performance of the Paragon and we think it has set new standards of excellence in synthesized rigs. All we ask is that you take the time to check it out. We think that you will share our pride in the Paragon.

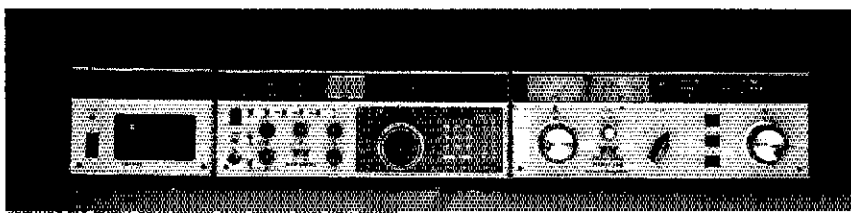
GENERAL SPECIFICATIONS

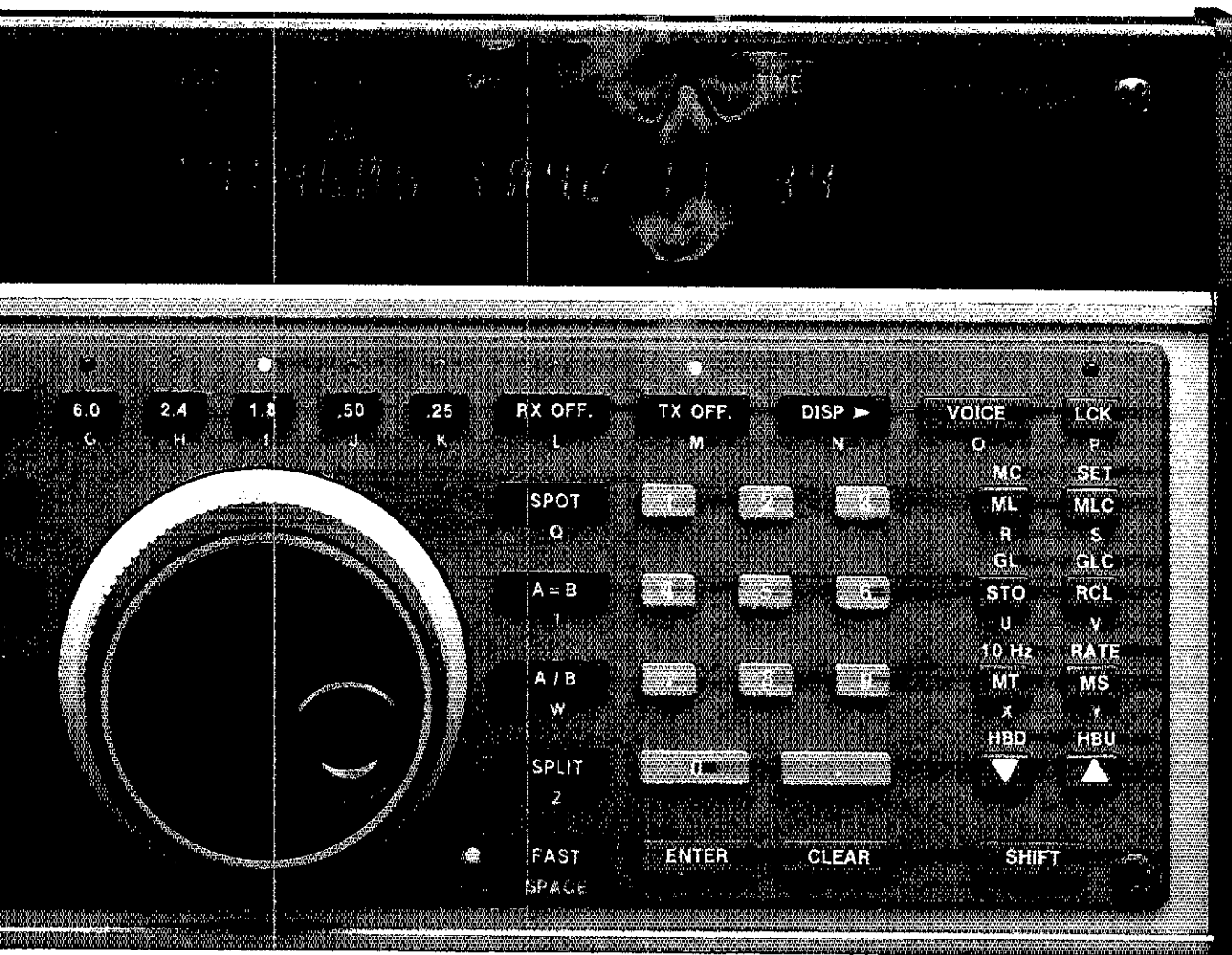
Frequency Range: Receive: 100 kHz to 29.9999 MHz. Transmit: 1.8 to 29.9999 MHz.
Frequency Control and Readout: Microprocessor controlled digital PLL synthesizer 10 Hz resolution.
Frequency Stability: Worst case, 1 PPM per degree C. at 29.999 MHz.
Frequency Accuracy: ± 100 Hz @ 25 degrees C.
Tuning Rate:

	Normal	Normal Shifted
CW/USB/LSB/FSK	10 Hz 4.8 kHz per turn	25 Hz 9.6 kHz per turn
AM/FM	50 Hz 24 kHz per turn	100 Hz 48 kHz per turn
	Fast	Fast Shifted
CW/USB/LSB/FSK	20 Hz 9.6 kHz per turn	50 Hz 24 kHz per turn
AM/FM	100 Hz 48 kHz per turn	500 Hz 240 kHz per turn

Antenna Impedance: 50 ohm unbalanced.
PC Boards: 14 double-sided, 9 single-sided .062" glass-epoxy.
Power Required: Receive = 1.5A Transmit = 20A. 12-14 VDC.
Dimensions: HWD 5 1/4" x 14 3/4" x 14 1/4". 13 x 37 x 36 cm.
Net Weight: 16 lbs. 7.25 kg.

**Paragon Station with Model 960
Matching Power Supply (\$229), and
the Mighty Titan Amplifier (\$2685).**





Shown actual size.

With the Paragon.

TRANSMITTER

Modes: USB & LSB (J3E), CW (A1A), FSK (F1A); FM (F3E) optional (Model 256).

DC Power Input: Typical 200 watts.

RF Power Output: ALC stabilized, adjustable, 10 to 100 watts (into 50 ohms) with front panel RF OUT control.

Microphone Input: Low impedance, bias voltage for electret provided.

CW Sidetone: Internally generated, adjustable tone and volume independent of AF GAIN control.

SSB Generation: 9 MHz, 8-pole crystal ladder filter. Balanced modulator.

Carrier Suppression: Greater than 60 dB.

Unwanted Sideband Suppression: Greater than 60 dB at 1.5 kHz AF input.

Harmonic Emissions: Greater than 45 dB below peak power output.

Spurious Output: Greater than 50 dB below peak power output.

Third Order Intermod Products: -30 dB from two-tone at 100 watts PEP.

Metering: Switchable forward power, SWR, collector current or audio processing level on SSB.

CW Offset: 750 Hz automatic.

FSK Shift: 170 Hz.

Transmit Offset Tuning Range: ± 99.9 kHz.

RECEIVER

Modes: USB, LSB, CW, FSK, AM, (FM optional).

Sensitivity:

	1-1.6 MHz	1.6-29.999 MHz
SSB/CW/RTTY	5 μ V	15 μ V
AM	3.5 μ V	1.0 μ V
FM	1.0 μ V	5 μ V

Selectivity:

	-4 dB BW	-60 dB BW	Shape Factor
Standard AM	6.0 kHz	11.25 kHz	1.8/5:1
Standard SSB	2.4 kHz	3.36 kHz	1.8/1
Opt. 1.8 kHz SSB (Model 258)	1.8 kHz	2.9 kHz	1.6/1
Opt. 990 Hz CW (Model 258)	500 Hz	1.4 kHz	2.8/1
Opt. 250 Hz CW (Model 282)	250 Hz	.85 kHz	3.4/1
Standard FM	15 kHz	30 kHz	2.0/1

Attenuator: -20 dB for 1.6 to 29.999 MHz, -10 dB for .1 to 1.6 MHz.

I-F Frequencies: 1st = 75 MHz, 2nd = 9.0 MHz, 3rd = 6.3 MHz (FM 3rd = 455 kHz).

Image Rejection: Greater than 80 dB.

I-F Rejection: Greater than 70 dB.

Noise Blanker: Switchable on/off with adjustable width.

Dynamic Range: 100 dB.

Blocking Dynamic Range: +16 dBm for 1 dB compression of an S9 signal, frequency offset = 50 kHz. -2 dBm for 1 dB compression of an S3 signal, frequency offset = 50 kHz.

Third Order Intercept: +18 dBm.

Noise Floor: -132 dBm @ 2.4 kHz BW.

Squeal Sensitivity: Less than .6 μ V.

Receiver Recovery Time: Less than 27 ms.

Receiver Offset Tuning Range: ± 99.9 kHz.

Pass Band Tuning I-F Shift: ± 1.2 kHz.

Audio Output: 1.5 watts @ 8 ohms, 5% distortion max.

Notch Filter: 250 Hz to 2.2 kHz, greater than 50 dB notch depth.

Audio Bandpass Filter: 4 pole, variable center frequency 220 to 1.7 kHz, 35% bandwidth @

-5 dB.

Tone Control: Variable 15 dB rolloff @ 5 kHz.

