QST

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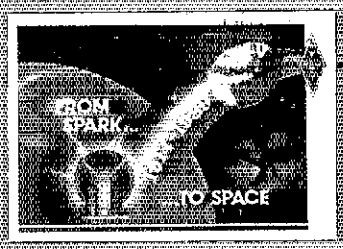

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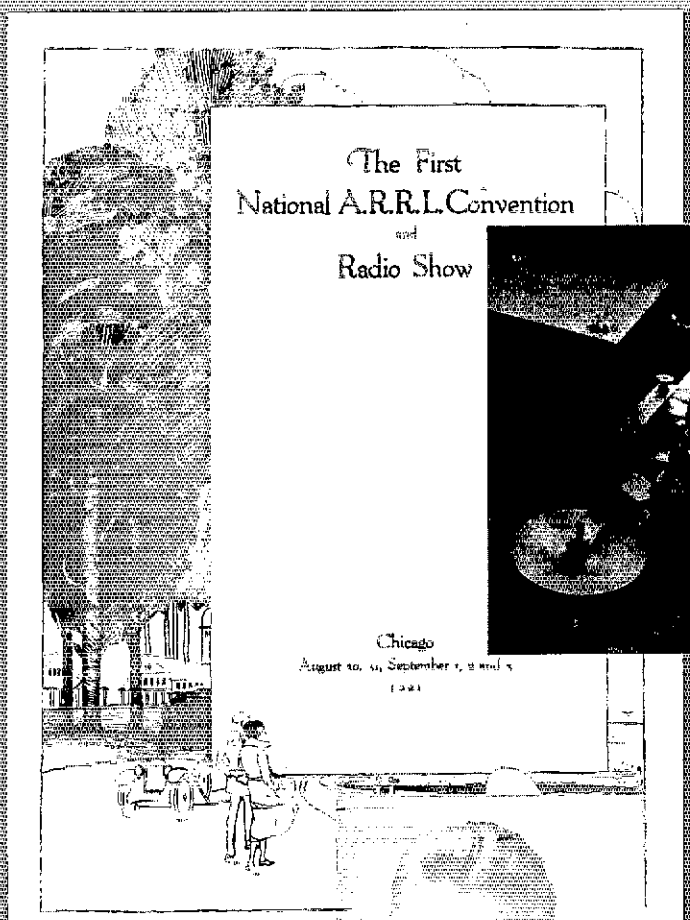

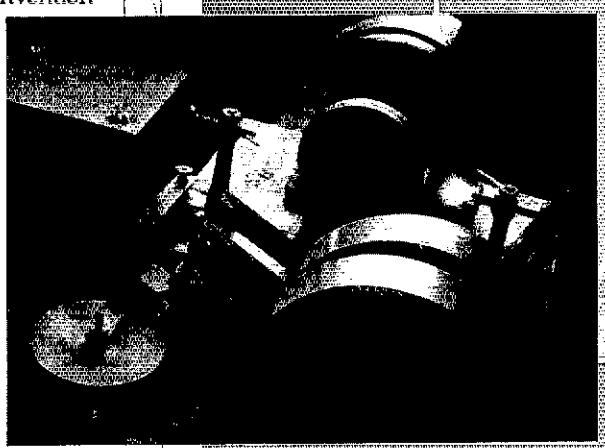

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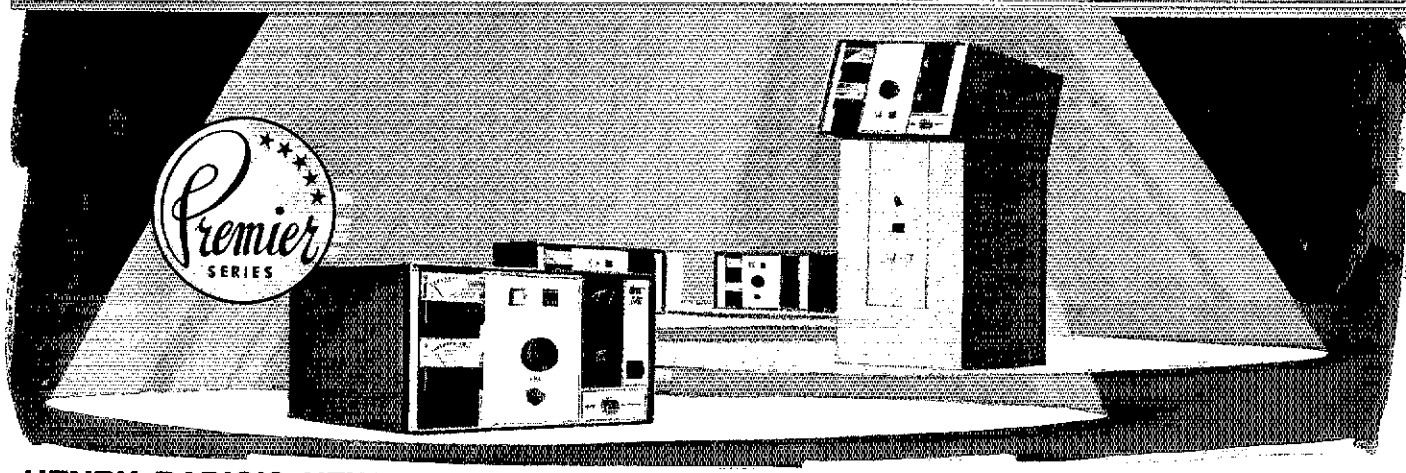
EXCITING NEW FEATURES. . .
PROVEN VALUE. . .GUARANTEED RELIABILITY
PREMIER SERIES



HENRY RADIO'S NEW PREMIER SERIES . . . AMPLIFIERS FOR THE DISCRIMINATING AMATEUR WHO REFUSES TO COMPROMISE . . . THE 3K PREMIER AND 3KD PREMIER DELUXE AMPLIFIERS. ALL OF THE MATCHLESS QUALITY AND FEATURES OF THEIR PREDECESSORS PLUS QSK BREAK-IN KEY AND 160 METER BAND.

THE PREMIER SERIES

☆ **The 3K Premier Console** --- all the rugged reliability of the 3K Console plus QSK and the 160 meter band.

☆ **The 3KD Premier Desk Model** --- the same RF deck in a smaller and lighter configuration.

☆ **The 3002-A Console** --- maximum legal power in a two meter block buster.

☆ **The 3004-A Console** --- a unique new approach to high power UHF amplification at 440 MHz.

***Attention:** All HF amplifiers can be modified for 10 meters • All export HF amplifiers are shipped with 10 meter operation included • Please call or write for a complete information packet*

FCC type acceptance pending on 3K Premier and 3KD Premier models.

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 for full information.

THE CLASSIC LINE
(Still available as before)

2KD Classic Desk Model ---3.5 – 21.5 MHz. (Two 3-500-Z tubes---the design Henry made famous)

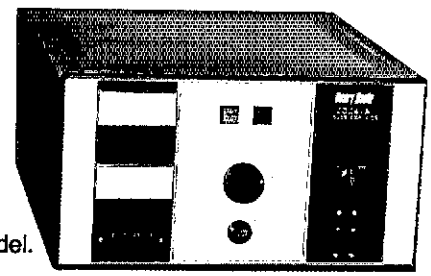
2K Classic Console --- the original and still the standard workhorse.

2K Classic "X" Console --- made heavy duty, rugged and reliable for a lifetime of service.

3K Classic Console with the magnificent 3CX1200A7 final tube.

2002-A...a two-meter desk model using the Eimac 3CX800A7... because this tube is rated at a 15dB gain, only about 25 watts drive is required for full output.

2004-A UHF desk model.



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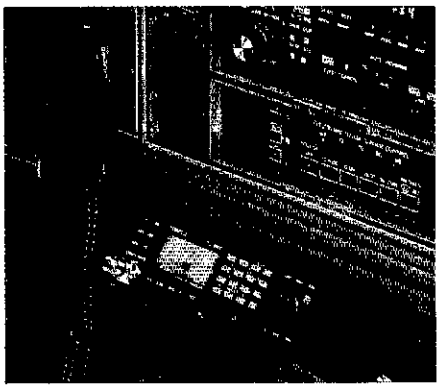
Three Choices for 2m!

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!**

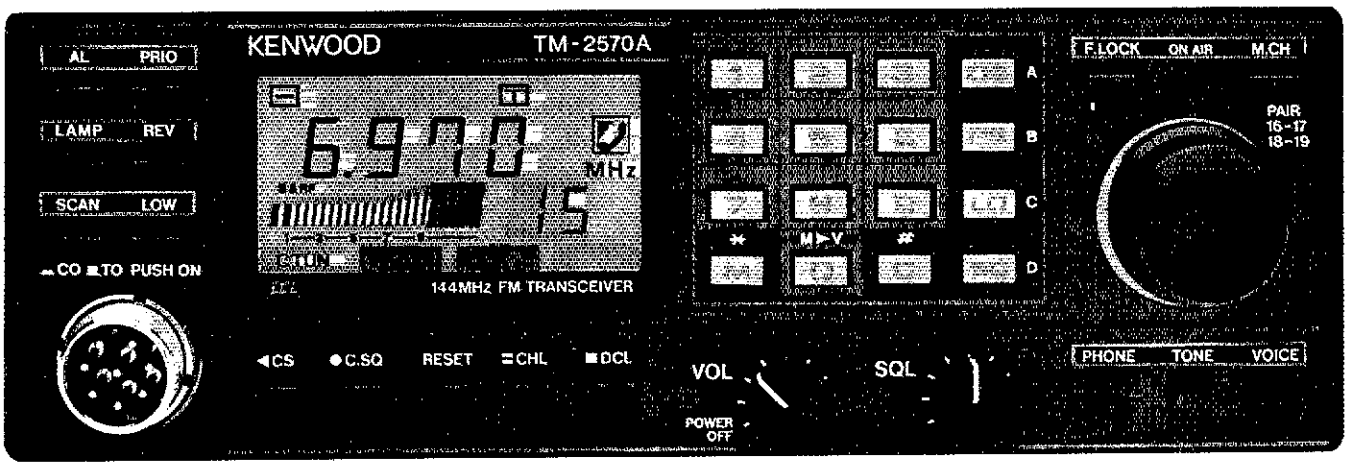


- New 5-way adjustable mounting system
- Automatic repeater offset selection—**another Kenwood exclusive!**
- Direct keyboard frequency entry
- Front panel programmable 38-tone CTCSS encoder **includes** 97.4 Hz (optional)
- Big multi-color LCD and back-lit controls for excellent visibility
- The TM-3530A is a 25 watt version covering 220-225 MHz. The first full featured 220 MHz rig!

DCL 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. Microprocessor control assures fast and reliable operation. The whole process happens in an instant!



Actual size front panel

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

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

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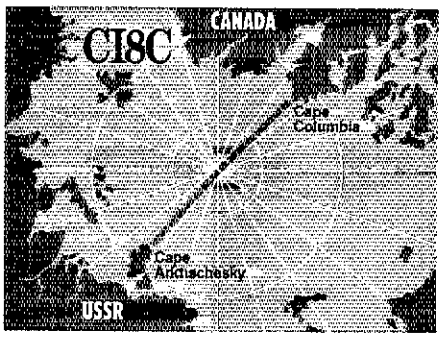
ICOM

IC-761 HF Transceiver

1988 Canada/USSR Trans Polar Ski Trek



"For more than three months, under the most exacting conditions, the Icom equipment performed superbly in support of the Polar Bridge Expedition... Icom equipment was our first choice."

— Barry Garratt VE3CDX/VE8CDX/4K0DX, Chief Operator/North Pole 28 1988 Canada/USSR Trans Polar Ski Trek

ICOM IC-761 ON TOP OF THE WORLD

The Canada/USSR Trans Polar Ski Trek did not include leeway for second best. That's why they chose Icom's IC-761 HF transceiver. With amateur radio as the sole means of communication in their 1,240 mile venture across the frozen Arctic, exceptional performance and dependability were vital to their mission. Just as they are to your globe-spanning home station activities.

THE COMPLETE HF TRANSCEIVER!

Includes: •Built-in AC power supply •Automatic antenna tuner •105dB dynamic range •Exceptionally low phase noise •100W output on most modes •100% duty cycle •High stability crystal oscillator •Self-calibrating SWR bridge •Multiple filter selection •Dial or front keypad frequency selection •32 memories •All bands, all modes with general coverage receiver •Passband tuning •IF shift •Built-in iambic keyer •Semi or full QSK rated at 60WPM •Built-in wide/narrow SSB and CW filters.

BEST IN RELIABILITY!

Field proven top performance backed by a one-year warranty and four North American service centers. Icom's IC-761... when there is no room for second best.

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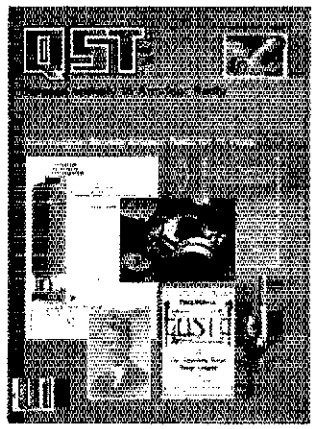


OUR COVER

This month's cover celebrates the League's diamond anniversary. Featured are a rotary spark-gap transmitter; Founding President, Hiram Percy Maxim, W1AW; the Wouff Hong; the first *Radio Amateur's Handbook* (1926); *QST*, December 1915; and the National ARRL Convention and Radio Show program (1921).

CONTENTS

February 1989
Volume LXXIII Number 2

TECHNICAL

NEWS AND FEATURES

OPERATING

DEPARTMENTS

Others May Try to Imitate, But...

Only One Can Be The Best

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

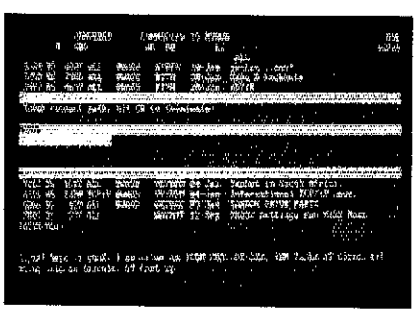
Amateur Net Price $319.95

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

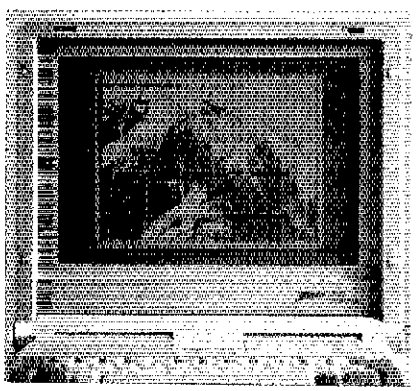
1 Versatility

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

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



PC Pakratt Packet TX/RX Display



Facsimile Screen Display

2 Software Support

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

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

3 Proven Winner

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

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

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

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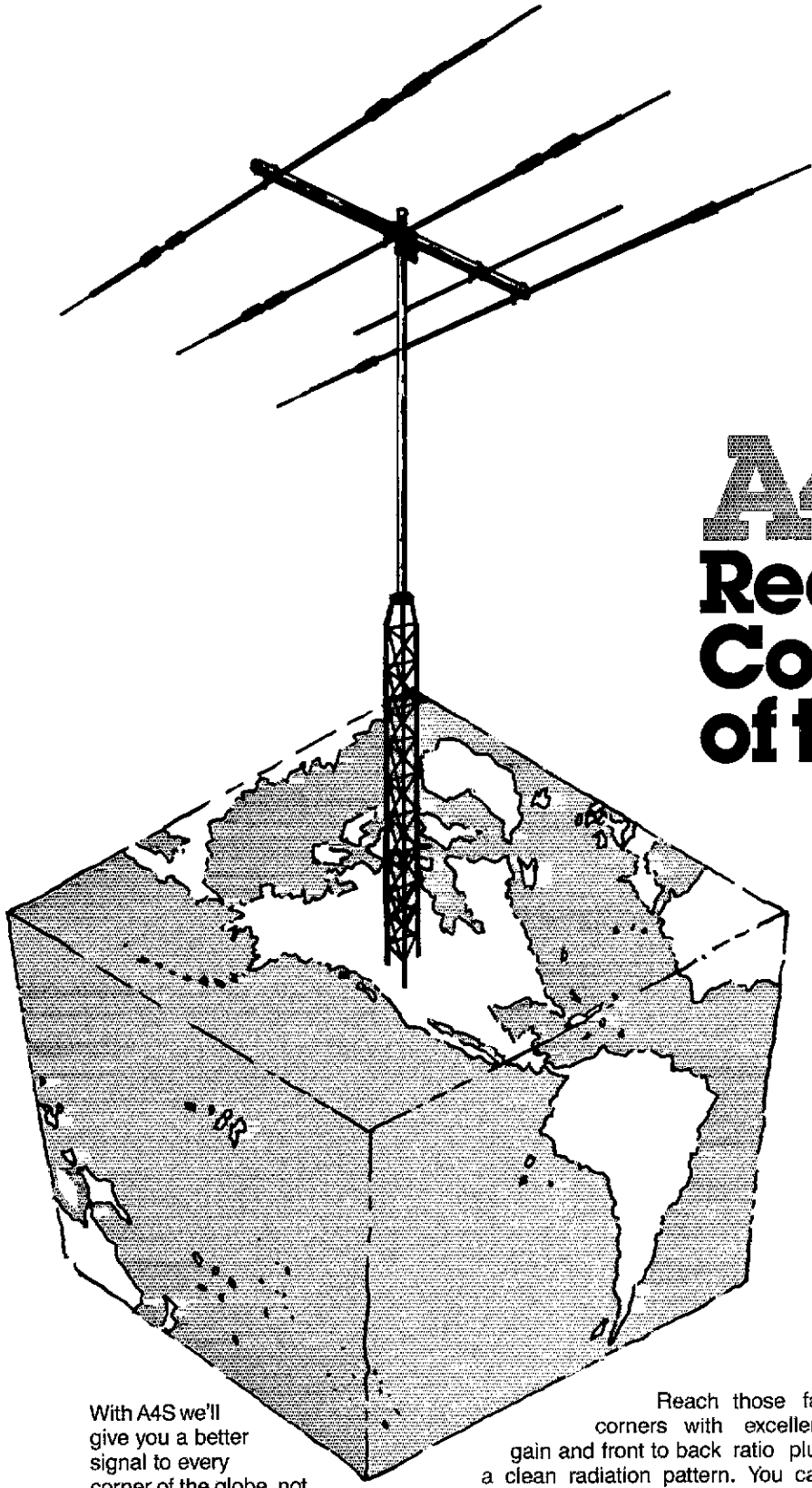

A4S
Reach Every Corner of the Globe

With A4S we'll give you a better signal to every corner of the globe, not by changing its shape, but by improving the performance of your ham station.

A4S has all of the features that you expect from a premium 20-15-10 meter beam, with high power precision tuned traps, optimum element spacing on a rugged 2″ diameter boom, high strength fiberglass insulators and all stainless steel hardware.

Reach those far corners with excellent gain and front to back ratio plus a clean radiation pattern. You can also corner 40 meters with a simple add-on kit.

Specifications: Forward gain and front to back ratio excellent, power rating 2KW PEP, boom length 18′, longest element 32′, turn radius 18.4′, wind load 5.5 ft, weights 37 lbs.

Your fellow hams agree about our products: Love the A4, it's my second Cushcraft, N6MBE; Good quality and performance for a competitive price equal a winner, KA9ZUA.

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NEW!

Affordable DX-ing!

TS-140S

HF transceiver with general coverage receiver.

Compact, easy-to-use, full of operating enhancements, and feature packed. These words describe the new TS-140S HF transceiver. Setting the pace once again, Kenwood introduces new innovations in the world of "look-alike" transceivers!

- **Covers all HF Amateur bands with 100 W output.** General coverage receiver tunes from 50 kHz to 35 MHz. *(Receiver specifications guaranteed from 500 kHz to 30 MHz.)* Modifiable for HF MARS operation. *(Permit required)*
- **All modes built-in.** LSB, USB, CW, FM and AM.
- **Superior receiver dynamic range** Kenwood DynaMix™ high sensitivity direct mixing system ensures true 102 dB receiver dynamic range.

- **New Feature! Programmable band marker.** Useful for staying within the limits of your ham license. For contesters, program in the suggested frequencies to prevent QRM to non-participants.
- **Famous Kenwood interference reducing circuits.** IF shift, dual noise blankers, RIT, RF attenuator, selectable AGC, and FM squelch.

- **M. CH/VFO CH sub-dial.** 10 kHz step tuning for quick QSY at VFO mode, and UP/DOWN memory channel for easy operation.
- **Selectable full (QSK) or semi break-in CW.**
- **31 memory channels.** Store frequency, mode and CW wide/narrow selection. Split frequencies may be stored in 10 channels for repeater operation.
- **RF power output control.**
- **AMTOR/PACKET compatible!**
- **Built-in VOX circuit.**
- **MC-43S UP/DOWN mic. included.**

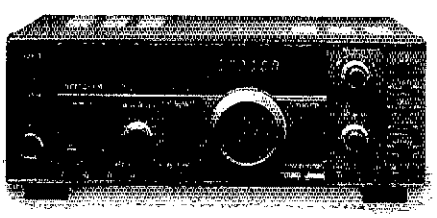
Optional Accessories:

• **AT-130** compact antenna tuner • **AT-250** automatic antenna tuner • **HS-5/HS-6/HS-7** headphones • **IF-232C/IF-10C** computer interface • **MA-5/VP-1** HF mobile antenna (5 bands) • **MB-430** mobile bracket • **MC-43S** extra UP/DOWN hand mic. • **MC-55** (8-pin) goose neck mobile mic. • **MC-60A/MC-80/MC-85** desk mics. • **PG-2S** extra DC cable • **PS-430** power supply • **SP-40/SP-50B** mobile speakers • **SP-430** external speaker • **SW-100A/SW-200A/SW-2000** SWR/power meters • **TL-922A** 2 kW PEP linear amplifier (not for CW QSK) • **TU-8** CTCSS tone unit • **YG-455C-1** 500 Hz deluxe CW filter. **YK-455C-1** New 500 Hz CW filter.

TS-680S

All-mode multi-bander

- 6m (50-54 MHz) 10 W output plus all HF Amateur bands (100 W output).
- Extended 6m receiver frequency range 45 MHz to 60 MHz. Specs. guaranteed from 50 to 54 MHz.
- Same functions of the TS-140S except optional VOX (VOX-4 required for VOX operation).
- Preamplifier for 6 and 10 meter band.



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

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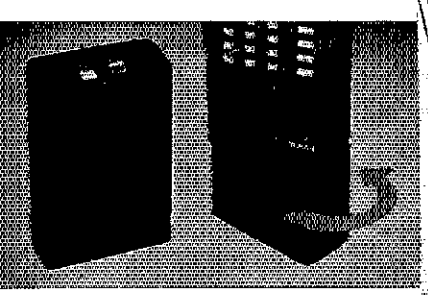
Ultimate Affordable HT!

TH-205AT

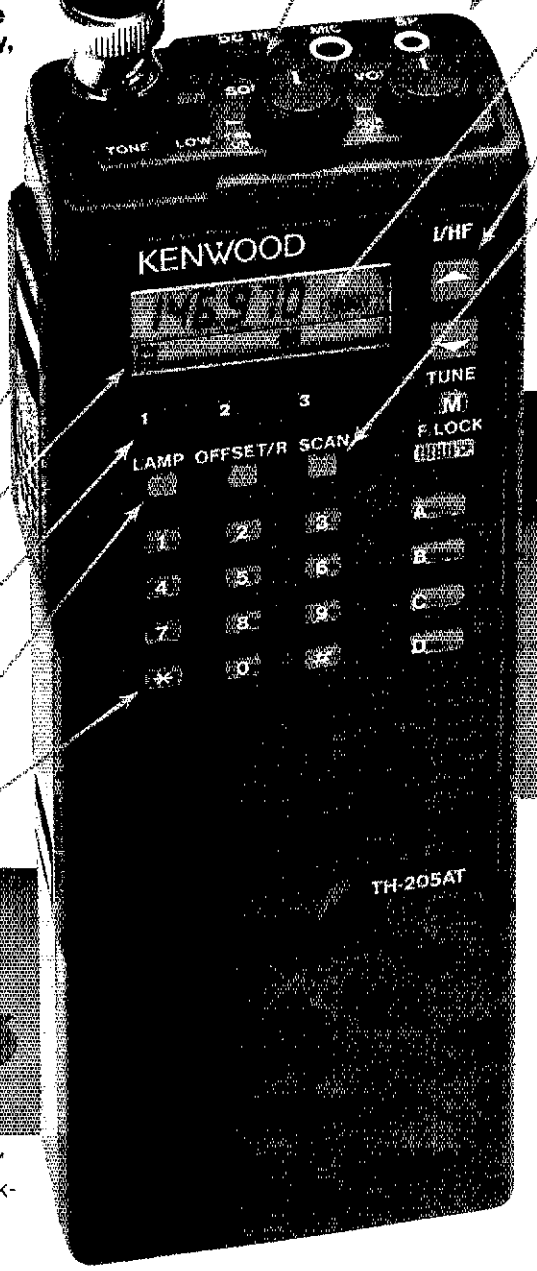
Affordable 5-watt hand-held transceiver. Ultimate Affordability!

It's here now! The affordable, "Kenwood Quality" hand-held transceiver. Standard features include a large, easy-to-read LCD display, wide-range power requirements (operates on 7.2 VDC—16 VDC), 3-channel memory, built-in battery saver circuit, and, when operated on 12 VDC, a robust five watts of power! The die-cast metal rear panel/heat sink assures cool, reliable operation. Receiver frequency coverage from 141—163 MHz is also standard—you can even listen to the "weather channels" at 162.40 or 162.55 MHz!

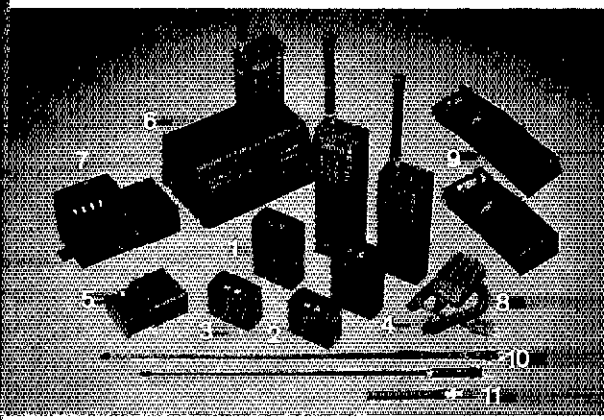
- Monitor switch—to check frequency when PL encode/decode switch is on.
- Extended frequency coverage for certain MARS and CAP operations.
- 3 memory channels store frequency and offset. And so easy to use! Simply press the memory channel number to recall your favorite channels!
- Night light, offset/reverse.
- 16-key DTMF pad for repeater autopatch is standard.



- NEW! Twist-Lok Positive-Connect™ battery case. A wide range of quick-change commercial duty battery packs are available.



- 12 VDC input terminal—allows direct mobile or external power supply operation. When 12 VDC is applied, power output increases to **5 watts!**
- Heavy-duty final amplifier and heat sink. The die-cast rear panel assures reliable operation. With the optional 12-volt PB-1 battery pack, the TH-205AT provides 5 W output. The standard 8.4 volt PB-2 provides 2.5 W output. (500 mW low power).
- Large, easy-to-read LCD display. Frequency, offset, memory channel, TX, RX, and battery indicator.
- Frequency UP/DOWN keys. Used to select frequency or scanning direction.
- Scan function
- Automatic battery saver circuit extends battery life. No buttons to push!
- Supplied accessories include: Rubber flex antenna, belt hook, 8.4 V, 500 mAH NiCd battery pack, wall charger.



Optional Accessories:

1) PB-1 12 V 800 mAH NiCd batt. pack (5 W output). **2)** PB-2 8.4 V 500 mAH NiCd batt. pack (2.5 W output). **3)** PB-3 7.2 V 800 mAH NiCd batt. pack (1.5 W output). **4)** PB-4 7.2 V 1600 mAH NiCd batt. pack (1.5 W output). **5)** BT-5 AA manganese/alkaline battery case. **6)** BC-7 Rapid charger for PB-1, 2, 3, or 4. **7)** BC-8 Compact battery charger **8)** SMC-30 Speaker microphone. **9)** SC-12, SC-13 Soft cases. **10)** RA-3, RA-5 Telescoping antennas. **11)** RA-88 StubbyDuk antenna • TSU-3 CTCSS encode/decode unit • VB-2530 2 m, 25 W RF power booster • LH-4, LH-5 Leather cases • MB-4 Mobile bracket • BH-5 Swivel mount • PG-2V DC cable • PG-3C Filtered cigar lighter cord.

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

THE AMERICAN RADIO RELAY LEAGUE, INC

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

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

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

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

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
FAX: 203-665-7531 (24-hour direct line)

Canadian membership inquiries and correspondence should be directed to CRRL Headquarters, Box 7009, Station E, London, ON N5Y 4J9, tel 519-660-1200.

"It Seems to Us . . ."

The Rewrite

As communications technology has grown ever more complicated, the FCC Rules governing Amateur Radio have grown accordingly. Trying to figure out the present Part 97 is not a trivial pursuit. With the help of the ARRL publication, *The FCC Rule Book*, it's possible to ferret out the answers to most questions about amateur operating—possible, but not always easy.

In 1980, the FCC tried to improve the situation with a "Plain Language" rewrite of the amateur rules. In this proposal, the traditional approach to writing regulations was abandoned in favor of a question-and-answer format. Now, Q&A isn't a bad way to explain something; we use it to good advantage in *The FCC Rule Book*, itself an outgrowth of the "Plain Language" discussion. But after careful review, it turned out not to be a good way to define what's legal and what isn't in a concise, specific fashion. There were other flaws in the "Plain Language" effort, perhaps the most serious being the proposed elimination of Section 97.1, the "Basis and Purpose" statement which sets out why the government thinks Amateur Radio is a good thing. The more that people looked at "Plain Language," the less they liked it; so, about a year after it had been proposed, there was great relief when the FCC dropped the idea.

Throughout the deregulatory 1980s, the amateur rules kept getting longer and longer. This led to another effort by Commission staff: PR Docket No. 88-139. The basic outline of the FCC-proposed rewrite looked pretty good, but closer examination uncovered some real "zingers" that were clearly unacceptable.

At this point it was very tempting simply to oppose the rewrite initiative once again, and to stick with the old rules. That they were far from perfect was widely acknowledged, but "Better the devil you know than the one you don't." However, a special committee of the ARRL Board had been given responsibility for developing a recommended detailed position, and the committee saw across-the-board opposition as a lost opportunity to engineer a significant improvement in the amateur rules. Over the summer and fall, with the help of ARRL staff, they devoted hundreds of hours to rewriting the rules so they would reflect good public policy toward Amateur Radio. The result, styled as "Part 96" to avoid confusion with the old rules, was submitted to FCC on November 29.

Part 96 is not a "Plain Language" document of the "Look, Jane, see Spot run" genre; but it is easy to use, because it is well organized. It is considerably shorter than both the old Part 97 and the FCC-proposed rewrite; but it is also precise, as a good legal document must be.

Our draft Part 96 is not the last word in amateur regulations for the simple reason that our rules, like our service, must continue to evolve. But it provides a solid framework for that evolution through the end of this century, and perhaps beyond. We hope the FCC will accept Part 96 as it has been offered, as a constructive, good-faith effort to build upon the work of its own staff—giving us rules we can live with, and live by.—*David Sumner, K1ZZ*

No "Safe Harbor" for Indecency

Back in the July 1987 issue of *QST*, we reported on this page that the FCC had put broadcasters and amateurs on notice that (1) standards for decency in radio transmissions exist in both services, and (2) henceforth, the standards would be enforced. We presented those standards, in detail which does not bear repeating here, and noted that while there was a blanket prohibition on obscenity, indecent material broadcast during the "wee hours" (when, presumably, children are asleep) would not be subject to sanctions.

It was never entirely clear whether this "safe harbor" for indecency applied to the Amateur Radio Service. Editorially, we expressed the hope that amateurs would choose to observe a higher standard anyway, rendering the question moot.

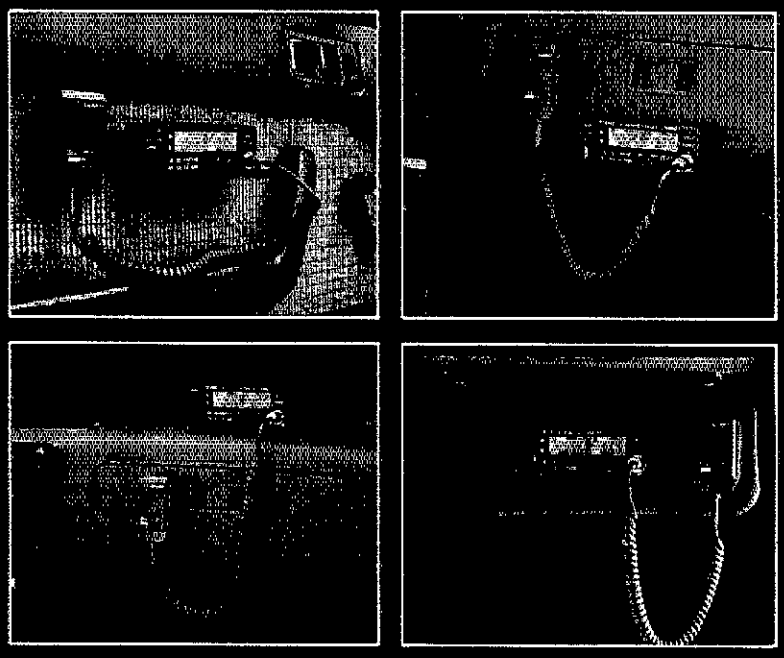
Well, Congress was not thrilled with the idea of a "safe harbor" for indecent broadcasts. In Public Law 100-459, signed by President Reagan on October 1, the FCC was given an explicit mandate to enforce the prohibitions against broadcast obscenity and indecency on a 24-hour-per-day basis. On December 19, the Commission acted accordingly and a couple of days later issued a press release announcing that the new rule would take effect 30 days after publication in the Federal Register.

It is reasonable to assume that the same standard applies to us. Section 97.119 as presently written prohibits the transmission of "communications containing obscene, indecent, or profane words, language, or meaning," so no new rule is necessary; it is simply a question of the extent to which the Commission will enforce the existing one.

No doubt there will be court tests of the new broadcasting rule. The FCC had been seeking to avoid a First Amendment confrontation; what Congress has told the Commission, in effect, is to abandon caution and to enforce its standards across the board.

We can only hope the FCC will be as responsive to Congressional will on another matter: 220 MHz.—*David Sumner, K1ZZ*

YAESU'S DUAL BANDER GOES PLACES OTHER MOBILES DON'T.



FT-4700RH control head (1 15/16" x 5 7/8" x 1")

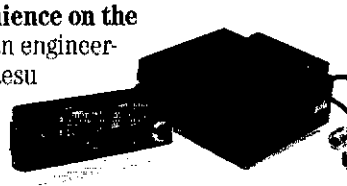
Introducing Yaesu's FT-4700RH dual-band mobile. Choose Yaesu's FT-4700RH, and you open the door to a lot of tight spaces.

While other dual banders just won't fit in today's small cars, the FT-4700RH utilizes a versatile "remote head" design. So you can mount the "brains" on your dash, visor, or door, and hide the "muscle" under your seat.

High-performance package. Packing a solid 50-watt punch on 2 meters (40 watts on 70 cm), the FT-4700RH includes Dual-Band Watch for simultaneous monitoring of both bands, with independent squelch settings on the main and secondary bands. When you transmit, opposite band monitoring goes on in a full-duplex mode.

You can adjust the relative volume of the two receive channels with the balance control, too. And with Yaesu's bright LCD display, transceiver status is clearly visible in sunlight or shade.

Convenience on the road. Human engineering, long a Yaesu specialty, is an important aspect of the FT-4700RH design. The ten-button front panel keypad includes a "do-re-mi" audible command verification, and all important controls are backlit for night operation. Plus you get extended receive coverage of 140-174 MHz (MARS/CAP permit required for transmit on 140-150 MHz), or 430-450 MHz on 70 cm. Nine memory channels on each band. High/low power selection (low power: five watts). One-touch reverse repeater shift button. Optional CTCSS module. And 16-key DTMF microphone.