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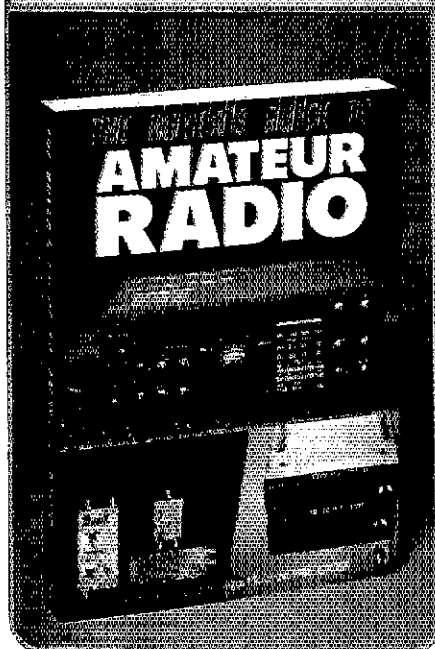
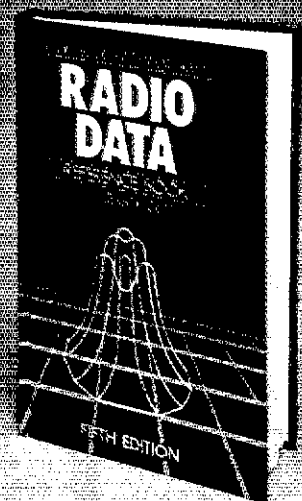
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AMATEUR RADIO SOFTWARE by John Morris, GM4ANB. Designed to be a sourcebook for the radio amateur program. Contains 86 programs written in BASIC and 6 in assembly language. The introductory chapter describes the differences between various versions of BASIC so that the programs presented can be modified slightly in order to be used on as many types of computers as possible. The remaining 8 chapters cover: CW, sending and receiving; RTTY and Data including Amtor and packet; Antennas and Propagation, predicting path loss, propagation predictions; Distances, Bearings and Locators; Satellites, predicting elliptical and geostationary orbits; Sun and Moon; Circuit Design Aids, filters and matching networks; Miscellany, a simple data base system and network analysis package. Copyright 1985, 328 pages, \$15.00 hardbound. First Edition.

RADIO DATA REFERENCE BOOK by G. R. Jessop, G6JP. This handy publication is divided into 9 chapters: Units and symbols. Basic calculations. Resonant circuits and filters. Circuit design. Antennas and transmission lines. Radio and TV services. Geographical and meteorological data. Materials and engineering data, and Mathematical tables. You'll find hundreds of useful tables, charts, and formulas. Fifth Edition. Copyright 1985, 244 pages, \$15.00 hardbound.

NEW!

THE BUYER'S GUIDE TO AMATEUR RADIO by Angus McKenzie, G3OSS. Have you ever seen a used equipment ad and wondered what the specifications were for the piece of gear advertised? Is the rig that your friend is selling all he claims it to be? *The Buyer's Guide to Amateur Radio* may have the answers! This book contains over 100 full reviews of equipment and close to that number of product descriptions. Modern gear is covered as well as some venerable "boat anchors." Some of the descriptions apply only to the British versions of equipment designed for operation under European band plans. The opinions expressed in this book are those of the author and not necessarily those of ARRL. Copyright 1986, 480 pages, \$12.00 softbound.



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HALLICRAFTERS Service Manuals. Amateur and SWL. Write for prices. Specify Model Numbers desired. Ardco Electronics, P.O. Box 95, Dept. Q, Berwyn, IL 60402.

WANTED: Radio, magazines, horn speakers, pre 1930. W6THU, 1545 Raymond, Glendale, CA 91201, 818-242-8961.

MICROPHONES AND related memorabilia used in radio/TV broadcasting prior to 1950 wanted. Cash paid: trade terms available. Write: James Steele, 160 West 77th Street, New York, NY 10024-6942.

WANTED: QST VOLUME 1. W6ISQ, 82 Belbrook Way, Atherton, CA 94025.

SCHEMATICS: Radio receivers 1920's/60's. Send Brand-name, Model No., SASE Scaramella, Box 1, Woonsocket, RI 02895-0001.

TELEGRAPH BUGS, paddles, old keys wanted. Collector seeks all models and variations to date. Keys by Martin-United Electric. Vibropies wanted working or not. Donations of parts, partial or damaged keys appreciated. Write: John Hensley, WJ5J, 5054 Holloway Avenue, Baton Rouge, LA 70808.

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WANTED. BOOKS: Pre-1900 Electricity and Telegraphy, Pre-1925 Radio, Pre-1940 Television. Books, Magazines or any other related literature. Jim Kreuzer, N2GHD, 6270 Clinton St., Elma, NY 14059 716-681-3186

BUY, sell, collect and restore early tube equipment? Early receivers, tubes and telegraph gear? Join the Antique Wireless Association which sponsors old-time "meets", flea markets, museum and journal with technical articles and free want ads. Membership and annual dues only \$10. Write for information and Museum hours: Bruce Kelley, W2ICE, Route 3, Holcomb, NY 14469.

WANTED: NATIONAL SW3 Receivers. Also parts and accessories for these receivers. Dean Showalter WA6PJR, 36308 Panorama Drive, Yucaipa, CO 92399.

NATIONAL RADIO equipment manuals or NCL 2000 factory parts lists. SASE Max Fuchs, 11 Plymouth Lane, Swampscott, MA 01907.

WANTED: SW-3, HRO-7, one-tube regenerative, w/coils. The earlier the version the better. Jack, W7HWW, 20 Santa Fe, Prescott, AZ 86301. 602-445-0999.

OLD CALLBOOKS WANTED: prior 1940. W2OC, 2 Barnard Road, Armonk, NY 10504, 914-273-3058.

HALLICRAFTERS SX-62. \$70. Needs work. Uship. 815-939-1440, WA9VLK.

WANTED: OPERATING MORROW HF Transmitter and/or receiver (MR?) Series, vintage around 1960) with mobile or fixed P/S, cords. Reply with equipment condition and price to WA6IYL (86 Callbook).

WANTED: SCOTT "Special" communications receiver or any parts thereof. Also any Scott or McMurdo Silver set, literature, etc. I am trying to put a few of these old sets back in working order so I could use extra parts speakers, power supplies, etc. If you think you have something please contact me. I will arrange shipping on large items. D. Yanko, 410 N. Summit, Oconomowoc, WI 53066. Please include your phone number. 414-965-3641 collect after 5:00 CST.

QST 1956 to 1986 Ham Radio first to 1987 Best offer W3MP.

HALLICRAFTERS SX-130 receiver 4 bands, BC and 3SW 1700-kHz to 34-MHz \$95; S-200 standard BC and 4 foreign \$40. Both clean, never used. Becker, W6QD, 213-598-2518.

ANXIOUSLY SEEKING Hallicrafters S-35 Panoramic receiver, to run with my HT-9. Finders fee for help getting one. Sam Thompson, W8HJU, 1031 San Antonio Avenue, Alameda, CA 94501, 415-521-1429.

WANTED: TELEGRAPH COLLECTOR looking for each make and model of bug before 1935. Vibropies, Martin, Boulder, Mecograph, DeLaney, Albright, etc. Also need spark keys and pre-1900 handline (keys, pocket sets, etc.). K5FRW, 1128 Midway, Richardson, TX 75081, tel. 214-234-1653.

QST 1960 thru 1983. Exc. Cond. Best offer for set. You pay shipping. K3OMX, 36 Rorer Avenue, Hatboro, PA 19040, 215-675-3845.

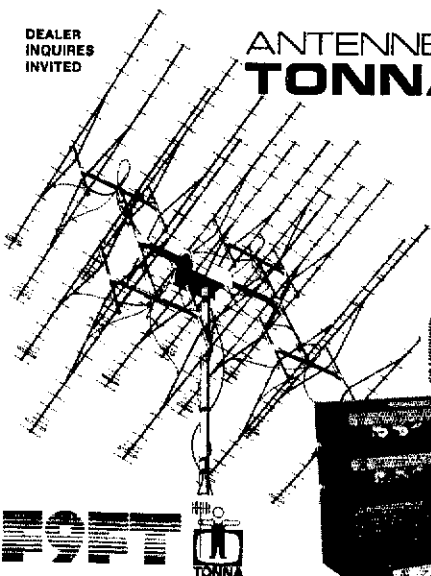
WANTED: H, J COIL Sets for Nat'l. HRO 50-1 or 80 Rcvr. C. Bardenwerper, 92 N. Main Street, Ft. Atkinson, WI 53538, 414-563-4818, 414-563-2689.

MILITARY RADIOS & Related items sought by enthusiast: German, Japanese, Italian, WW2 sets & items; any U.S. Gov't publication with info on "enemy equipment"; some older U.S. equip. particularly self-contained rec-trans sets or compact sets, examples ARR-16, MBM, PRC-1 thru 5, RAX, TBY, TRC-10. Trade/sell list, send SASE. Hugh Miller, KA7LXY, 11206-1 NE, Seattle, WA 98125, 206-365-3684 1600-1900 UTC. Tnx!

WANTED: BC-610, any model. Also parts including tuning units, xmtr coils, etc. Please write stating condition and price. K6GPX, Garry, 3420 Birdie Street NE, Fargo, ND 58102.

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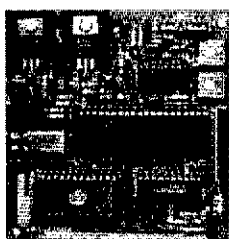


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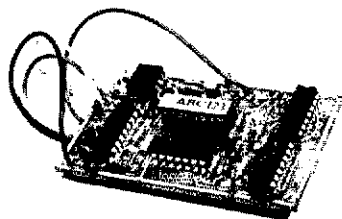
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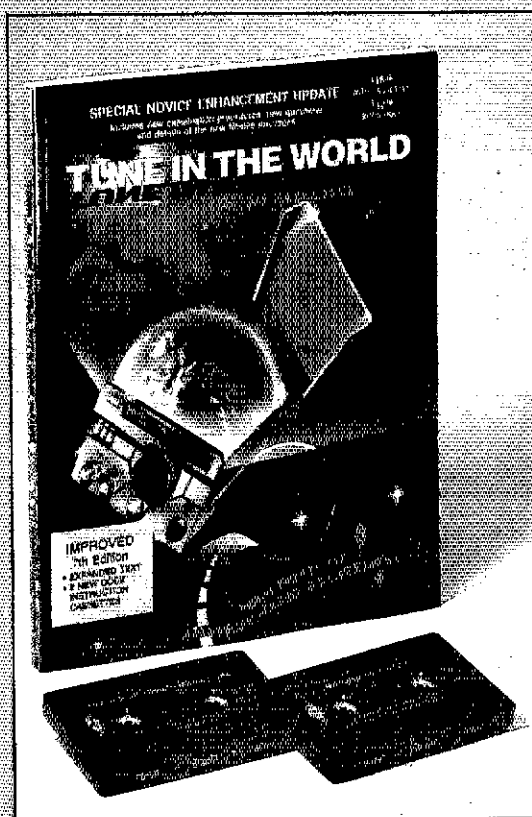
Tune in the World with Ham Radio has put the fun back into learning what Amateur Radio is all about. Enhanced Novice class privileges have brought the fun back into operating. Now beginners with their Novice licenses no longer have to spend all of their time on the air using only Morse code. Novices 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.



How We Made *Tune In the World With Ham Radio* Even Better!

Two new tapes with almost three times the code practice material and an expanded text covering Novice Enhancement changes make this edition a winner.

Tune In the World With Ham Radio has proven to be one of the League's most popular courses of instruction for the aspiring ham, and the 7th Edition of this package has just been released.

The **BIG NEWS** about our beginner's package is that we have replaced the 60-minute cassette with two 90-minute cassettes to give almost three times the Morse Code instruction. Production of these tapes was a team effort. First, selected ARRL registered instructors were asked to review prototype tapes. ARRL Training Manager John Foss, W7KQW and Club Resources Manager Curt Holsopple, K9CH reviewed the suggested changes and these were incorporated into the 3-hour script that was prepared by Assistant Technical Editors Larry Wolfgang, WA3VIL and Bruce Hale, KB1MW.

Although it is easy to get an IBM® PC to generate code, it is very difficult to get acceptable code reproduction on even the highest quality audio equipment. The keying wave-form coming from a PC is uncomfortably "hard," which makes copy difficult for the beginner. To overcome these problems, one of our ARRL Laboratory engineers Ed Hare, KA1CV, designed and built a keying interface which



At the recording studio: Curt Holsopple, K9CH, reads the voice-over and Larry Wolfgang, WA3VIL, monitors the code sent from the IBM® PC.



An audio engineer prepares the deck on which the master tape for the new *Tune In the World With Ham Radio* cassettes will be recorded.

allows proper shaping and audio levels for use with mixing and recording equipment.

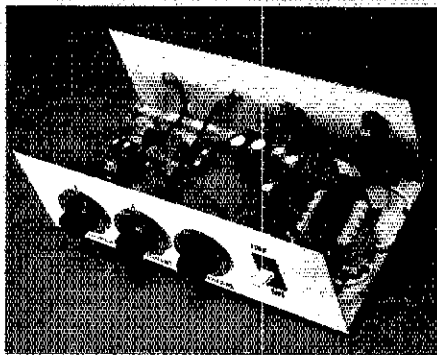
The result is vastly superior to the code practice material contained in the previous editions. The popular Farnsworth method is used: the letters are sent at 18 WPM with appropriate spacing so that the actual speed is 5 WPM. The code is recorded on both stereo channels, but the voice-over is recorded only on one. Students with a stereo tape player can learn the code as the text is described on the tape, and then switch to the "code only" channel to test themselves as they go along.

The first tape is devoted to teaching the letters of the alphabet, prosigns, and numbers; the knowledge of each is required on the code portion of the Novice exam. Each new letter (or character) is sent several times, then words are sent containing previously learned letters and the new letter before going on to the next. The audio channel explains what is being sent. The first side of the second tape consists of 9 practice sessions; which are described on the tape and in greater detail in Chapter 3 of the *Tune In the World* text. The other side of the second tape consists of six sample Amateur Radio contacts for use as

final practice by the student. Sample 10-question tests covering each of the QSOs are also presented in the text in order to give the student a feel for what the code portion of the exam will cover. The new tapes should make learning the code a fun experience.

We've improved the text too! Material has been added to the text to cover what the prospective Novice needs to know in order to pass the new 30-question Novice exam. The question pool has been expanded with all 300 possible questions and distractors presented along with an answer key. The new chapters are written in the style that has made the most recent editions of *Tune In the World With Ham Radio* so popular among students and instructors. Editorial responsibility for the package belongs to ARRL Assistant Technical Editor Bruce Hale, KB1MW. Additional editorial support came from Senior Assistant Technical Editor Mark Wilson, AA2Z.

Tune In the World With Ham Radio is suitable for individual or classroom instruction. With the expanded text and improved code-learning cassettes, this package should be *your* choice for Novice instruction material. Complete kit with text and two C-90 code instruction cassettes, \$15. Text only, \$12. Set of both cassettes, \$10.

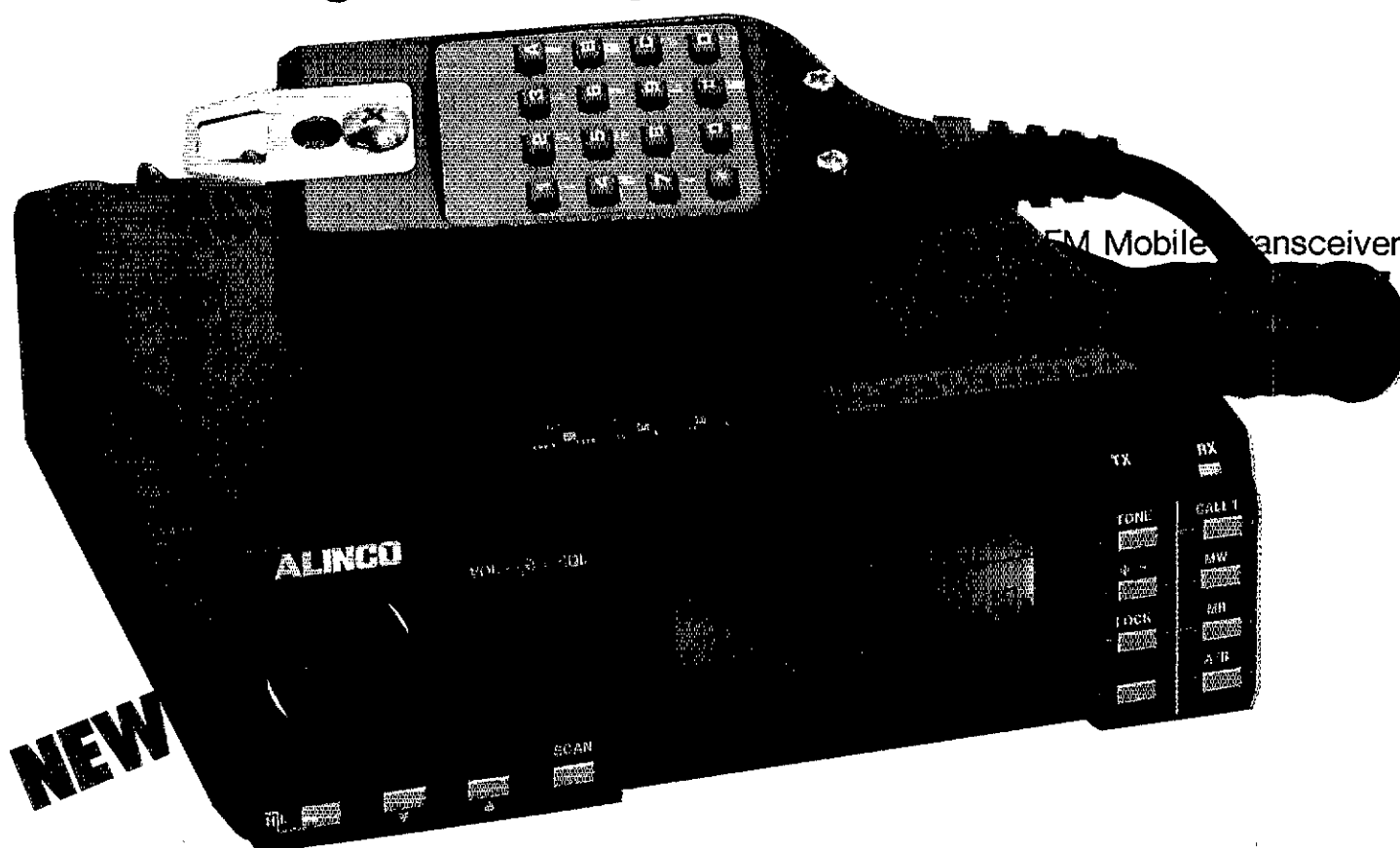


Ed Hare, KA1CV, designed and built this active filter in order to improve the quality of the code practice audio. It *really* makes a difference!



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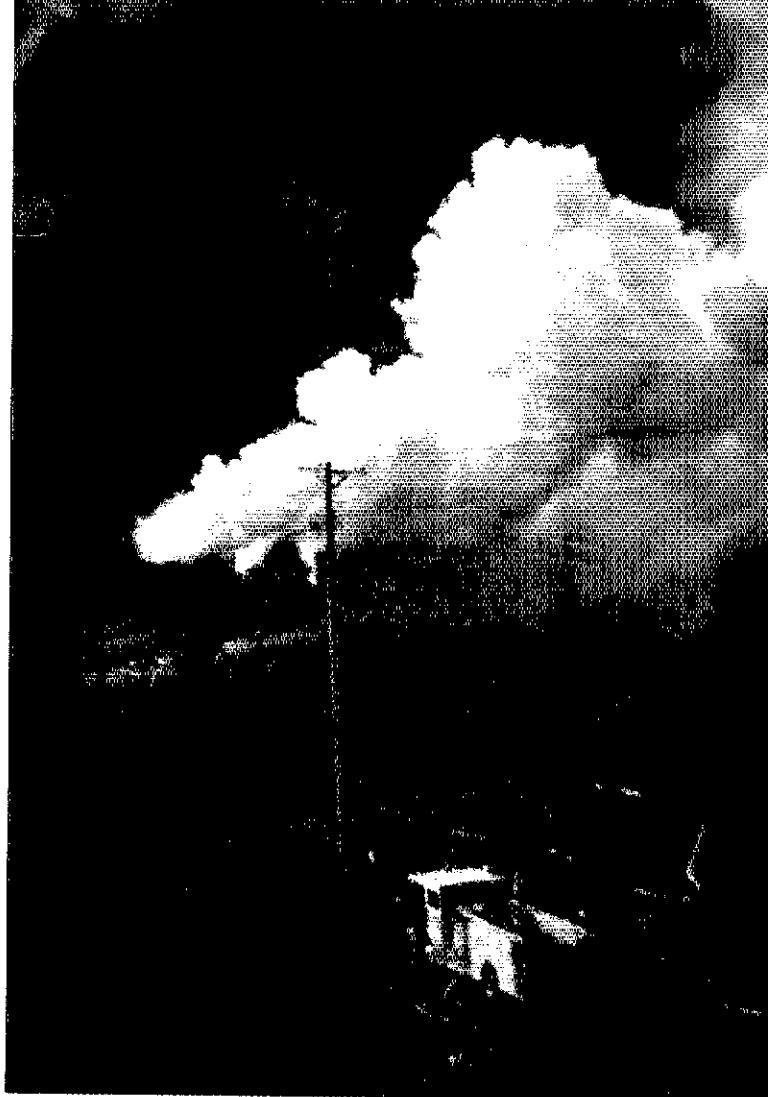
Amateur & Advance Comm. - Wilmington, DE.
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AES - Milwaukee, WI.
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AES - Orlando, FL.
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The New 688-page ARRL Operating Manual is **HOT...**



On July 8, 1986, a railroad tanker carrying toxic phosphorous 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, KTSY 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, AK7M, 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 pound-

ing 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 its 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, WA3LOU, 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 QSL's 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-peditioneer, Carl Henson, WB4ZNH gives advice on how to operate from the "rare-ones"

without catching malavia 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," WAILOU 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.