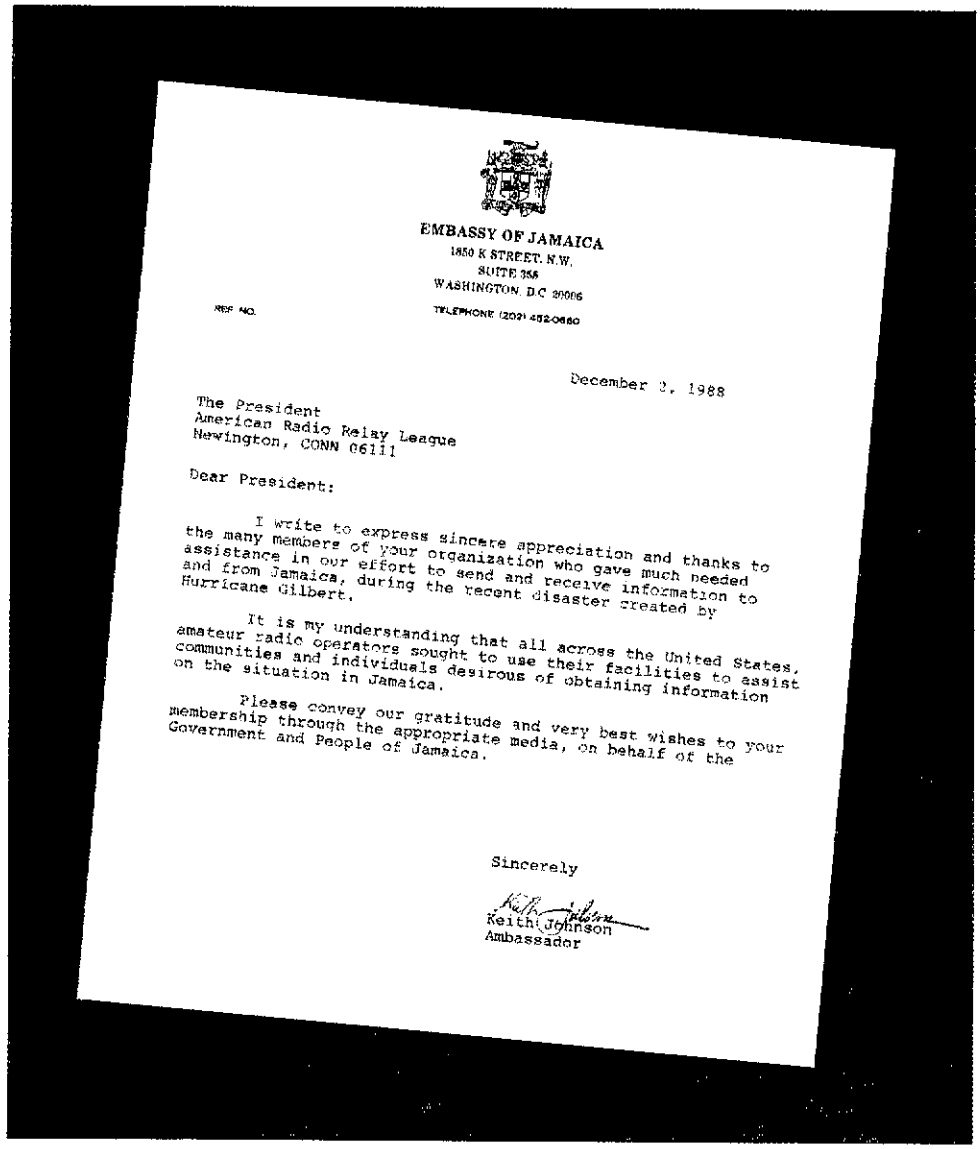
Optional accessories. FTS-8 CTCSS unit. MH-15D8 Autodialer Microphone with 10-telephone number memory. SP-3 or SP-4 External Speakers. And YH-1 Headset/Boom Mic or MF-1A3B Flex-Arm Boom Mic, both with SB-10 PTT Switch Unit.

Discover Yaesu's FT-4700RH today. And see what "high performance" really means. For dual-band mobile operation, Yaesu's FT-4700RH really fits!

Yaesu USA 17210 Edwards Road, Cerritos, CA 90701 (213) 404-2700. **Repair Service:** (213) 404-4884. **Parts:** (213) 404-4847. Prices and specifications subject to change without notice. Specifications guaranteed only within amateur bands.

YAESU

Thanks: The Jamaican Ambassador to the US sent this letter expressing thanks on behalf of his country for the assistance rendered by US amateurs after Hurricane Gilbert hit Jamaica. Best wishes to the people of Jamaica as they recover from the devastating effects of the hurricane.



EMBASSY OF JAMAICA
1850 K STREET, N.W.
SUITE 356
WASHINGTON, D.C. 20006
REF NO. TELEPHONE (202) 452-0660

December 2, 1988

The President
American Radio Relay League
Newington, CONN 06111

Dear President:

I write to express sincere appreciation and thanks to the many members of your organization who gave much needed assistance in our effort to send and receive information to and from Jamaica, during the recent disaster created by Hurricane Gilbert.

It is my understanding that all across the United States, amateur radio operators sought to use their facilities to assist communities and individuals desirous of obtaining information on the situation in Jamaica.

Please convey our gratitude and very best wishes to your membership through the appropriate media, on behalf of the Government and People of Jamaica.

Sincerely

Keith Johnson
Ambassador

Auld Lang Syne

There was certainly no shortage of Amateur Radio news and developments in 1988. For a look back at some of the notable events in the Amateur Radio world in 1988, see the story which begins on page 54 of this issue.

Everything You Always Wanted to Know...

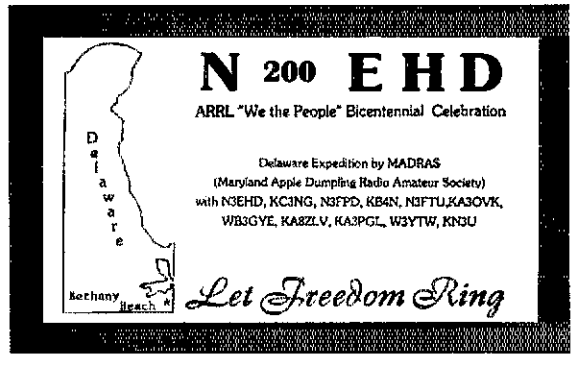
Are you a new ham who has been enjoying getting on the air and making contacts, but now find yourself faced with sending out QSL cards confirming your many contacts? If so, there's some helpful advice for you in this month's installment of Novice Notes. Turn to page 58 of this issue and see how easy it is to enjoy the fun of QSLing.

New SAREX mission planned: Wayne Wilson, WB8TSO (l), Heath Co Product Line Manager for Amateur Radio, presents one of three Heath HK-21 TNCs donated to the Johnson Space Center ARC for use in SAREX. Receiving the equipment is Gil Carman, WA5NOM, President of JSC ARC, with Gerry Creager, N5JXS, Engineer-in-Charge of SAREX packet integration, and Lou McFadin, W5DID, SAREX Project Engineer. You can read about the newest SAREX mission in "At The Foundation" on page 62 of this issue. *(photo courtesy NASA)*

And the winner is: The ARRL film *The New World of Amateur Radio* won the Gold Medal in the Science and Technology category of the 1988 International Film and TV Festival of New York. The eight competitors for the award included Public Broadcasting "heavyweights" WGBH of Boston and WNET of New York. The hefty (6.7 oz) medal is on display in one of the new trophy cases gracing the halls of HQ.

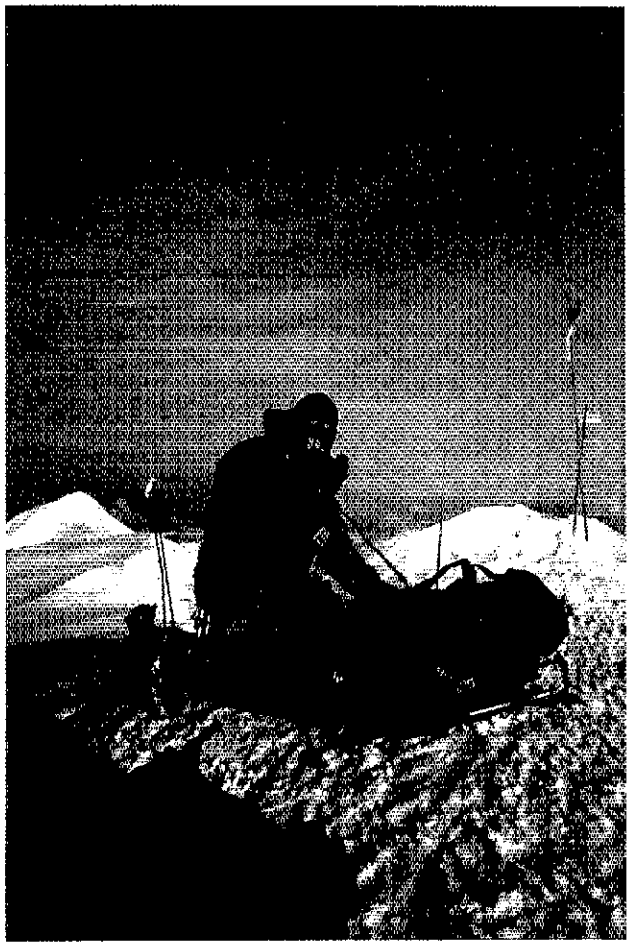
Porta-Station: The Houston (Texas) ECHO Society assembled this FB "transportable" station which was used for talk-in at the Houston HAM-CON. The transportable station also has obvious utility in emergency and other public-service communications. *(photo courtesy WQ5Y)*

Pushed aside: Bruce Ryan, KA5VSY, reports that his daughter Colleen wasn't content to let him complete a recent antenna project. After watching him for a few minutes, Colleen said, "Here Dad, let me do it. You're taking too long, we'll never get it done today." From that point, Bruce was reduced to working as ground crew while Colleen installed a 2-meter Yagi, as well as a new television antenna. Colleen, who is not (yet!) a ham, is working on an accounting degree and plans to become a CPA. *(photo courtesy KA5VSY)*

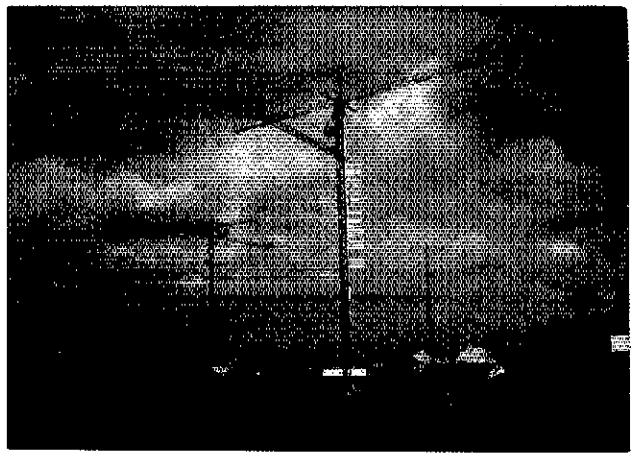


Go for it: "We the People" special-event station N200EHD made over 7000 contacts during operations from three locations. In addition to 3250 contacts from their home state of Maryland, Alan Gener, N3EHD, of Silver Spring, Maryland, reports that the group made 2050 contacts from Delaware and 1750 contacts from Washington, DC. If you worked all 50 states during the period from September 17, 1987 to December 31, 1988, apply for your "We the People" WAS, a handsome addition to any ham shack. Deadline for applying for the award is December 31, 1989. *(QSL courtesy N3EHD)*

Souvenir: During the 1988 Summer Olympics in Seoul, South Korea, Joe Martocci, K3CQY, of Roseto, Pennsylvania, had a chance to operate 6K24SO, located in the Athlete's Village. Joe, a technician for NBC, was given a copy of the Korean Amateur Radio League (KARL) publication. "I couldn't read much of it because it is all in Korean, but it was a nice souvenir to take back with me." *(photo courtesy K3CQY)*



Peaking it up: Blake Ward, KA3PLZ, of Pittsburgh, made 35 contacts from the summit of Mt McKinley, Alaska. Several of the contacts were phone patches, including one to Earl Korf, K2IC, of Lincroft, New Jersey. Earl's son, Richard, was one of Blake's companions on the climb. For the whole story on ham radio's role in the climb, see page 53 of this issue.



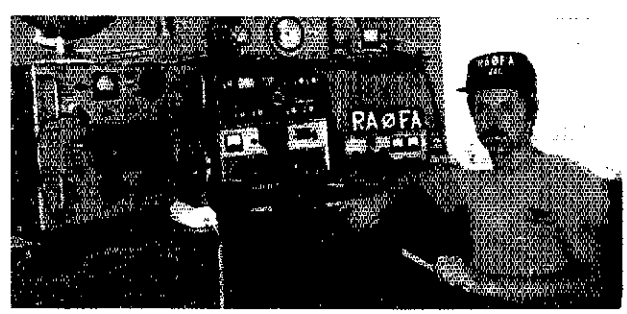
59+: This all-band HF log periodic array should be the envy of any ham, including Gary Pelletier, KA9QOT/ON9COJ, who sent along this picture. (That's Gary standing at the base of the tower, which should give some idea of the size of the array!) The array is located on a US Air Force base in Frankfurt, West Germany. Gary is stationed in Belgium and was visiting the base during a softball tournament. Being a good ham, Gary couldn't help spotting the impressive array (and sending along a nice picture for other amateurs to drool over). *(photo courtesy KA9QOT)*

EME Anyone?

If you're equipped for meteor-scatter or satellite communications on 2 meters, you may already have everything you need to make some EME contacts. For the story on minimum equipment requirements and how to achieve EME success with low power and small antennas, check out the story beginning on page 28 of this issue.

The Count is...

Need an accurate frequency readout for that QRP transmitter you're building, or perhaps a small frequency counter for general use around the shack? Complete details on a small, low-cost frequency counter begin on page 21—this unit will fit the bill for many uses around the shack, as well as portable operation!



Winning effort: Val, RAØFA, of Sakhalin Island, USSR, proudly displays the plaque he received as first-place, single-operator, all-band operator in the USSR in the 1988 ARRL International DX Contest. *(photo courtesy RAØFA)*

League Lines

ARRL coordinates shipment of packet stations to USSR: Six complete packet VHF stations have been sent to the USSR at the request of Leonid Labutin, UA3CR, who has been put in charge of radio communications in support of the Armenian earthquake relief effort by the Radio Sports Federation of the USSR. Leo had requested assistance in the form of portable packet-radio stations to help the Soviets develop their fledgling packet-radio network in response to the emergency.

Thanks to *QST* columnist Vern Riportella, WA2LQQ, donations of equipment were lined up from the Tandy Corporation (six Model 102 laptop computers), Yaesu USA (six FT-23R transceivers) and AEA (six PK-88 TNCs, a PK-232 data controller and six Hotrod antennas).

Donations were shipped to ARRL HQ, and employees of the ARRL lab spent two days making up cables to integrate the donated equipment as six complete, separate packet stations. HQ added a supply of batteries and some other accessories to the shipment.

The completed stations were packed and given to Riportella, who delivered them to Kennedy Airport, where they were flown to Moscow December 21. As of this writing, several of the portable packet stations are on the air, supplementing communications between the stricken area, Moscow and the rest of the world.

By unanimous vote, the ARRL Awards Committee has accepted the recommendation of the ARRL DX Advisory Committee to add Rotuma to the ARRL DXCC Countries List. Rotuma is an island located at approximately 285 statute miles north-northwest of Fiji.

The start date for accreditable contacts was left to be resolved by further consultation between the Awards Committee and the DX Advisory Committee. The recent 3D2XX operation has been accredited and will be acceptable for DXCC credit. Details of submission of a QSL card for DXCC credit will be released soon. Until then, please do not submit any cards from Rotuma to the DXCC Desk.

Amateurs operating on 10 meters are often bewildered by requests for "10-10 numbers." 10-10 numbers are assigned by the 10-10 International Net, Inc. A number is available to any amateur who works ten 10-10 members and submits the log data to the appropriate 10-10 Call Area Manager. The purpose of 10-10 is to promote interest and activity on the 10-meter band. For further information, send a business-size SASE to Chuck Imsande, W6YLJ, 18130 Bromley St, Tarzana, CA 91356.

Each year, the ARRL Foundation sponsors a number of scholarships, the Victor C. Clark Youth Incentive Program and the Jesse Bieberman Meritorious Membership Program. For the 1989-1990 academic year, the Foundation will offer nine different scholarships. The deadline for all ARRL Foundation Scholarship applications for the 1989-1990 academic year, except for the $5000 ARRL Scholarship to Honor Senator Barry Goldwater, is May 1, 1989. The deadline for the Goldwater Scholarship is June 1, 1989.

The Vic Clark Program is designed to provide minigrants year-round to groups that demonstrate a serious intent to provide support for the development of Amateur Radio among high-school-age youth. The Bieberman Membership Program provides funding for long-time ARRL members who may no longer be able to afford membership.

For further information about these scholarships, which range from $500 to $5000, and other Foundation programs, contact the ARRL Foundation, c/o ARRL HQ.

A reminder to those amateurs who completed the requirements for the "We the People" WAS Award and/or the special "200" endorsement before the December 31, 1988 deadline: All applicants must submit their award application no later than December 31, 1989. Applications for the "We the People" WAS Award and the "200" endorsement are available from HQ for an SASE.

Meanwhile, 1989 is the ARRL's 75th anniversary, and in its commemoration ARRL is sponsoring the ARRL Diamond Jubilee Award. For further details on this operating award, see October 1988 *QST*, page 59.

Members of The Institute of Electrical and Electronics Engineers (IEEE) who are interested in serving as IEEE Congressional Fellows for the 1989-1990 term are invited to apply for one of the two positions available. Those selected will serve a one-year term on the personal staff of individual Senators or Representatives or on the professional staff of congressional committees, with the IEEE paying half of their salary.Candidates are selected on the basis of technical competence, ability to serve in a public environment and evidence of service to the IEEE and the profession. Prospective Fellows must have been in the IEEE at the member grade or higher for at least four years. Applications are available by contacting W. Thomas Suttle at 202-785-0017 or by writing: Secretary, Congressional Fellows Program, The Institute of Electrical and Electronics Engineers, Inc, 1111 19th St NW, Washington, DC 20036. Applications must be postmarked by March 31, 1989. If you apply, please advise ARRL Washington Area Coordinator Perry Williams, W1UED.

Hurricane Gilbert—Amateur Radio Again Proves its Worth

Amateur Radio came through with flying colors when Hurricane Gilbert cut a wide path of destruction in September 1988.

By Luck Hurder, KY1T
Deputy Manager, Field Services Department

Graham, W4PJS/6Y5RO, at the operating position in Kingston, Jamaica.

The recent onslaught of Hurricane Gilbert, which decimated Jamaica, again pointed out the invaluable service that is so often provided by on-the-scene amateurs during emergency situations.

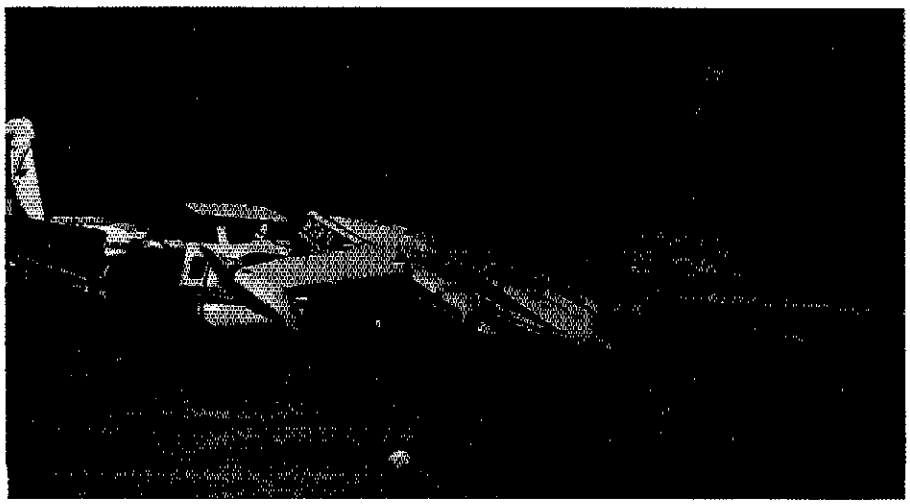
When normal channels of communication failed in storm-ravaged Jamaica, and shortly thereafter on Grand Cayman, Amateur Radio volunteers maintained contact between these islands and the rest of the world. For many days, radio links were provided from point to point *on* the islands, as well as from a large number of countries worldwide *to* the islands. These links served to keep island government officials in touch with emergency services in the United States, as well as to pass messages to and from worried friends and relatives.

ARRL volunteers, such as Emergency Coordinator Ken Harwood, WA5QZI, are typically already hard at work long before the disaster actually strikes.

"We start tracking hurricanes early on," states Ken, "because most of those that hit the Texas coastline come from the Yucatan area. A week before Gilbert hit Mexico and Texas, we were already on the air monitoring radio traffic and communicating with other Amateur Radio operators in the Caribbean. Following the evacuation of thousands of Texans, we provided around-the-clock communications coverage for the Red Cross Disaster Service, which had opened 19 shelters."

Hurricane Gilbert spawned far more records than simply the lowest pressure ever observed in a Western Hemisphere hurricane. It also saw the implementation of new plans of action worked out by various members of the Amateur Radio community. Some of the communications support plans put to use in this disaster had been formulated and exercised over the years, and some evolved spontaneously. An example of this was the operation of the Hurricane Watch Net on 14.325 MHz.

First organized during Hurricane Betsy in 1965, this network of radio amateurs has constantly been undergoing changes suitable for the times and technology. Some of the key players have come and gone, and others have been there all along. During and after each storm, they have handled things slightly differently, but the basic procedure has always been to disseminate the official National Hurricane Center (NHC) advisories and bulletins, to seek the weather reports (ground truths) in the affected areas and to provide support for disaster-relief officials. Key to this support is the organization of the Dade County amateurs who man Amateur Radio equipment in the NHC, and the members of the Hurricane Watch Net (HWN) who gather reports from affected areas and read the NHC advisories to people on the net.



Damaged aircraft at Jamaica's Montego Bay Airport.

Forecasting hurricane behavior falls far short of a perfect science. In order to forecast weather at all, the meteorologists must have command of a bewildering amount of data. Within the borders of our country—given the numerous official observation sites such as airports, laboratories and universities—they have a better chance of being accurate in their forecasts. But for a storm well out in the ocean, there is precious little data available, even though we do get some data from satellites, buoys, ships, aircraft and the occasional island reports. Governments can only fund so many observation posts and must therefore heavily depend on volunteers. When the storms cross international waters and inter-

Salvation Army Colonel Thompson and W4PJS/6Y5RO at the operating postion.

national boundaries, the communications difficulties and complexities create much more of a problem. Amateur Radio operators *are* able to provide the required support.

Getting the watches and warnings into the hands of the people who need them poses yet another communications problem. In fact, it represents a double-edged sword, as timely notice of advancing storms creates heavy responsibilities for not only the NHC, but for local governmental and disaster-relief officials as well. Errors in the placement of watches and warnings can cause severe economic burdens, as well as the more obvious loss of life or property. While it is often difficult at best to communicate watches and warnings into the areas where they apply, warning persons on the islands, at sea and in some foreign places is especially difficult. This represents yet another area where Amateur Radio steps in to fill a void or to supplement existing channels.

Once an area falls under the gun, reports to the NHC help refine the advisories and bulletins, as well as the watches and warnings. Frequently, official paths of communications become inoperative because of the storm, and the Amateur Radio Service suddenly finds itself as the *only* way to communicate. This became the case during Gilbert in many places. The initial scope of the disaster was first heard in several cases on the Hurricane Watch Net. The HWN provided this information to the NHC, where the attention of the government and the media were focused. Many other nets sprang up to provide the necessary disaster relief. The initial interest in Gilbert was sparked on the HWN while they were still working with future Hurricane Florence in the Gulf of Mexico. At the time, Gilbert was merely a tropical depression well to the east of the Antilles, and Florence was still a tropical storm. Both had been carefully watched for some time, Gilbert from its spawning grounds near the Cape Verde Islands. And before the final gasp from Gilbert, the HWN was watching future Hurricane Helene as it came off the African coast. It soon became evident that Gilbert was going to be a major storm, but even this was an understatement. Named a tropical depression on September 9, it became Tropical Storm Gilbert the very next day, with a 72-hour forecast promising the possibility of winds in excess of 100 knots. Members of the HWN advised persons in the Antilles and elsewhere along the projected track, and provided the updated advisories and bulletins.

Staying well south of the populated islands, Gilbert still was able to levy death and destruction in the islands north of its track, but this was for the most part within the capabilities of local officials and the net was not activated. The Hurricane Watch Net began operations the morning of September 11, operating in conjunction with personnel in NHC from Dade County, Florida. Gilbert had moved to 150 miles SSE of Santo Domingo and had winds of 80 knots. Reports as received from several amateurs in the Dominican Republic and Haiti were relayed to and from NHC. Jamaican stations received the initial progress reports, relaying them to their local officials regularly. This gave them some preparation time, but even that proved inadequate in some cases. Jamaica was devastated two days later by Gilbert, which at the time had a relatively tame central pressure of 960 millibars and sustained winds of about 115 mi/h. One by one, amateurs in Jamaica lost power, antennas and the ability to communicate with the outside world. One of the few who stayed on was K2BPP/6Y5, in a hotel near Montego Bay; he lost most of his antenna and some of the walls of his hotel room, but managed to make reports. He and the others in the area would find themselves overburdened shortly with disaster-relief and health-and-welfare communications.

Next on Gilbert's agenda was the Cayman chain. Located just south of Cuba, they took a glancing blow of some 140 mph from Gilbert. There were no casualties in the chain, but there was, of course, some damage. Because of the path of the storm near Cuba, warnings were likewise up in that country. In the past, there was rarely any contact between HWN and Cuban amateurs. For Gilbert, however, there were frequent and regular reports through CO2KK and other amateurs of conditions ashore and, more importantly, reports from Cuban radar, detailing the conditions and movements of the eye of Gilbert to the Hurricane Center. This caused great excitement among the leadership of the NHC and became an incentive for the members of the HWN. All political differences were put aside; we were "colegas" once again.

Ahead lay the Yucatan peninsula. Behind lay the ruins of Jamaica, the damage on the Cayman group and Cuba, the minor gales in the Florida Keys and the Bahamas. The dead and injured in the islands on the northern tier of the Caribbean were being tended to and life there was returning more or less to normal. Coming along in the wake of the storm was yet another surprise for the HWN and listeners. A British Naval Frigate, the HMS Active, was enroute to Georgetown, Cayman Islands, to render assistance. She made and maintained contact with the island through the HWN, ZF1RC, and others.

Also ahead lay the deepening of the central pressure to a new world-record low, for a hurricane, of 885 millibars, second only to Super Typhoon Tip near the Philippines in 1979. Mindful of the importance of strict radio discipline and the ever-increasing need for Amateur Radio communications, the Director of the National Hurricane Center requested the FCC to declare an emergency on 14.325 MHz for weather-related work and on 14.275 MHz for disaster relief in already stricken areas. It was quickly granted and broadcast by W1AW in official bulletins; all of this was in accordance with long-established plans and Part 97.107 of the FCC Rules. This particular paragraph is apparently unknown to many amateurs and should be studied by all those who wish to participate in the future of emergency communications.

With the persistent storm bearing down

on the Yucatan, the local officials required evacuations and thereby prevented any loss of life in the many tourist areas. This evacuation resulted in tremendous difficulties for families looking for health-and-welfare reports. The northern tip of the Yucatan, including the resorts on Cancun and Cozumel, was hit very hard. Most of the amateurs that had been on frequency earlier were forced off the air by loss of power or antennas, making communications with the area nearly impossible for some time. But Gilbert was hardly finished with his assault on Mexico. Ahead lay the upper Gulf Coast of Mexico and the southern coast of Texas. Warnings went up from Port O'Connor to Tampico, with watches and boaters' advisories further east along the Gulf Coast. Brownsville was mentioned as the probable landfall.

In fact, the storm refused to follow the computer models which suggested he would turn northwesterly, but rather continued on a path that caused him to plow into the Mexican coast, just over 100 miles south of Brownsville. Luckily, Gilbert had lost much of his punch and was back up to a modest-but-still-powerful 948 millibars, with winds of 120 mi/h. The winds were hard enough to take; it was the rains in excess of 20 inches inland, and the numerous tornadoes in Mexico and Texas, that caused the most grief. Indeed, hundreds died and many were injured or left homeless in the wake of this ferocious storm.

Following the effects of a severe emergency situation, ARRL HQ receives hundreds of articles, newspaper clippings and accolades in the form of personal letters extolling the virtues of the Amateur Radio Service's capabilities. Gilbert was no exception, of course. What follows are excerpts of some of the typical letters and comments that serve to illustrate the superb service that many amateurs provided.

Senator Lauds Local Rabbi After Hurricane Disaster

Rabbi Kenneth L. Cohen, NI3F, of Columbia, Maryland, was presented with a certificate in honor of his efforts on behalf of the people of Jamaica in the wake of Hurricane Gilbert. The award was presented by Senator Barbara Mikulski.

"I wanted to take this opportunity and let you know what a terrific job you did during Hurricane Gilbert in Jamaica. I know many people here in the States appreciated the messages you relayed from family members in the Caribbean," Mikulski said. "It is inspiring to know that people such as you, Rabbi Cohen, are willing to unselfishly give their time and energy during a crisis situation."

"I accept this award on behalf of the men and women of the Amateur Radio fraternity here and around the world, who offer their talent and equipment for the public service," Cohen said.

Other Exemplary Examples

Amateurs in the United States weren't the only ones, of course, who provided appropriate public-service communications before, during and after Gilbert.

"Australian and New Zealand stations were heard relaying messages of assistance during times that Jamaicans were unable to contact North America as a result of varying radio conditions. In Australia, the national media, particularly radio stations, had generated some 100 health-and-welfare inquiries for Jamaica from the public. Due to a lack of (Australian) third-party agreements, all such messages were sent to Jamaica via the US. Australia has a third-party agreement with the US, and the US has a third-party agreement with Jamaica. This meant that Australian amateurs were able to provide service directly to the public without the normal delays which are involved in establishing such agreements. The Radio Society of Great Britain (RSGB) activated and provided official assistance to the British High Commission as well as handling health-and-welfare inquiries into and out of Jamaica to the UK. In Germany, amateurs provided that country's communications for Jamaican public health and welfare. Belgium and Sweden were also involved in health-and-welfare traffic, alleviating the worries of some seriously ill people, whose concern and lack of news about loved ones was indeed threatening to their own well-being."—*S. Voron, VK2BVS*

Some Amateur Radio operators even had the means of traveling directly to the disaster area to provide equipment and communications skills.

"On September 17th, the International Amateur Radio Network (IARN) requested that W4PJS and I proceed to Jamaica to furnish much-needed radio communications for the Salvation Army in Kingston. We were met at the Montego Bay airport by representatives of the Salvation Army, only to discover that customs took a dim view of bringing two-way radio equipment into their country. After cooling our heels for two days, we were finally given permission to put our radio equipment on a plane and accompany it to Kingston. We arrived at the Salvation Army headquarters building to discover that the roof had been completely destroyed. We were given a nearby temporary building to set up our base of operations. We hastily put up our 20-meter dipole and soon were in communications. After a little over a week's operations of handling priority messages, communications capabilities of the country returned to near-normal and Graham and I left to return to our homes in the States." —*Albert Vayhinger, W9ELR/6Y5RO*

Bexar County, Texas EC Ken Harwood, WA5QZI, sending message traffic from the San Antonio Red Cross Chapter of the American Red Cross, where the San Antonio Club station, W5SC, is located.

"After Jamaica was hit by a devastating hurricane, our objective was to provide additional Amateur Radio communications into the country. As a member of a medical-relief team, I was sponsored and able to gain entrance into Jamaica. I brought with me my communications equipment, which consisted of a Kenwood TS-830S and a 3-element beam. My primary responsibility was to support the medical clinic with daily radio transmissions to the Oral Roberts Medical Center in Tulsa, Oklahoma, via the International Amateur Radio Network. This was accomplished by checking into the IARN on 14.275 and making contact with the Medical University Center. Daily transmissions into ORU consisted of medical updates on the conditions of the community, especially the high probability of outbreaks of cholera and typhoid, in addition to health-and-welfare traffic to the families of the medical relief team."—*Bill Theodorou, WB2TUU*

It is times of disaster like Gilbert that should give us all pause. In such instances, it is heartening to know that the corps of dedicated hams within and outside of the US can—and do—provide Amateur Radio communications systems that can be activated when regular channels upon which we rely are knocked out.

What's That New Signal on 80 Meters?

Interference problems can be troublesome. Locating the source of interference can be difficult. Here's how they did it in Ohio.

By Ralph C. Craig, AJ8R
290 Pinehurst Dr
Troy, OH 45373

My adventure began during a casual conversation. Bob Peura, K8FN, a ham in our housing development, complained of interference near one of his favorite 80-meter CW frequencies—3518 kHz. Several days later, as I finished an operating session, I remembered his comment and tuned my receiver to the frequency. I found a very strong signal (S9 + 20 dB) that consisted of a series of CW pulses. There appeared to be no intelligence, just pulses.

Two days later, Bob told me that there was a similar signal around 3501 kHz. I found that one, too. My curiosity was aroused. I tuned to 1750.6 and 1759.1 kHz—half the 80-meter frequencies. There I found signals with the same pulse pattern. Further calculations and checks showed that these two frequencies were the fundamentals, and their harmonics (through the ninth) were easily identified.

What could all this mean? The interfering signal had a strength of S9 + 30 dB, just a little less than that of a broadcast station on 1600 kHz located 30 miles away. Was it a new navigational signal replacing LORAN A? A new OTHR (Over the Horizon Radar)? A form of atmospheric sounder? Because a major Air Force research base, four universities, a research park, an atomic laboratory and a major international airport are all within 30 miles south of our homes, we assumed that the signals came from one of them.

We Devise a Plan

With the year-end holidays fast approaching, there was little time for hamming or monitoring, but we often did a spot check of the frequencies. The signals were always there. We searched the back issues of a popular monitoring magazine, and various confidential frequency lists. No help. We checked our back issues of *QST*. We found several articles describing odd signals and interference generated by ham equipment—but not much help.

As part of our plan, we first constructed an RDF (radio direction finder) loop using information in the *ARRL Handbook*[1] and the *Low and Medium Frequency Scrapbook*[2], (see Fig 1). We calibrated the loop using broadcast signals on 1600 and 1570 kHz. The stations are 90 degrees apart and 10-30 miles away. We left out the sensing antenna that would make the RDF loop unidirectional. A bidirectional pattern was good enough—we thought. That was a mistake. The first RDF trial indicated that the interference was coming from the south. That is, we assumed that it indicated a southerly direction.

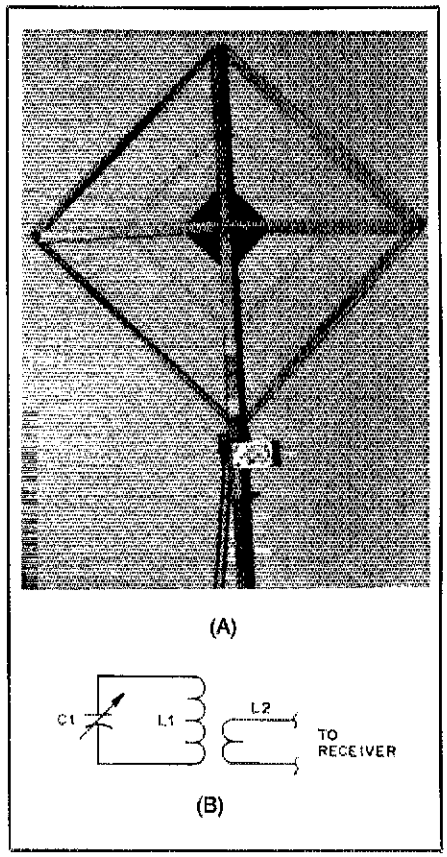


Fig 1—Photo of the RDF loop (A) and schematic (B).
C1—Transistor radio variable, mounted in shield can.
L1—Six turns of no. 16 wire 18 in. each side of square.
L2—Two turns of no. 20 wire 9 in. each side and centered in L1.

On Friday evening, our plan was put into effect. We chose to monitor six frequencies. The signals on 1750.6 and 1759.1 kHz, the harmonics on 3501.2 and 3518.2 kHz, the broadcast station on 1600 kHz and, as a check, CHU Canada on 3330 kHz. We took readings every half hour for a total of 50 hours.