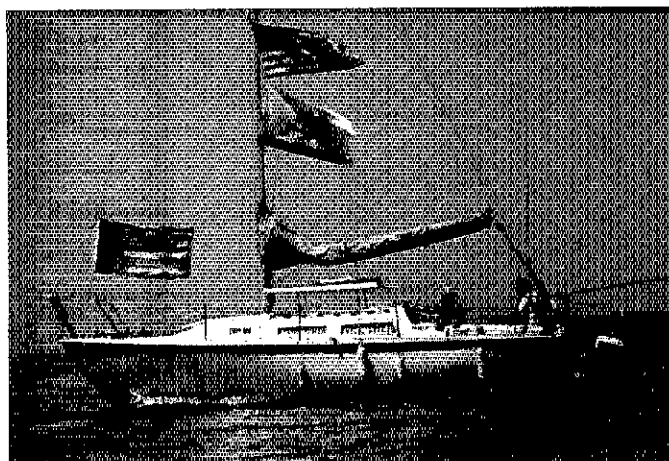
You'll also find numerous handy tables and charts in the third edition of *The ARRL Operating Manual*. It is edited by Robert J. Halprin, K1XA, Deputy Manager of Membership Communications at ARRL HQ. The new edition is available at your dealer or from ARRL for \$15. (Please add \$2.50, \$3.50 for UPS; for shipping and handling.)

For even more information, turn the page!

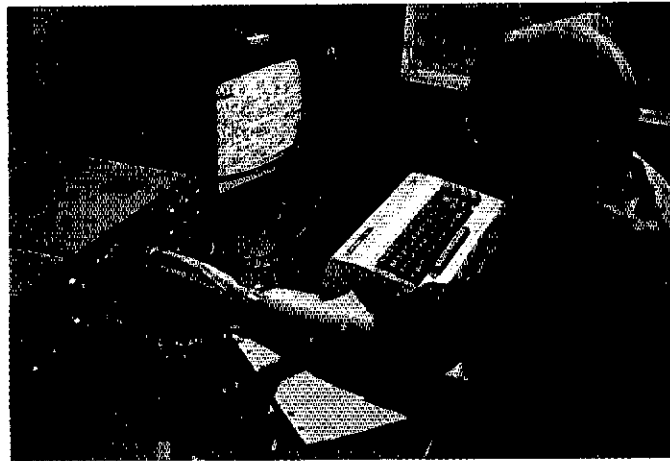
but it's also

FUN!



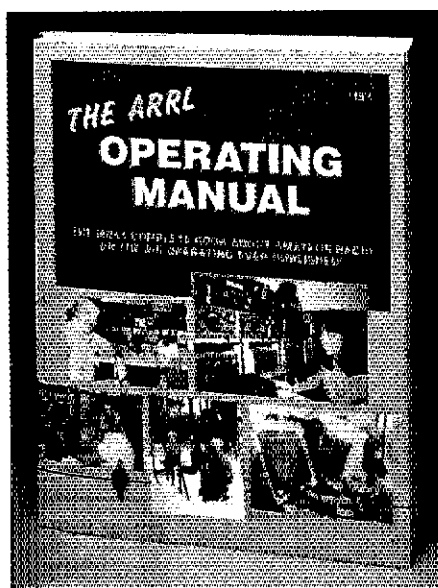


Can you think of a better spot for some relaxing operating than this? KB6AIB and N6ESB ride the waves after catching some waves on HF. Fun like this is covered in the Basic Operating chapter of the new *ARRL Operating Manual*.



WB7RPJ shows visitors to a county fair what RTTY is all about. We've doubled the amount of material on digital communications in the new edition so you can learn how to join in. (KC7YN photo)

A brief look at the new ARRL Operating Manual



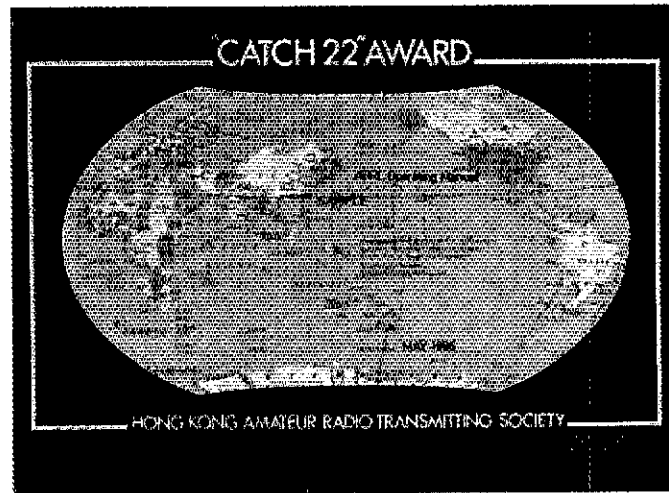
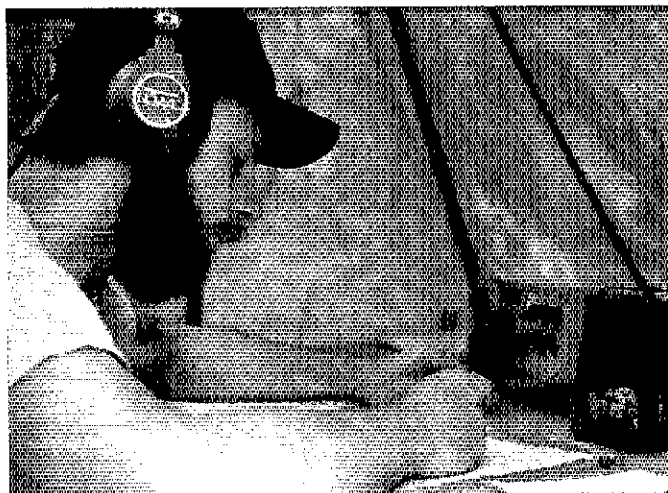
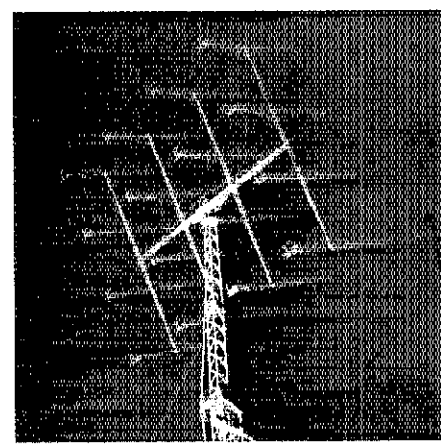
N1CXV is shown here checking out W1AW 2-meter repeater. The new *Operating Manual* does an excellent job in describing just about all you need to know about this popular means of communication.

There is no better book on operating for the new Novice. Now that Novices are allowed operation on FM and other modes on the VHF/UHF bands, the new *ARRL Operating Manual* is the source for information on the proper procedures to use. Many beginners are nervous because they haven't tried a particular band or mode before. Now, newcomers can find out what is going on and explore new frontiers of operating with confidence. Even the beginner can use the propagation tables to determine when there will be openings to particular parts of the world on the HF bands.

Weak signal work on VHF/UHF is always fascinating. The array at right is used by I2OD1 for moonbounce. There is also meteor and tropospheric scatter, and if that isn't enough there are Sporadic E and auroral openings. ARRL's VUCC awards for working grid squares make VHF/UHF operating all the more fun! The VHF/UHF chapter tells what you need to know.

Practically all of the popular operating awards are described in the Awards chapter. Like the "Catch 22" Award, most are reproduced in full color!

N8HLE is shown here operating Field Day. "FD" is an emergency exercise, an operating event, and a learning experience. Those terms also capture the essence of the new *ARRL Operating Manual*. The new edition belongs in every Amateur Radio operator's library. (See the preceding page for more details.)

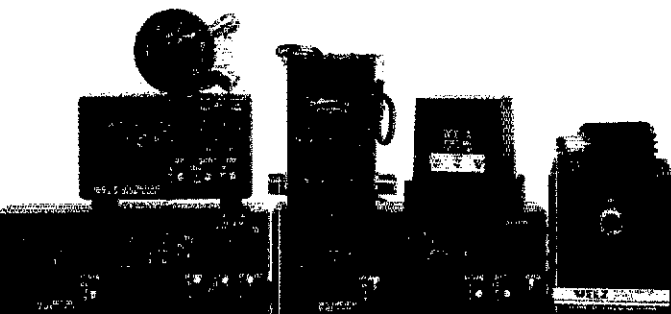


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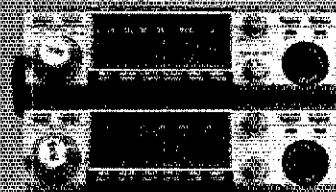


THE MOST POPULAR HAM RADIO ACCESSORIES are available from WELZ. WELZ brand easy-to-read power and VSWR meters and other high quality station accessories are used world-wide. WELZ, good enough to be the best.



THL THE INDUSTRY LEADER IN DESIGN AND PERFORMANCE add-on accessory VHF/UHF amplifiers, antenna couplers and now HF LINEARS too. When power out is your problem, stop in for the THL brand solution.