On Monday, around 4 PM, the signals suddenly left the air. They returned approximately an hour later as a continuous carrier. Deep variation in their strength suggested that someone might be tuning a transmitter. Then the familiar pulsation pattern returned.

On Tuesday we plotted the results of our monitoring on graph paper (see Fig 2). As expected, the signal from CHU faded in and out at sunset and sunrise. The BC station also faded in and out, but did not completely disappear. The interfering signals did fade, but not much. This reinforced our theory that the location was within 30 miles of our homes.

Later, we used an oscilloscope to check the pulses on each frequency. Those on 1750.6 were found to be 100 milliseconds long; those on 1759.1 had a duration of 16 milliseconds. When we used a dual channel oscilloscope and a second receiver to simultaneously view both frequencies, we saw that we were dealing with some kind of frequency shift keying (see Fig 3). Shortly after we turned off the scope, we heard a brief burst of data modulate the signal. What could it be?

The First RDF Attempt

When the cold, gray days of January moderated into a thaw, we placed a receiver in the car, attached the RDF loop and off

[1]Notes appear on page 20.

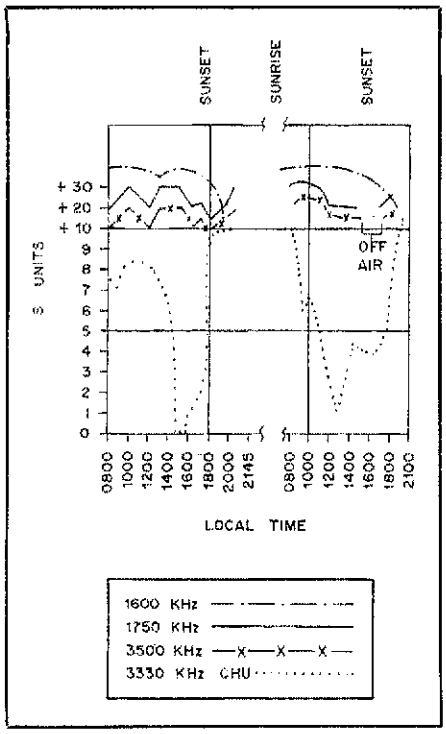


Fig 2—Plot of signal strengths; see text.

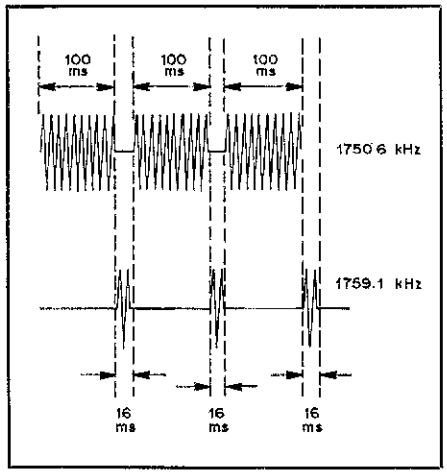


Fig 3—The interfering signals as viewed on the dual-channel oscilloscope. This shows frequency shift keying (FSK), with 8.5-kHz shift.

we went to locate that transmitter. As all of the suspected sources of interference were to the south, we drove five miles south. We live in a semi-rural setting, so finding a location free of overhead wires and obstructions was easy. The received signals were strong. We took a bearing and plotted it on a map of the surrounding area. Something didn't seem quite right. We chose a second location, 90 degrees from the bearing line and about five miles distant. Once there, we took another bearing and plotted it. Something was wrong! We chose a third location, took a bearing and plotted it. The three lines crossed near our homes. Our assumption of a southerly direction was wrong! We had been misled by the signal strength.

We drove toward home, the receiver on and the loop sticking out the window. As we passed beneath the utility lines that serve the development, the receiver's S meter nearly pegged. Whoa, back up. The strongest signals were directly under the cables. The area was definitely hot! We made a check with the RDF loop. We found many minimums, but no nulls—the signal seemed to come from everywhere.

We contacted an engineer at the power company, a neighbor who is a technician with the telephone company, and a soon-to-be-ham at the CATV company. All three assured us that there was nothing in this frequency range on their lines. No carrier current, no telemetry, no data transmission, nothing resembling our interfering signal.

A Visit from the FCC

It was income tax time, spring was here and the interference was almost forgotten. Then one day, in the midst of a QSO, a loud knock came on the front door. I opened it and saw a man, gold badge in hand. "I'm Mr Jones[3] with the Federal Communications Commission, are you Mr Craig, AJ8R?" "Yes," I answered as my blood pressure went up at least 30 points, a strange pain formed in the pit of my stomach and a lump formed in my throat. All my past transgressions flashed before me. Had I been operating legally? I was kind of close to the band's edge. Was my modulation heavy? Was I splattering? What had I done now? Over his shoulder, in the driveway, I saw a plain tan sedan. It looked ordinary except that the right front seat had been replaced with a rack of equipment. A second man sat in the rear seat operating the equipment. Oh, oh, I thought, here comes a pink ticket for some type of illegal operation! "My supervisor would like to speak with you," the man continued. "May we come in?" "Yes, yes, both of you come right in." If I were going to be cited, I might as well be cited in style.

When both men were inside, out of the cold, the supervisor spoke first. "We are from the Detroit Field Office. Mr. Peura (K8FN) sent us a letter concerning interference. He wrote that if he wasn't in that we should contact you for the details." The lump in my throat disappeared, the pain in my stomach subsided, and my blood pressure returned to near normal. "Come right into the shack," I said. "I'll show you what the signals are like." Entering the shack, I tuned in the signals, showed them the documentation—logs, charts, diagram of signal characteristics, the RDF plots. They seemed impressed with the thoroughness and details of our attempt at locating the interference. They departed with the comment, "we'll be back."

Late that afternoon the FCC engineers returned. They hadn't located the source, but did suspect CATV leakage near a cornfield at the edge of our housing development. They said they found a cordless telephone in the same frequency range, and that its signal was audible over 2.5 miles away from the base. The engineers described the owner's surprise as they told the owner everything she had said over the telephone. She was indignant when asked to remove the phone from service until it was repaired. They left to find the offices of the CATV and telephone companies to talk with their engineering staff.

Probing Further

One afternoon, a month later, I received a call from a manager at the telephone company. He said that the FCC had written him a letter concerning possible interference originating from the company's lines. FCC gave me as a reference. The telephone company did not have test equipment for the frequencies in question. Would I help them? I would.

On the agreed-upon day, a telephone crew of several technicians showed up with a bucket truck. We placed the receiver in the truck, connected a low sensitivity probe to it (actually a coil I had wound over a ferrite rod), and off we went on our search. The first stop was at the suspected leak located by the FCC. The S meter indicated S9+20 dB as we passed the probe near the telephone cables. However, it indicated S9+30 dB as it passed the CATV coax. Over 400 feet of cable was checked with similar results. We called the general manager of the local CATV office.

In less than 15 minutes, a CATV service technician showed up in another bucket truck. We briefed him on our findings. When shown the 30-dB reading, he was surprised and interested. Together, we traced the signal back to the main amplifier feeding the whole development. As the technician brought the probe near the amplifier, the signal level increased. Hallelujah, we'd found it! Off came the watertight cover and out came the amplifier. The technician was positive that he'd found an oscillating amplifier. He removed and terminated the main feed coax. Nothing changed. What a disappointment!

The CATV technician wanted to probe the CATV feeder cable to each house on the line near the hot spot. We decided that it was easier to disconnect the feeder lines. He tried that. There was no change.

Returning to the hot spot, we rechecked the signals. Still S9+20 dB. The lines we had been checking ran alongside the south edge of an 80-acre cornfield. On the west and south side was the development, but down the east side of the field ran a high-tension line (see Fig 4). We surmised that the FCC engineers in their sedan would not go there, but in our truck we could. Down the right-of-way, through waist-high weeds, we drove right under the high-tension lines.

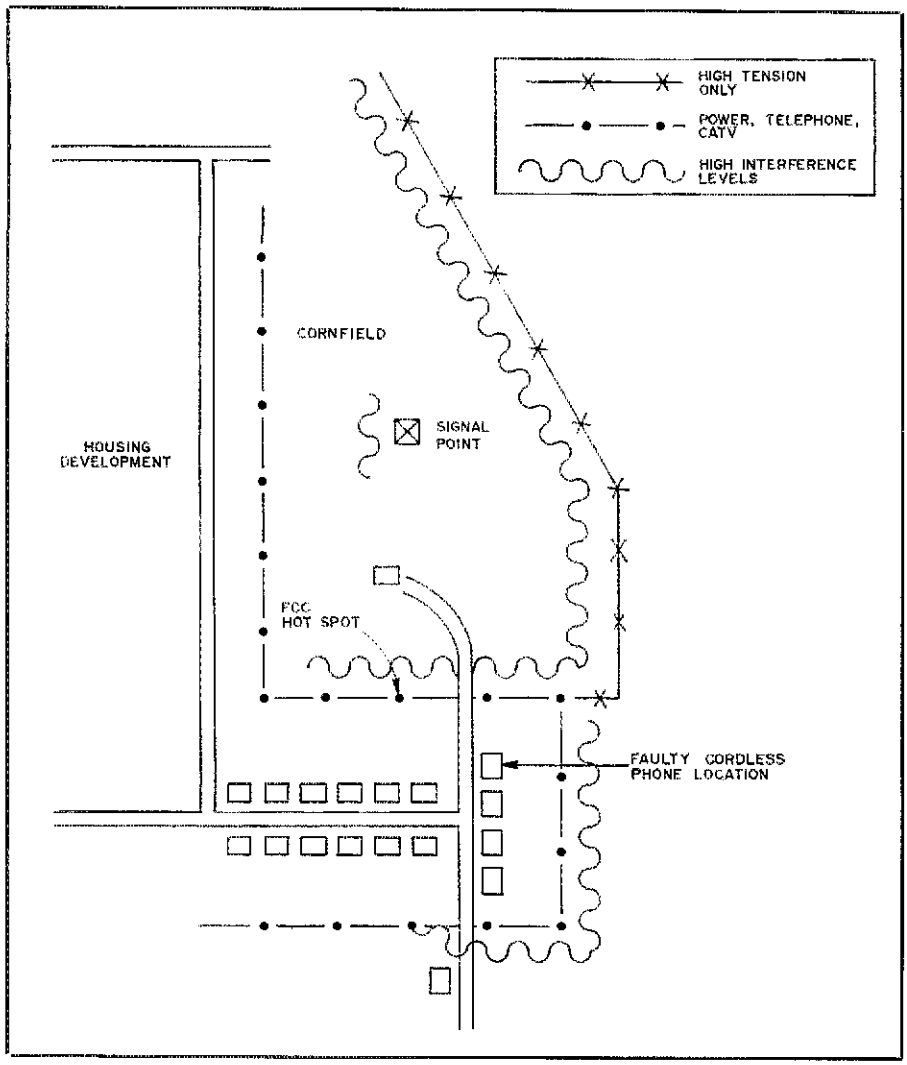


Fig 4—Map of the housing development.

The signals stayed at 20 dB over S9 or better.

The disappointed CATV technician and I took a short cut across the rough field back to the road. Suddenly a signal peak appeared. We stopped, extended the probe's cable and began checking. There—in the middle of the field—we found a point of radiation coming from underground. It wasn't S9 + 20 dB, but it certainly was a peak. We had no idea why that should be.

Twice during the next week I crossed the field in my truck. The results were always the same. Even the barbed wire fence along two sides of the field was hot. No wonder the FCC engineers couldn't find a source! No wonder Bob and I couldn't either. The *whole field* was hot!

What was that signal? What type of equipment uses such signals? We asked a lot of people—hams, engineers, technicians. The answers were varied—none made any sense.

Determination Pays Off

I was determined to locate and bring an end to this nuisance. I bought a small transistorized BC band radio at a garage sale for 25 cents. By simply detuning the trimmer capacitors across the antenna and oscillator coils, I modified it to receive the interfering signals on 1750 kHz. A small capacitor across the IF amplifier caused it to oscillate, thus making it an effective BFO. This gave me a portable, low-sensitivity, RDF receiver.

I slipped a fresh battery into the receiver and walked towards the offending area. As I passed under the utility wires the receiver began to squeal. The signals were still there. As I approached the hot spot, the signal levels increased. The receiver overloaded as I brought it near the ground wire that runs down the pole. The signals were in the power company's ground system! I walked along the right-of-way under the cables behind the houses. Even the chain link fences were hot with very strong signals. Although there were many signal peaks, the peak near one house seemed higher than the rest. No one was home. A dog with a vicious bark helped me decide to return later.

Later that evening, I saw a car parked in the driveway of the home. I returned, receiver in hand. In the front yard, the signals were loud. On the front porch, the receiver overloaded. With anticipation, I rang the door bell. A young couple and a barking dog answered the door. I explained about the interference and our search to locate the source. I asked if there was anything in the house that could cause them. "No," came the answer, but they owned two computers, a remotely controlled TV and a microwave oven. The computers weren't in use and were disconnected, the TV wasn't on and the woman was just preparing to use the oven.

The man seemed interested in my quest, so I showed him how the radio worked. He listened with interest as we walked along the power cables. Following the power drop to his house, the receiver overloaded when placed near the power meter. Suddenly, the signals stopped. The woman appeared in the doorway. "Did you just touch anything?" asked the man. "Yes," came the reply. "I just disconnected the cordless telephone." She plugged the cordless telephone back in. The signals returned. When she disconnected the phone again, the signal disappeared. The mysterious source of interference had been found! The long and interesting adventure was over.

The woman recalled that last fall lightning had struck near their home. "After that, the telephone never did seem to work properly. I could call out, but the phone would never ring. The lightning strike occurred in October." October! Yes, that was when Bob's favorite frequency in the 80-meter band had become useless.

The couple offered me the cordless phone. I took it—the parts were useful for a construction project.

Notes

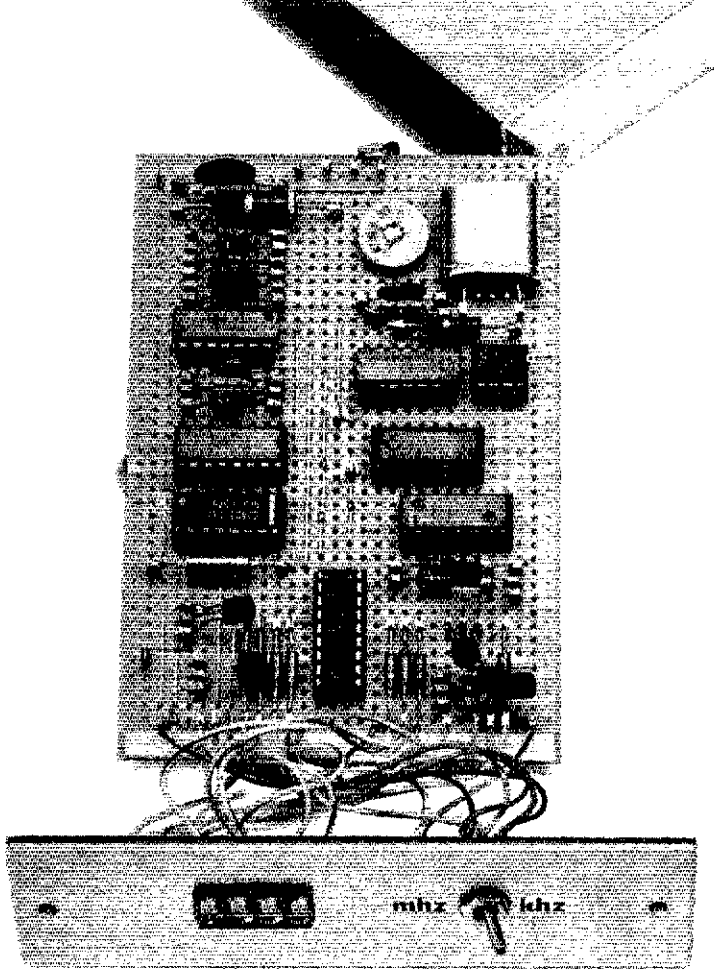
[1]M. Wilson, ed, *The 1986 ARRL Handbook* (Newington: ARRL, 1985), Chapter 39.
[2]Ken Cornell, *The Low and Medium Frequency Scrap Book*, 3rd edition (Greenville: Comm Tech Inc., 1977), Chapter 3.
[3]This is not his real name.

Ralph C. Craig was licensed as W1RAW in 1948. In 1961 he upgraded to Advanced with the call sign W8EVU, and in 1980 came an Extra and his present call sign, AJ8R. He received a First Class commercial FCC license in 1955. Ralph is a member of the Old Timers Club and is an accredited volunteer examiner.

Ralph attended the Massachusetts Radio School in Boston in 1947-48 for training as a maritime radio operator. In 1949-51 he studied at the University of New Hampshire. He has continued to study electronics and electronic equipment throughout his career.

For six years Ralph was a civilian Electronics Technician for the US Navy. During his 25-year career with the Federal Aviation Administration, he worked as a Supervisory Electronics Technician and as Field Office Chief. Ralph received nine performance awards while serving with FAA. He is now retired from FAA and enjoys experimental work in electronics.

A Low-Cost Frequency Counter



This pocket-size frequency counter has an upper-frequency range of 40 MHz. Its cost is well within the range of your pocketbook, too!

By Douglas Bainbridge, NØHPK
26056 County Rd H
Cortez, CO 81321

How would you like a small, low-cost frequency counter for your shack or workbench? Maybe you'd like to eliminate a complex dial mechanism and crystal calibrator from your next home-brew rig. Perhaps you're a newcomer who hasn't tried building a project that uses ICs and you have been waiting for a sure-fire project that'll perform a useful function. Well, here's a way to satisfy any of these needs.

General Description

The frequency counter shown in the title photo is simple to build, inexpensive, requires little power to operate and is of moderate size. This particular unit is to be used with a home-brew transmitter during a journey through VE8 country with a homebuilt outrigger sailing canoe.

This counter uses a four-digit display, but with a flip of the range switch, it can display frequencies from 1 to 40 MHz, with a resolution of 100 Hz. If you decide to build the counter from scratch, you'll find the parts are readily available.[1] To make things easy, PC boards, parts kits and even completely assembled and tested units are available from A & A Engineering. (See the information at the end of this article for obtaining information on hand-wiring the unit shown in the title photograph or for ordering materials from A & A Engineering.)

The A & A Engineering PC board shown in Fig 1 is about 4-1/2 inches long and 2-1/4 inches wide, about 3/4 inch narrower than the hand-wired prototype shown in the title photo. A rectangular panel space of about 3/4 × 5/16 of an inch is required for the display. The panel space required for the range switch will depend on whether you use a slide switch (supplied with the A & A Engineering board) or a double-pole, double-throw toggle switch.

A power supply capable of delivering 5 V at 40 mA is sufficient to operate the counter and illuminate the bright LED bubble display. Later on, we'll have a look at the construction of an eight-digit version of the counter, how to modify the design to accommodate a sensitive input circuit and how to extend the counter's frequency coverage from audio to VHF.

Circuit Description

The keystone of this frequency counter is National Semiconductor's MM74C926. This CMOS IC contains a four-digit decimal counter, can latch a given count and then use this information to drive a

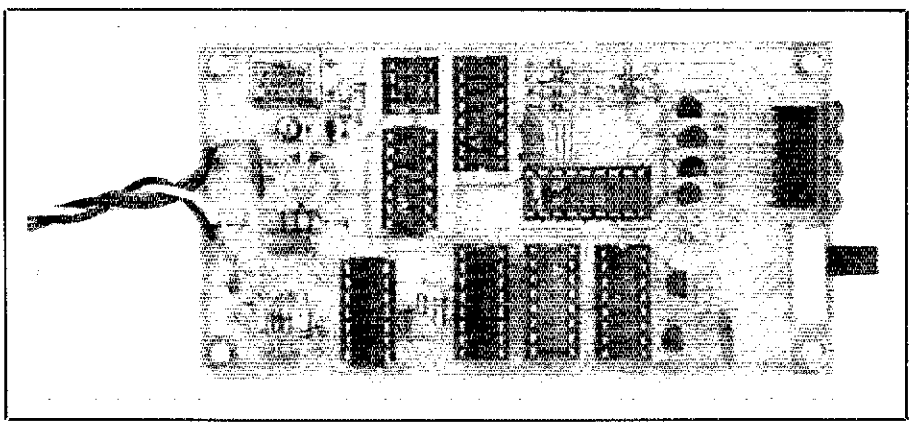


Fig 1—The A & A Engineering version of the frequency counter. A double-sided PC board is used. A right-angle socket is used to mount DS1. The display can be remotely located by using a DIP jumper cable between the socket for DS1 and the display. A DPDT slide switch is shown in this version. You can substitute a remotely located DPDT toggle switch.

[1]Notes appear on p 26.

seven-segment, common-cathode multiplexed (MUX) display. The block diagram (Fig 2) and schematic (Fig 3) show the operation of the counter. A crystal-controlled timer (U1-U3) produces a 5-Hz square wave used for timing the frequency count. Y1 is a TV color-burst crystal operating in a reliable circuit that controls the oscillator frequency. U1 acts as the oscillator and also divides the fundamental operating frequency (3.579545 MHz) to produce a square-wave output of 60 Hz. U2 divides the 60-Hz output of U1 by six. In turn, the 10-Hz output of U2 is divided by two in U3, a dual flip-flop, to produce the 5-Hz pulse.

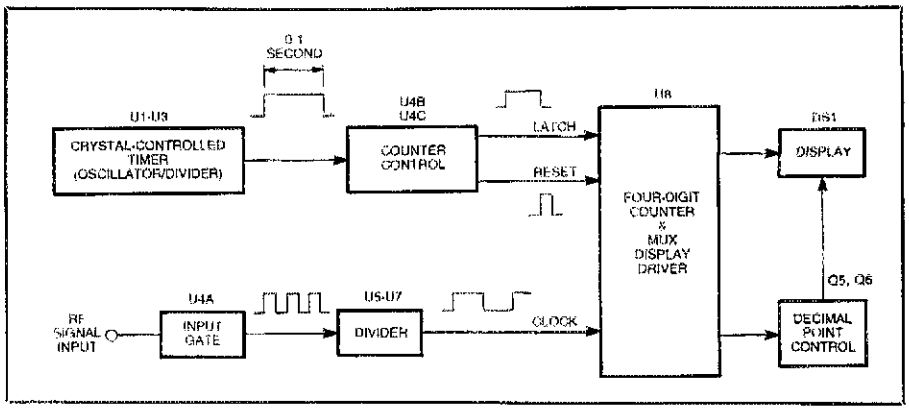
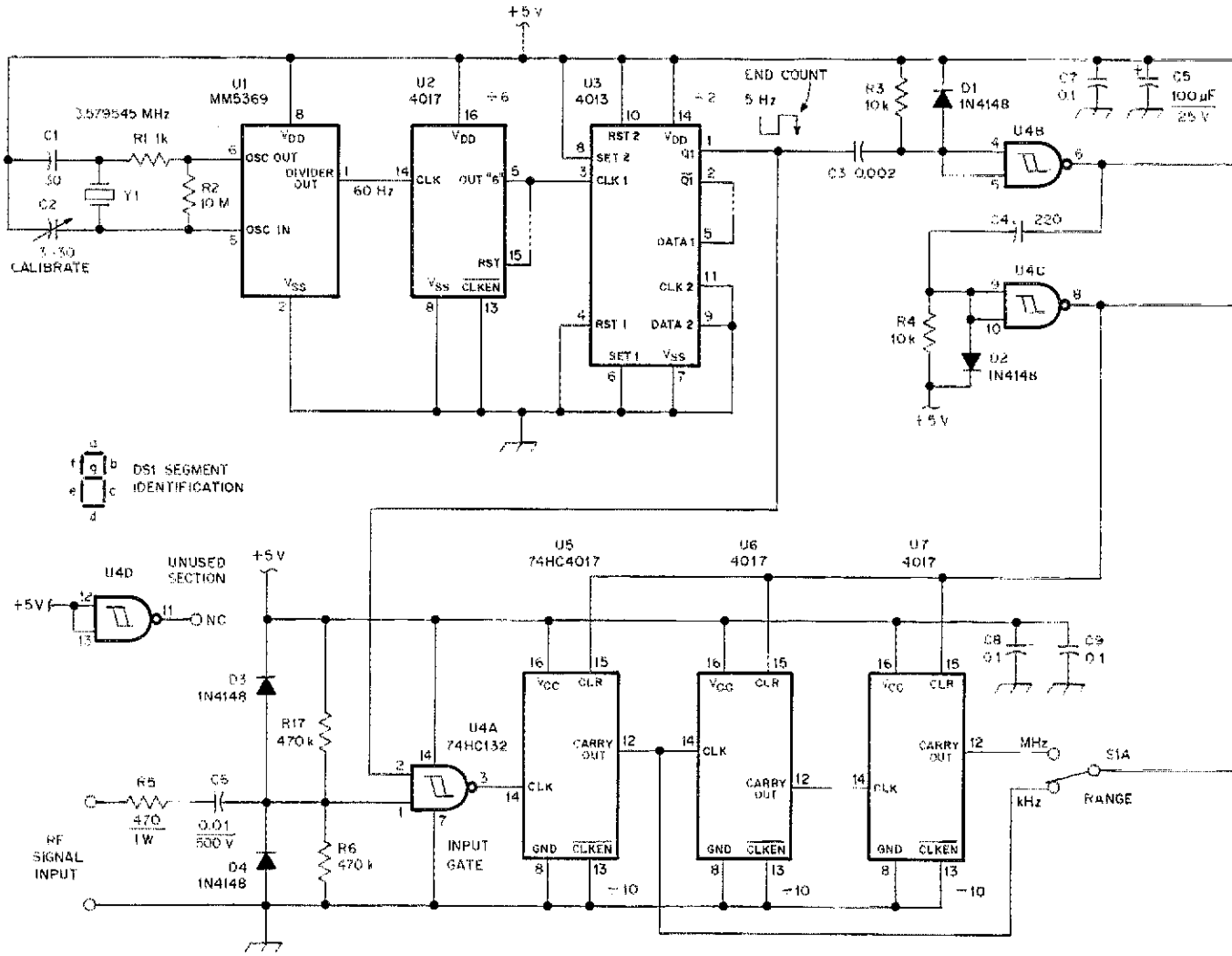


Fig 2—Block diagram of the frequency counter.

Fig 3—Schematic diagram of the frequency counter. All resistors are ¼-W carbon-composition units unless otherwise noted. See text and notes for parts sources.

C1—30 pF NP0.
C2—3-30 pF trimmer.
D1-D4—1N4148 or equiv.
DS1—DL34M 4-digit, 7-segment, common-cathode MUX display.
Q1-Q5—2N2222, 2N3904 or equiv.
Q6—2N2907, 2N3906 or equiv.
U1—MM5369AA oscillator/divider.
U2, U6, U7—CD4017 CMOS decade counter/divider.
U3—CD4013 CMOS dual flip-flop.
U4—74HC132 HCMOS high-speed quad 2-input NAND.
U5—74HC4017 HCMOS high-speed decade counter/divider.
U8—74C926 CMOS 4-digit counter/MUX driver.
Y1—3.579545-MHz crystal.



A quad, two-input Schmitt-triggered NAND (U4) is used for gating the RF-signal input and for generating the counter-control pulses. (Section U4D is unused.) The 5-Hz output pulse of U3 is applied to the RF-signal input gate (U4A pin 2). When the timer output (U3 pin 1) is high for 0.1 second, the RF signal is passed. When the timer output signal is low, the gate is closed.

Because the '74C926 has a typical maximum input frequency of 4 MHz, it's necessary to divide an RF input signal frequency of 40 MHz by at least ten before sending it to U8. Additional frequency division is required in order to read the first four digits of the 40-MHz frequency. This frequency division is accomplished in U5-U7, inclusive.

In addition to controlling the time that the RF signal is allowed to pass, U4A also converts an incoming sine wave to a square wave. This signal is then divided by ten in a high-speed decade counter/divider, U5. Further division by 100 can be selected by means of the range switch (S1), which can activate two decade counter/dividers, U6 and U7. The signal then passes to the clock input of the counter/driver, U8.

Note that the two input terminals of U4B (and U4C also) are tied together. In this configuration, the two-input NANDS behave as simple inverters. Their inputs are held high by the 10-kΩ resistors connected to +5 V until the input capacitors see a sudden high-to-low transition. This puts a low on the inverter input. The inverter output goes high and remains high for a period determined by the time constant of the RC input network. This function is similar to that obtained with the use of a monostable multivibrator.

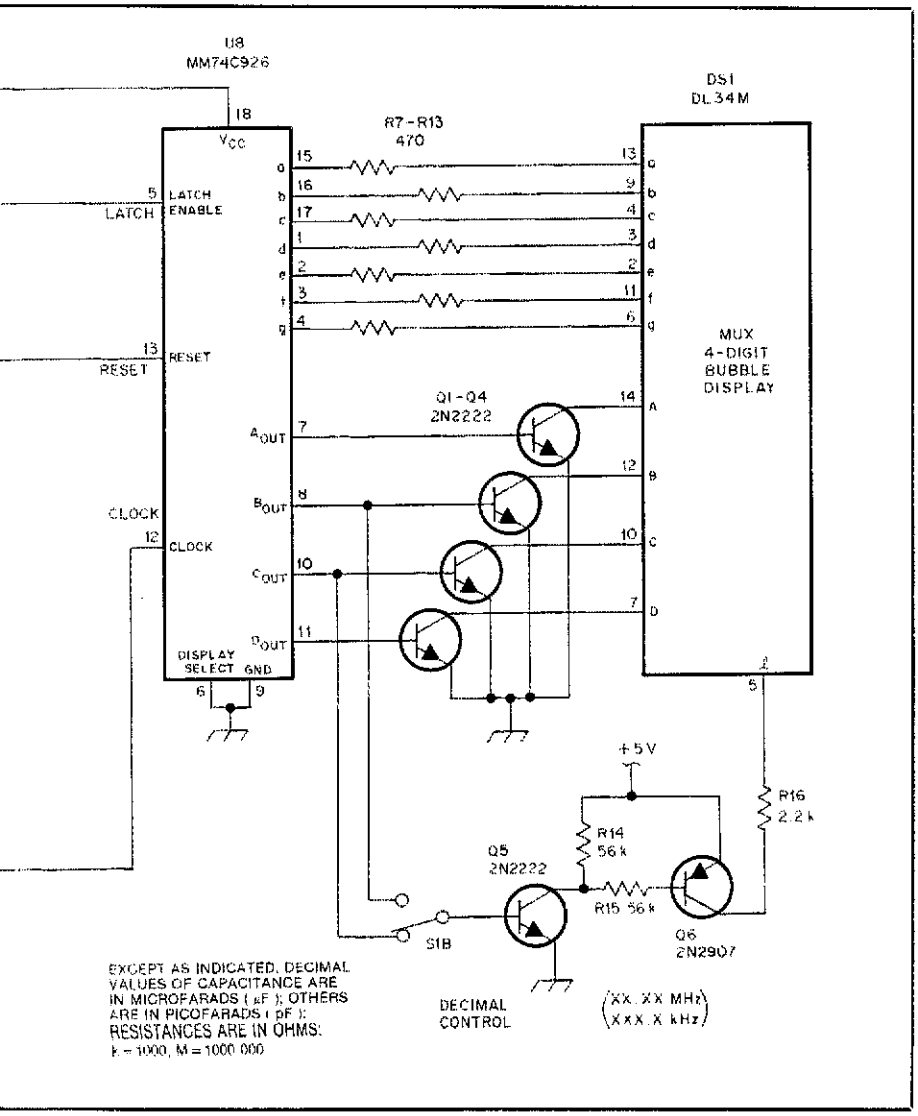
At the end of the 0.1-second timer pulse, U8's counter register contains the result of the frequency division count. U8 is instructed—by means of the latch pulse from U4B pin 6—to transfer the register contents to the output latches, where it is held until the next transfer takes place. This action is initiated in the counter-control circuit (U4B and U4C) when the 5-Hz timing signal waveform falls.

When latching is completed, a reset pulse is sent to U8's counter by the counter-control circuit (U4C pin 8). This action clears the counter register and it stands ready to make the next count. The reset pulse is also sent to the frequency dividers (U5-U7).

DS1 is a four-digit, multiplexed, common-cathode display. All the negative terminals of the segments for *one* digit are tied together. The positive terminals of the corresponding segments of *all* the digits are also tied together. This arrangement greatly reduces the number of terminals on the display and simplifies the external wiring of the display.

U8 drives DS1 by multiplexing the latched number in its counter register. An AF oscillator in U8 controls the cycling of the output to the display from one digit to the next, and reads the appropriate segments for each digit as it cycles. Decimal control of DS1 is not provided directly by U8; a pair of transistors (Q5 and Q6) is used to handle this function.

R7 through R13, inclusive, couple the output latches of U8 to the positive terminals of the LED segments of DS1 and serve to limit the driving current to the proper value. Pins 7, 8, 10 and 11 of U8 drive Q1 through Q4, inclusive. These transistors serve as switches to establish the negative connection of a particular digit of DS1 when that digit is to receive its share of the multiplexed information. A signal from pin 8 or 10 of U8 is also used to drive Q5. When Q5 conducts, Q6 also conducts and provides a positive signal to DS1's decimal through current-limiting resistor R16.



Power Supply

It's important to maintain the power supply voltage for this counter close to +5. A regulator chip such as the LM340T-5, 7805T, or an adjustable voltage regulator such as the LM317T, should be used when powering the counter from batteries or an ac-operated power source. For information on suitable power supplies, see the *ARRL Handbook, QST* articles[2,3] or the manufacturer's data sheets (copies are available from Jameco) for the aforementioned ICs.

Construction

There are different ways to construct this counter. The easiest route is to order the board or kit from A & A Engineering. Placing the parts in the correct holes isn't difficult, but soldering must be done carefully to avoid damage to the board. Use a low-wattage iron (a 25-W iron is sufficient) and use a heat sink between the part and the soldering point whenever possible.

The construction method shown in the title photo is suggested for eager beginners who would like to learn a technique that is particularly useful for creative work. Plain, prepunched circuit board is used for the foundation, and Vector® T421 inserts are used for all input and output terminals.

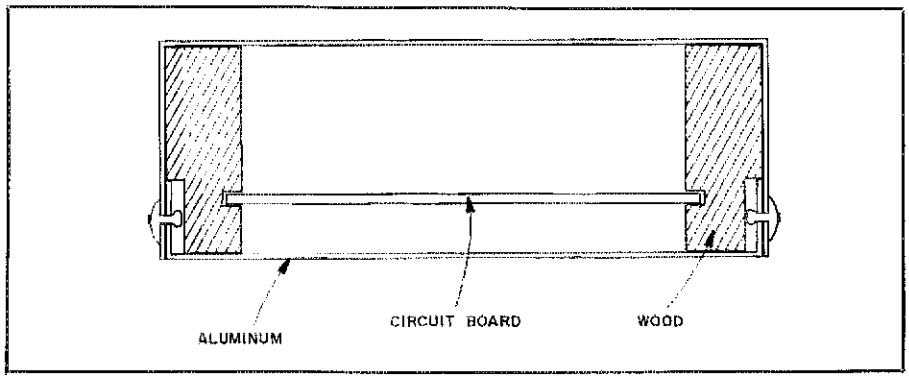


Fig 4—A cross-section drawing of the prototype frequency counter's housing and method of mounting the circuit board.

Table 1
Sensitivity of the A & A Engineering frequency counter as measured in the ARRL Lab

Freq (MHz)	*Input Voltage (P-P)*
1	1.3
10	1.9
25	3.5
30	4.2
40	7.9

All parts except the ICs are also mounted on the inserts. Low-profile sockets are used for the ICs, and the socket pins are soldered before the ICs are inserted. Thermal or electrical injury to the ICs during soldering is thus eliminated. This type of construction makes it easy to remove and replace any of the parts for testing and trimming. The inserts can also be easily modified. The leads of all soldered parts are exposed, so it's easy to heat sink them with pliers or a copper clip. The board shown in the title photo was laid out so that flush, bare wiring could be used throughout.

Four versions of this counter have been constructed and all worked fine. The first was done using the "ugly" construction method, with only casual thought given to the layout. But the counter worked fine after a wiring error was eliminated in the "rat's nest." This suggests that parts layout is not critical.