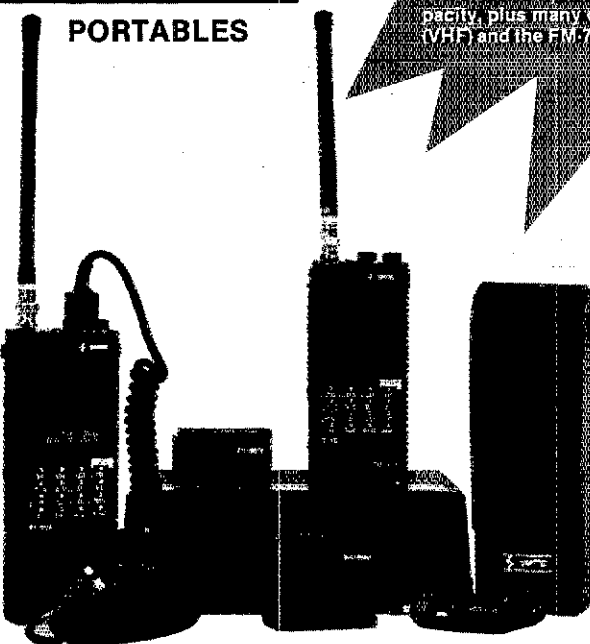
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COMPACT MOBILES MAKE FULL DUPLEX POSSIBLE KDK mobile radios are so small, TWO of them will fit in the space normally accomodating one full size mobile radio. This allows for full duplex cross band operation with 32 memory capacity, plus many other advantages. Check out the FM 240 (VHF) and the FM 740 (UHF) today.

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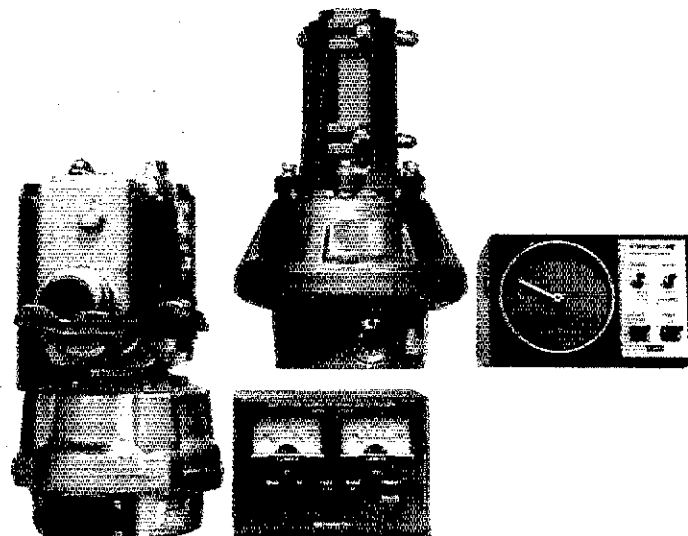


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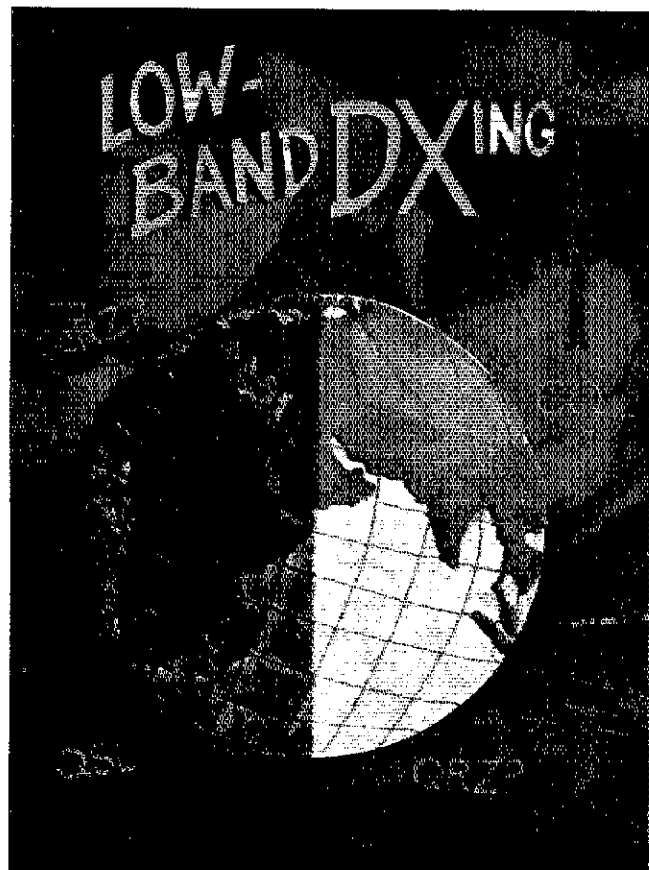
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WHEN, WHERE & HOW ON 160, 80 & 40 METERS

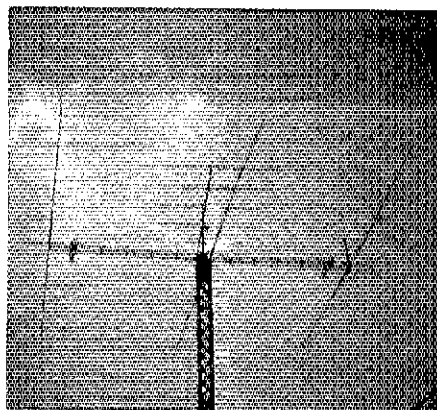
Written by John Devoldere, ON4UN, published by ARRL

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.

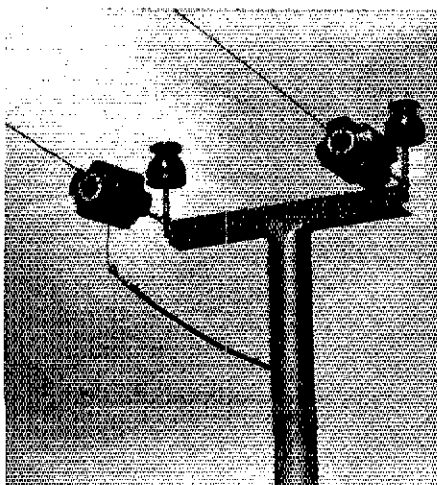
John draws on his vast knowledge and years of experience, as well as that contained in over 500 references which are listed in their own chapter. A large portion of the book is devoted to the design and building of efficient antennas for these frequencies. Receiver, transmitter and transceiver characteristics 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 15NPH, 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
 TIME OF YEAR (MONTH/DAY) = 11 / 7
 YOUR SUNRISE IS AT 14.59 UTC
 GRAY LINE WIDTH IS 56 MINUTES.

YOUR LONGITUDE IS 122 DEG. WEST
 YOUR SUNSET IS AT 00.44 UTC
 MINIMUM TARGET DISTANCE IS 14000 KM.

PREFIX	COUNTRY	CITY	KM.	START	END	MIN/TARG
FBX	KERGUELEN ISL.		19136	14.28	14.41	20
FR	MAYOTTE		16019	14.52	15.12	20
FR	REUNION ISL.		17113	14.26	14.41	20
FR	EUROPA ISL.		16837	15.23	15.32	20
FR	GLORIOSO		15931	14.42	15.02	20
FR	JUAN DE NOVA		18380	15.07	15.27	20
FR	TROMELIN		16524	14.28	14.39	20
TS	SOMALI	MOGADISHU	14418	14.34	14.54	20
VKO	HEARD ISL.		18714	14.26	14.40	23

PREFIX	COUNTRY	CITY	SUNRISE	SUNSET
EAG	BALCARIC ISL.	PALMA	04.27	19.20
EAG	CANARY ISL.	ETA. CRUZ	06.12	20.06
EAG	GUETA & MELILLA	MELILLA	05.02	19.30
RI	IRELAND	DUBLIN	04.03	20.55
EL	LIBERIA	MONROVIA	06.33	19.02
EP	IRAN	TEHRAN	01.23	15.54
ET	ETHIOPIA	ADDIS ABABA	03.10	15.48
F	FRANCE	PARIS	03.53	19.57
F	FRANCE	MARSEILLE	04.03	18.22
F	FRANCE	BORDEAUX	04.21	18.52

STATION	COORDINATES	34.2 DEG NORTH, 118.1 DEG WEST	DIST	(KM)	DIST (MILES)
PREFIX	COUNTRY	CITY			
(1)	ABU AIL		23	14289	8869
1A	ORDER OF MALTA	ROME	34	10180	6314
1B1	SPRATLEY		302	12909	8022
SA	MONACO		36	9738	6052
SB6-7	AGALEGA & ST. BRANDON		12	17301	10752
SB8	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 INDUCTANCES

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

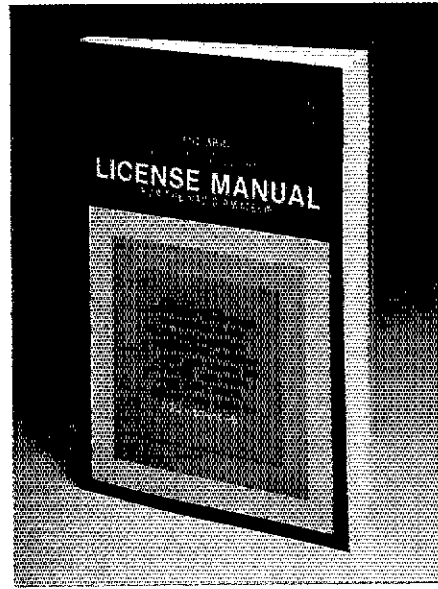
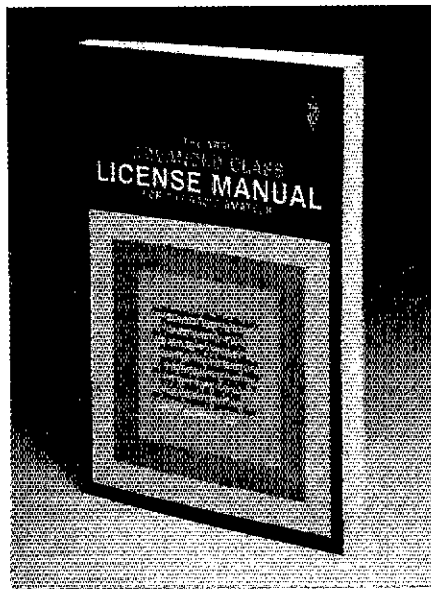
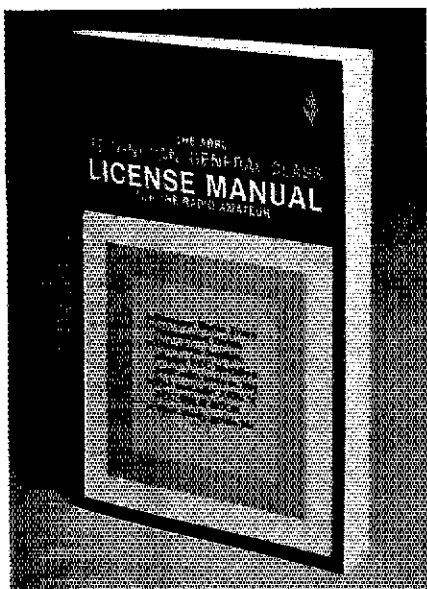
Low Band DXing Software

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 compatibles, 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.