Although the inputs for all the ICs used in this counter are protected against static discharge, this protection is not sufficient to withstand the more severe jolts that can be developed when handling the ICs. Be sure to use a wrist strap tied to ground through a 1-MΩ resistor.[4] When directly soldering ICs to a board, or when doing soldering work on a board with the ICs in place, be sure to use a soldering iron with a grounded tip.

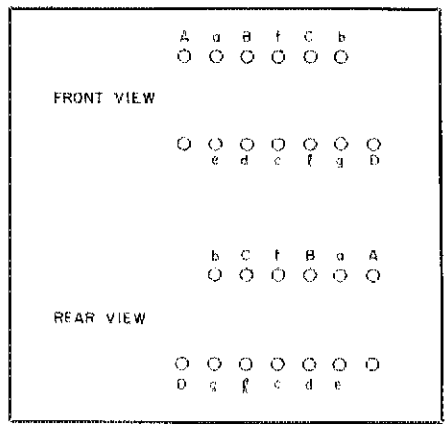


Fig 5—Pin-out diagram for the DL34M 4-digit, 7-segment multiplexed display.

Enclosure

The housing for the prototype counter shown in the title photo is made of aluminum; it physically supports and shields the counter board. (Tin-can stock and double-sided PC board could also be used for the housing.) The front and rear panels are made of 1/16-inch thick aluminum; 1/32-inch material is used for the rectangular body of the enclosure. The rectangular portion of the housing was made easily by bending two U-shaped channels and riveting them together. End tabs along the horizontal edges of the ends of the section are folded back to act as stiffeners, and tabs along the vertical edges of the section ends are bent at right angles for mounting the front and rear panels. PEM® nuts are ideal for attaching screws to thin metal in blind locations, such as the rear-panel mounting used in the prototype counter.

Fig 4 shows a method of mounting the circuit board within the housing. Two slotted strips of wood support the board edges. With this method of mounting, the counter board can be permanently wired to

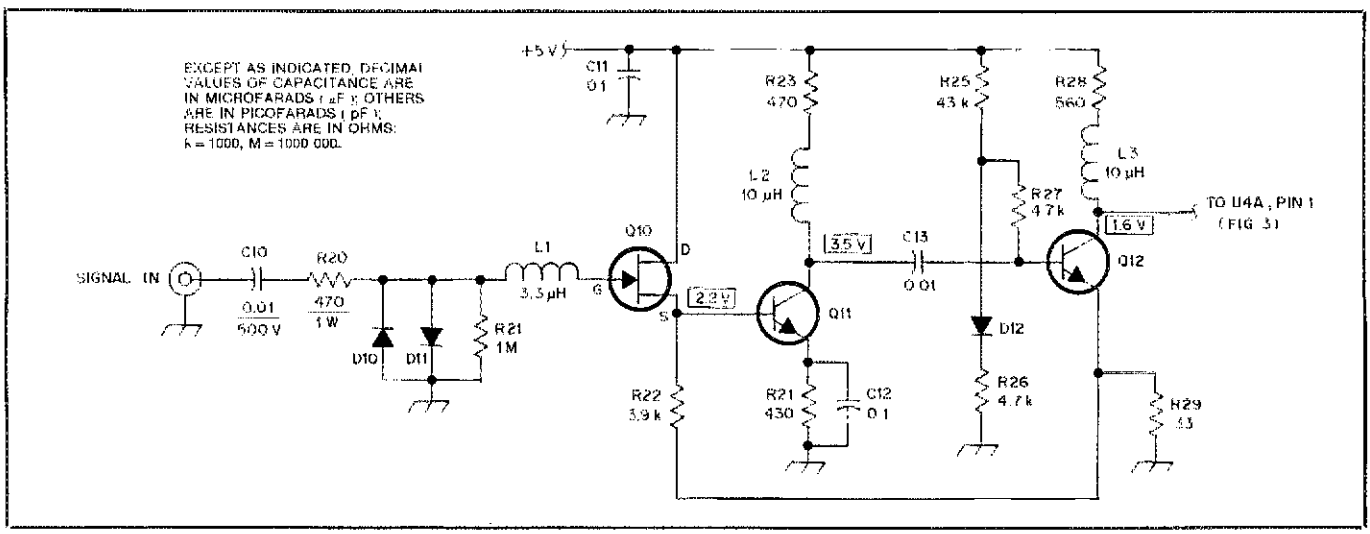


Fig 6—Schematic diagram of a broadband preamplifier circuit that can be added to the basic frequency counter to improve input-voltage sensitivity. Resistors are ¼-W carbon-composition unless otherwise specified; capacitors are disc ceramic. D10-D11—1N4004; D12—1N4148; Q10—MPF102 N-channel FET; Q11, Q12—2N918.

the display, range switch and chassis ground on the front panel. The circuit board is simply slid into the forward end of the housing and the front panel is attached to it. The RF input and dc power terminals are accessible at the rear of the housing. An access hole is drilled in the enclosure so that C2 can be adjusted.

In the prototype counter, a strip of 0.1-in-grid perf board the same size as the front panel holds the display. In the A & A Engineering unit, a right-angle socket is supplied for mounting the display. The display can be plugged directly into the socket, or remotely located using a header cable between the socket and the display. Pin identification for the DL34M display in shown in Fig 5. Note that the top of the display has six pins; the bottom of the display has seven pins, one of which is unused. Terminal A is the common-cathode connection for the seven segments and decimal of the left-hand number of the display, and B, C, and D are the common-cathode connections for the successive digits. Terminal *a* is the common segment connection for the *a* anodes of the four digits, and so on for segments *b* through *g* and the decimal point, *ℓ*.

Checkout and Adjustment

After you've double-checked your wiring and the power-supply output voltage, connect the power supply to the counter. The display will flash 7777 when power is first applied, and this will change to 0000 when the first reset pulse comes through. It's a good idea to check the current drain of the counter. With the DL34M display specified, the current drawn should be close to 40 mA.

C2 must be adjusted so that the timing cycle is precise. You can do this one of two ways. Use a signal generator and a frequency counter of known accuracy, and adjust C2 until the readings of the two counters coincide. Or, use WWV as a reference. Tune your receiver to WWV. Feed the signal-generator output to the counter and zero beat the signal generator to the WWV signal. Adjust C2 until the counter displays the appropriate WWV frequency. If all is in order, place the counter board in its enclosure, check the adjustment of C2, and you're done.

A Preamplifier Circuit

Table 1 provides a comparison of counter input sensitivity v frequency. If you require a greater amount of sensitivity, you can use the broadband preamplifier circuit shown in Fig 6. The preamplifier uses a high-impedance JFET and two bipolar transistors to boost weak signals in the frequency range between 1 and 30 MHz. Bootstrapping is used to prevent oscillation: Negative feedback of the signal appearing across the emitter resistor (R29) of Q12 is returned to the base of Q11. The value of R29 depends on circuit layout and the properties of the transistors employed in the preamplifier. Use the lowest value for R29 that prevents oscillation.

L1, L2 and L3 can be omitted if you are willing to accept lower signal amplification at the higher frequencies. Output from the collector of Q12 can be fed directly to U4A of the basic counter.

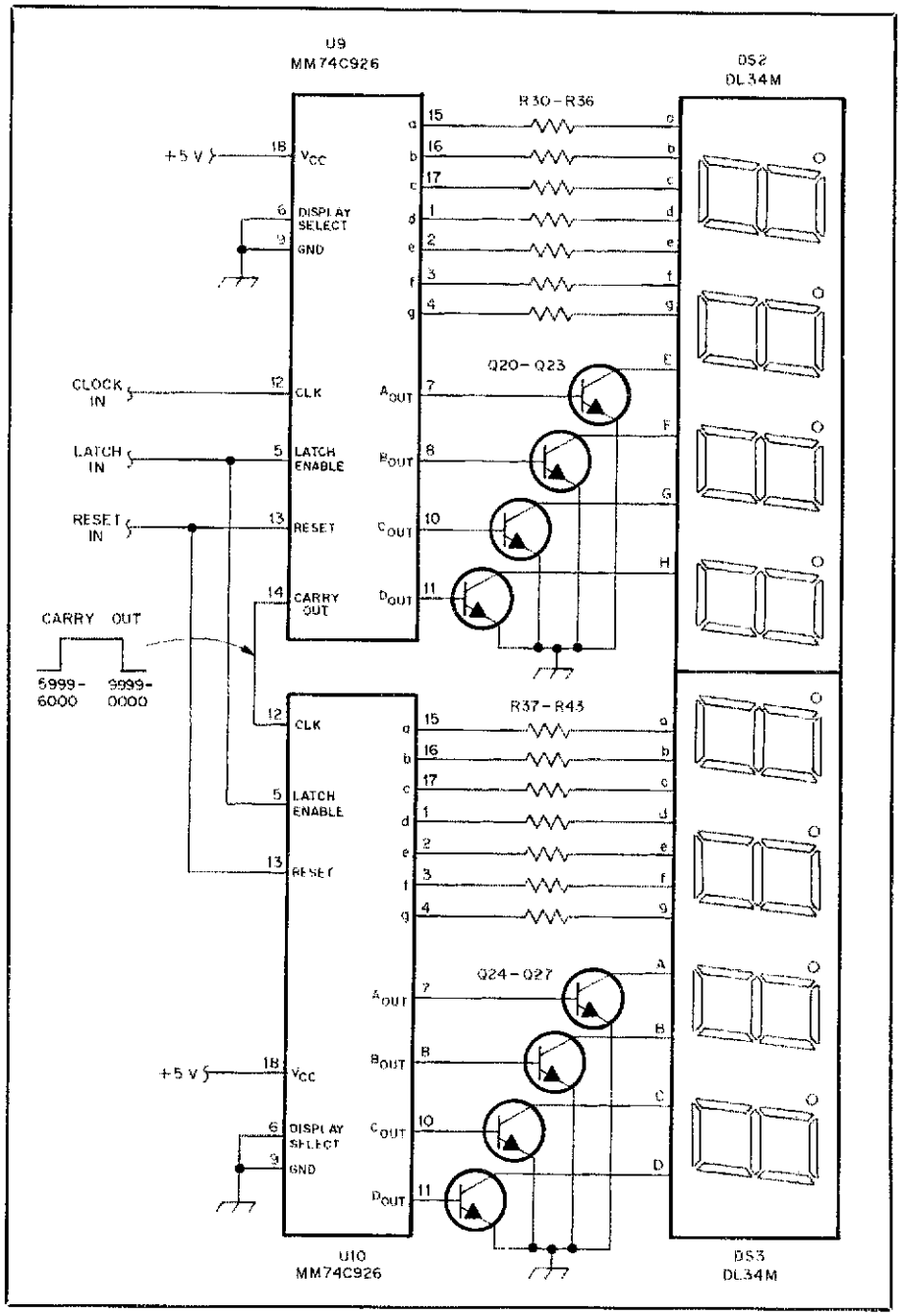


Fig 7—Here's a suggested circuit for an eight-digit version of the frequency counter. Q20-27—2N2222.

An Eight-Digit Counter

It's not difficult to couple two '74C926s to operate two of the four-digit displays (see Fig 7). The carry out signal from pin 14 of U9 goes high at 5999-6000, then returns low at 9999-0000. It's the negative-going signal that advances the counter in U10. A single test of this circuit showed that the latch and reset pulses generated by U4B and U4C of Fig 3 can handle this additional stage.

Covering Other Frequency Ranges

The circuit of Fig 3 can be altered to cover other frequency ranges and the number of digits displayed. But, you must pay attention to the counting period, the frequency division and the capabilities of the ICs. High-speed prescalers can be placed in front of the basic counter's input gate (U4A) to extend the frequency range. A larger-value input capacitor (C6) is needed to cover low frequencies (below 1 MHz). Table 2 identifies a few of the many possibilities. Additional divide-by-ten ICs can follow U3 to provide for longer

Table 2
Other Frequency-Counter Configurations

Counting Period (Seconds)	Prescale Factor	Post Division Factor	Maximum Frequency (MHz) *	Maximum Number of Digits	Maximum Resolution (Hz)
0.1	100	10	3,000	6	10,000
0.1	10	10	300	6	1,000
0.1	1	10	30	6	100
1.0	1	1,000	30	5	1,000
1.0	1	100	30	6	100
1.0	1	1	3	7	1
10.0	100	10	3,000	8	100
10.0	100	1	300	8	10
10.0	1	1	3	8	0.1

*This maximum frequency limit is based on using input-gate and first divide-by-ten ICs having 30-MHz capability and a counter/driver IC with a maximum clock frequency of 3 MHz.

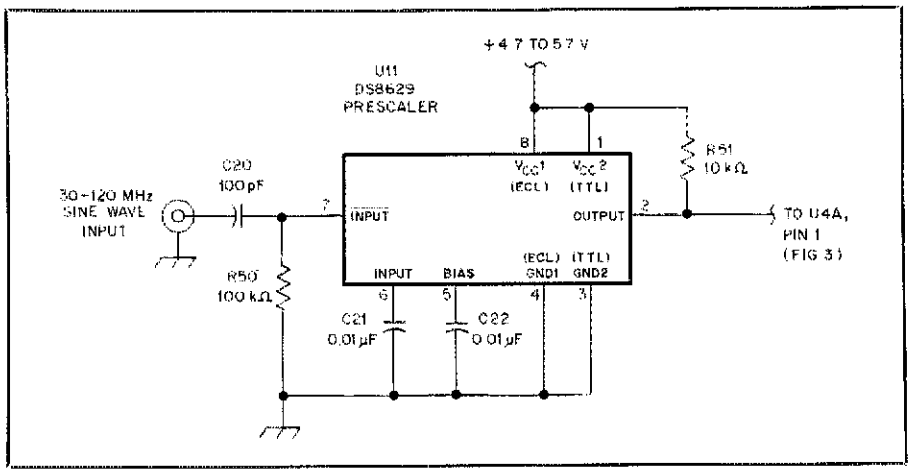


Fig 8—This prescaler (see text and note 5) can be added to the front end of the basic frequency counter (see Figs 2 and 3) to extend its frequency range.

counting periods, and you probably can find a use for the unused divide-by-two in U3 of the basic counter.

A DS8629 prescaler can be placed in front of U4A to provide coverage of the 6-meter band. This National Semiconductor prescaler is available from Jameco, is reasonably priced, and will handle sine-wave inputs from 30 to 120 MHz (typically to 160 MHz) with a sensitivity of approximately 10 to 15 mV P-P. The signal input voltage should not exceed 1 V P-P. The DS8629 includes an amplifier, an ECL high-speed counter, an ECL-to-TTL translator, and a TTL counter for a combined division of 100.

Fig 8 shows how this prescaler can be used to drive U4A of the basic counter. A 100-kΩ pull-down resistor (R50) on the input prevents the IC from oscillating when there is no input signal. R51, the 10-kΩ pull-up resistor at the output, makes the TTL output compatible with the HCMOS chip used at U4A.

The DS8629 prescaler alone requires more than twice the power of the entire basic counter and display circuit. So, the combined current requirement is about 130 mA. Square-wave input is required for proper operation of the prescaler below 30 MHz.

The 11C90 prescaler described in the *ARRL Handbook*[5] will handle frequencies to 600 MHz and uses ECL technology to provide division by ten. This prescaler also has a TTL output and requires a pull-up resistor to work with HCMOS ICs.

There should be no problem in altering the design of the basic counter for operation at low frequencies. The Schmitt trigger of U4A allows low-frequency sine-wave input, so it's only necessary to parallel C6 with a capacitor having a large enough value to pass the lowest frequency of interest. A resolution of 1 Hz and a four-digit range of 1 to 9999 Hz can be obtained by increasing the counting period to one second and eliminating all division of the input signal (see Table 1). If the preamplifier of Fig 6 is to be used at low frequencies, all of its capacitors should be increased in value.

Closing Remarks

Getting a commercially built transceiver on the air and learning to operate it well is an accomplishment and an enjoyable pursuit, but that only scratches the surface of Amateur Radio. There's something quite thrilling about designing and building your own electronic equipment, debugging it and finally experiencing its performance.

Simple construction articles provide a pleasant way to become familiar with electronic parts and their respective functions. Though your first project may be rudimentary, it can open the door to ever-expanding adventure.

PC boards, parts kits and assembled PC boards (enclosure not included) are available from A & A Engineering, 2521 W La Palma Ave, Unit K, Anaheim, CA 92801, tel 714-521-4160. See note 1.

The author's description of the discrete wiring method, suggestions for construction and a detailed layout diagram for the board wired as shown in the title photo can be obtained from the ARRL. Please address your request to the Technical Department Secretary. Enclose a business-size SASE and identify your request as the Bainbridge Frequency Counter Template. Requests from foreign countries should provide sufficient funds for a 1-oz letter.

Notes

[1]Parts are available from Jameco® Electronics, 1355 Shoreway Rd, Belmont, CA 94002, tel 415-592-8097. PC boards, parts kits and wired and tested units are available from A & A Engineering, 2521 W La Palma Ave, Unit K, Anaheim, CA 92801, tel 714-521-4160. MasterCard® and Visa® charge cards are accepted. PC board only (#165-PCB), $12.95 + $1 shipping and handling; PC board and kit of parts (#165-KIT), $39.95 + $2.50 shipping and handling; assembled and tested counter board (#165-ASY), $59.95 + $3.50 shipping and handling. (Note: The kits do *not* include the enclosure.) Shipping and handling charges on other orders less than $10, $1; between $10 and $50, $2.50; over $50, $3.50.

[2]M. Wilson, ed, *The 1988 ARRL Handbook*, (Newington: ARRL, 1987).

[3]D. DeMaw, "Some Power Supply Basics," *QST*, Jan 1987, pp 27-29 and 17; P. Pagel, "Power Supplies—Quick and Easy!", *QST*, Feb 1988, pp 23-25.

[4]Radio Shack® 276-2399 or equivalent.

[5]"A 500-MHz Frequency Counter," *The 1989 ARRL Handbook*, (Newington: ARRL, 1988), pp 25-13 to 25-19. The 11C90 is available from Circuit Specialists, Inc, Box 3047, Scottsdale, AZ 85257, tel 602-966-0764, and Ramsey Electronics, 2575 Baird Rd, Pennfield, NY 14526, tel 716-586-3950.

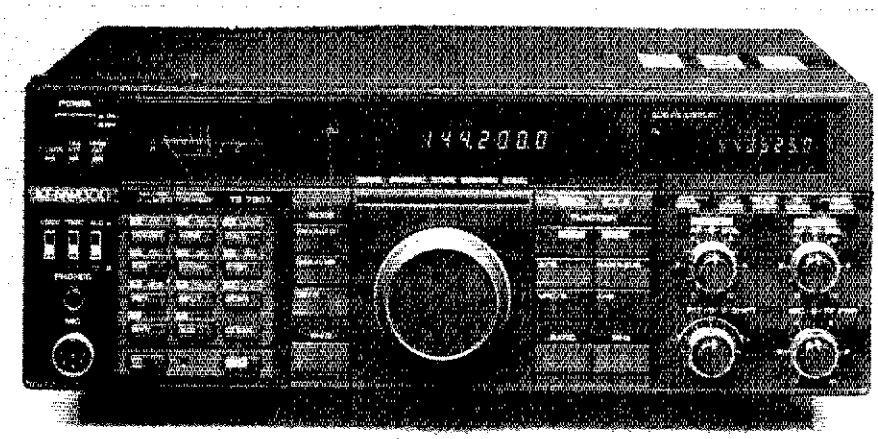
Doug Bainbridge and his wife, Lucille, have two sons, Robert and David. Doug is a metallurgist with degrees from the University of Wisconsin and the University of California. He has worked for the General Electric Company and the Aerojet-General Corporation. He has taught at the Colorado School of Mines and Oregon State University.

Doug obtained his Novice license (KAØWXH) in June 1986, and upgraded to General (NØHPK) in December 1986. Doug became interested in electronics in the late 1930s and has enjoyed building electronic equipment as a vocation and avocation since that time. His first project was a regenerative short-wave receiver using a type 30 tube; this was followed by an attempt to remotely control a model boat with ultrasonics using homemade magnetostrictive transducers. More recent projects include a home-brewed ultraviolet spectrometer, a solid-state communications receiver and a tube-type transmitter—and, of course, this frequency counter.

New Products

KENWOOD TS-790A TRIBAND VHF/UHF TRANSCEIVER

☐ Kenwood has introduced a triband VHF/UHF transceiver primarily geared toward satellite users. The TS-790A covers the 144, 430 and 1200-MHz ham bands and features dual high-stability VFOs (claimed stability is ±3 parts per million), 59 memory channels, 13.8-V dc operation, multiple scanning functions, a built-in 500-Hz CW filter, a 10-dB RF attenuator and a noise blanker. Special features for the satellite user include automatic lock tuning on the 1200-MHz band (to eliminate frequency drift) and Doppler-shift compensation.



High-power operation is available on 144 MHz (45 W) and 430 MHz (40 W), and 10 W on the (optional) 1200-MHz band. The TS-790A also has IF shift, selectable AGC, all-mode squelch, a packet-radio terminal, simultaneous dual-band reception capability, automatic mode and repeater-offset selection, direct keypad frequency entry, a voice synthesizer and a computer-control option. Suggested retail price is $1995. For more information, contact Kenwood USA, Communications and Test Equipment Group, 2201 E Dominguez St, Long Beach, CA 90801, tel 213-639-4200. —*Rus Healy, NJ2L*

HAPN 4800-BIT/S PACKET RADIO MODEM

☐ The Hamilton and Area Packet Network (HAPN) has introduced the HAPN-T 4800-bit/s packet radio modem that is compatible with the TAPR TNC 1 and TNC 2 (and many TNC-2 compatible TNCs). The HAPN-T connects to the external modem connector of the TNC, and can be mounted inside the enclosures of most TNCs (the HAPN-T PC board is 3¾ × 2¾ inches). With the HAPN-T connected to your TNC, you can easily switch between the TNC's 1200-bit/s rate or the HAPN-T's 4800. Internal radio connection is also required—the HAPN-T operates independently of the rig's volume and squelch controls because of the need for fast TR switching and a short squelch delay.

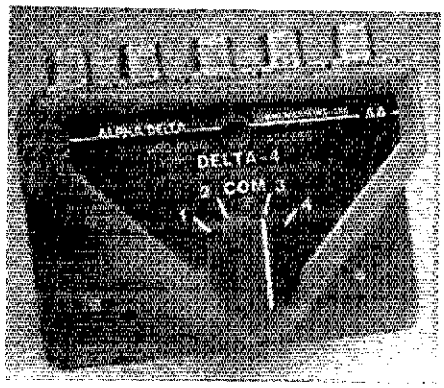
The HAPN-T is available in kit form from HAPN, Box 4466, Station D, Hamilton, Ontario, L8V 4S7, Canada. Price: $15 for a PC board ($18 Canadian). For a PC board and a kit of parts, price is $48 ($60 Canadian). HAPN offers a 10% discount on orders for 5 or more units. Shipping and handling is $5 ($8 for overseas orders).—*Rus Healy, NJ2L*

RF CONCEPTS RFC 8-AP AUTOPATCH CONTROLLER

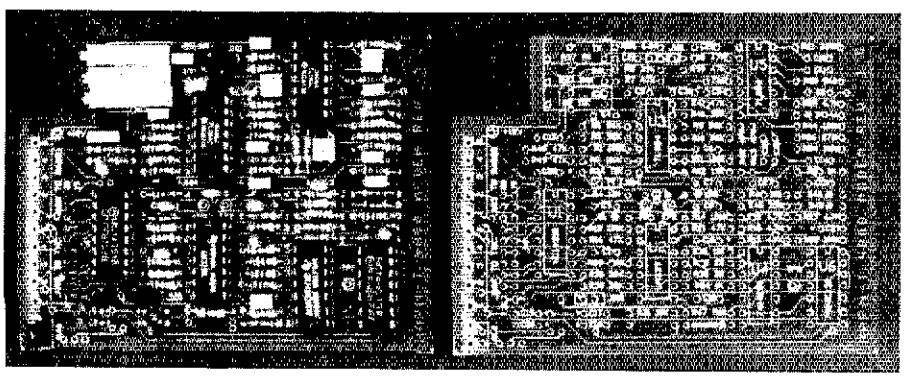
☐ RF Concepts has introduced the RFC 8-AP autopatch controller as an addition to their RFC 8-RC repeater controller. The 8-AP features a 100-memory autodialer that stores phone numbers (including area codes) in nonvolatile memory, a programmable activity timer, last-number redial, toll-call exclusion and the circuitry for decoding the eight auxiliary outputs. Another feature is internal DTMF tone regeneration (to eliminate the effects of weak or distorted input DTMF tones). The 8-AP is simple to connect to the 8-RC repeater controller—there are four power-supply connections, two repeater-receiver connections, two telephone-line connections and several control-line connections. For more information, contact RF Concepts, 2000 Humboldt St, Reno, NV 89509, tel 702-827-0133.—*Rus Healy, NJ2L*

ALPHA DELTA FOUR-POSITION COAX SWITCH

☐ Alpha Delta's Delta-4/4N coax switches contain an Arc-Plug® ceramic gas-discharge pill in an easily replaceable position. The Delta-4 switch has UHF connectors, and the Delta-4N has N connectors. These four-position switches ground all unselected output lines and have separate switch positions for grounding all output lines. The Delta-4N is rated for use



up to 1.3 GHz, and the Delta-4 is rated through 450 MHz. Rated SWR/loss for the Delta-4 is <1.4:1/0.5 dB at 450 MHz, <1.3:1/0.15 dB at 150 MHz and <1.1:1/0.1 dB at 30 MHz. Isolation is rated at >60 dB at 30 MHz, >50 dB at 150 MHz and 50 dB at 450 MHz. For ratings of the Delta-4N, contact Alpha Delta. For more information, contact Alpha Delta, PO Box 571, Centerville, OH 45459, tel 513-435-4772.—*Rus Healy, NJ2L*



"QRP" EME on 144 MHz

You can make 2-meter EME contacts with a good single-Yagi station, if you know and use the right techniques. Here's how it's done.

By Ray Soifer, W2RS
60 Waldron Ave
Glen Rock, NJ 07452

In Amateur Radio pursuits, the better your station, the better the likely results. Although this certainly holds for EME communications, many amateurs are unaware of just how little in the way of power and antenna gain it really takes to work some of the bigger 144-MHz EME stations now in operation. If you have equipment as modest as a solid-state brick capable of producing 100 W or more, a good GaAsFET preamplifier and a single long Yagi, a little persistence and preparation could get you some 2-meter EME contacts. If you're a good CW operator and your station is capable of 144-MHz meteor-scatter communications, chances are you can also make it on EME.[1]

Good general introductions to EME may be found in several sources, including *The ARRL Handbook*,[2] the RSGB *VHF/UHF Manual*[3] and the recent series by Joe Reisert, W1JR, in *ham radio*.[4] These articles appear to draw primarily on experience gained at 432 and 1296 MHz, however, and EME operating conditions at 144 MHz are different in many respects from those on 432 MHz and the higher bands. Understanding these differences can sometimes spell the difference between success and failure. In this article, I'll try to fill in some of the gaps.

Accomplishments of Modest Stations

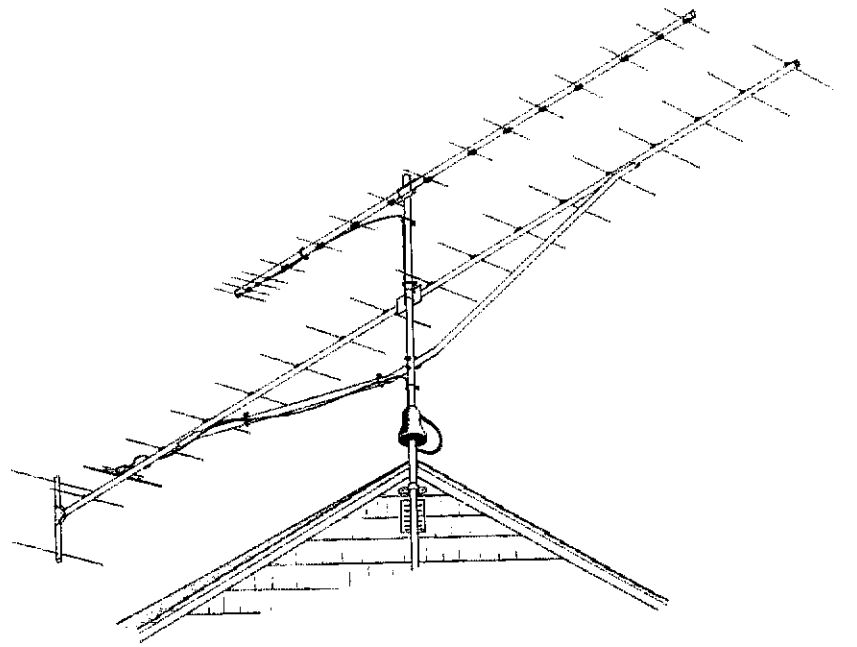
With a single 3.2-λ-boom, 19-element Yagi and a 160-W solid-state amplifier (a maximum effective isotropic radiated power [EIRP] of 37.1 dBW), I've made 23 two-way EME contacts with eight different stations. Among them, these eight stations used a total of eleven different antenna systems. Table 1 shows what several other 144-MHz EME operators have achieved with modest single-Yagi stations.

The record for working the smallest station via 2-meter EME is held by Dave Blaschke, W5UN.[5] In 1986, Dave, using his array of 32 4.7-λ-boom, 17-element Yagis, worked Tom Hall, VP9IB. VP9IB was running just 80 W to a single Yagi. W5UN has since upgraded his antenna system to 48 Yagis, and in July 1988, Dave worked me on EME while I was running only 50 W to my 19-element Yagi (only 32.3 dBW EIRP)! Of the 23 EME QSOs I've logged, I made two with 50 W output, nine with 130 W and twelve with 150 W.

In Table 1, I have concentrated on the results of single-Yagi stations because the information was readily available and corresponds to my own experience, and because it shows what's possible. In some cases (notably countries where power limits are more restrictive than in the US), hams may be able to erect larger antennas than those listed in Table 1, but remain limited in terms of EIRP. For example, a station with four 4.2-wavelength-boom Yagis, but limited to 100 W output would be capable of generating approximately 42 dBW EIRP. A single-4CX250B amplifier run at full output to four similar antennas would produce about the same EIRP as 1.5 kW to a single Yagi. Such configurations are more than adequate for 144-MHz EME communications. A good example of this approach is Joe Mayenschein, WB9SBD, who has worked five different stations on 144-MHz EME using just 40 W to an array of four eight-element Yagis (about 35 dBW EIRP).

What is Possible?

If common textbook theory is taken as absolute, many of the EME contacts I've made should not have been possible. For example, the EME link calculation found in both the ARRL and RSGB handbooks predicts that the smallest station that I should be capable of working with 150 W



W2RS's antenna system is simple: From top to bottom, a 16-element 432-MHz Yagi on a 10-foot boom and a 19-element 144-MHz Yagi on a 21-foot boom.

Table 1

Some Single-Yagi-Station 144-MHz EME Achievements

Station	Approx power (W)	Approx EIRP (dBW)	Stations worked
VP9IB	80	34.4	1
K5WE	90	33.5	1
AA7A	800	45.7	4
W5UWB	1000	46.3	18
N1BUG	1100	46.9	16
WA7VHW	1500	48.4	19

[1]Notes appear on page 32.

to my single Yagi is one having antenna gain of 29.6 dBi, or about what an array of 24 5-λ-boom Yagis would produce. With only 50 W of transmitter power and a single Yagi, an antenna gain of 34.4 dBi is theoretically needed on the other end of the path. That's approximately equivalent to a *96-Yagi* array! These predictions assume a 100-Hz receiver bandwidth and ideal moonbounce conditions—when the moon is at perigee, sky noise at its quietest, there is no man-made noise, and antenna polarizations match at both ends of the path. Conditions as ideal as this hardly ever exist, so real-world conditions are generally much more challenging.

Derwin King, W5LUU, has developed a useful measure of *system degradation*, predictions for which are published monthly in the *2 Meter EME Bulletin*.[6] W5LUU's model, which we will adopt here for discussion purposes, computes the degradation in signal-to-noise ratio that results from the actual sky noise with respect to the quietest point in the sky (165 K), assuming a system noise temperature of 80 K (typical of a good EME station) and then adding the additional path loss caused by the moon's position when it is farther from earth than at perigee. The result is a single figure for overall system degradation with respect to ideal conditions, enabling operators to consider tradeoffs between path loss and background noise when arranging QSO schedules.

Making use of this simplification, and again assuming a noise bandwidth of 100 Hz, the 144-MHz *Handbook* EME-link equation reduces to:

$$S/N = P_e + G_r - D_s - 66.7 \quad \text{(Eq 1)}$$

where

- S/N = signal-to-noise ratio in decibels
- P_e = effective isotropic radiated power of the transmitting station expressed in dBW
- G_r = gain of the receiving antenna in dBi
- D_s = system degradation in decibels, as discussed above.

Solving for the smallest receiving antenna needed to produce a S/N ratio of 0 dB, we have:

$$G_r = 66.7 + D_s - P_e \quad \text{(Eq 2)}$$

Hence, for my maximum EIRP level of 37.1 dBW,

$$G_r = 66.7 + D_s - 37.1 = 29.6 + D_s \quad \text{(Eq 3)}$$

The average value of system degradation experienced during my 23 QSOs was 3 dB. Under these conditions, according to Eq 3, it should theoretically take an array with a gain of at least 32.6 dBi, which is roughly what W5UN's 48-Yagi antenna produces, in order to work me with 150 W (let alone with 50 W!). This prediction *still* assumes no man-made noise and no mismatch in antenna polarization! All this notwithstanding, I've worked one operator—Lionel Edwards, VE7BQH—who had only 24.9 dBi of antenna gain (he has since upgraded his antenna system to provide about 26.5 dBi gain), and another—Manfred Kubat, DL8DAT—with 25.3 dBi gain. With 150 W, I routinely work stations with antenna gains in the range of 27 to 28 dBi. More remarkable yet, my lunar echoes have been heard by Scotty, KI3W, who was using four 4.2-λ-boom, 18-element Yagis (about 22 dBi gain). As shown in Table 1, others are also seemingly defying the laws of nature. The question is, what accounts for the differences between reality and these theoretical predictions?

Table 2
Analysis of W2RS's Completed 2-meter EME Contacts

Station	Estimated ant gain (dbi)	Calculated degradation (dB)	Predicted S/N Ratio (dB)	Comments
W5UN	30.4	4.6	−4.4	First EME QSO, 130 W output
W5UN	30.4	4.3	−4.1	First random QSO, 130 W
W5UN	30.4	2.1	−1.9	Easy QSO, 130 W
W5UN	30.4	2.5	−2.3	Easy QSO, 10° elevation, 130 W
KB8RQ	29.1	2.6	−3.7	First QSO other than W5UN, 130 W
W5UN	30.4	2.5	−2.3	Random, easy QSO, 130 W
W5UN	30.4	2.9	−2.7	Easy QSO, 10° elevation, 130 W
VE7BQH	24.9	3.4	−8.8	"Smallest" station worked, 130 W
SM7BAE	26.0	2.2	−6.4	Rising moon, 130 W, first European
N5BLZ	26.5	4.1	−7.2	+5 dB S/N at 10° elevation
W5UN	30.4	3.7	−2.9	Random QSO, 10° elevation
W5UN	30.4	2.8	−2.0	Easy QSO
KB8RQ	27.7	2.8	−4.8	QSO on first schedule
W4ZD	27.7	4.0	−6.0	Ground gain on both ends
W5UN	32.5	4.2	−1.3	Random QSO, 10° elevation
W5UN	32.5	3.1	−0.2	+13 dB S/N at 10° elevation
K1WHS	26.9	3.3	−6.1	Rising moon, ground gain both ends
W5UN	32.5	2.2	0.7	Random, easy QSO
W5UN	32.5	2.9	−4.8	50 W output
W5UN	32.5	3.3	−5.2	50 W output
KB8RQ	29.3	2.0	−2.3	Also copied by KI3W (4-Yagi station)
DL8DAT	25.3	1.7	−6.1	Rising moon, second European
W5UN	32.5	1.7	1.2	Random QSO, 10° elevation

Analyzing the Log

Table 2 presents an analysis of each EME contact I've made, showing the estimated antenna gain of the stations worked, the calculated system degradation present, the predicted signal-to-noise ratio (calculated from system degradation), and observations I made during the contacts. For consistency, I have used antenna gain estimates derived from a recent series in *ham radio*,[7] except for VE7BQH's 224-element collinear (which is now 50% larger) for which the source of gain information is VE7BQH, and W5UN's antenna (the gain figures here were derived by Dave). Contacts are listed in chronological order, beginning with the first EME QSO I made (with W5UN, on November 17, 1985). The first nine contacts were made with 130 W at the antenna. In mid-1987, I made some improvements that allow me to run 180 W output (150 W at the antenna). Table 2 takes this into account.

Ground-Reflection Gain

Among the most significant factors neglected by the calculations described thus far is ground-reflection gain. Ground-reflection gain results from direct signals and those reflected from the ground combining in phase at some vertical angles. For a given antenna height, the angles at which the vertical-plane lobes form can be predicted.[8] If the earth was a perfect reflector, ground-reflection gain would provide a 6-dB signal enhancement. All the EME contacts I've made have been with my antenna pointing at the horizon. My antenna is mounted about 30 feet above ground, providing two major vertical-plane lobes: one at approximately 3.5° elevation, and the other at approximately 10.5°.

The information in Table 2, as well as experience gained from countless uncompleted schedules, leads me to conclude that ground gain can make EME QSOs possible when the moon is in the lower (3.5°) lobe, even when the predicted S/N ratio (including system degradation, but not including ground gain) is as low as −5 dB. When the predicted S/N ratio is −3 dB or better, contact has sometimes been possible when the moon is in the 10.5° lobe.

Nothing about my QTH appears to make it much better or worse than average in terms of ground-reflection gain. For amateurs in most typical suburban or rural

locations, it is probably reasonable to expect ground gain from single-Yagi antennas in the 3 to 5 dB range (when the antenna is pointed at the horizon). The precise vertical angles at which lobes are formed depends on the antenna height and the free-space pattern. Ground gain at 144 MHz decreases rapidly as the elevation angle is increased beyond about 10 or 12°. Ground gain also decreases with wavelength because of the dielectric characteristics of the earth.

Ground gain is often considerably more useful for practical communication at 144 MHz than at 432 MHz and the higher bands. The earth typically produces noise (through black-body radiation) of approximately 290 K, regardless of frequency.[9] At 432 MHz, sky noise is generally well below 100 K, resulting in an increase in received noise of 5 dB or more when the antenna is pointed at the horizon rather than at the sky. At 144 MHz, although the minimum sky noise is 165 K, values encountered in practice are generally much higher. The average sky noise during the contacts in Table 2 was 295 K, and the highest (which occurred for my first contact) was 529 K. Hence, except when man-made noise is a problem (as discussed later), very little increase in noise is often experienced at 144 MHz—when aiming at the horizon—compared with that at higher frequencies.

All but one of the stations in Table 1 make use of ground gain. The exception, Don Baldwin, WA7VHW, points his antenna at an elevation angle of about 20°. Don uses a 1.5-kW amplifier, but the results he has achieved are quite remarkable. They include two contacts with four-Yagi stations, Jim, WA2GSX, and Scotty, KI3W. As long as sufficient power is available to make up the loss of 3 to 5 dB of ground gain, the greatly increased flexibility gained through the ability to elevate the antenna seems to be well worth it, as is the potential reduction in man-made interference. For low-power stations, however, ground gain often makes the difference between success and failure.

Several QSOs in Table 2 are noted as "easy" or "random." I made these contacts with less effort and fewer repeats than usual, or without prior scheduling, respectively. As may be seen from the table, these generally occurred under conditions significantly better than the −5-dB ground-gain minimum.

Seven of the contacts in Table 2 were made when the predicted S/N ratio was worse than −5 dB. Two of these contacts, those with Bev, W4ZD, and Dave, K1WHS, occurred when both stations in the QSO were experiencing ground gain. During a QSO with Gary, KB8RQ, KI3W heard my lunar echoes when the predicted S/N ratio at KI3W was −9.6 dB (excluding ground gain, which was used at both ends).

Because of the extremely narrow beamwidths of their antennas, it is unlikely that the larger stations experienced more than a couple of decibels of ground gain, but that appears to have been enough. For example, several prior schedules with W4ZD—when the moon was positioned so that he did not have ground gain—were fruitless. Sky temperatures were 411 K for the W4ZD QSO, 375 K for K1WHS and 278 K for KI3W, so noise from the earth was not a significant factor.

Ray Soifer, W2RS, at his neat operating position. On the HF bands, Ray uses a multiband transceiver and a 500-W amplifier, and on 144 MHz, he uses a 10-W mobile transceiver, a GaAsFET preamplifier and a 160-W solid-state amplifier. An active audio filter helps him pull out the weak ones.

Making Use of Libration

Ground gain alone does not appear to have been sufficient to account for my contacts with VE7BQH, DL8DAT, SM7BAE and N5BLZ, nor for the outstanding signals during several of my contacts with W5UN (including the two 50-W contacts). One or more additional mechanisms must have contributed as well; one likely candidate is *libration enhancement*.

Libration refers to small perturbations in the moon's motion as it revolves around the earth. The irregular terrain of the moon, with its varying reflection coefficients, produces a multipath interference effect on reflected waves as the moon and the earth move in relation to each other. The result is apparently random fading, the rate of which varies directly with frequency. Brief enhancements of up to about 10 dB above normal signal levels are capable of being produced in this way, and so are deep fades. Claus Neie, DL7QY, estimates that signal strengths of 7 dB more or 17 dB less than the average value occur 1% of the time, and that levels of 4.5 dB above and 7.5 dB below average occur 10% of the time.[10]

The experiences of moonbounce pioneers at 23 and 70 cm—where signal peaks are typically about 0.1 to 0.4 second and about one second or less in duration, respectively—convinced them that libration is nothing but a tantalizing nuisance at those frequencies. They could *hear* the signals during libration enhancements, but because the fading rate was faster than the CW keying rate, the signals were uncopiable.

At 144 MHz, however, libration fading can be extremely useful for communication. Analysis of my EME tapes shows frequent libration peaks lasting as long as 3-4 seconds, which is more than enough time to pass meaningful information. At 15 WPM, my full call sign takes about 3.5 seconds to send, and the sequence "RO" can be sent in 1.8 seconds (signifying, in 144-MHz EME procedure, "roger my report, and your signal report is O," [O means "I have copied both call signs"]).

My experience to date indicates that some 144-MHz EME operators may be sending too slowly to make the best use of libration enhancement. I generally send at 15 WPM, which is about as slow as one can go and still get everything into most libration peaks. Dave, W5UN, who probably has as much experience with this mode as anyone, usually sends in the 18-20 WPM range. Of course, during any given schedule, the low-power station should always try to send at the same speed as the other operator, since that is probably the speed for which his "cerebral signal processor" is set.

In addition to libration enhancements, I have observed signal improvements that were apparently the result of ionospheric scintillation, the mechanism for which is discussed by Davies.[11] These enhancements are considerably longer than those produced by libration, lasting 20 to 30 seconds or more, but they are much weaker. Signals sometimes take on a fluttery, auroral tone, which makes them more difficult to copy. During libration enhancements, in contrast, signals often exhibit a very clear tone.

Polarization Effects

We have not yet considered the very important subject of Faraday rotation. As is the case with satellite signals, the polarization of EME signals is subject to rotation as the signals pass through the ionosphere in the presence of the earth's magnetic field. The moon, however, is much farther from the earth than the OSCARs, and moon motion relative to the earth is much slower. Thus, the Faraday effects observed in EME work are quite different from those in OSCAR communications. Changes in polarization are much slower in EME than in satellite communication, and EME polarization sometimes even appears to be locked in one mode for the duration of a schedule.

Faraday rotation is one reason why 144-MHz EME is such an unpredictable mode of communication. Virtually all

stations use linearly polarized antennas, since gain is at such a premium relative to antenna size and weight. Much of the time, signals are quite a bit weaker than the equations say they should be, because of partial or total cross-polarization. All of the S/N ratio predictions discussed earlier assume linear polarization—with no mismatch.

Lionel Edwards, VE7BQH, whose array is capable of rotation in the Z axis (polarization rotation), as well as in the X (azimuth) and Y (elevation) axes, has made a study of observed Faraday effects. He reported his findings in the *2 Meter EME Bulletin*.[12] The results turned out to be most interesting, in that true linear polarization was observed only about 15% of the time. About 60% of the time, polarization was distorted into a number of sharp lobes, while 25% of the time, virtually no distinct polarization could be observed. Evidently, multipath effects in the ionosphere cause numerous variations on what was once thought to be a simple theme of wave-front rotation.

From the viewpoint of the low-power, single-Yagi station, VE7BQH's results say that some loss of signal resulting from Faraday effects will occur at least 85% of the time. Without Z-axis-rotation capability at the receiving antenna, some degradation from this source will be present more than 90% of the time, for only when true linear polarization is present and the incoming plane is horizontal will received signals be at full strength. Lionel's Z-axis-rotation capability may help to explain why I was able to work him despite a predicted S/N ratio of nearly −9 dB. His remarkable "weak-signal ears" certainly helped, too. Joe, WB9SBD (mentioned earlier), also uses Z-axis rotation.

The Need for Persistence

VE7BQH's findings about polarization bring out what is perhaps the most important factor leading to successful 144-MHz EME operation, for large and modest stations alike: *persistence*. For low-power, small-antenna stations in particular, all conditions must be right. In very few cases does a schedule result in a contact the first time it is tried, and even time-tested, proven paths such as W2RS-W5UN do not always work. Fortunately, all that we really need is that one contact—with a given station—that leads to a confirmation. Although the higher frequencies tend to be somewhat more predictable, it is the very unpredictable nature of 144-MHz propagation that holds the promise of eventual success for the persistent low-power EME operator who is willing to keep trying.

Adding to the need for persistence is the problem of man-made noise. Perhaps nothing is more frustrating for the low-power station than to be heard at the other end of the circuit, in part because of ground gain, only to have the contact fail because a power-line leak or other local noise prevented the higher-power station from being heard. I've measured antenna noise ranging from 300-400 K (in the absence of man-made noise) to well over *5000 K* when pointing my antenna at a power-line leak a quarter-mile (1300 feet) away. While a higher antenna-elevation angle would sometimes alleviate the noise problem, it would also reduce or eliminate the ground gain that helps my signal to be heard. Trying again, at a time when the moon is at a different azimuth heading, is often the only way to make contact.

Table 3
Some Currently Active 2-Meter EME Stations

Station	*Present antenna*	*Estimated Gain (dBi)*	*Stations worked*
W5UN	48 17-el Yagis	32.5	1010
KB8RQ	24 5-λ-boom Yagis	29.3	575
W4ZD	16 5-λ-boom Yagis	27.7	257
K1WHS	24 14-el Yagis	26.7	600
VE7BQH	336-el collinear	26.5	610
N5BLZ	12 17-el Yagis	26.5	302
SM7BAE	16 Cue Dees *	26.0	306
SM5FRH	16 Cue Dees	26.0	NA
DL8DAT	16 14-el Yagis	25.3	463

*Cue Dees are European-made, 3.1-λ-boom 15-element Yagis

What About OSCAR Stations?

Now that we have established that a station with a common solid-state brick and a single long Yagi is capable of 2-meter EME, what about an OSCAR station? Vern Riportella, WA2LQQ, writes in *QST*[13] that successful Mode J communication via AMSAT-OSCAR 13 requires a minimum of 25 dBW EIRP, which is probably not enough for EME. However, if a 160-watt amplifier is available, commercially available satellite antennas could produce EIRPs as high as 35 dBW, or about the same as WB9SBD's antennas. VP9IB, K5WE and I have made EME contacts with less. For EME, circular polarization should be replaced by linear, since the loss of up to 3 dB from the circular-to-linear mismatch could prove disastrous for so marginal a station. If available, Z-axis rotation capability could help, too. Unless a really large amplifier—one in the kilowatt class—is available, an OSCAR-type antenna should be pointed at the horizon to maximize ground gain.

Moon Tracking and Contact Scheduling

More than a thousand amateurs have made at least one contact via 144-MHz EME, and there are several hundred active regulars. Table 3 lists some of the larger, currently active stations along with some information about their present antenna systems. At this writing, all of these stations are available for contact scheduling. Although random contacts (those made without schedules) have been made, the likelihood of success for a low-power station is much greater when the operator at the other end knows who to listen for. Schedules are most often made on the 2-meter EME net, which meets at 14.345 MHz Saturdays and Sundays after the 70-cm EME Net has finished (usually around 1700-1730 UTC). The net-control station generally asks for European check-ins around 1900 UTC.

With the recent announcement of a 144-MHz DXCC award, amateurs located in countries with rare or nonexistent EME activity should be aware that the stations in Table 3, and many others, are actively chasing DXCC and would greatly appreciate QSO schedules. This also pertains to those planning expeditions for meteor-scatter or satellite operation—don't forget about the moon!

Moon-tracking software is available for most popular computer systems. For those with IBM® PCs or compatibles, an excellent program has been written by Lance Collister, WA1JXN, and is available as part of a package of excellent programs for the EME operator.[14] BASIC moon tracking programs for some common personal computers (Apple®, Commodore 64™, Timex/Sinclair and TRS-80®) appear in *Computer Programs for Amateur Radio*.[15] Some satellite tracking software can be modified to track the moon; details by James Miller, G3RUH, have appeared in *OSCAR News*.[16] Experience with many satellite programs, however, indicates that a good special-purpose moon tracking program is the best thing to use for serious EME work.

Summary

Although I've discussed many of the factors that can help you to achieve success in 2-meter EME operation, it is clear that there is still much that we do not fully understand about 144-MHz EME. The

more work that is done, the more knowledge we'll gain and be able to use in the future. And, for the DXer, what thrill can possibly beat a round trip to the moon?

Ray Soifer has written extensively for QST, primarily on satellite communications. A former director of AMSAT, Ray currently serves as Vice President of Special Programs. Ray was first licensed in 1955, and has held K1WXC, K2QBW, WA4IJR and G5DDU. An Extra Class licensee, he received his present call in 1976. Ray is an active DXer on both HF and VHF. A member of the DXCC Honor Roll, he also holds 5BDXCC, Satellite DXCC, VUCC and numerous other operating awards, and serves the League as a volunteer examiner and an Awards Manager.

Professionally, Ray is a manager of research for an international investment firm. He received a BSEE degree from MIT in 1963, and an MBA from Harvard in 1965.

Notes

[1]This article is based on a paper presented at the AMSAT-NA Fifth Space Symposium, Southfield, MI, November 6-8, 1987, and originally published in the *2 Meter EME Bulletin* (Aug 30, 1987, issue). A preliminary version of this article was presented at the Third AMSAT-UK Colloquium, Guildford, England, July 29-31, 1988.

[2]B. Hale, ed, *The 1989 ARRL Handbook* (Newington: ARRL, 1988), Chapter 23. This information also appears in many previous editions of the *Handbook*.

[3]G. R. Jessop, ed, *VHF/UHF Manual*, Fourth edition (Hertfordshire: RSGB, 1983).

[4]J. Reisert, "VHF/UHF World," *ham radio*, Aug and Sep 1987.

[5]D. Blaschke, "The Evolution of the Mighty Big Antenna," *QST*, Jan 1989, pp 15-19.

[6]*2 Meter EME Bulletin*, 14826 Daisy Lane, Tampa, FL 33613. In my opinion, this is must reading for the 144-MHz EME operator.

[7]See note 4.

[8]More information on ground effects, including methods of predicting vertical-plane lobe positions, is given in J. Hall, ed, *The ARRL Antenna Book* (Newington: ARRL, 1988), Chapter 3.

[9]All objects inherently generate noise (at temperatures above absolute zero), the levels of which can be equated to noise temperature in Kelvins. Noise temperature is directly proportional to noise level. For more information on noise temperature and noise in general, see B. Hale, ed, *The 1989 ARRL Handbook* (Newington: ARRL, 1988), Chapters 12 and 23.

[10]C. Nele, "Libration Fading," *2 Meter EME Bulletin*, Oct 3, 1988 issue, pp 2-3.

[11]K. Davies, *Ionospheric Radio Propagation* (Boulder: National Bureau of Standards, 1965). This book is currently out of print, but can be found in many technical libraries.

[12]L. Edwards, "Polarity," *2 Meter EME Bulletin*, May 25, 1988 issue, pp 6-7.

[13]V. Riportella, "Introducing Phase 3C: A New, More Versatile OSCAR," *QST*, Jun 1988, pp 22-30.

[14]A software package containing Lance Collister's MOONS program, plus many others (for the IBM® PC and compatible computers) called VHFPAK has been compiled by Bob Mobile, WA1OUB, and is available from him. Contact Bob at RFD 2, Box 442, Hillsboro, NH 03244, tel 603-464-3187 for more information.

[15]W. Overbeck, and J. Steffen, *Computer Programs for Amateur Radio* (Rochelle Park, NJ: Hayden Publishing Company, 1984).

[16]J. Miller, "Keplerian Elements for the Sun and Moon," *OSCAR News*, Dec 1987. Available from AMSAT-UK, 94 Herongate Road, London E12 5EQ, England.

New Books

WRITING TECHNICAL ARTICLES, SPEECHES, AND MANUALS

By Mark Forbes, KC9C. Published by John Wiley & Sons, Inc, 605 Third Avenue, New York, NY 10158. First edition, 1988. Soft cover, 6 × 9-inches, 207 pages, $24.95.

Reviewed by Kirk Kleinschmidt, NTØZ

If you've ever wanted to see your latest ham-radio invention written up in *QST*, or dreamed of presenting an award-winning hamfest seminar on low-band antennas—only to be stopped cold by a fear of technical writing—this book will help you master the basics. *Writing Technical Articles, Speeches, and Manuals* won't make you an overnight sensation, but your submitted manuscripts will be better focused, researched, presented and polished—all things your handling editors or colleagues will appreciate.

Although the editors of *QST* (and those of other Amateur Radio publications) don't expect contributors to be professional writers, if your submitted manuscript is top notch, it makes our work a lot easier—and you'll probably be rewarded with more and better assignments. Before I came to work at the League I worked as a freelance writer. Believe me, making the editor happy should be your primary concern!

Forbes takes you through the research, writing and presentation stages one step at a time. He claims his book is the first to teach technical writing systematically—in a way engineers and technicians, particularly, will understand. The book is written in a unintimidating manner, and the author assumes the writer is a beginner (for whom writing is a pain!). Here's a quick rundown of the chapter titles. The Outline: A Specification for Writing; Collecting Data; Writing Articles for Technical Magazines; Presenting Your Ideas; Design Rules for Writing; Writing at the Reader's Level; Constructing the Manual; Preparing a Technical Speech; Delivering the Speech.

Forbes touches on a lot of topics in this relatively short (200-page) book. Not every topic is covered in great detail, but there are interesting sections on library research, personal computers and word processors, how to find expert sources, visuals and graphics, and technical speaking, to name a few.

Writing Technical Articles, Speeches, and Manuals is well produced, but considering that the book costs $24.95, I'd like to see it printed in a hardcover edition.

Beginning technical writers will find this book quite informative; for more experienced writers, the book can help you review the basics—it did for me. If you're serious about submitting articles to more mainstream magazines, however, you'll need additional information on the mechanics of manuscript submission and preparation. *Writing Technical Articles, Speeches, and Manuals* is available at your bookstore, or from the publisher.

Strays

I would like to get in touch with...

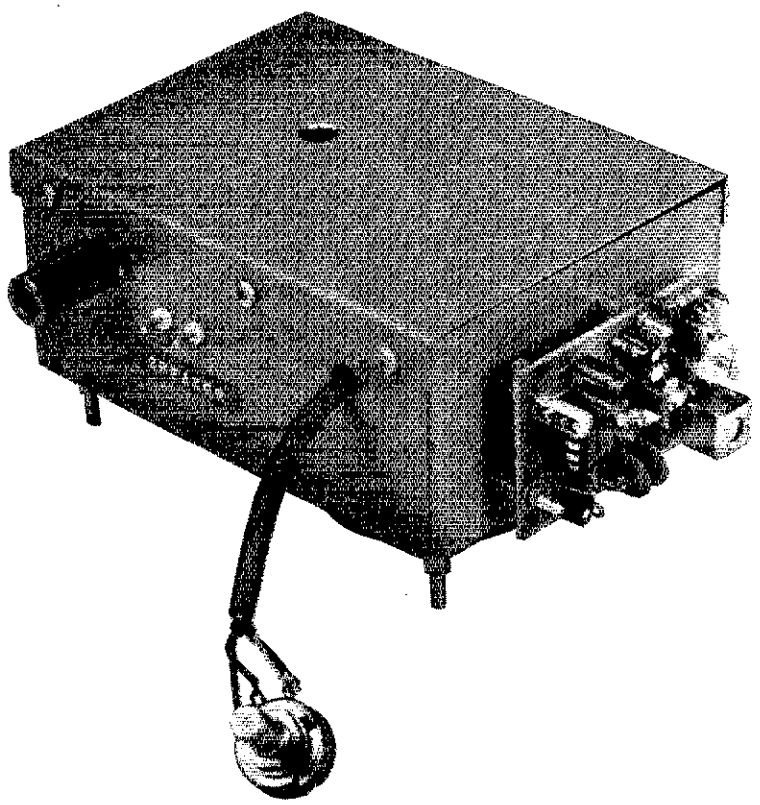
☐ anyone with a schematic and/or service manual for a LA-20 2-meter linear amp/power supply for a MT-20 hand-held. Roy Richards, N7ARO, 4525 Fir Dr NE, Bremerton, WA 98310.

☐ anyone with information on the Airadio Inc, TRA-1B 12 V transmitter. C. M. Sakir, N7IOK, 4243 E 1st St, Tucson, AZ 85711.

☐ anyone with a schematic for a 2-meter Edgecom 3000 A transceiver. William Currie, WE2Q, 86 Howard St, Fredonia, NY 14063.

☐ anyone with an Atlas 210X digital frequency readout, model DD6, serial #DD 641. Bill Faulkner, NM5O, 22100 Wyldewood Dr, Little Rock, AR 72210.

Transistor AM Radios as Ham Receivers



Build an inexpensive ham receiver by adding a BFO and product detector to a pocket-size transistor radio. This, plus a simple outboard converter, provides a compact receiver.

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

Would you enjoy having a small receiver for ham-band monitoring during business trips, camp-outs and hikes? Perhaps you want to keep track of the happenings on 75-meter SSB or on your favorite CW frequency. This article may provide the solution to your quest for a low-cost receiver.

There is an abundance of pocket-size AM transistor radios at the market place. Used radios sell for as little as 50 cents at some flea markets. Why not utilize one of these bargains as the heart of a portable ham-radio receiver? Certainly the main ingredients are present in one of these units. You need only to make minor modifications and add some outboard circuits to copy CW and SSB in our ham bands.

Curing Some Ailments in Transistor Radios

The principal weakness in run-of-the-mill pocket radios is the input stage. Fig 1 shows a typical circuit that is used by many manufacturers. The standard gimmick is to use one transistor as the oscillator/mixer. You can see that Q1 is used in this fashion. All manner of spurious signals can creep into the tuning range as a result of this scheme. The mixer and oscillator share a common silicon substrate. Therefore, harmonic currents in the oscillator are passed into the mixer without attenuation. This gives rise to spurious HF-band responses across the tuning range of the AM receiver. Attempts to add an external antenna to one of these radios will result in the reception of myriad unwanted voice and RTTY shortwave signals. Furthermore, the dynamic range of the combination bipolar transistor mixer/oscillator is less than spectacular. Strong-signal overloading and IMD are common problems.

I solved these problems by converting the mixer/oscillator to only an oscillator. This requires disconnecting L2 of Fig 1 from the base of Q1 and adding a 0.01-μF bypass capacitor from the Q1 base to ground. A dual-gate MOSFET is used as an outboard mixer, as shown in Fig 2. These modifications eliminate the problem of spurious responses and improve the receiver dynamic range considerably. Two MOSFETs can be used to form a singly balanced mixer, should you want improved performance. Please note the addition of L3 in Fig 2. This is a six-turn link that is wound over L2. It provides a low-impedance input for the mixer. Outboard converters may be attached to L3 for ham-band reception. A PC board for the outboard mixer (Q7 of Fig 2) and a board for the product detector and BFO are available.[1]

Fig 3 is a full-size etching pattern and a scale parts-placement guide for the new mixer. You may prefer to use perf board or terminal-lug strips as a foundation for your new mixer. A close-up view of my assembly is shown in Fig 4.

LO injection to gate 2 of Q7 should be at least 3 V P-P, and no more than 6 V P-P. If you find the oscillator output voltage too low, try increasing the operating voltage to Q1 of Fig 2. If there is a series resistor in the oscillator supply voltage line, reduce the value of resistance or replace the resistor with a 1-mH miniature RF choke.

Some Considerations

Not all AM transistor radios contain NPN transistors. Many units have PNP devices, and they have a *positive* ground. The circuit of Fig 2 will not work with a positive-ground radio. Look for a receiver that has a *negative* ground (Fig 1).[2] If you wish to use a positive-ground radio it will be necessary to change the design shown in Fig 2 so the supply voltage feeds the emitter and source circuits of Q1 and Q7. The drain and collector circuits must then be returned to ground. Examples of the required changes are provided on page 8-2 of the *ARRL Electronics Data Book*.[3]

BFO and Product Detector

Details for my outboard product detector and BFO are given in Fig 5. I added a single-pole RC active audio filter to provide improved selectivity (U1). Although the filter has an 800-Hz low-pass cutoff frequency for CW reception, you may alter the constants to allow a cutoff of 2 kHz for SSB reception. Details for changing the cutoff frequency are given in any recent edition of *The ARRL Handbook*.

A 3N211 MOSFET is used at Q1 for the product detector. A low-noise TL080 op amp serves as the audio filter. The BFO is

[1]Notes appear on page 36.

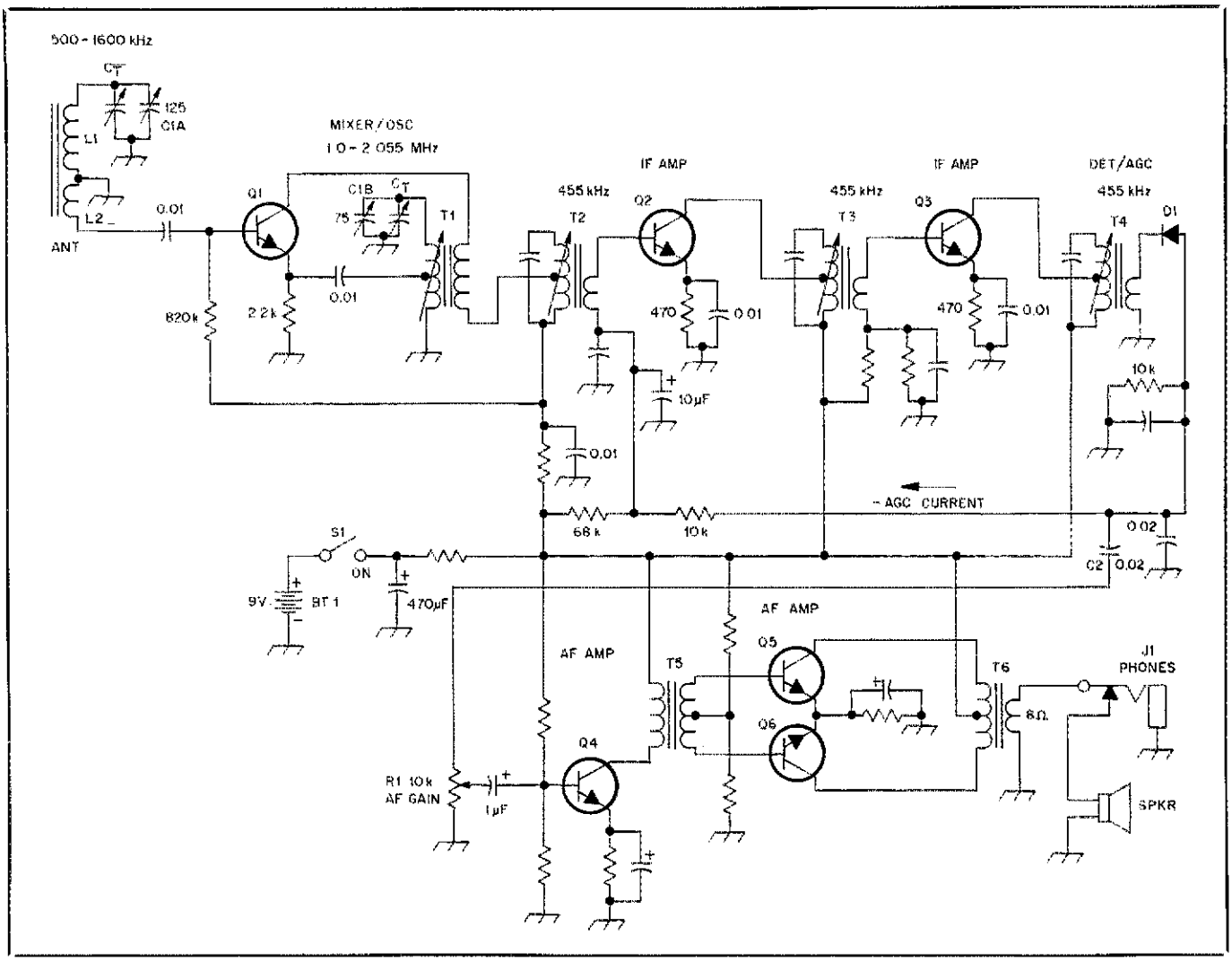


Fig 1—Schematic diagram of a typical transistor AM radio. Component values vary with the circuit and brand. Some average parts values are listed here. Many transistor radios use PNP transistors, and therefore have a positive circuit ground (see text). Note that Q1 functions as both an oscillator and mixer. This causes spurious responses from shortwave signals because harmonics of the oscillator section are injected into the mixer along with the desired LO frequency.

tunable. It contains a 455-kHz miniature IF transformer. The small winding provides feedback for the oscillator. A transformer from a junked AM radio can be used for T1. The BFO is adjusted for USB reception with no voltage applied to D1 and D2. When these diodes are activated, they place C11 in the circuit to permit LSB reception. C11 is adjusted accordingly.

Q1 of Fig 5 is coupled to the top end of the T4 primary winding (Fig 1). D1 of Fig 1 is retained. The diode serves as an AM detector and AGC rectifier. It is disconnected from R1 of Fig 1, but is not otherwise changed. The AGC function must remain intact while disabling the AM-detector action. Simply remove C2 of Fig 1.

Output from U1 of Fig 5 is now routed to the top end of R1, Fig 1, thereby supplying audio energy to the audio portion of the transistor radio.

You will need an SPST switch for selecting upper or lower sideband. The switch is installed in the supply line to D1 and D2 of Fig 5. W1 indicates a circuit point that you may break to provide receiver muting during transmit periods. This function may be controlled with a TR switch or relay.

A full-size etching template and a scale parts-placement guide for the BFO/product detector module are provided in Fig 3. See note 1 for a supplier of this PC board.

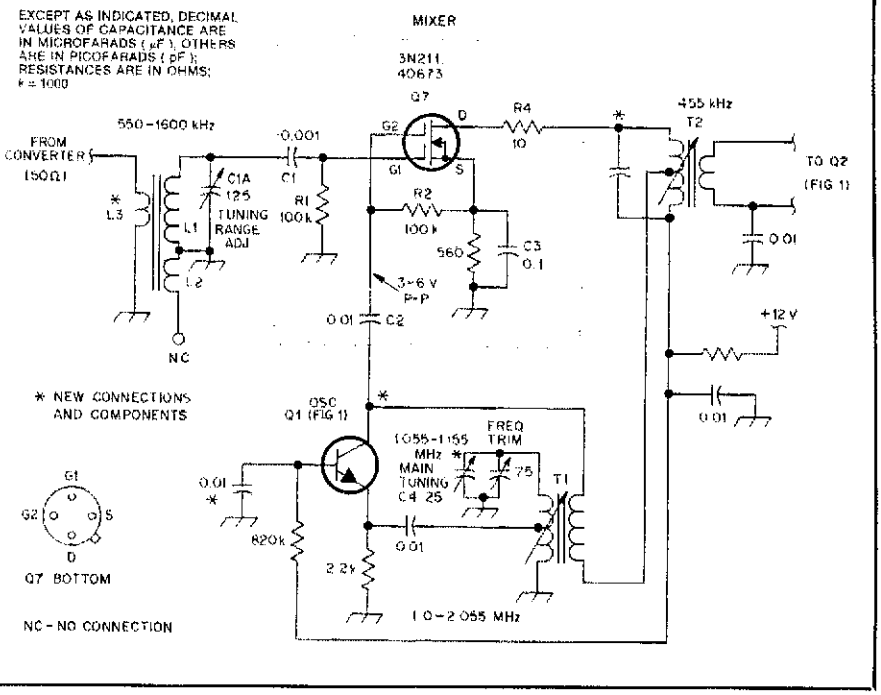
Modified Receiver Notes

I enclosed my modified AM radio in a box made from PC board sections, as shown in the title photo and Fig 4. This ensures that the mainframe is shielded. Without the shielded box, you will have problems with unwanted reception of standard AM radio stations, owing to the loop antenna being exposed. I elected to retain the loop because it provides a selective tuned input circuit for the MOSFET mixer.

The BFO/product-detector module is mounted outboard on one outside end of the box (see photograph). A U-shaped metal cover is press fit on the top of the box, then affixed with screws. I soldered no. 4-40 nuts on the copper surface inside the box. This enables me to attach the cover with no. 4-40 screws, and it ensures that the lid is grounded.

I placed a miniature 25-pF tuning capacitor (C4) in parallel with C1B of Fig 2. C4 is mounted on one of the box walls and is used as the main tuning for my ham receiver. C1 of Fig 1 is set to the part of the broadcast band that allows the desired tuning range for the amateur band of interest. *Caution*: Select an AM radio tuning range that does not allow the third harmonic of the local oscillator (1.0 to 2.055 MHz) to fall in the tuning range of the amateur band. The strong third harmonic will cause a very loud beat note in the receiver tuning range! I use 600 to 700 kHz as the tunable IF for my 80-meter

Fig 2—Schematic diagram of the new mixer (enclosed in shaded lines) and the modified oscillator of Fig 1. Fixed-value capacitors are disc ceramic. Resistors are ¼-W carbon composition. This circuit is built on the small PC board of Fig 3 and is mounted atop the AM radio module near L1 and Q1 of Fig 1. Connecting leads must be kept short. C4 is a miniature 25-pF air variable that is wired in parallel with C1B of Fig 1. It serves as the receiver main tuning control. Remove plates as required to obtain desired bandspread. L2 is disconnected from the circuit and L3 is a 6-turn link over the grounded end of L1. Some component values may vary.



CW converter. The third harmonic of Q1, Fig 1, is 3165 to 3465 kHz—well outside the 80-meter band. The second harmonic is also below the 80-meter band. My receiver tunes from 3.5 to 3.6 MHz, with 3.5 MHz falling at 700 kHz on the radio dial. This backward tuning scheme places 3.6 MHz at 600 kHz on the AM radio dial. This arrangement calls for a 4.2-MHz crystal frequency in the outboard 80-meter converter oscillator.