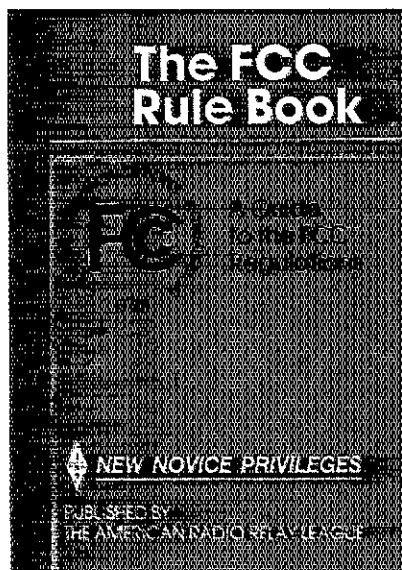
THE AMERICAN RADIO RELAY LEAGUE
 225 MAIN STREET
 NEWINGTON, CT 06111



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.

NEW EDITIONS!

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

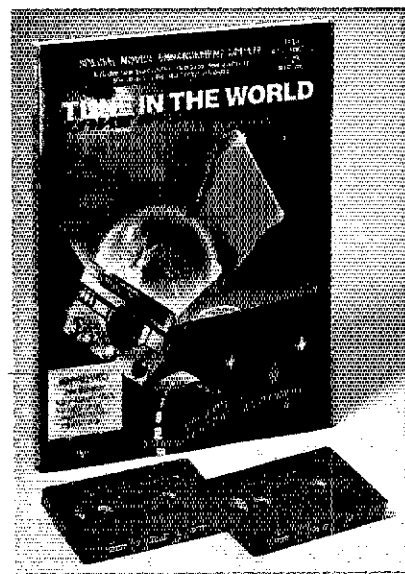
License Manual Series
 Technician/General Class #0143 \$ 5
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Code Proficiency
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THE NEW LK-500ZC

This self-contained, full QSK high frequency linear power amplifier is capable of amateur continuous operation at output power levels of 1500 watts. It is manually tunable from 1.8-2.4 and 3.5-22 MHz continuous. The HF tank coil and Centralab bandswitch are silver-plated.

INTERNAL POWER SUPPLY

All 500 Series amplifiers have a Peter Dahl Hipersil plate transformer and a separate filament transformer. The fullwave bridge rectifier system—unlike other systems that utilize weak voltage doublers—uses computer grade electrolytic capacitors.

COMPATIBILITY GUARANTEED

Customer feedback in 1986 insisted on system compatibility. Responding to this challenge, a special Plug and Play Harness to hook your favorite radio to the LK500 is offered as an accessory. Of course, all Amp Supply amplifiers have our famous ATI-6 tuned input systems, assuring a perfect 50 ohm load to your transceiver.

AUTOMATIC LOCK OUT "NEW"

All the new LK-500ZC Series amplifiers are equipped with the ALO which stops amplifier operation when it senses an unacceptable SWR, improper tuning, or overcurrent on the tubes.

2-SPEED FANS

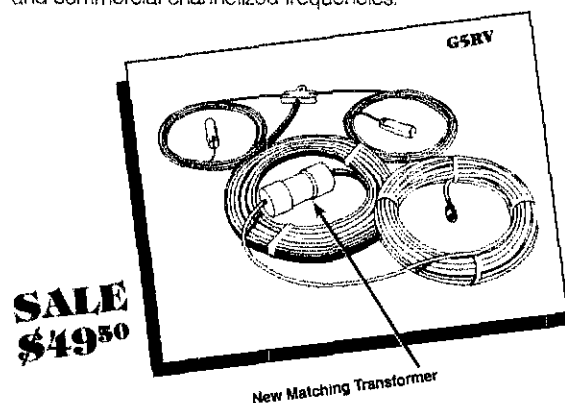
Most manufacturers have had to compromise on fan speed, one of the noisiest and objectionable aspects of amateur radio operation. But, our 500 Series amplifiers are different; they are the result of our perfected system of customer communication and engineer response.

THE LK-500ZC WITHOUT QSK

A version of the 500ZC is available without the Jennings vacuum antenna changeover relay and a companion sealed relay QSK system. A super buy at \$1199.00!

THE LK-500NTC NO-TUNE

Our no-tune amplifier is the same dependable amplifier as the LK-500ZC with the new ALO system and full QSK, and completes our popular 500 Series. This desirable version allows you to merely switch to your favorite amateur band and transmit at full power. We have preset internal capacitors and coils for each of the traditional six amateur bands. The LK-500NTC is also available for special MARS and commercial channelized frequencies.



SALE
\$49⁵⁰

THE G5RV ANTENNA

Reg. \$60.00 SALE \$49.50

The G5RV Signal Injector™ antenna is an excellent all band (3.5-30 MHz) 102 ft. dipole. On 1.8 MHz the center and shield of the coax at the transmitter end may be joined together and the antenna may be used as a Marconi with a tuner and a good earth ground. The proper combination of a 102 ft. flat-top and 31 ft. of 300 ohm transmission line achieves resonance on all the amateur bands from 80 to 10 meters with only one antenna. There is no loss in traps and coils. The impedance present at the end of the 300 ohm line is about 50-60 ohms, a good match to the new RGBX mini foam coax.

- 2 KW PEP
- Completely assembled
- Use as horizontal or "V" configuration
- Consists of: 102 ft. copper antenna wire, 31 ft. 300 ohm transmission line, 70 ft. RG-8X coax, 2 end insulators, 1 center insulator, 1 PL-259 and sleeve, connector and the **new transformer coupler**.



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 AB₂ grounded grid. Type of Emission: SSB, CW, RTTY, AM, SSTV

Duty Cycle: Amateur continuous duty in all modes at specified output.

Output Circuit: Pi-network (silver plated tubing HF coil).

Power Requirements: 115/230 VAC, 30/15 amps (230 VAC factory wired and recommended).

Dimensions: 8" H x 14" W x 16" D (including knobs).

UPS Shippable: 59 lbs.

Warranty: Two years on amplifier

LK-500ZC Full QSK \$1395.00 Reg. \$1295.00 SALE

LK-500ZC Without QSK \$1199.00 Reg. \$1099. SALE

LK-500NTC No-Tune Version \$1695.00 Reg. \$1595. SALE

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AT3000 Matching 3K Tuner \$499.00

LK-550 New 3 Tube w/Power Pac \$1895.00

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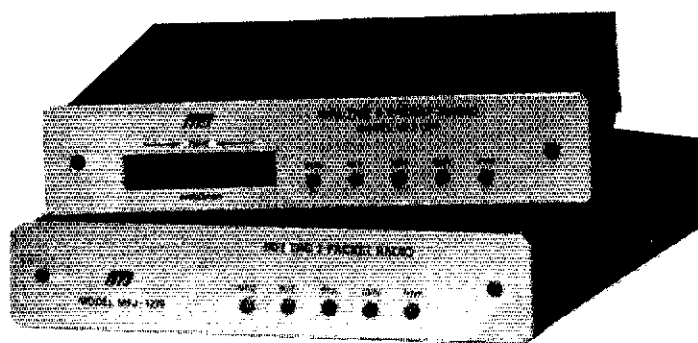
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New MFJ-1274 lets you work VHF and HF packet with built-in tuning indicator for \$169.95 . . .

. . . you get MFJ's latest clone of TAPR's TNC-2, TAPR's VHF/HF modem and built-in tuning indicator that features 20 LEDs for easy precise tuning

MFJ-1274
\$169⁹⁵

MFJ-1270
\$139⁹⁵



Now you can join the exciting world of packet radio on both VHF and HF bands with a precision tuning indicator . . . for an incredible \$169.95!

You get MFJ's top quality clone of the highly acclaimed industry standard TAPR TNC-2. We've made TAPR's modem selectable for both VHF and HF operation, added their precision 20 segment LED tuning indicator, a TTL serial port, an easily replaceable lithium battery for memory back-up and put it all in a new cabinet.

If you don't need the tuning indicator or the convenience of a switchable VHF/HF modem, choose the affordable MFJ-1270 for \$139.95.

All you need to operate packet radio is a MFJ-1274 or MFJ-1270, your rig, and any home computer with a RS-232 serial port and terminal program.

If you have a Commodore 64, 128, or VIC 20 you can use MFJ's optional Starter Pack to get on the air immediately. The Starter Pack includes interfacing cable, terminal software on disk or tape and complete instructions . . . everything you need to get on packet radio. Order MFJ-1282 (disk) or MFJ-1283 (tape), \$19.95.

Unlike machine specific TNCs you never have to worry about your MFJ-1274 or MFJ-1270 becoming obsolete because you change computers or because packet radio standards change. You can use any computer with an RS-232 serial port with an appropriate terminal program. If packet radio standards change, software updates will be made available as TAPR releases them.

Also speeds in excess of 56K bauds are possible with a suitable external modem! Try that with a

machine specific TNC or one without hardware HDLC as higher speeds come into widespread use.

You can also use the MFJ-1274 or MFJ-1270 as an excellent but inexpensive digipeater to link other packet stations.

Both feature AX.25 Level 2 Version 2 software, hardware HDLC for full duplex, true Data Carrier Detect for HF, multiple connects, 256K EPROM, 16K RAM (expandable to 32K with optional EPROM), simple operation, socketed ICs plus much more.

You get an easy-to-read manual, a cable to connect your transceiver (you have to add a connector for your particular radio), a connector for the TTL serial port and a power supply for 110 VAC operation (you can use 12 VDC for portable, remote or mobile operation).

Help make history! Join the packet radio revolution now and help spread this exciting network throughout the world. Order the top quality and affordable MFJ-1274 or MFJ-1270 today.



MFJ-1273, \$49.95

Now you can tune in HF, OSCAR and other non-FM packet stations fast!