Tune-Up Procedure

It is best to check out the AM receiver before adding the BFO/product detector, but after the new mixer has been installed. Connect a 25-foot or longer piece of antenna wire to L3 of Fig 2. Tune in a weak AM station near 900 kHz. Adjust the trimmer on C1A (Fig 1) for maximum

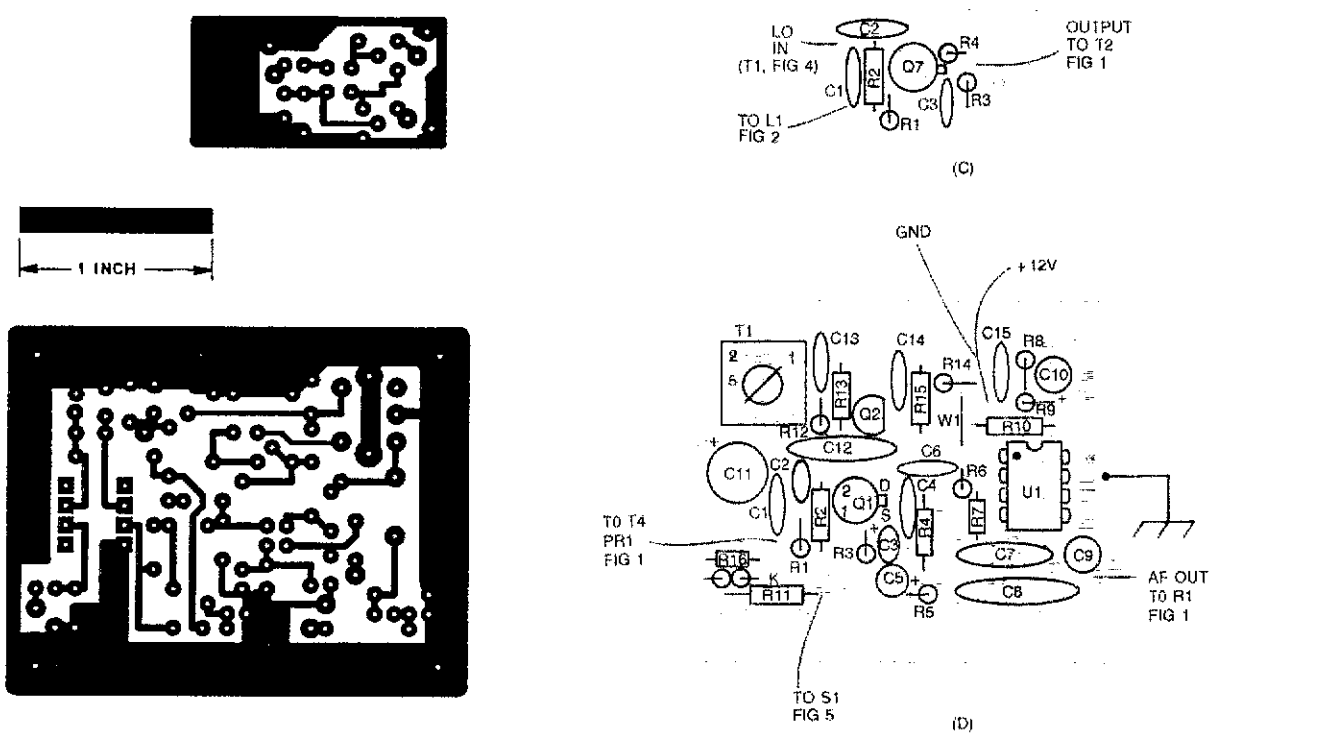


Fig 3—Circuit-board etching pattern for the new mixer and the BFO/product detector/filter PC board (A and B). The pattern is shown full-size from the foil side of the board. Black areas represent unetched copper foil. At C and D are the parts-placement guides, not to scale. Parts are placed on the nonfoil side of the board; the shaded area represents an X-ray view of the copper pattern. Component outlines are not necessarily representative of the shapes of the actual parts used.

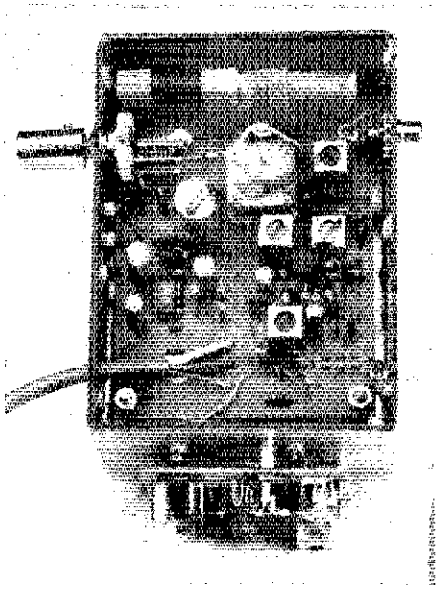


Fig 4—Close-up view of the outboard converter. The AM transistor radio is mounted inside the PC-board enclosure, and the added components are placed on a smaller external circuit board.

audio volume from the speaker. If C2 of Fig 2 has been installed, adjust the trimmer on C1B for proper AM broadcast dial readout. C2 is unmeshed during this step. It may be necessary to adjust the core of T1 (oscillator, Fig 1) slightly to obtain the correct dial calibration.

When you have the mainframe working properly, add the BFO/product detector module and wire it into the circuit as explained earlier. Adjust T1 of Fig 5 for a beat note while listening to a broadcast-band signal. Activate D1 and D2 and adjust C11 for a beat note on the opposite side of the AM-signal carrier. Repeat these steps to correct for interaction between the adjustments. Final adjustment of the BFO may be done after you add an HF-band converter ahead of the modified receiver. I plan to describe a suitable 80-meter converter in a subsequent issue of *QST*.

Summary

I used an AM radio module that I bought on the surplus market. It has NPN transistors and operates from +9 to +12 V. Many transistor radios have the schematic diagram pasted on the inside of the back cover. A diagram will enable you to learn whether or not the radio has a positive ground, and will also be helpful when you make the circuit modifications.

The 455-kHz IF transformers in Fig 1 provide reasonably good selectivity for SSB reception. Improved CW selectivity may be had by adding a two- or three-pole RC active band-pass filter between R1 and Q4 of Fig 1.

Notes

[1]Drilled and plated PC boards for this project are available from FAR Circuits, 18N640 Field Ct, Dundee, IL 60118, tel 312-426-2431 after 6 PM.

[2]A complete AM radio module with NPN transistors and a negative ground may be available (limited supply) from Oak Hills Research, 4061 North Douglas Rd, Luther, MI 49656, or from Marlin P. Jones & Associates, PO Box 12685, Lake Park, FL 33403-0685, tel 407-848-8236. This unit was used for this article.

[3]The new second edition is available from ARRL or your local dealer for $12. The schematic appears on page 87 of the first edition.

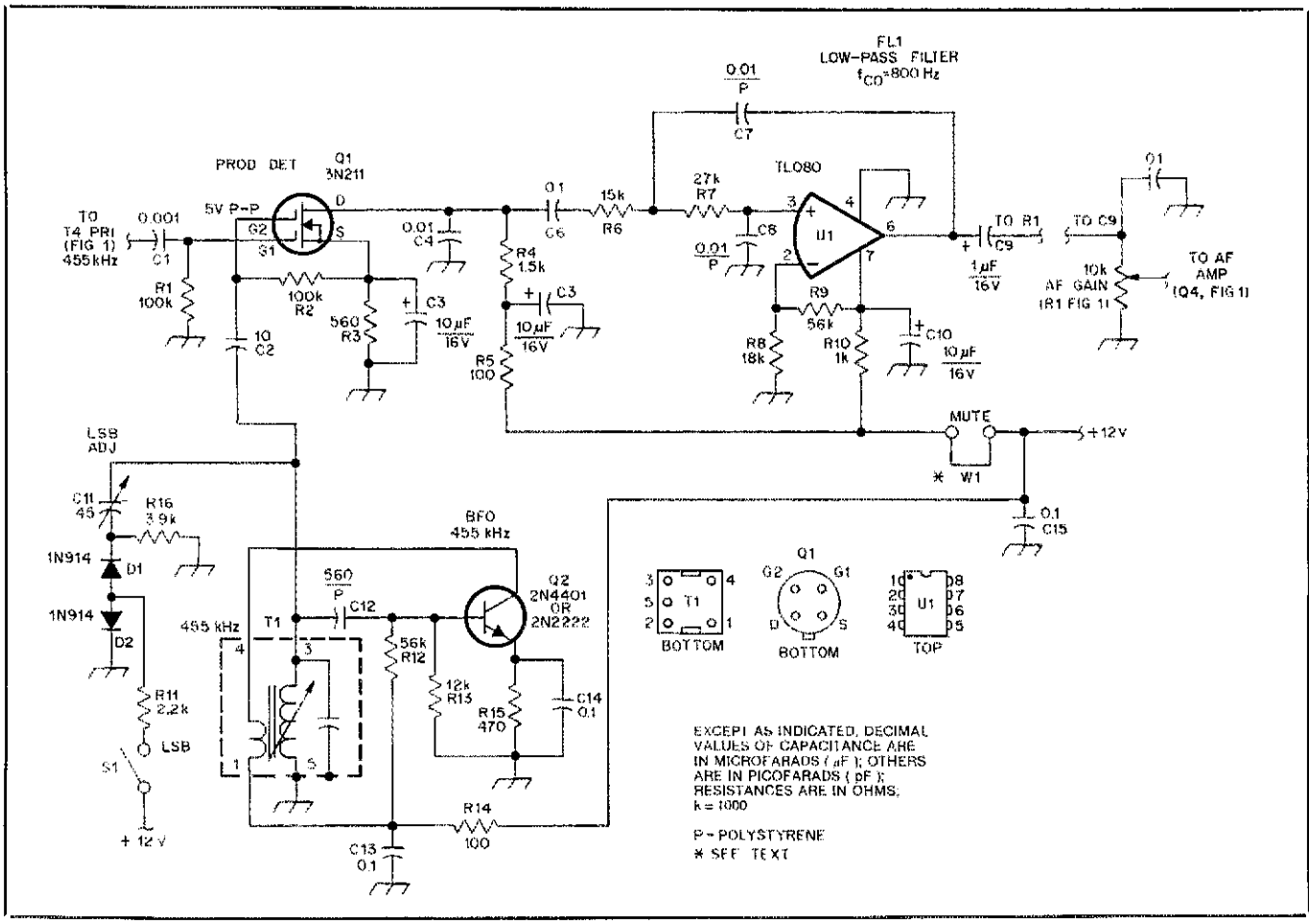


Fig 5—Schematic diagram of the BFO, product detector and active filter. Fixed-value capacitors are disc ceramic, except those with polarity marked, which are tantalum or electrolytic. P indicates polystyrene or other high-Q, stable capacitors. Resistors are ¼-W carbon composition. C2 value is chosen to provide 5-6 V P-P injection for Q1. C11 is a 45- or 60-pF miniature plastic or ceramic trimmer. S1 is an SPST toggle or slide switch. T1 is a J. W. Miller no. 2067 455-kHz IF transformer or equiv. Most 455-kHz IF transformers from transistor AM radios have the same pin-out and are suitable for this circuit.

Conducted By James W. Healy, NJ2L
Assistant Technical Editor

Kenwood TM-721A Dual-Band VHF/UHF FM Transceiver

Reviewed by Rus Healy, NJ2L, and Kirk Kleinschmidt, NTØZ

The TM-721A looks like many other FM dual-band mobile rigs on the market—it has few external connections, multipurpose front-panel controls and display, and a conveniently small enclosure—but as we shall see, Kenwood has added several interesting features not found on most rigs intended for the same purpose. The TM-721A covers the amateur 144-MHz band and the 438- to 450-MHz segment of the 420-MHz band. Transmit power levels are 45 W on 2 meters and 35 W on 70 cm. The '721A's sister rig, the TM-621A (not reviewed), covers the 144- and 220-MHz bands at power levels of 45 W and 25 W, respectively. The TM-721A's operating specifications are detailed in Table 1.

The '721A is easy to install and get running. There are only five external connections: UHF connectors for 144 and 440 MHz, power supply, external speaker (optional) and the microphone. It took less than half an hour to install the rig in a car and program several local repeater frequencies into the rig's memory channels. Reports on the rig's audio quality were favorable.

Operationally, one of the better things about the '721A is the logical way in which it beeps—whenever a front panel button is pushed, that is. When selecting several of the rig's functions, a high- or low-pitched beep is emitted. The beeps allow you to keep your eyes on the road—not on what's happening on the front panel of your radio. (Some have voiced an objection to beeps such as these, but both of us find them unobjectionable and extremely useful.) It's a good thing that the '721A beeps, because its display is not very legible in bright sunlight. Adjusting the display-brightness control (a two-level high/low control) doesn't eliminate the problem.

Initially, the '721A seems intimidating. It looks as though there are too many controls to mess with. (After all, the rig can monitor two bands simultaneously, operate in crossband full-duplex mode, has multiple scanning functions and an optional handset remote control!) After using the '721A for a short while, however, it can be mastered enough to change frequency with the VFO, program and recall memory channels, set up repeater shifts and monitor a frequency in the sub band (discussed later).

To operate the '721A in crossband full-duplex mode, and/or to monitor two bands simultaneously without confusing you unduly, the rig's display window *has* to be laid out logically—and it is. To minimize confusion, Kenwood designed the '721A to provide all the operating features of the radio for one band, and limited control of the operating status for the second band, at any given time. The band for which full control is available is called the main band. The second band is called the sub band. To distinguish between the main and sub bands, the display on the '721A uses larger, orange characters on the left side of the display to indicate main-band status. The sub band's operating conditions are shown on a smaller, yellow display on the right side of the display window.

Swapping the main and sub bands to gain full control of the sub band's operational parameters (repeater offset, subaudible tone frequency, and so on), is as easy as pressing the BAND key. The sub band can also be turned off (by pressing the DUAL key), eliminating displayed information you don't need if you're only listening or operating on one band.

The rig's BALANCE control operates during simultaneous reception on both bands. This control is a slide potentiometer that is mounted near the bottom center of the front panel, and, as you would expect, sliding it to the left causes the volume of main-band signals to be louder than those from the sub band. Sliding the BALANCE control toward the right causes the sub-band signals to be more dominant in the speaker audio. The '721A also has dual S meters—one for each band.

One of the '721A's technical characteristics worthy of mention is spectral purity. As shown in Figs 1 and 2, the second harmonics of the 144- and 440-MHz signals are at least -81 *dBc* and -69 dBc, respectively. The key closure/RF output characteristics of the '721A are shown in Fig 3.

As you would expect from a flashy new dual-band rig, the TM-721A has a feature not found before in similar rigs: automatic band changing (ABC). An interesting feature, ABC swaps the sub- and main-band contents upon receipt of a signal in the sub band, if you're not transmitting on the main band at the time. This feature allows immediate and complete control of the radio's functions on the frequency on which there's a signal (only limited control of the sub band is available, as mentioned earlier). Essentially, ABC puts the sub band "in the foreground" by making it the main band when a signal is present. If you don't transmit after the '721A changes bands, the main and sub band frequencies are returned to their previous status three seconds after the squelch closes.

The TM-721A is easy to use and should pose no problems for those familiar with

Table 1

Kenwood TM-721A 144- and 440-MHz FM Transceiver, Serial no. 9042797

Manufacturer's Claimed Specifications	*Measured in the ARRL Lab*
Frequency Coverage: 144 to 148 MHz and 438 to 450 MHz.	Transmitter: 144.0 to 147.995 MHz, 438.0 to 449.995 MHz; receiver: 138.0 to 173.995 MHz, 438.0 to 449.995 MHz.
Mode of operation: FM.	As specified.
Frequency resolution: 5 kHz.	As specified.
Power requirements: 13.8 V dc (±15%) at 9.5 A	13.8 V dc at 8 A on transmit (high power) and 3 A (low power); 510 mA on receive (at maximum audio output).
Transmitter	*Transmitter Dynamic Testing*
Power output (144/440 MHz): Low, 5W/5W; high, 45W/35 W.	Low, 5.5 W/6.6 W; high, min 44.3 W/34.7 W, max 47.5 W/34.7 W.
Spurious and harmonic suppression: Better than 60 dB.	See Figs 1 and 2.
TR turnaround time: Not specified.	See Fig 3.
Receiver	*Receiver Dynamic Testing*
Receiver sensitivity (144/440 MHz): Less than 0.2 μV/0.16 μV for 12-dB SINAD.	0.15 μV/0.18 μV for 12-dB SINAD; 0.20 μV/0.28 μV for 20-dB quieting.
Squelch sensitivity (144/440 MHz): Less than 0.09 μV.	0.05 μV/0.07 μV.
Receiver audio output: More than 2 W at 5% distortion (8-Ω load).	1.95 W at 5% total harmonic distortion (THD) with an 8-Ω load.
S-meter sensitivity (μV for S9 meter reading—144/440 MHz): Not specified.	2.0 μV/1.75 μV.
Color: Black.	
Size (height, width, depth; projections included): 5.9 × 2 × 8.6 inches.	
Weight: 4 lbs.	

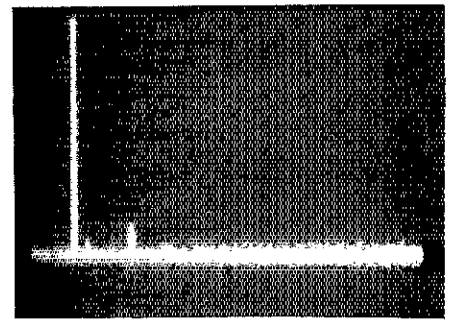


Fig 1—Worst-case spectral display of the TM-721A on the 144-MHz band. Horizontal divisions are each 100 MHz; vertical divisions are each 10 dB. Output power is 47.5 W at 145.13 MHz. The fundamental has been notched by 30 dB to prevent spectrum-analyzer overload. The log reference level (top line of the graticule) is −30 dBc. All harmonics and spurious emissions are at least 81 dB below fundamental output (−81 dBc). The TM-721A complies with current FCC specifications for spectral purity on the 144-MHz band.

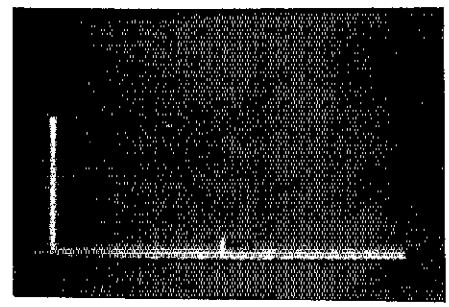


Fig 2—Worst-case spectral display of the TM-721A on the 70-cm band. Horizontal divisions are each 100 MHz; vertical divisions are each 10 dB. Output power is 34.7 W at 440.0 MHz. The fundamental has been notched by 40 dB to prevent spectrum-analyzer overload. All harmonics and spurious emissions are at least 69 dB below fundamental output (−69 dBc). The TM-721A complies with current FCC specifications for spectral purity on the 70-cm band.

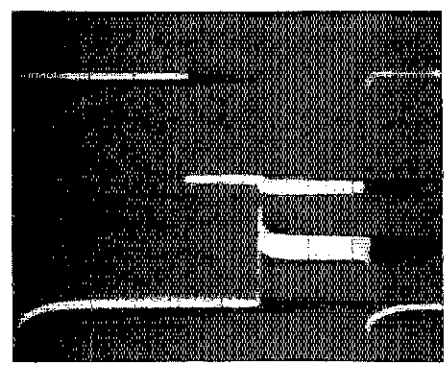


Fig 3—FM keying waveform for the TM-721A on 146 MHz. Each horizontal division is 50 ms. The upper trace is the actual key closure; the lower trace is the RF envelope.

modern VHF/UHF FM mobile rigs. As is increasingly common in modern rigs, the '721A combines control of multiple operating functions into single controls and function keys to conserve front-panel space. For instance, the rig has a wide variety of selectable frequency steps and subaudible tone frequencies (the optional CTCSS—continuous-tone-coded squelch system—encoder is required to obtain the use of the latter). To change the frequency steps (5, 10, 12.5, 15, 20 or 25 kHz), simply press the FUNCTION and STEP keys, and rotate the main tuning knob. The frequency step is shown in the main-frequency display window. When you reach the desired step, press any key to return the main frequency to the display. Simple! Selecting the subaudible tone frequency is a similar process.

Memory and Scanning Functions

The TM-721A has all of the memory and scanning functions common to the newer-generation FM mobile rigs: band and memory scanning, lockout of unwanted memory channels during scanning, priority and CALL channels, priority alert and so on. These functions are available on both bands. Memories for odd repeater offsets, band-scanning limits and normal repeater or simplex operations are available—there are 14 memories in all. The '721A also has a function that's common on HF transceivers, but not so common on VHF/UHF mobile rigs: the ability to write the contents of a memory channel *directly* into the VFO. Scanning can be initiated and terminated from the front panel of the radio, from the microphone or the optional RC-10 handset (described later).

The Manual

The instruction manual for the TM-721A is small but complete. In addition to the usual array of connection and operation descriptions, the manual contains information on installing the optional TSU-6 CTCSS board. Also included are descriptions and cautions for using the RC-10 remote-control handset with the '721A. An example of the completeness of the manual is the inclusion of a table of frequencies—and the corresponding scale notes—at which the beep tone (described earlier) sounds as the functions of the radio are changed. For instance, if the beep tone is enabled and you initiate the scan mode, the beep frequency will be 466.16 Hz (A#). If you then stop the scanning, the beep-tone frequency will be 493.88 Hz (B).

Complete block and schematic diagrams for the radio are provided on sheets separate from the manual. The documentation is clearly written and well prepared—much better than some manuals published in the past by offshore Amateur Radio equipment manufacturers.

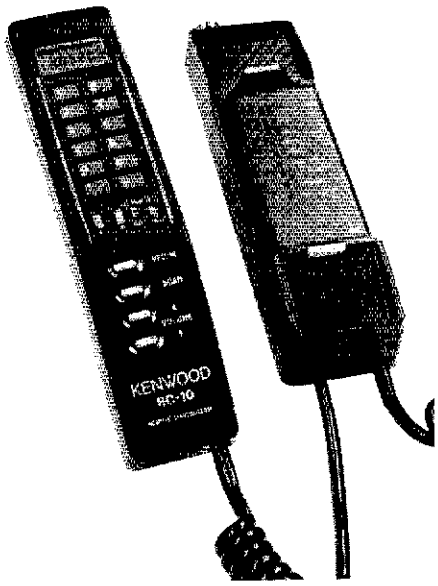
If you're in the market for a dual-band rig that has high power and a relatively large number of bells and whistles, the TM-721A is a good choice. Price class:

$650. Manufacturer: Kenwood USA, 2201 E Dominguez St, Long Beach, CA 90801, tel 213-639-4200.

KENWOOD RC-10 REMOTE-CONTROL HANDSET

The RC-10 is a multipurpose remote-control handset. Costing more than $200, the handset is not an accessory that everyone will want, however. For certain applications, the RC-10 is quite useful. It is designed for use with either Kenwood's TM-621A or -721A dual-band radios, or for simultaneously controlling the functions of any *two* radios in the TM-621A/721A or TM-221A/321A/421A series. In the latter service, control cables are attached to each radio and the RC-10 provides full-duplex capability with two single-band radios. Another nifty function of the RC-10 is its ability to serve as a crossband repeater controller. You simply connect the controller to the radio(s), put the handset in repeater mode and let 'er rip. The controller has a built-in three-minute time-out timer and a three-second squelch-release timer, and local PTT control is automatically disabled during repeater operation. The RC-10 manual contains the appropriate cautions and references the FCC Rules' Part 97 sections pertaining to repeater operation.

The handset remote control is designed to be mounted in a convenient place—one that's close to you, such as on your car's center armrest, console or dashboard. Almost all of the '721A's functions can be controlled from the handset: AF gain, squelch, scanning, memory programming and recall operations, frequency selection, autopatch dialing and other functions. With the handset close by, you don't have to lean forward to manipulate front-panel radio controls; it also gives you the feeling of talking over a cellular telephone. For situations where privacy is desired, the handset is ideal. Remote mounting of radio(s) in compact cars, or in situations where you don't want a radio visible to prospective thieves, is yet another advantage the RC-10 provides.



As with the TM-721A, the RC-10 initially appears to be much more complicated than it really is. After 10 minutes or so of operation, using the RC-10 becomes almost second nature. A wide array of functions can be easily controlled from the relatively small number of keys on the handset. For example, the keys provide nine functions not operated by dedicated controls, volume levels for the main and sub bands can be set, and radios can be selected by pushing buttons. Main- and sub-band squelch levels are set by way of recessed potentiometers inside the RC-10.

Although the RC-10 is a relatively expensive option, there are some situations in which it is extremely useful. Price class: $210. Manufacturer: Kenwood USA, 2201 E Dominguez St, Long Beach, CA 90801, tel 213-639-4200.

HUSTLER FX-2B 2-METER MAG-MOUNT ANTENNA

Reviewed by Kirk Kleinschmidt, NTØZ

The Hustler FX-2B is a high-performance, magnetic-mount, 2-meter mobile antenna designed to stay put at vehicle speeds of up to 100 miles per hour. I can't personally attest to this claimed top-speed adhesion limit, but the FX-2B didn't move around at all during combined city and highway driving. Besides, who wants to risk a speeding ticket just to velocity-test an antenna's adhesion capabilities?

The 5/8-λ black whip is rather slender. When I first saw it in the blister pack, I wondered if the antenna would be sturdy enough over the long haul. The review antenna had a slight kink—probably incurred during shipping.

Setting up the FX-2B is easy. After removing the antenna from the blister pack (the most difficult part of setup), the upper portion of the antenna (the whip and matching coil) is screwed into the magnetic mount. A rubber gasket is provided to seal out moisture and debris.

With the antenna assembled, there's nothing left to do except put the thing on the roof of your car. A slippery Teflon® -like substance lines the underside of the magnetic mount. It's there to protect your car from scratches. Be sure to "plop" the magnetic mount squarely into position. Do not slide the mount around on the roof. Even though there's a protective coating, scratches can occur.

An Allen-head wrench is provided to allow you to adjust the antenna to resonance (adjustment of the review unit was not necessary). If you'd like to tweak the FX-2B for lowest SWR, loosening the setscrew allows you to adjust the length of the whip by about an inch or so.

I used this antenna when testing the Kenwood TM-721A. I made several repeater and simplex QSOs while driving around the suburbs of Hartford, and the antenna performed well. The FX-2B's workmanship and materials appear to be of high quality. The unit should provide many years of trouble-free service—even if you never test its 100-mile-per-hour-rated tenacity! Price class: $30. Manufacturer: Hustler, Inc, 1 Newtronics Pl, Mineral Wells, TX 76067, tel 817-325-1386.

DIGITAL RADIO SYSTEMS PC*PACKET ADAPTER

Reviewed by Jon Bloom, KE3Z

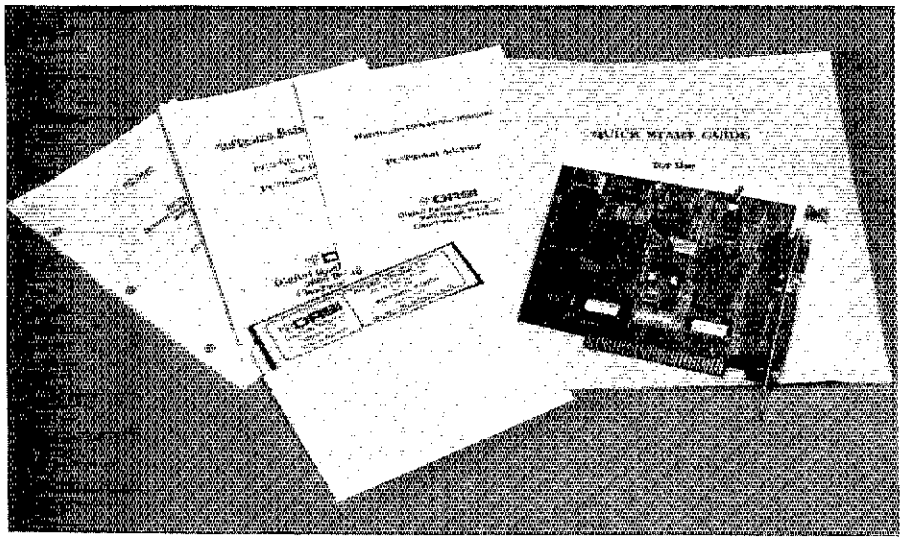
Amateur packet radio has blossomed into a widespread activity largely because of the availability of inexpensive terminal node controllers (TNCs). The use of a TNC separate from the station computer has become the norm, but a TNC isn't needed to run packet radio if some other computer can perform the TNC function. This was demonstrated in the early days of packet by Richardson, and is still true today.[1,2] Some hardware must be added to the computer, however. A modem is needed, and hardware to handle the lowest level of the protocol, called HDLC (for high-level data link control), is often desirable. For computers that easily can have hardware added, the prospect of a plug-on or plug-in board to allow packet-radio operation is attractive. It is this capability that Digital Radio Systems, Inc (DRSI) provides with their PC*Packet Adapter for the IBM® PC family of computers.

PC*Packet

The PC*Packet Adapter (let's call it PCPA for short) is a short board that plugs into a PC expansion slot. The board provides two packet-radio channels (or *ports*) that operate independently. One of the channels includes a modem for 1200-bit/s VHF FM packet operation; the other port terminates in an RS-232-C port to which an external modem can be connected. (DRSI has an HF modem available for use at this port, and expects to have a 2400-bit/s modem available as well. Neither of these accessories was reviewed.) The packet channels are implemented by way of a Zilog 8530 IC.

The hardware of a TNC is only one element of the package. The other element is the software. It is in the software that the concept of a plug-in TNC board differs from a stand-alone TNC. The software to operate a stand-alone TNC is contained in read-only memory (ROM) chips within the TNC (as *firmware*). Updating or changing the firmware requires disassembly of the TNC followed by removal and replacement of an IC. Because these ICs are static-sensitive devices, this procedure involves

[1]Robert M. Richardson, W4UCH, "Packet Radio—A Software Approach," Second ARRL Amateur Radio Computer Networking Conference (Newington: ARRL, 1983), pp 67-70.
[2]"New Packet Software: DIGICOM64," *Gateway*, July 31, 1987.



some risk: The IC may be destroyed. A plug-in TNC such as the PCPA, on the other hand, is controlled by a program read from the mass storage device (disk) of the computer. Updating disk-based software consists, at most, of copying the updated control program from one disk to another.

Operation

DRSI supplies manuals covering the hardware and software. The manuals are well written and helpful, but I was disappointed that a schematic diagram is not included. A floppy disk containing the software needed to use the PCPA is included.

Your only requirement in dealing with the PCPA hardware is setup and calibration. Normally, the default setup of the board will suffice, but if your system has an unusual hardware addition, you may have to reconfigure the PCPA. The instruction manual covers this eventuality. A *Quick Start Guide* is provided to help you get the PCPA up and running right away, and DRSI provides support via telephone and CompuServe® should you encounter any problems. (I ran into an interrupt conflict between the PCPA and my multi-I/O card. This situation is specifically covered in the manuals, so I had no trouble correcting it.)

Modem calibration is accomplished using the CAL program provided on the diskette. Although the modem is calibrated at the factory, the CAL program is useful for testing the cable between the PCPA and your radio. (You have to make this cable yourself; the DB-9 connector necessary for connection to the PCPA is not supplied, although a cable with DB-9 connector is available from DRSI.) You may need to adjust the transmit audio level control via a screwdriver adjustment on the PCPA card.

Because software is such an important element of a TNC system, the remainder of this review focuses on the software supplied with the PCPA. Because changing software is so easy with the PCPA, the folks at DRSI supply several programs. The TNC on which the DRSI software is modeled is the system designed by Ron Raikes, WA8DED (see sidebar, "The WA8DED TNC"). The basic DRSI software was written by Software 2000, the company that designed the NET/ROM networking firmware for the Tucson Amateur Packet Radio (TAPR) TNC 2. The WA8DED system is becoming a de facto standard for use with host-computer applications of packet radio, at least in some circles. By mimicking a WA8DED TNC, the DRSI software allows existing and new application programs to easily include the PCPA among their list of supported devices. The THS program supplied by DRSI is an example: It can run on the PCPA, or on a TAPR TNC-1 or TNC-2 that has WA8DED firmware installed.

A stand-alone program, called TNCX, is provided to make the PCPA work just like a WA8DED TNC. Most people, however, will use the *resident* software. This program, TNCTSR, is loaded into memory and stays there forever... well, at least until the computer is reset. The advantage of this is that a WA8DED TNC is capable of running in the unattended mode. In this mode, anyone connecting to your station will receive a text message (that you provide) and has the opportunity to leave you a message. When you return, you can read these messages. Although both TNCX and TNCTSR have this capability, using TNCTSR allows you to run DOS normally while TNCTSR continues to respond as an unattended WA8DED TNC. TNCTSR and TNCX each come in two versions, the difference among them being the amount of memory reserved for storage of messages received during unattended mode. The smaller version reserves about 48 kbytes, while the larger version expands to 110 kbytes.

The presence of the WA8DED host mode allows the use of intelligent terminal programs with TNCTSR. Two such programs are provided by DRSI. The SS program from Software 2000 is a split-screen terminal program with few features. If you like your TNC interface "raw," SS does a nice job. It doesn't get in the way; you have complete control of the TNC. At the same time, the split-screen feature keeps the transmitted and received data separate for easy operation.

The WA8DED TNC

For most uses, the TAPR-designed software (which is often called *firmware*, because it is contained in read-only memory) for their TNC 1 and TNC 2 is suitable. For use with a host computer, however, this software leaves something to be desired. After all, this software was designed for a human to use, not for a computer! The most famous packet-radio host-computer software—that for packet bulletin boards—is complex largely because the job of making the computer understand what the TNC is doing is so difficult.

Ron Raikes, WA8DED, has provided alternative TNC firmware for the TAPR TNC 1 and TNC 2. (Several of the currently marketed TNCs use the TAPR design and can run the WA8DED software. If in doubt, check with the manufacturer.) Ron's command system is much simpler than TAPR's. Most important, his software includes a host mode that allows the computer to have complete control of the TNC. Thus, the host computer will never be surprised by what the TNC is doing.

In operation, the host computer sends a stimulus to the TNC. This stimulus can be either a command or some data for the TNC to transmit. The TNC sends a response, which may include status messages or received data. Because the TNC sends to the host only in response to a stimulus, the host computer can easily maintain control of the TNC-to-host communication.

TAPR makes the WA8DED firmware available for both the TNC 1 and the TNC 2. For information, contact Tucson Amateur Packet Radio (TAPR), PO Box 22888, Tucson, AZ 85734.—*Jon Bloom, KE3Z*

The second terminal program provided is THS (TNC Hostmode Server), by Peter Heinrich, HB9CVV. This is a full-blown terminal program that provides terminal emulation, programmable keys, ASCII and binary file transfers, printer control and scads of on-line help information. This software was not written specifically for the PCPA, but for WA8DED TNCs in general. It can be easily configured to run either the PCPA or a WA8DED TNC that is attached to one of the PC's serial ports. You do this configuration by means of an ASCII text file, which also includes selection of printer port, display attributes (colors), TNC parameter settings and programmable keys.

THS uses pop-up windows for parameter selection and manipulation. (You can also issue commands directly to the TNC.) Using a 4.77-MHz IBM PC clone with a CGA display, I found the operation of the menu system somewhat sluggish, but acceptable. My computer configuration represents the worst (slowest) case, so just about any other computer in the IBM PC family should exhibit speedier performance.

The binary file-transfer protocol—invented by Jeff Jacobsen, WA7MBL, for his YAPP terminal program and used in the WA7MBL packet bulletin-board software—is supported by THS. This means that you can transmit and receive binary files as well as ASCII files.

Software, Anyone?

If you're a computer programmer, one exciting programming possibility is that of writing your own host-mode applications. The interface between an application program and TNCTSR is done via a single software interrupt. The most popular high-level language compilers for the PC, such as those for the Pascal and C languages, provide software-interrupt generation capability, making the writing of application programs that use the resident TNC quite straightforward. DRSI includes a sample file of C functions to demonstrate how a host program communicates with TNCTSR. The simplicity of the TNC command protocol allows a programmer to concentrate on the useful parts of the program, rather than the task of talking to the TNC.

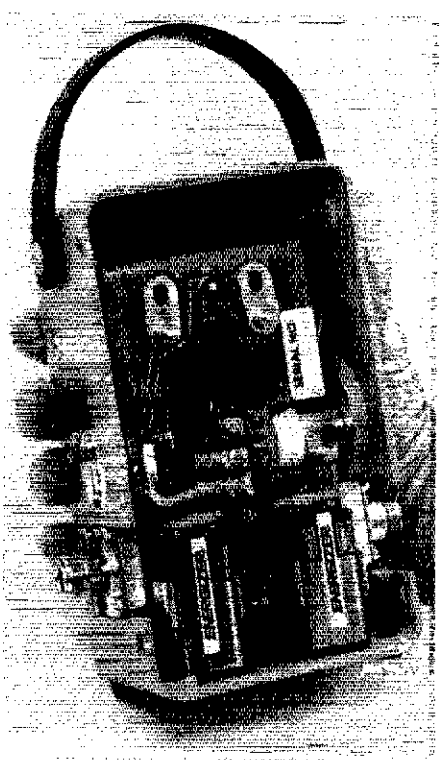
The PC*Packet Adapter seems to be a "board for all seasons." Operators who just want a compact, easy-to-use packet system will find what they need in the PCPA, as will software experimenters. DRSI plans to have a bulletin board program available soon to serve that application as well.

Manufacturer: Digital Radio Systems, Inc, 2065 Range Rd, Clearwater, FL 34625, tel 800-999-0204. Price class: $140.