This MFJ clone of the TAPR tuning indicator makes tuning natural and easy - it shows you which direction to tune. All you have to do is to center a single LED and you're precisely tuned in to within 10 Hz. 20 LEDs give high resolution and wide frequency coverage.

The MFJ-1273 tuning indicator plugs into the MFJ-1270 and all TNC-1s, TNC-2s and clones that have the TAPR tuning indicator connector.

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MFJ TUNERS

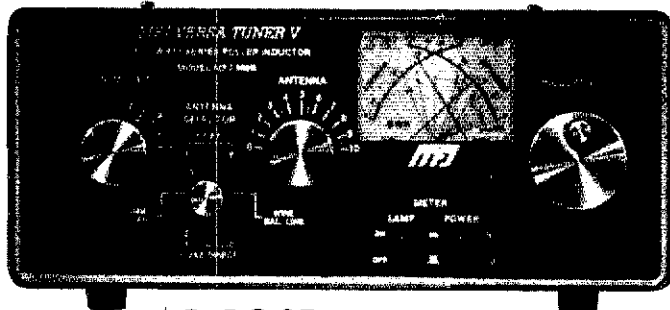
This may be the world's most popular 3 KW roller inductor tuner because it's small, compact, reliable, matches virtually everything and gives you SWR/Wattmeter, antenna switch, dummy load and balun — all at a great price!

Meet "Versa Tuner V". It has all the features you asked for, including the new smaller size to match new smaller rigs—only 10 3/4" W x 4 1/2" H x 14 7/8" D.

Matches coax, balanced lines, random wires—1.8 to 30 MHz. 3 KW PEP—the power rating you won't outgrow (250pf-6KV caps).

Roller inductor with a 3-digit turns counter plus a spinner knob for precise inductance control to get that SWR down to minimum every time.

Built-in 300 watt, 50 ohm dummy load, built-in 4:1 ferrite balun.



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). 50-239 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

MFJ-941D **\$99.95**



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 allround inductor! Larger more efficient 12 position allround 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**

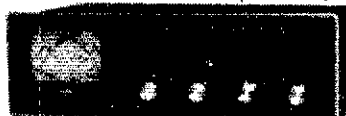


Run up to 1.5 kw PEP and match any feedline continuously from 1.8 to 30 MHz: coax, balanced line or random wire.

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: 10 3/4" x 4 1/2" x 14 7/8" 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.

You can run full transceiver power output—up to 300 watts RF output—and match coax, balanced lines or random wires from 1.8 thru 30 MHz. Use it to tune out SWR on dipoles, vees, long wires, verticals, whips, beams and quads.

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.

A large efficient allround inductor—3 inches in diameter—gives you plenty of matching range and less losses for more watts out. 100 volt tuning capacitors and heavy duty switches gives you safe arc-free operation. A 4:1 balun is built-in to match balanced lines.

Order your convenience package now and enjoy.

2 KW COAX SWITCHES

MFJ-1702 **\$19.95**



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Less than .2 dB loss.

SWR below 1:1.2.

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6 positions. White

markable surface

for antenna positions.

\$29.95 MFJ-1701



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 allround 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-1801D **\$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 allround inductor, 1000 volt capacitor spacing and rugged aluminum cabinet. 8x2x6 inches. Mobile mounting bracket available for \$5.00.

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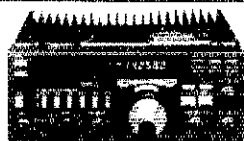


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30W In = 170W out

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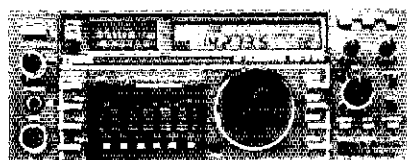
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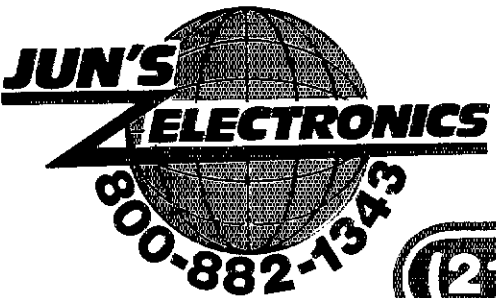
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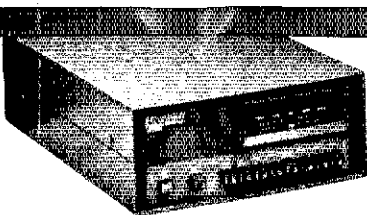
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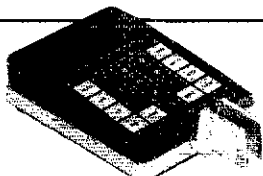
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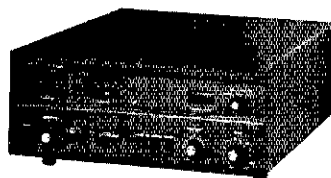
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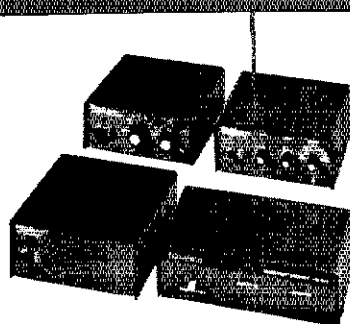
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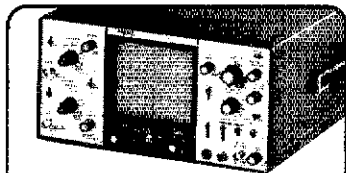
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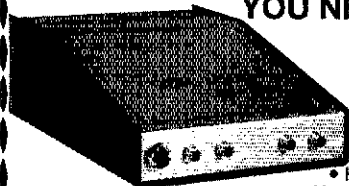
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WANTED: the PHILLIPS CODE, by Walter P. Phillips, TCR edition rev 1945. Published by Telegraph and Telephone Age, New York, NY, 1945. Earlier editions may be acceptable. Please write or phone with edition, condition, and price. N8AF, P.O. Box 66134, Chicago, IL 60666-0134, 312-359-2903.

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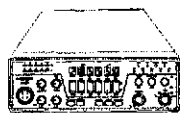
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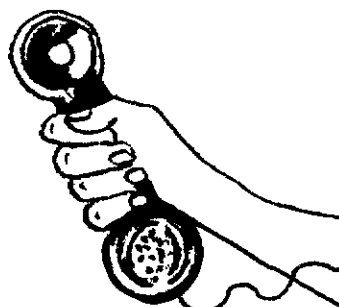
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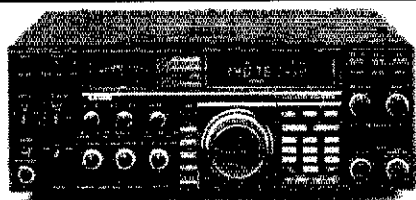
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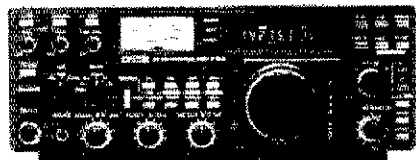
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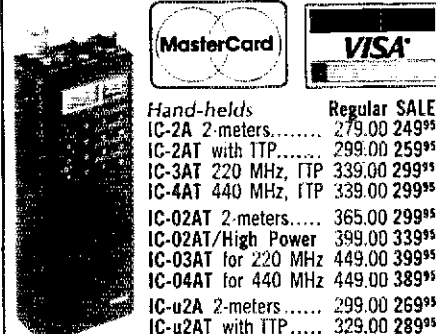
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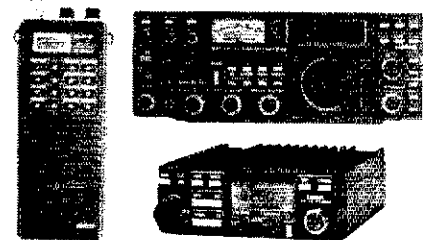
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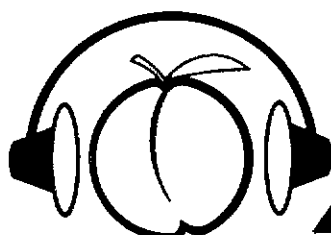
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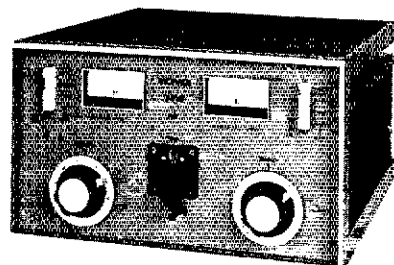
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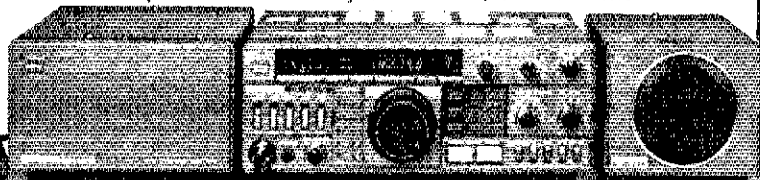
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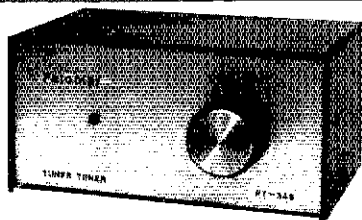
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TH5MK2S Broad Band 5-el Triband Beam. \$299
TH7DXS 7-el Triband Beam. \$299
TH3JRS 3-el Triband Beam. \$299
205BAS 5-el 20-mtr Beam. \$299
155BAS 5-el 15-mtr Beam. \$299
105BAS 5-el 10-mtr Beam. \$299
204BAS 4-el 10-mtr Beam. \$299
64BS 4-el 6-mtr Beam. \$299
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14 AVQ 40-10 mtr vertical. \$299
18 AVT/WB 80-10mtr Vertical. \$299
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28BS 8-el 2 mtr Beam. \$299
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BR86 80-10 mtr KW Balun W/Coax Seal. \$299

HUSTLER

6BTU 80-10 mtr Vert	\$129	5BTU 80-10 mtr Vert	\$109
4BTU 40-10 mtr Vert.	\$89	6T-144 2-mtr Base	\$119
6T-144B 2-mtr Base	\$89		