New Products

BIRD MODEL 43 PEAK-POWER-READING WATTMETER AND 4300-400 ADD-ON KIT

☐ Bird has introduced a new version of their popular model 43 wattmeter. The Model 43P Thruline® meter measures peak power of SSB signals and some other varying-level signals. The peak-power measurement accuracy is 8% of the full-scale meter reading. The 43P uses the same elements as the standard Model 43—elements are available for measuring full-scale power levels from 0.1 W to 10 kW, over the range of 450 kHz to 2.3 GHz. The peak-power measurement circuit uses two 9-V batteries, which, according to Bird, should have a service life of about 48 hours.



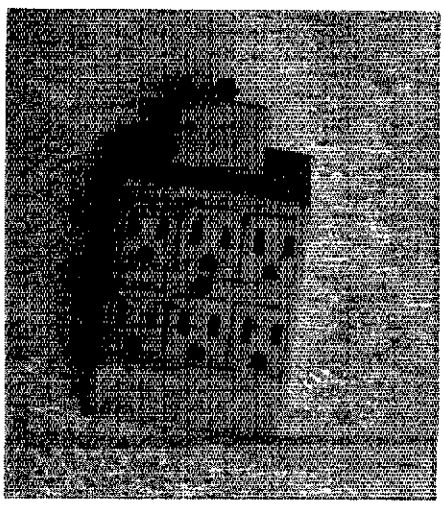
Model 43 wattmeter owners can modify their units for peak-power measurement capability with the 4300-400 retrofit kit. For more information on the Model 43P and 4300-400 kit, contact Bird Electronic Corp, 30303 Aurora Rd, Solon, OH 44139-2794, tel 216-248-1200.—*Rus Healy, NJ2L*

SEM QRM ELIMINATOR

☐ SEM, of Isle of Man, UK, produces the QRM Eliminator: a device that allows you to reduce interference by using signals from a sense antenna to cancel offending signals. Some kinds of interference that the QRM eliminator should be effective in reducing are power-line noise, computer hash, and so on. The QRM Eliminator is connected to the receiving antenna and a second antenna (which can be, for instance, a 2-meter antenna, a long piece of wire, or another antenna for the same band), and uses RF-sensed switching for use with transceivers. SEM claims noise reduction of as much as 50 dB with the QRM Eliminator. For more information, contact SEM, Unit B, Union Mills, Isle of Man, UK.—*Rus Healy, NJ2L*

SPI-RO LINE FILTER/SURGE SUPPRESSOR

☐ The Spi-Ro SP-6-CB is a 6-outlet EMI/RFI filter and surge suppressor with a built-in circuit breaker and an indicator light. The unit is rated at 15 A at 125 V, and provides 1-ns switching response. It can handle 4500-A spike currents. Price: $29.95. Available from Spi-Ro Manufacturing, PO Box 1538, Hendersonville, NC 28793.—*Rus Healy, NJ2L*



Hints and Kinks

Conducted By David Newkirk, AK7M
Assistant Technical Editor

IMPROVING THE HEATHKIT SB-220 AMPLIFIER

☐ The life of some of the components in the SB-220 amplifier can be prolonged with simple circuit modifications. These modifications concern:

• *The 3-500Zs:* If 3-500Zs possessing above-average gain are used in a stock SB-220, the amplifier may occasionally oscillate near 110 MHz. (This problem is not unique to Heathkit® amplifiers.) The presence of this condition is indicated by occasional arcing at the TUNE capacitor and/or band switch. If a full-blown parasitic oscillation occurs, the result is usually a loud bang. Sometimes this results in a grid-to-filament-shorted 3-500Z, a shorted Zener bias diode, exploded grid bypass capacitors, open grid-to-ground RF chokes (RFC4 and/or RFC5 in the SB-220 circuit), or any combination of these effects. A full SB-220 parasitic cure includes: (1) installation of Q-damping resistors (R1A and R2A in Fig 1A) in the tube cathodes (necessary because the coaxial cable between the SB-220's band switch and the 3-500Z cathodes happens to resonate near the SB-220's parasitic-oscillation frequency!); (2) installation of low-Q parasitic suppressors in the 3-500Z anodes; (3) installation of a 10-Ω, 7- to 10-W, wirewound resistor in series with the anode-supply lead (R5A in Fig 1B) to serve as an HV fuse should a full-blown parasitic oscillation occur; and (4) replacement of the 3-500Z grid RF chokes (RFC4 and RFC5) with 24- to 30-Ω, ½-W resistors (R3A and R4A in Fig 1A) to protect the tubes from grid-to-filament shorts. Full information on steps 1 and 2, and a discussion of how and why VHF parasitics can cause component failures, can be found in my article, "Improving Anode Parasitic Suppression for Modern Amplifier Tubes," *QST*, October 1988, pp 36-39, 66 and 89.

• *Heat reduction:* The eight 30-kΩ, 7-W resistors (R12 through R19, inclusive) that equalize the voltage drops across the SB-220's electrolytic HV filter capacitors (C10 through C17, inclusive) are a major source of heat: They dissipate about 38 W. The filter capacitors are subjected to this heat. Problem: Over a period of time, this heating can cause the filter capacitors to fail prematurely, and can also cause the capacitors' molded-plastic holders to melt. This problem can be corrected by replacing each of the 30-kΩ equalization resistors with a 120-kΩ, 2-W, 2%-tolerance Sprague Q-line® resistor. This modification reduces the power dissipation of the equalization-resistor string by 75% and greatly extends the life of the HV filter capacitors. (Don't use carbon-composition resistors here; they tend to change value unpredictably with use. This trait could result in [potentially destructive] unequal voltage division across the SB-220's HV filter capacitors.)

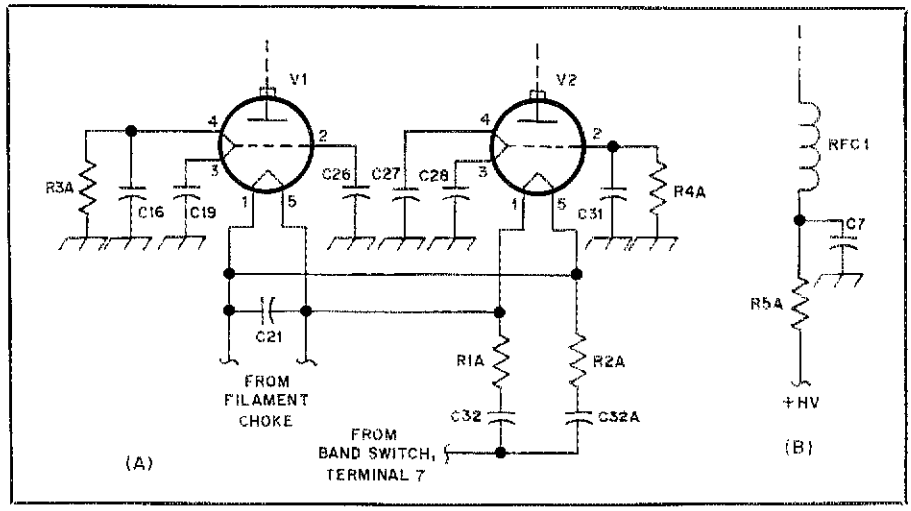


Fig 1—Part of the SB-220 VHF-parasitic-oscillation cure (A) consists of installing Q-damping resistors (R1A, R2A) in the amplifier cathode circuit and replacing the 3-500Z grid chokes with fuse resistors (R3A, R4A). Note that the installation of R1A and R2A also entails the addition of a second filament blocking capacitor (C32A).

Whether or not you apply parasitic-oscillation fixes to your SB-220, the installation of an HV fuse resistor (R5A, at B) is strongly recommended. The resistor protects the amplifier tubes by limiting, and opening in response to, the huge anode current pulse that occurs when the SB-220's 3-500Zs "take off" at VHF.

C32A—0.01 μF, 1 kV, disc ceramic.
R1A, R2A—10 Ω, 2 W, metal film.
R3A, R4A—24 to 30 Ω, ½ W.
R5A—10 Ω, 7 to 10 W, wirewound.

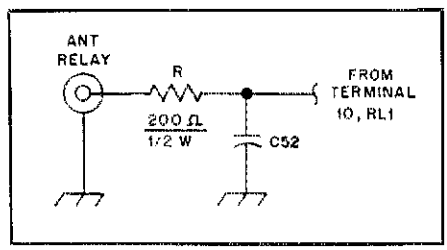


Fig 2—Relay contacts tend to be chewed up after several years of controlling an SB-220 because of the current pulse that occurs when C52 (the bypass capacitor at the SB-220's ANT RELAY jack) is discharged through the contacts. The addition of a current-limiting resistor (R) solves this problem.

• *Pitted contacts in the amplifier-control relay:* A common problem with the SB-220 is that it pits the contacts of the control relay in its associated transceiver after several years' operation. The contact pitting is caused by the repeated short-circuiting of C52 (the 0.02-μF bypass capacitor at the SB-220's ANT RELAY), which charges to +115 V during receiving periods. This problem can be solved by placing a 200-Ω, ½-W resistor in series with the center pin of the ANT RELAY jack to limit the capacitor discharge current (see Fig 2).

• *Fan lubrication:* The fan-motor bearings on early-production SB-220s did not have lubrication holes, and lack of lubrication sometimes led to premature failure of the fan motor. Small lubrication holes can be drilled into the top of the castings that hold the front and rear oilite bearings. This can be done without removing the fan motor.

Ordinary, SF-grade 20w motor oil is a satisfactory fan lubricant; 0.1 cc of oil in each of the two holes once each year is adequate. More oil is not better, just messier.

The SB-220 can be modified for 160-meter operation without sacrificing any of its HF coverage. For details, see "Adding 160-Meter Coverage to HF Amplifiers," *QST*, January 1989, pp 23-28.—*Richard L. Measures, AG6K, 6455 La Cumbre Rd, Somis, CA 93066*

BAND-PASS FILTERS FOR 80 AND 160 METERS

☐ Using the 80- and 160-m preamplifier described by Doug DeMaw in August 1988 *QST*[1] with a Beverage antenna, I encountered intermodulation from strong

[1]D. DeMaw, "Preamplifier for 80- and 160-M Loop and Beverage Antennas," *QST*, Aug 1988, pp 22-24.

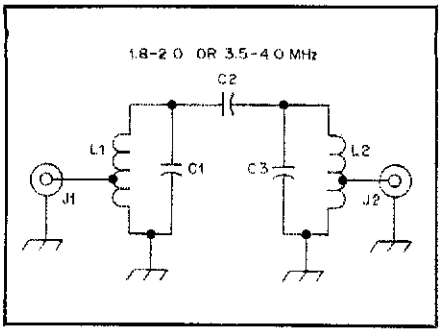


Fig 3—Schematic of the band-pass filters for 160 and 80 meters. Fig 4 shows the constructed filters; Fig 5 shows their response curves.
C1, C3—Silver mica; 160 m: 560 pF; 80 m: 330 pF.
C2—Silver mica; 160 m: 47 pF; 80 m: 33 pF.
J1, J2—Coaxial RF connectors.
L1, L2—Wound on T-50-2 powdered-iron toroidal cores. 160 meters: 48 turns of no. 28 enam wire tapped at 8 turns from ground ; 80 meters: 29 turns of no. 24 enam wire tapped at 4 turns from ground.

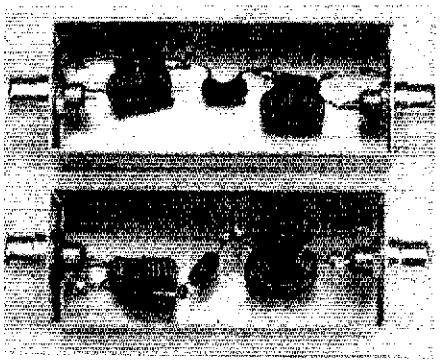


Fig 4—Bent brass sheet forms the enclosures for the 160-m (upper) and 80-m (lower) band-pass filters.

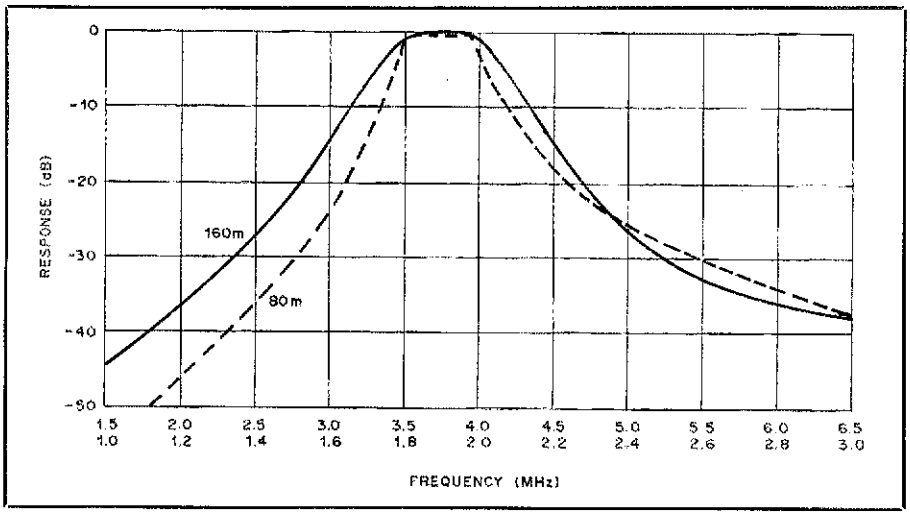


Fig 5—Responses of the 160- and 80-meter band-pass filters. The measured insertion loss of both units is less than 1 dB; for these curves, the 0-dB reference is the minimum filter attenuation. The −3-dB points of the 80-m filter curve barely miss the edges of the 80-m band; judicious squeezing or spreading of the inductor turns can place either band edge safely within the filter passband if band-edge attenuation is a problem in your version of the 80-m filter. The entire 160-m band falls safely within the −3-dB passband of the 160-m filter.

medium-frequency broadcasting stations. (The intermod was absent with a small, shielded loop.) To solve this problem, I designed the band-pass filters shown in Figs 3 and 4. The design is based on standard capacitor values and should not require adjustment if the specified wire sizes and silver-mica capacitors are used. Fig 5 shows the filter responses.

Don't attempt to transmit through these filters; they are intended for receiving purposes only. In addition to suppressing broadcast-band intermod, these filters may also be useful in reducing adjacent-band interference in multiple-transmitter installations.—*Gary Nichols, KD9SV, 4100 Fahlsing Rd, Woodburn, IN, 46797*

INEXPENSIVE GROUND WIRE

☐ When installing an extensive ground system for a new tower, I needed about 20 ft of no. 8 copper wire. I was shocked to learn that it would cost me 65 cents per foot! After some research and a few calculations, I found that there was a cheaper equivalent.

I consulted the *ARRL Handbook*'s copper wire table and learned that the cross-sectional area of no. 8 wire is 16,510 circular mils (cmils). On a hunch—and having recently purchased 250 ft of no. 14 Romex cable (with ground wire, which made it a three-conductor bundle) for $25, or about 10 cents per foot—I also noted that the cross-sectional area of no. 14 wire is 4107 cmils. My hunch was confirmed: doubled three-wire Romex (6 × no. 14) would serve at least as well as a single no. 8 conductor—at less than 1/6 the cost of the no. 8 wire!

I cut 40 ft of the Romex and stripped all three wires in the bundle. Then I doubled each wire (folded each back on itself) and clamped the free ends (six) in a vise. Placing a screwdriver through the three *folded* wire ends, I twisted the wires until they were bundled so tightly that they looked like they'd been manufactured that way. Result: 20 ft of wire that was closer to no. 6 wire than no. 8 in cross-sectional area—at a cost of $4 versus $13 for 20 ft of no. 8!—*Stan Barczak, K8MJZ, 11220 Churchill Rd, Rives Jct, MI 49277*

2C39 HEATER CONNECTIONS FROM SO-239 CENTER PINS

☐ Searching for a means of making a connection to the female heater terminal on a 2C39/7289 tube, I found that the center collet of an SO-239 coaxial jack fit the bill nicely. (Secure the SO-239 in a vise, solder cup up. Several sharp hammer blows to the solder cup will drive the collet out of the SO-239 center insulator.) If better contact is needed between the SO-239's female heater terminal, the slit end of the collet can be flared slightly by careful bending. —*Harry Conowal, WA4OFS, 2007 Peachtree Blvd, St Cloud, FL 32769*

ANOTHER ONE-MOSFET CONVERTER

Almost fifteen years ago, *QST* published a 10- and 15-meter converter that used a 40673 dual-gate MOSFET as mixer *and* crystal oscillator—a *converter* stage (see Fig 6).[2] Despite the article's report that the circuit oscillated reliably with ten different crystals, I recall having heard that some builders had trouble getting the circuit to work.

A variation on the single-MOSFET converter appears in the December 1987 issue of the Japanese magazine *CQ Ham Radio*. The Japanese configuration differs from McCoy's *QST* circuit in that a parallel tuned circuit (resonant at the crystal frequency) between the MOSFET drain and the output tuned circuit (resonant at the IF) is used to keep the drain impedance

[2]L. McCoy, "Improving Your Receiver Performance on 15 and 10 Meters," *QST*, Mar 1974, pp 26-27.

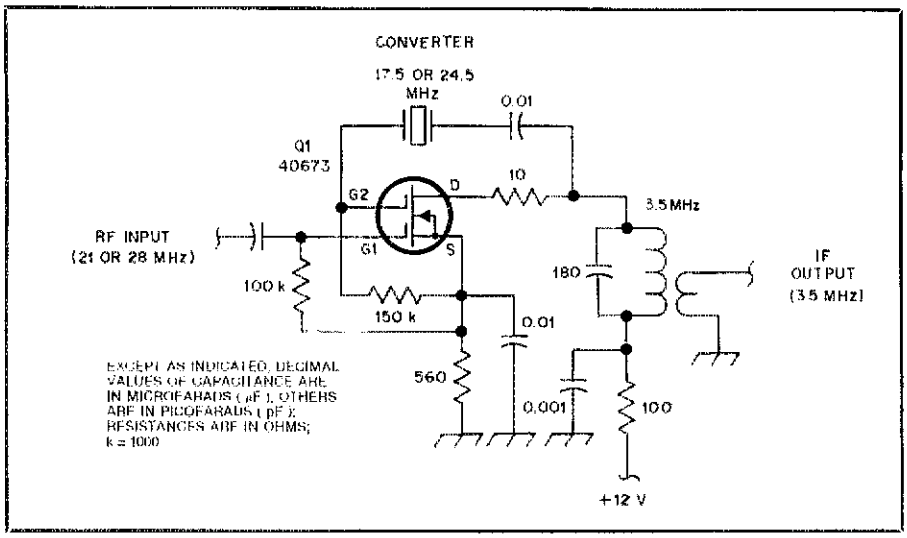


Fig 6—This one-transistor converter stage (RF amplifier not shown) appeared in March 1974 *QST*. Q1 acts as a Pierce oscillator and mixer. The 10-Ω drain resistor may have been included to suppress VHF parasitic oscillations in Q1.

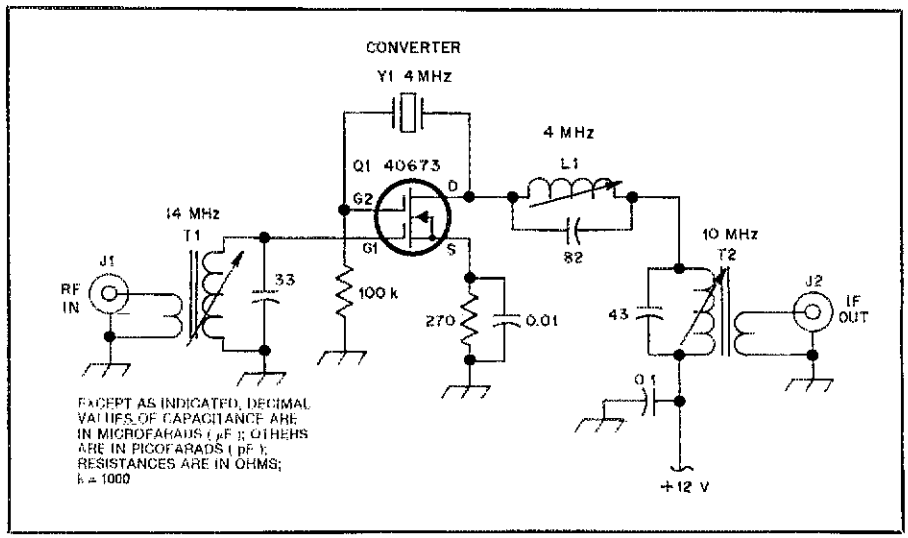


Fig 7—A one-MOSFET converter based on a *CQ Ham Radio* design. The principal difference between this circuit and that shown in Fig 6 is the drain trap (L1 and the 82-pF capacitor). Solenoidal slug-tuned inductors and transformers were used only because they were handy; their toroidal equivalents should work as well or better. See text.

J1, J2—coaxial RF connectors.

L1—14.8- to 31-μH slug-tuned coil (Miller 4407) set to approximately 19.3 μH. Reactance: approximately 485 Ω at 4 MHz.

T1—2.7- to 4.2-μH slug-tuned coil (Miller 4307) set to approximately 3.9 μH; primary: three turns of no. 26 enameled wire over cold end of secondary. Reactance of secondary: approximately 344 Ω at 14 MHz.

T2—4.7- to 6.8-μH slug-tuned coil (Miller 4407) set to approximately 5.9 μH; secondary: four turns of enameled wire over cold end of primary. Reactance of secondary: approximately 370 Ω at 10 MHz.

high at the crystal frequency. With sufficient separation between the crystal and intermediate frequencies, this drain *trap* should not unduly attenuate the converter's IF output. Fig 7 shows the circuit, along with component values for the working model I built in the ARRL Lab.

The values shown in Fig 7 have not been optimized; the tuned-circuit reactance values, in particular, were pulled out of thin air with the intent of constructing a working model quickly. The first crystal I found in my "junk box" was a 4-MHz microprocessor-clock unit; I chose the converter input and output frequencies (14 and 10 MHz, respectively) because they "work" with a 4-MHz LO.

Yes, it works. Dynamic range? I have no idea. Sensitivity? You've got me, although disconnecting my indoor antenna from the converter made most of the received background (not line) noise disappear (the "low tech" sensitivity test!). Image rejection? Not so hot; but this simple prototype has only one tuned circuit between the antenna and gate 1 of the MOSFET, after all.

How does the *CQ Ham Radio* circuit compare with McCoy's? Well, my Fig 7 prototype doesn't oscillate if the 4-MHz drain trap (L1 and the 82-pF capacitor) is shorted; shorting the drain trap of the *CQ Ham Radio* circuit approximates McCoy's hookup. (I suspect that the impedance of T2's resonant secondary is too low at 4 MHz to allow Q1 to "take off" without the drain trap. At some combinations of intermediate and LO frequencies, this may not be a problem. Crystal characteristics undoubtedly play a part.) The McCoy circuit uses positive bias on gate 2 of the MOSFET, and keeps gate 1 and the source at the same dc potential. The Japanese circuit returns both gates to ground; in conjunction with the voltage drop across the 270-Ω source resistor, this biases both gates negatively relative to the source. Even with positive bias applied to gate 2 of the MOSFET, however, my prototype does not oscillate with its drain trap shorted. Message: The drain trap is important! (*CQ Ham Radio* carried one version of this converter in which the gate-2-to-ground resistor was 10 kΩ instead of 100 kΩ; in that circuit, Y1 was a 41-MHz crystal, and a 5-pF feedback capacitor was connected from gate 2 of Q1 to ground.)

It pays to make L1, or its resonating capacitor, variable. In my prototype, the crystal oscillated on several frequencies at once and generated broadband hash unless the drain trap was tuned just so. But it *was* possible to find an L1 setting at which Q1 oscillated cleanly. In my opinion, this merely means more fun for the experimenter! (I also point out that we're perhaps being a bit unkind to the MOSFET in this circuit: Amplitude limiting—essential in any oscillator that does not destroy its active device[s]—obviously occurs *somewhere* in the circuit, but not by design! [Unlike the cathode-grid diode in a vacuum-tube oscillator, a MOSFET's gate-source insulator can't conduct without instantly destroying the device. Perhaps drain saturation is the amplitude limiter in this case.] McCoy reported that the highest RF voltage measured on gate 1 in his circuit was 4—well within the ratings of the 40673. I did not measure the gate 1 voltage in the *CQ Ham Radio* circuit.)

Might this single-MOSFET converter work with overtone crystals? I dunno; *you* experiment, and tell us about it! How about configuring Q1 as an LC, instead of a crystal, oscillator? Great idea! Let me know your results.

The circuit does what I wanted: It works—it "makes noise"—and it's interesting to fiddle with. Maybe you can find a good use for it. You might even have some fun along the way!—*AK7M*

TRANSISTORIZING SURPLUS VFOS

☐ Building stable tunable oscillators for home-brew projects can be difficult. VFOs are available on the surplus market, however—as subassemblies from disassembled vacuum-tube military equipment. Collins Radio, for instance, designed and built many excellent VFOs over the years; many of these are now available as surplus. These VFOs, sometimes also called linear master oscillators (LMOs), use special permeability-tuned coils and cam assemblies to achieve stable, wide-range, linear tuning. Although these VFOs use vacuum tubes, they can easily be "solid-stated" by replacing their vacuum tubes with 40673 dual-gate MOSFETs.

One such surplus VFO is the master oscillator from the T-195 transmitter. This unit, often available from Fair Radio Sales,[3] covers 1.5 to 3.0 MHz in somewhat over 12 shaft revolutions (a tuning rate of about 125 kHz/r). In the discussion that follows, I'll cover how to "MOSFETize" a T-195 VFO. (Note: The unmodified T-195 VFO can oscillate at B+ voltages as low as 24. If you have a 200-mA dc supply that can furnish this voltage [25.2 V is optimum because the tube heaters are connected in series], you can replace the 5749/6BA6Ws with 12BA6s and run the VFO at 25.2 V dc.[4])

Most of the T-195 VFO's volume is occupied by a sealed cylindrical housing that contains the oscillator tuned circuit. The two VFO tubes, and most of their associated circuitry, are contained in a small subassembly in front of the tuned-circuit housing. Removing the hexagonal screw on the front of the housing—between the two tubes—gives access to the slotted shaft of the VFO frequency-trim inductor. (Do not open the housing if you can avoid it; a key factor in Collins' achievement of short- *and* long-term stability in these oscillators is the hermetic protection of the VFO's frequency-determining components against temperature and humidity variations. Once you break the hermetic seal, that protection is lost.)

Fig 8 shows the schematic of the modified T-195 PTO. Components added to replace the tubes with MOSFETs are drawn with heavy lines. The MOSFETs are wired to the tube sockets. The 1N4148 diode (a 1N914 is also suitable) replaces the cathode-grid diode of the oscillator tube (V801). The 10- and 18-kΩ gate-2 resistors serve as counterparts to the screen-grid dropping resistors of the 5749/6BA6Ws.[5]

[3]Fair Radio Sales Co, Inc, 1016 E Eureka St, Box 1105, Lima, OH 45802, tel 419-227-6573.

[4]Another approach to retubing one of these VFOs for lower-voltage operation might be to replace the 5749/6BA6Ws with 12EA6 (remote cutoff) or 12EK6 (sharp cutoff) pentodes. (5749/6BA6Ws are remote-cutoff tubes, so the 12EA6 would probably be the better replacement.) These tubes have 12.6-V, 190-mA heaters, and were designed to operate at plate/screen voltages of 12.6 (absolute maximum, 16) in "hybrid" (tube-and-transistor) auto broadcast radios. Assuming that 12EA6s worked properly with no other circuit changes, a "12EA6ed" VFO would require, say, 12.6 V for its plates and screens, and 25.2 V for its heaters. Wiring the 12EA6 heaters in parallel would allow them to be operated at 12.6 V as well. Current drain during all-12.6-V operation of the VFO would be considerably higher than that of a "40673ed" unit, of course: two 12EA6s require 380 mA at 12.6 V just to heat their cathodes! 12EA6s and 12EK6s are available as "new old stock" from Antique Electronic Supply, PO Box 1810, Tempe, AZ 85281.—*AK7M*

[5]Nonetheless, it's important to keep in mind that gate 2 of a MOSFET is *not* the solid-state equivalent of a vacuum tube's screen grid. A screen grid can function as a control element or an anode; a MOSFET gate can function only as a control element. That screens *and* gate 2s are commonly operated at fixed positive voltages lower than those applied to their associated anodes is coincidence.—*AK7M*

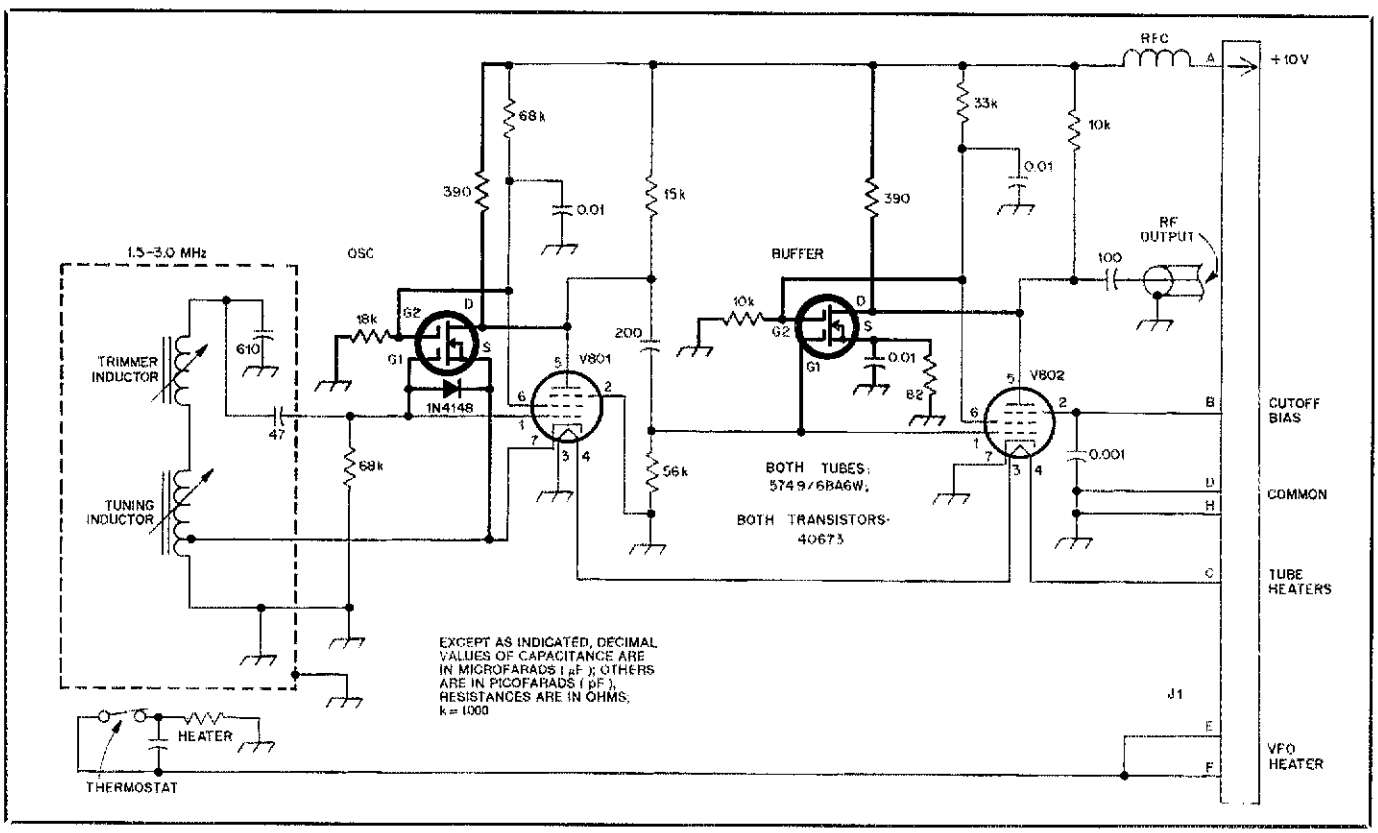


Fig 8—Schematic of the MOSFETized T-195 VFO. Added components are shown in heavier lines. Although vacuum tubes and transistors are shown simultaneously in this circuit for clarity, the tubes must be removed for proper operation of the VFO after transistors have been installed. The 610-pF capacitor in the V801 grid circuit actually consists of a 580- and three 10-pF capacitors; it is shown as a single unit for clarity. J1 mates with an Amphenol 126-192 connector. When vacuum tubes are used in the VFO, pin B of J1 allows the application of cutoff bias to the suppressor grid of V802 during receive periods. See text.

The 40673s have higher transconductance than the 5749/6BA6W tubes, and draw more supply current. The 390-Ω resistors in the MOSFET drains offset these differences.

I operated the MOSFETized VFO from a well-regulated 10-V, 7-mA supply (yes, this low current requirement signifies that I don't use the VFO's oven feature!). At this supply voltage, the VFO's output is about 1 V P-P into a high-impedance load. The output waveform is rich in harmonics because it is more like a series of pulses than a sine wave.

The MOSFETized T-195 VFO is very stable. When set to 3 MHz (and operating at a regulated supply voltage of 10), the VFO drifted 16 Hz in the first 10 minutes after warm-up. During the next 40 minutes, the VFO drifted an additional 10 Hz. The output frequency changed 10 Hz as the supply voltage was varied between 8.8 and 9.6; adjusting the supply over the 9.6- to 12.1-V range resulted in a frequency change of only *1 Hz*.

Mechanically, the T-195 VFO is very smooth: Equipped with a 2¼-inch-diam knob, it can be adjusted to within 20 Hz of a desired frequency. With patience, it can be set to within 1 Hz. (My VFO exhibits a slight mechanical bumpiness or backlash, and seems to "prefer" settings at 10- to 20-Hz intervals. This may be caused by the cams used to linearize its tuning.) *—Peter Traneus Anderson, KC1HR, 990 Pine St, Burlington, VT 05401*

AK7M: I've had similar success in MOSFETizing a Collins 70E-8 permeability-tuned oscillator (PTO): After a warm-up drift of a few Hz, it stays within *1.5 Hz* of its set frequency for hours on end.

A note of caution regarding the T-195 VFO (Collins nomenclature, 70H-3) was sounded by Don Chester, K4KYV, in "Collins Stability for Under $10," *The AM Press/Exchange*, June 1987: "*Never* attempt to tune the PTO all the way to either extreme end of its tuning range. There is no mechanical stop on the mechanism, and if the tuning shaft is turned beyond the limits of its intended frequency range, *permanent damage* will be done to the mechanism that moves the powdered iron slug in and out of the oscillator coil . . . . *if the shaft is turned far enough that you begin to feel resistance to further motion, permanent damage has already been done.*" Don adds that this problem is compounded when a reduction drive is used: By the time you feel the 70H-3's end-of-travel resistance through a reduction drive, it's *much* later than you think!

CLOSE, BUT NO CIGAR

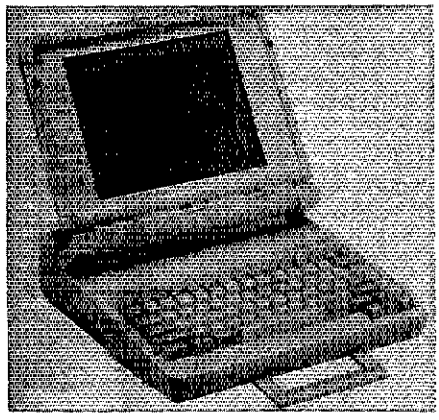
☐ The text of Maurice Sasson's "A Doorbell Alert Alarm" (*QST*, Hints and Kinks, November 1988, p 39) is correct, but the accompanying drawing (Fig 5) implies that the alarm's ac supply should be stolen from the bell transformer instead of the doorbell. This is incorrect; connecting the alerter directly to a bell transformer results in continuous noise! The drawing *should* read "8-24 V AC FROM DOORBELL."