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Additional Motor Units	\$89
Alliance HD73 (10.7 sq ft rating)	\$119.95
Alliance U110 (3 sq ft rating)	\$49
Telex CD 45H (8.5 sq ft rating)	\$CALL
Telex HAM 4 (15 sq ft rating)	\$CALL
Telex Talltwister (20 sq ft rating)	\$CALL
Telex HDR300 Heavy Duty (25 sq ft rating)	\$CALL
Kenpro KR500 Heavy Duty Elevator Rotor	\$189
Kenpro KR5400 AZ/EL Rotor Package	\$319

ROTOR CABLE

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ROHN GUYED TOWER SECTIONS 10 FT. STACKED SECTIONS

20G	\$45.00	45G	\$116.00
25G	\$52.00	55G	\$180.00

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)	\$ 28/ft
5/32 7 x 7 Aircraft Cable (2700 lb rating)	\$ 15/ft
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1/4 CCM Cable Clamp (1/4" Cable)	\$.55
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3/8EE (3/8" Eye & Eye Turnbuckle)	\$6.95
3/8 EJ (3/8" Eye & Jaw Turnbuckle)	\$7.95
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1/2 x 9EJ (1/2" x 9" Eye & Jaw Turnbuckle)	\$10.95
1/2 x 12EE (1/2" x 12" Eye & Eye Turnbuckle)	\$12.95
1/2 x 12EJ (1/2" x 12" Eye & Jaw Turnbuckle)	\$13.95
5/8 x 12EJ (5/8" x 12" Eye & Jaw Turnbuckle)	\$16.95
3/16" Preformed Guy Grip	\$2.49
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500 D Guy Insulator (5/32" or 3/16" Cable)	\$1.69
502 Guy Insulator (1/4" Cable)	\$2.99
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HPTG4000 Guy Cable (4000 lb rating)	\$.49/ft
HPTG6700 Guy Cable (6700 lb rating)	\$.69/ft
9901LD Cable End (for 2100/4000 cable)	\$8.95
9902LD Cable End (for 6700 cable)	\$9.95
Socketlast Potting Compound (doses 6-8 ends)	\$14.95

GALVANIZED STEEL MASTS

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25 in Wall	\$69	\$129	\$189	\$249

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(Antenna/tower product prices do not include shipping unless noted otherwise)

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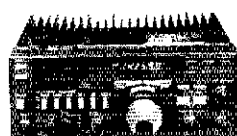
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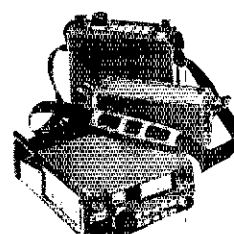
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- 5W Output
- Coverage 150-174 MHz
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FT-109RH

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- Memory And Priority Scanning
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- Super "Mini" HT's
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- 2W Battery Pack or Optional 5W Pack



FT-727R

- Two Affordable Radios in One
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- 5W On Both Bands
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- Ten Memories
- Also, FT-711RH For 440 MHz



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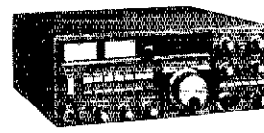
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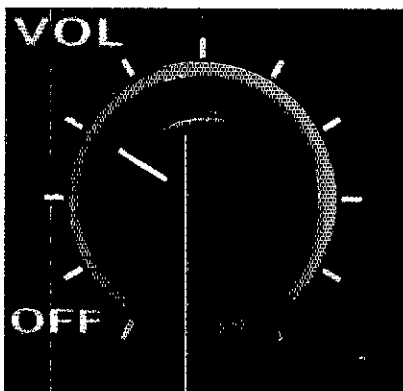
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One of the most complex operating controls of our high-performance mobiles.

You don't have to sacrifice performance to gain simplicity in your mobile operation.

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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.

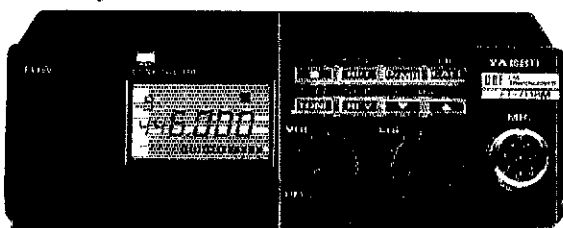
Tuning via tuning knob, or up/down buttons. PL tone board (optional). PL display.

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).

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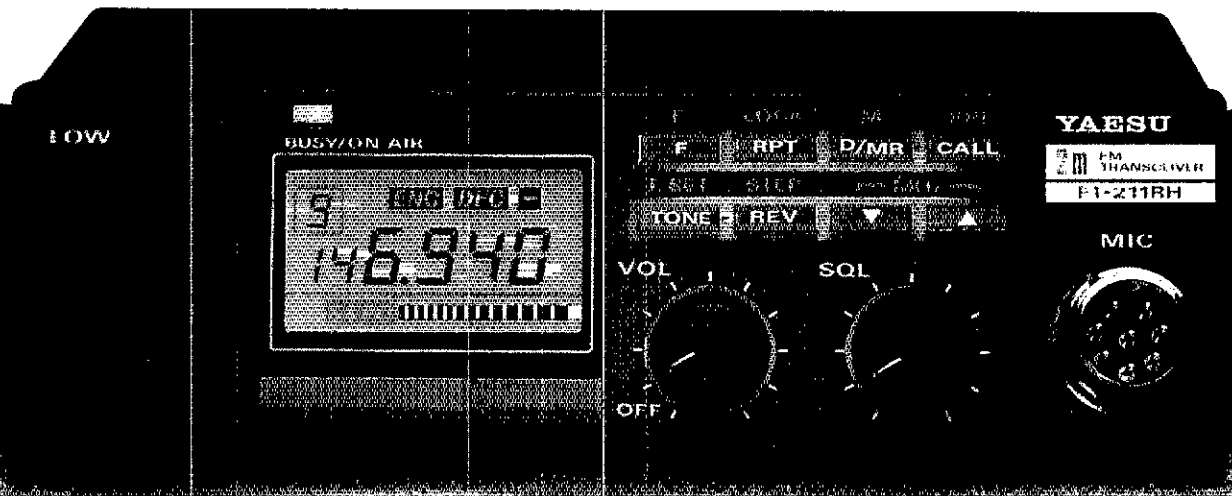
Discover the 2-meter FT-211RH and 440-MHz FT-711RH at your nearest Yaesu dealer today. If you can turn a knob and push a button, you'll have high-performance mobile operation mastered.

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operating complexities to interfere with your driving.

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TH-315A
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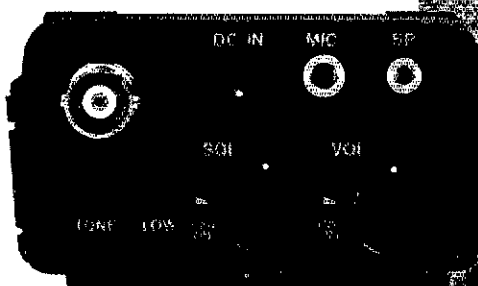
This HT Has it All!

TH-215A/315A/415A

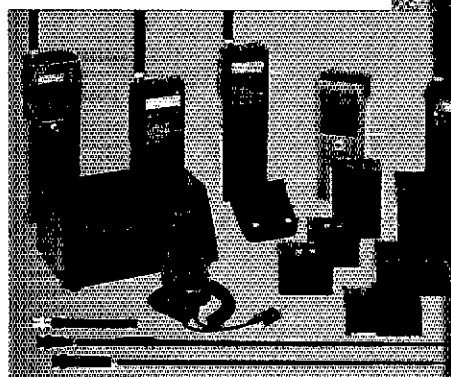
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Kenwood brings you the greatest hand-held transceiver ever! More than just "big rig performance," the new TH-215A for 2 m and TH-415A for 70 cm pack the most features and the best performance in a handy size. And our full line of accessories will let 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 saver 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 squeal.** Used to check the frequency when CTCSS encode/decode is used or when squelch is on.

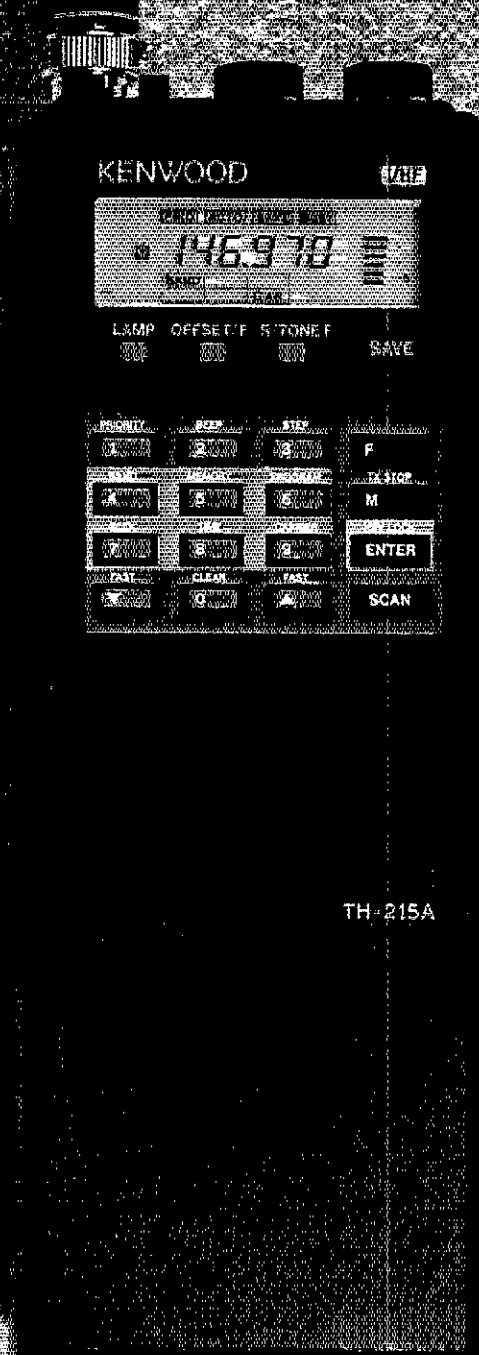


- **Large, easy-to-read multi-function LCD display with night light.**
- **Audible beeper to confirm keypad operation.** The beeper has a unique tone for each key. DTMF monitor also included.
- **Supplied accessories:** Belt hook, rubber flex antenna, PB-2 standard NiCd battery pack (for 2.5 W operation), 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-2630: 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

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.