In John Siegel's "Better Transmit Protection for GaAsFET Preamps" (Hints and Kinks, *QST*, December 1988, p 45), Advanced Receiver Research was incorrectly identified—by yours truly—as Advanced *Radio* Research.—*AK7M*

New Products

HEATH® LAP-TOP COMPUTER KIT

☐ In their Christmas 1988 catalog, Heath introduced what they call "The first kit laptop computer ever offered by a major manufacturer." The HS-2680 features IBM® PC AT compatibility, a 12-MHz 80286 microprocessor, 1 Mbyte of RAM (expandable to 3 Mbytes on the main board), one 1.4-Mbyte 3.5-inch disk drive, an optional second internal floppy disk drive, and optional 20- and 40-Mbyte hard disks. Also featured are a 640- × 400-pixel LCD, a removable battery pack capable of running the computer for up to 6 hours, serial and parallel ports, an RGB video port, and an external disk-drive jack. The HS-2860's dimensions (HWD) are 3.07 × 12.2 × 15.4 inches. Price: $2995. Available from Heath Company, PO Box 8589, Benton Harbor, MI 49022, tel. 1-800-253-0570 *—Rus Healy, NJ2L*



QEX: THE ARRL EXPERIMENTERS' EXCHANGE AND AMSAT SATELLITE JOURNAL

The January issue of *QEX* includes:

• "RF Power FETs—Their Characteristics and Applications," *Part 1*, by H. O. Granberg, K7ES. RF power FETs are showing up with increasing regularity in Amateur Radio circuits. If you're not up to date on power FETs, this detailed comparison of bipolar transistors and FETs may be just what you've been looking for.

• "Path Selection," *Part 2*, by Dennis L. Haarsager, N7DH. The second of two parts, this article picks up where last month's installment left off: the process of planning paths using topographic maps. Obtaining maps, and determining distances and azimuth headings are covered.

• ">50," by Bill Olson, W3HQT. This month's column is the second in a series on reflector antennas. Covered are types, selection and placement of dish feeds.

• "Components," by Mark Forbes, KC9C. This month: inductors, overcurrent protectors; the IBM® PS/2® Model 30 286; microwave prescalers; MMICs; RF power FETs; crystals—and the Components reader survey is on!

• For "Correspondence," Dom Mallozzi, N1DM, has compiled another bibliography. This one is for readers interested in crystal filter design.

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

Technical Correspondence

Conducted By Paul K. Pagel, N1FB
Associate Technical Editor

READ THE LABEL

☐ I use an old prop-pitch motor to rotate my three-element beam. This motor draws more current than most commercial rotators. When the rotator on/off switch started sticking, I sprayed it with WD-40®. Unfortunately, I made the mistake of immediately throwing the rotate switch. The result was a flash fire caused by WD-40 fumes inside the metal enclosure! Fortunately, the fire lasted only three or four seconds and didn't ignite anything else.

After that experience, I read the manufacturer's warning label with some astonishment. In discussing this incident with two local hams, I learned that neither of them thought WD-40 was flammable.

Experimenting with some of this product sprayed into a cup, I found that the fumes dissipate rapidly if not closely confined. My fire extinguisher is now within reach at all times.—*Eddie Bertram, W5PIL, Box 1106, Beeville, TX 78104*

[The WD-40 spray can has warning labels on the front and rear. The front label reads: "DANGER: Extremely flammable. Harmful or fatal if swallowed. Contents under pressure." On the rear of the can: " . . . . Keep from sparks, fires and open flame. Use in a ventilated area. . . . . "—Ed.]

NEON SIGN INTERFERENCE

☐ About 18 months ago, I noticed the beginning of a form of RFI whose effects worsened as time passed. I lived with the problems for 16 months. Then, when the RFI got so bad as to interfere with everything from my broadcast radio, TV and personal computer to my Amateur Radio activities, I decided to track it down. The process took two months.

First, I watched TV channels 2 and 5 in the early evening to determine when the interference started. Then, I'd go outside to see which photocell-operated lights came on during the interference period. I found no correlation between the interference and the operation of the photocell-operated lamps.

My next suspect was a neon sign located about 1500 feet from my home and place of business. By watching TV and checking the on and off times of the neon sign, I confirmed my suspicion. I called the local electrical utility company, but their checks confirmed that nothing in their service lines seemed to be the cause of the interference. Next, I called Les Lines, K5SDF, an Official Observer in the Albuquerque area. After inspection, he agreed that the neon sign was the cause of the interference.

I then talked to the owner of the neon sign and showed him what was happening when his sign was turned on. After several contacts with the sign owner, I finally called the Denver FCC Field Office. They asked the utility company to check the suspected sign. The utility company provided me with their findings and the sign was inspected by a neon-sign servicing company. The company discovered two defective transformers and a poor ground system. Part of the ground system consisted of some layers of metal flashing connected to the back of the neon sign. The amount of moisture in the dirt collected between the layers of flashing affected the quality of the ground system. Attaching a ground wire between the center tap of the sign transformer and a ground stake driven directly into the earth cured this problem.

If you're troubled by interference, remember to be polite during your troubleshooting. Be sure to document your findings and ask for copies of documentation from enlisted sources of help. I'm happy to finally be out from under the blanket of interference 1500 feet away!—*Louis R. Berry, KF5OW, ARRL ATC, 1200 Legion Rd NE, Albuquerque, NM 87102*

ZENER DIODE NOISE

☐ Zener diodes generate noise. I caught onto this more than a year ago and decided to try an idea I had to decrease the receiver noise floor in my Drake TR-7 and ICOM 551 transceivers.

The TR-7 was modified first. I put a 0.1-μF capacitor across all the Zener diodes. Because most three-terminal regulators employ Zener diodes, I filtered the input and output pins of all of the three-terminal regulators on the power supply boards and in both VCOs. LM723 voltage-regulator ICs also have internal Zener diodes. So, I bypassed pins 4, 6, 10, 12 of the LM723s in the TR-7 and PS-7 power supply with 0.1-μF and 5-μF capacitors. In the ICOM 551, I filtered all the Zeners with 0.1-μF capacitors.

Results? A noticeable lowering of the receiver noise floor in both receivers. I was able to increase the TR-7's IF gain (by adjusting R1136 on the 2nd IF board) to maximum. The receiver now performs very well on 10 meters; signals seem to pop up out of nowhere. I also noticed that noise modulation of received signals by strong nearby signals now occurs only with the noise blanker turned on. I can now listen to S4 or S5 CW signals wedged between two S9 + 50 signals only 1 kHz apart. When I'm using my external receiver preamplifier with my IC-551, the received-noise-level increase with the preamplifier turned on is dramatic.

My findings are anecdotal. I don't have the test gear to measure receiver noise floor or transmitted noise. I hope someone who has the proper test equipment will try what I've done on a few pieces of HF, VHF and UHF equipment, make before and after measurements (transmitter phase noise, receiver noise floor, blocking and so on) and publish the results.—*Bud Moist, AE7K, Box 2143, Elko, Nevada 89801*

LOOP THE LOOP

☐ I recently constructed an indoor version of Doug DeMaw's shielded receiving loop[1] for 160 meters. I was so impressed with the dramatic enhancement it had on some signals that I elected to build a similar system for 80 meters—a perennial victim of noise.

Rather than starting from scratch by building a second wooden framework to support the 80-meter loop, I elected to take a page out of the high-frequency quad-builder's notebook by stringing the 80-meter loop inside the 160-meter loop.

Interaction between the loops (if any) is not apparent. There could very well have been such interaction had I elected to use a single, common feed line for both loops, but I chose to employ separate feed lines for each loop.

A separate receiving loop is a very worthwhile addition to the arsenal of the low-band DXer. If you've ever contemplated trying one, but were reluctant to go through the trouble of constructing the supporting hardware, why not build one "on approval" by simply tacking, or taping, the element to the wall of your shack? If your results—even from a basement location—are as good as mine are, it won't be long before you're constructing a more permanent version! —*Edward Peter Swynar, VE3CUI, 48 Evergreen Dr, Whitby, Ontario L1N 6N6, Canada*

TS-140S SCAN HOLD

☐ I recently purchased a Kenwood TS-140S transceiver. One of the factors that convinced me to purchase the rig was the review in *QST*.[2] One of the problems mentioned in the review was the difficulty in finding out what the SCAN HOLD function does. I had the same difficulty, so I wrote to Kenwood. Here's their reply, in a nutshell:

[1]D. DeMaw, "Beat the Noise with a Scoop Loop," *QST*, Jul 1977, pp 30-34.

[2]L. Wolfgang, "Kenwood TS-140S 160- to 10-Meter Transceiver," Product Review, *QST*, Jun 1988, pp 42-46.

"When the TS-140S is in the programmable scan mode, you may find that you want to jump ahead or behind the current frequency setting. The VFO dial can be used to quickly move to a different portion of the band. If the SCAN HOLD function is on, scan will pause approximately one second when the VFO is released. This allows you to determine if you want to continue scanning. To stop the scan, perform one of the following steps: (1) Press the CLEAR key; (2) Press the front panel SEND switch; (3) Key the microphone (all modes except CW); (4) Close the CW key (CW mode only)."

Once you get used to working the scan function (with hold on), it proves to be very useful. However, the '140S will *not* stop scanning when it receives strong signals. Other radios do have this capability, and I think it would be a good addition to the TS-140S—if you're into scanning.—*Marlo Montanaro, KA2IRQ, 15 Timberlane Dr, Colonia, NJ 07067*

IC-735 CHIRP ON SPLIT CW QSK

☐ I found the Product Review of the IC-761 transceiver[3] quite interesting. The problem the reviewer discovered when using split CW QSK also exists in other ICOM transceivers, such as my IC-735. I reported the problem to ICOM and also ordered a service manual so that I could dig into the radio and find the problem myself.

After receiving the service manual, it took me about 15 minutes to determine the cause of the problem. With the IC-735 in split mode, the transmitter emits RF before the frequency synthesizer has had a chance to lock. The problem is *not* the fault of the PLL, though. The 100-kHz-step synthesizer has a 5-kHz reference. A rule of thumb is that a synthesizer should lock up in five cycles, in this case 1 ms. The problem is that it takes somewhere between 3.5 and 7 ms to program a new frequency into the synthesizer. This is caused by a very slow conversion between the parallel data (coming from the microprocessor) to the serial data required by the PLL IC. (When not in split mode, this delay does not occur.) No amount of fiddling with the PLL time constants of the '735 would fix the problem. The only fix is to synchronize the analog and digital sections of the radio.

I proposed a number of fixes to ICOM. All but one requires rewriting the microprocessor firmware. The solution that ICOM is using in Service Bulletin 13188-001 adds two capacitors to the TR circuitry. This increases the delay between the time that the PTT (send) line goes low and the RF output appears. The IC-735 now can be used in split CW QSK mode up to speeds of 40 WPM, with any split—even hundreds of kilohertz.

Unless the IC-761 is radically different in design from the IC-735, I suspect that the "chirp" also exists when using semi-break-in CW. The turn-on circuitry for both modes is the same. How often you hear the chirp is determined by the setting of the DELAY control. If it is set to drop out between words, the radio will chirp then. The radio chirps whenever you toggle between transmit and receive. It has to—it was designed that way.

I highly recommend returning either radio to ICOM for modification. Their policy of making the modification free of charge is commendable. It took them less than 10 days (door to door) to fix my radio. If you don't want to return your radio to ICOM for service, use lots of delay when working split CW.—*Steve Lund, WA8LLY, 10180 Mill Station Rd, Sebastopol, CA 95472*

[3]T. Miller, "ICOM IC-761 160- to 10-Meter Transceiver," Product Review, *QST*, Sep 1988, pp 36-41.

Feedback

☐ There is an error in the schematic diagram of "A Three-Channel CW Emergency Transceiver," *QST*, Nov 1988, p 18, Fig 7. Q11 is a 2N5486, not a 2N3486 as shown.

☐ A line of text is missing at the end of paragraph one, column two, p 36, in Richard L. Measures' "Improved Anode Parasitic Suppression for Modern Amplifier Tubes," *QST*, Oct 1988, pp 36-38, 66 and 89. The last sentence of that paragraph should read: "A parasitic suppressor capable of preventing oscillation in a tube with a μ of 40 may fail to suppress parasitics in a tube possessing much more gain."

Also on p 36 of that issue, the span of medium frequencies (the first bracketed phrase on line six, paragraph three, of the sidebar "What's a Parasitic Oscillation?") should read "[300 kHz to 3 MHz.]"

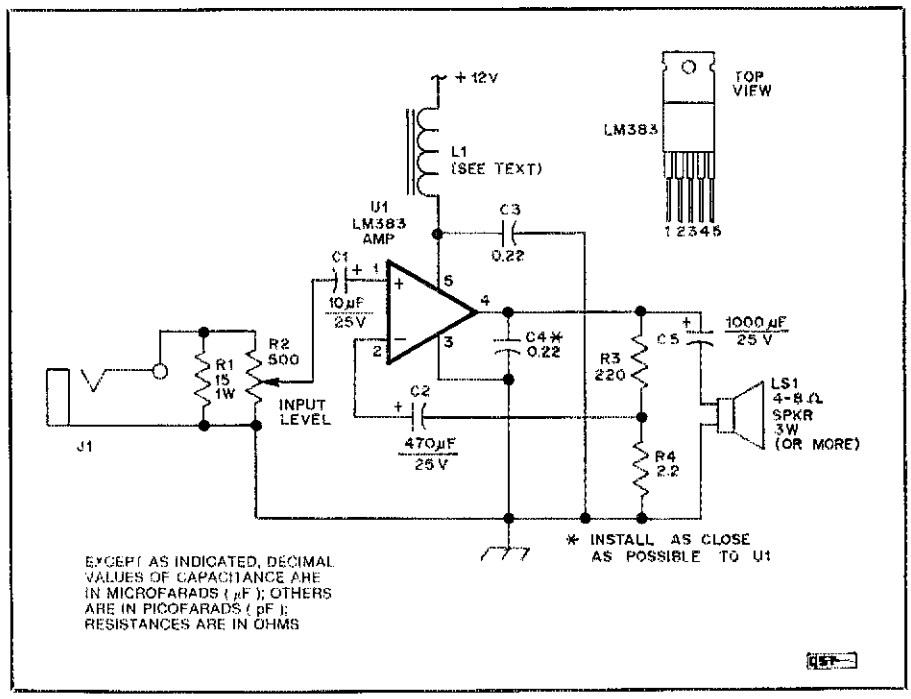
☐ Ace Collins, K6VV, author of "Log Periodic Dipole Arrays for the Upper HF Bands," (*QST*, Nov 1988, pp 21-23 and 28), brought to our attention an error in Table 3 on p 21. The third column in Table 3 should read:

Spacing (feet)	*Spacing (feet)*
3.64	2.15
3.28	1.94
2.95	1.74
2.66	1.57
2.39	1.41

☐ There's an error in Fig 1, p 20, of "A Speaker Amplifier for Hand-Held Transceivers," *QST*, Jan 1989. C2 should not be shown connected to ground. A corrected diagram appears in Fig 1.

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.

Fig 1—Corrected diagram of the amplifier circuit (see *QST*, Jan 1989, p 20, Fig 1).



A Yank Tackles the RAE and Wins

A ham from Houston discovers that there are testing thrills even beyond the Extra Class!

By Mike Martin, WA5LNG/GØJCZ
12519 Huntington Venture Dr
Houston, TX 77099-4403

Why would anyone who could easily get a reciprocal license by just filling out a form go to all the trouble of traveling thousands of miles to take a test that, if successfully passed, would result in being issued the same type of license? That was the question I kept asking myself as I sat in the darkened cabin of a DC-10 somewhere over the North Atlantic, desperately trying to cram information that I hadn't studied intently since 1965 into my head.

The Catalyst

It had all started the previous September, during one of our semiregular visits to England. My wife, Patsy, KA5VZA, and I had decided to take a couple of hand-held transceivers with us, since we would be attending a meeting of the Southdown ARS and we wanted to be able to talk with members on 2 meters. We had long since applied for and received our reciprocal licenses; it was the call signs on those licenses that triggered the whole adventure.

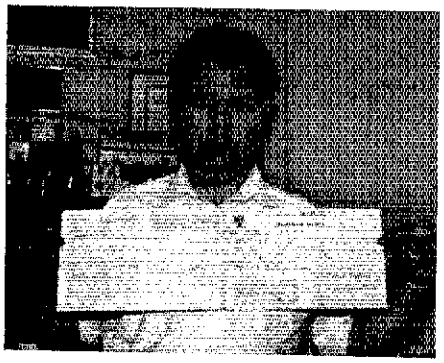
I had operated reciprocally only once before, in Great Britain back in 1980. At that time, the Post Office issued a G5-prefixed one-by-three call for use while in the UK (mine was G5DHM). Things are different now: The Radio Amateur Licensing Unit simply prefixes your own call sign with GØ. Since both Patsy and I hold Group D call signs, this meant our calls were a bit cumbersome—GØ/KA5VZA and GØ/WA5LNG, respectively! And if we operated away from our licensed location, we had to add a /A to boot!

Insert Foot in Mouth

I mentioned to our radio hosts, Pat and Dick Jeffries, G8TNH and G4KAR, that it was a good thing our operations were limited to FM, as I doubted that I would have much success in a CW pileup signing my reciprocal call.

"Why don't you sit for the RAE?" they asked. "There's no citizenship requirement anymore."

Why not, indeed! After all, I had passed the Extra Class exam. I speak English. Surely, with a little study each night, I could easily master what I needed to know. So I inserted my size 11 EEE foot in my mouth with a "Sure! Good idea! Let me know when the next test session is."



Mike with his Class A License "Booklet."

Licensing in Great Britain, I was soon to learn, is quite a bit different from what we are used to here in the US. Licenses are issued by the Radio Amateur Licensing Unit of the Post Office under the authority of the Department of Trade and Industry. There are two classes of licenses: A no-code VHF-and-above Class B, and an all-amateur-privileges-conferring Class A. Interestingly enough, the written test is the same for both licenses. The difference is that you must pass a 12-WPM code test to qualify for the Class A. An Amateur Radio Certificate is issued to anyone over the age of 10 who passes the code and written tests, which allows them to operate another amateur's station, but you must be 14 or older to have your own station license.

The Test

Testing procedures are quite a bit different, too. The code tests are administered by examiners from the Radio Society of Great Britain at sites throughout the country on a regular basis. (Schedules of tests are published in *Radio Communication*, the house organ of the RSGB.) The tests are in four parts: a plain-language receiving and sending test, each of three minutes duration, and sending and receiving tests consisting of figures, each 1½ minutes long. You are allowed four errors in each of the plain-language tests and two errors in each of the figures tests, with the errors in the sending tests corrected as you send. (No "one minute of clear copy" here!)

The written test, known as the Radio Amateur Examination, or RAE, is administered by the City and Guilds Institute, a prestigious testing organization which also administers examinations for many other purposes, including technicians, bricklayers and hairdressers. The RAE itself is a multiple-choice test, just like ours, and is at a level that combines elements of our General and Advanced tests. Questions are on rules and regulations (*very* different from ours), interference, transmitters, receivers, propagation and other elements of general operating theory and practice. There is one major difference, however: The RAE is in English. If you think that we speak English in the US, I invite you to "sit the RAE"!

The RAE is given only twice a year, normally in May and December, and you usually have to wait several weeks just to find out if you passed. You must register several weeks in advance to take the test, which is given at sites all across the UK on the same night. The cost is quite high, too—nearly $50 US! The test results are not given as percentages, but as one of four possible "grades" earned on each of the two parts. The grades, in descending order, are "Distinction," "Credit," "Passed" and "Failed."

Putting It All Together

So how does it all come together? If you're successful with both the code and written tests, the RSGB and the City and Guilds Institute each send you written certification that you have indeed passed. (The City and Guilds Certificate is quite impressive—mine is framed and hanging in

my shack.) Once you have these in hand, you fill out a licensing application and send it to the Post Office's Radio Amateur Licensing Unit (along with the appropriate fee).

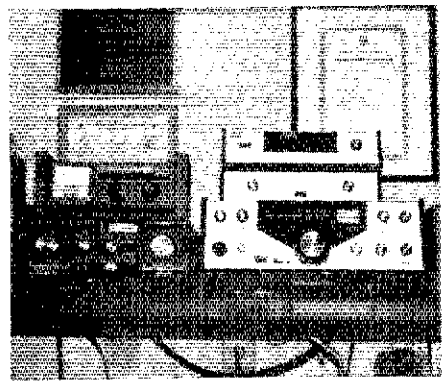
In my case, the response from the RALU was quite fast. In a couple of weeks I had my materials returned, along with a very nice hand-lettered Amateur Radio Certificate (also framed and hanging in my shack).

Then the waiting began. What would my British call sign be? After four weeks I couldn't stand it any longer, and wrote the RALU to express my worry that my license had gotten lost in the international mail. They immediately dispatched a duplicate to me via air mail and I finally had my call, GØJCZ! It turned out that the license was not lost, just delayed. Like ours, it was printed on postage-ready forms, SURFACE POSTAGE, and arrived a couple of weeks later.

There are a couple of things we can learn from the way our British counterparts do things. The license itself is not a little slip of paper, but a booklet encompassing all of their rules and regulations. It's a little rough to carry something like this around, and they have started issuing certificates about the size of our license which show that the license is currently valid. It would be nice to have the latest Part 97 sent to us every time we renew or modify our licenses. Also, their tests lean heavily toward questions on interference and its causes and prevention—not a bad thing for a new ham to know about!

Was It Worth It?

It took more preparation than some DXpeditions, but I will always be glad I went to the trouble to get my very own British Class A. I will also be forever grateful to the people at the RSGB, the RALU and the Southdown ARS who made it all possible.



The "DXpedition Edition" rig for GØJCZ, consisting of a Ten Tec 540 transceiver (100-W output) with digital readout, 160-meter transverter, power supply, Dentron AT-1K antenna tuner and Gold Line wattmeter.

Was it a thrill? You bet it was, and a unique one at that. My new goals? I'm saving my pennies and working hard to put together a suitcase station and buy the plane tickets to activate GØJCZ. If I'm successful, you'll probably find me lurking in the Novice bands, beaming USA and trying to infect a new crop of hams with the DX bug that bit me nearly 25 years ago.

Epilogue

I soon learned that tests, and the studying involved in passing them, can be a valuable part of the "self-training" aspect of Amateur Radio, as well as great self-improvement.

In all my years of work in radio and television, I had never gone past the old "3rd Phone" and Restricted Radiotelephone permits. On February 1, 1988, I passed my General Radiotelephone License with Ship Radar Endorsement! But there was still one more hurdle to climb...

On August 1, I passed the test for the license that I was sure I could never obtain, the Second Class Radiotelegraph! I would love to go for the First Class, but that requires a year's experience on a ship or at a coastal station, experience that I haven't found a way to obtain yet. I did, however, earn the 25-WPM endorsement to my ARRL Certificate of Code Proficiency, and I know in my heart I could pass the test if I were allowed to take it.

So, what am I doing with all my licenses? They certainly aren't gathering dust!

As of this writing (early December 1988), the DXpedition is *on*! Plans are to activate GØJCZ January 13-20, 1989. By the time you read this, some of you may have already worked me. (And the QSL is in the mail...I promise!)

As for the commercial licenses, it is comforting to know that I am limited in working on transmitters only by my knowledge, not by the lack of any official permit. My employer seems impressed, and I have been given several projects that involve my newfound knowledge and certification. (The licenses look real good on my office wall, too!) Also, should the need arise, I can always find a job somewhere as an entry-level technician.

And, who knows—there may be some way I can get that needed year's experience for the T-One. Then Patsy and I will try to learn firsthand if there really *is* a "Love Boat."

Mike Martin is a broadcast journalist with two decades' experience in broadcasting and radio news reporting. Mike and his General-class XYL, Patsy, KA5VZA, usually monitor the Houston Echo Society's 147.32-MHz repeater and are active volunteer examiners. In addition to 2 meters, Mike operates 160-10 meters, splitting his time between SSB and CW modes. Mike was first licensed in December 1964. After 12 years of marriage, the bug finally bit Patsy in 1985.

New Products

DIGICOM >64 PACKET-RADIO SYSTEM FOR THE C64

☐ A & A Engineering produces a kit for the Digicom >64 packet-radio system described by Barry Kutner, W2UP, in August 1988 *73 Magazine*. The Digicom >64 system works with Commodore 64 and 128 computers, and provides packet-radio capability without the need for a conventional TNC. The A & A Engineering kit version of the Digicom >64 features a reed relay for PTT and a watchdog timer, and requires no alignment before operation. A toggle switch allows selection of HF or VHF operation. The unit is based on the AM7910 modem IC, and the companion public-domain software was developed by hams in West Germany.

A & A Engineering makes two versions of the Digicom >64 available: A kit of parts, including the PC board and all board-mounted parts, and an assembled and tested version. The program diskette is provided with both versions. For the kit, order no. 154-KIT and enclose $49.95 per kit, and $2.50 for shipping and handling. For the assembled unit, order no. 154-ASY, and enclose $79.95 per unit, plus $2.50 shipping. Orders shipped to California addresses must include 6% sales tax. A & A Engineering accepts MasterCard and Visa telephone orders. Available from A & A Engineering, 2521 W La Palma, Unit K, Anaheim, CA 92801, tel 714-952-2114.—*Rus Healy, NJ2L*

ARRL Proposes Its Own Rewrite Of Amateur Rules

By Phil Sager, WB4FDT
Editorial Manager, Regulatory Information Department

"The amateur rules have not undergone any major reorganization since 1951 (they were called Part 12 then). Those rules were designed for an Amateur Radio Service using vacuum-tube transmitters and receivers and surplus mechanical teleprinters. Given the technological explosion which has occurred since then, and the deregulatory climate we're now basking in, the Commission has decided that the resulting rule additions and revisions have resulted in a patchwork of rules that can be confusing, especially to new amateurs, and it is high time to take another overall look at our rules." Thus spoke the article in June 1988 *QST*, pages 53-54, detailing the FCC's proposed restructuring of the amateur rules, PR Docket 88-139.

During the past seven months, an ARRL working group has studied the FCC proposal intensely. This group has literally gone over the proposal line-by-line, comparing it to the present rules. In addition, the committee digested countless comments of individual members.

This ARRL working group consisted of Vice President George Wilson, W4OYI, and Directors Steve Mendelsohn, WA2DHF, Marshall Quiat, AGØX, and Rod Stafford, KB6ZV, with detailed support from the ARRL HQ staff.

In the course of the working group's study, it was decided that rather than try to correct the flaws it saw in the FCC proposal, and to make some changes of its own, it was best for the Committee to propose its own total rewrite of the rules based on the framework of the FCC's proposal. The ARRL version is styled as "Part 96," a number not previously assigned to any portion of the FCC rules, to prevent confusion between old and proposed new rules.

By and large, the ARRL Part 96 avoids substantive changes, and in many cases returns to time-tested language as the preferred alternative to the new language offered by the Commission.

Perhaps the major concern of the ARRL in the new FCC rewrite was the proposed elimination of the procedural protections for amateurs in Section 97.131 in the current rules in regard to RFI. The FCC proposed Section 97.221 states: "The FCC may restrict operations as necessary to prevent harmful interference."

Our comments on the FCC proposal state: "This is undoubtedly the most severe and inappropriate of the Notice proposals. It represents an effort to legitimize the presently illegal Field Operations Bureau (FOB) policy of imposing operating restrictions on amateurs in RFI situations without the hearing mandated by Section 316 of the Communications Act and despite findings of no technical fault on the amateur's part. The notice proposal, which gives the FOB the authority to impose whatever restrictions it wishes, is completely unacceptable and violative of due process of law." The ARRL proposal, contained in 96.221, retains and strengthens the due-process protections.

Other Part 96 changes are:

- Rules governing public-service amateur communications have been clarified and liberalized, while protecting Amateur Radio from commercial exploitation. In particular, the FCC would have prohibited logistical support for event organizers; the ARRL version in 96.105 permits it where the public is the ultimate beneficiary.
- The definition of "third-party traffic" has been changed to clarify that amateur-to-amateur communication is not third-party traffic. This is consistent with the rules and policies of virtually all national telecommunications administrations as shown by surveys of member societies of the International Amateur Radio Union (IARU).
- 96.213 would permit amateurs to retransmit the Department of Commerce weather, propagation or time bulletins above 50 MHz. The ARRL said that the use of these bulletins is of direct interest to amateurs and could be critical to amateur emergency communications efforts.
- Certain key paragraphs of PRB-1, the Federal Preemption of state and local regulations which unduly restrict amateur antennas, are included in 96.15(a). This represents an effort to bring the policy more to the attention of the public.
- A special proceeding is required with respect to new digital communication modes. The ARRL recognizes that specific rules must be developed for the unique operational characteristics of these modes, and the ARRL is in the process of developing the suggested language.
- Rules governing RACES drills are proposed to be relaxed somewhat, without opening the door to misuse of amateur frequencies for routine government communications.
- The ARRL proposal would drop the FCC prohibition on external RF power amplifiers capable of operation between 24 and 35 MHz. Our comments said that this prohibition has greatly disserved the Amateur Radio Service over the years, and "has not significantly benefited Commission enforcement efforts relative to overpower operation in other services." Our proposal would also increase the number of home-brew amplifiers from 1 to 5 per year (96.411, 96.413).
- Lastly, in 96.415, the ARRL suggests the FCC issue a preemption of state and local laws which prohibit the ownership or use of amateur equipment which may tune outside the ham bands.

ARRL members having a special interest in particular areas of the rules will no doubt find other features of "Part 96" to be of significance. We believe the points highlighted here are of the most interest to the general membership.

The ARRL believes this final document represents the interests of the broadest majority of amateurs while protecting the needs of minorities with special interests. It was reviewed and approved by the ARRL Board of Directors by mail vote before it was submitted to the FCC on November 29, the last day of the comment period in PR Docket 88-139.

It is interesting to note that, in its proposal, the FCC had succeeded in reducing the length of the present Part 97 from 30,073 words to 24,397. The League's "Part 96" further reduced the length to 17,045 words without eliminating necessary substance and retained the basic structure of the rules as proposed by the FCC.

Our comments to the FCC concluded: "The League has painstakingly reviewed the Commission's proposed rewrite of Part 97...It is believed, as stated above, that a good effort by the Commission has been made better by the above suggestions (Part 96). To the extent that the League has incorporated some deregulatory suggestions, they are necessary in order to permit the flexibility necessary to an essentially self-regulated service, rooted in experimentation and development of communication systems."

Members can obtain a copy of the League's comments and Part 96 rewrite of the rules by sending a 9- × 12-inch SASE with $1.25 postage to ARRL HQ, 225 Main Street, Newington, CT 06111.

DX Century Club Awards

Administered By Don Search, W3AZD

The ARRL DXCC is awarded to those amateurs who submit written confirmation for contacts with 100 or more countries on the ARRL DXCC Countries List. You may endorse your award in 25-country increments through 250, 10-country increments through 300, and 5-country increments above 300. The Satellite and 160 Meter DXCC awards are endorsable in 10-country increments through 200, and 5-country increments above 200. The totals shown below are exact credits given to DXCC members from October 1 to October 31, 1988. An SASE will bring you the rules and application forms for participation in the DXCC program. Send $1.00 to request the ARRL DXCC Countries List.

New Members

Mixed

DF6PL/101
DJØGN/108
DK5FP/109
DL3EBX/157
DL9YCS/106
EA1MV/215
F6DSX/206
G3PMR/150
G3RQ/120
G3VGR/109
GM4XLU/103
HB9DDW/160
IK4HLR/152
IKØFUX/169
JP1VAP/110
JQ1GXV/105
JA3APU/110
JE3AVS/118
JF6JQM/109
JF6KAC/110
JH7RRM/110
JE8KKX/107
JX7FD/194
LA1MBA/210
LAØEW/111
LU8DWN/205
OK3CDZ/104
PA2SAM/102
VE7AFI/156
VE7KY/100
VK3CNT/110
VK7RH/110
VKØRO/102
XE2GKG/103
YBØAQL/101
9N5QL/101
K1VNS/126
N1FJ/101
W1OBE/110
WA1MHZ/159
WB1DTJ/106
K2HFW/105
K2TE/135
N2LT/321
WA2PJC/192
WA2VKS/100
K3UR/144
KC3LM/106
KU3R/144
NK3B/101
KB4QZH/100
WA4JVE/100
WB4NXG/104
AA5HP/165
K5BQJ/104
KA5SWC/110
KA6L/113
W6KG/4S7/111
KS7V/176
K8BL/120
K8TVQ/KL7/110
K9PNG/146
WA9WCP/101

Phone

CE1HBI/105
EA1MV/173
HK4DUM/203
HK6AUG/172
IX1BZO/104
IK4HLR/120
IK5GUJ/200
IK7BDN/171
IK8HOB/120
IKØFUX/141
JP1VAP/110
JQ1GXV/105
JE3AVS/118
JW6VDA/147
JF7TCK/105
JY9LC/151
NL7NF/102
OZ1KWC/102
SM4CTT/313
VE3MBM/123
K1VNS/124
N1FBN/229
KC2ZA/110
N2HOS/114
N2LT/284
KC4UG/154
KK4QX/118
W4USW/108
W4WG/298
WA4CMS/116
WB4NXG/104
AA5HP/149
KB5CX/105
KF5YZ/113
W5VEM/119
KJ6CR/104
W6ZZB/100
WZ6E/113
KA7EXD/110
N7FSW/289
K8OQL/103
KA8WAS/106
WA9EZY/151
WD9DGA/182
WKØF/119

CW

DK4JN/106
DL3EBX/131
DL8TQ/110
EA1MV/140
F6BLP/270
F6DSX/181
G3PMR/149
GM4REN/110
IK2ECP/125
IK2FSS/106
IKØFUX/106
JH6TYD/135
LA3GI/101
LU2CC/106
SM4CTT/238
SM5AHX/140
VK6HD/131
K2TE/100
N2LT/277
WE2L/100
KA3KQQ/109
KA3LHP/100
N4JHP/103
N4RUM/101
WA4QHI/103
KA5TUF/101
W5FS/260
WK5F/103
AA6AY/105
K6SIK/103
KS7V/127
K9PNG/129
WB9IHH/112
WD9DZV/106

RTTY

SMØAJU/109
W2AYJ/125
NØDAA/100

160 Meters

JA6LCJ/104
N2LT/100

10 Meters

I1JQJ/239
JA1SGU/130
JH7LVK/192
LU2CC/220
LU8DWN/125
SM6CVX/195
K1HMO/175
K1XM/185
KA1MVB/100
KQ1F/137
K2YFO/110
KC3VE/104
K4XG/189
W4BKP/145
W4UN/176
K6CBL/206
N6OGB/106
KB8DAE/101
AI9U/106
WØIKD/139

5BDXCC

K1CLN
KØJGH
F6CZL (#2500)
IK8CNT
I1ZEU
ZP5CDV
EI8AR
DJ4YS
PT7AQ
EA9IB
WN4KKN
OH7XI
IØWDX
WK6E
NX4Y
PAØRLF
ZL2AGY
KD5M
Y25JA
DJ9RB
WA2TMP
KN6J
W9KXW
WB6JMS
OH3SR
WZ4F
N4XR

New Honor Roll Members

Mixed

314
JH1ARJ/326
SV1IW/318

313
HBØLL/330

312
SM5BRW/325

311
IN3DEI/315
K4KJZ/315
K4ZKZ/335
K9VQK/327

310
CE3GN/319
DK1FW/325
JR1TNE/321
JA4VAD/315
JA7DRM/320
OH2BN/315
K1AR/318
KE3A/314
K4JEX/316
K4KUZ/315
KB4FQ/314
KA5V/315
WD5K/328
W6BJI/327
W6TMD/314
WB6RSE/315
NE8Z/324
K9BIL/313
W9IT/330
WA9VGY/325
KBØU/314

Phone

311
JE1MGE/320
JH1EDB/319
ON6MY/316
SM7BYP/316
K7SP/320
W9XX/316

310
JH1ARJ/320
ZL1AMO/314
W2GA/324
K6LM/314

CW

308
W2SM/311
W9XX/312

307
JE1JKL/312
NS7J/308

306
JA3MNP/310
K4KUZ/310
K5KR/309
W6TC/312

Endorsements

Mixed

AL7BL/287
CU2AK/336
DF7AU/266
DFØAFZ/275
DJ8FW/327
DJ9KG/283
DK6NP/318
DK8KC/252
DL1EY/311
DL3MAA/165
DL3ZI/352
DL6RAI/303
DL6WD/304
DL7FT/345
DL7HU/353
DL7MAE/308
DL9TJ/310
F6BKI/320
F6HWU/253
FE6IFF/233
FM5WD/281
G4BWP/302
G4EDG/290
G4MZF/231
HB9BZA/307
HB9G/301
HB9IK/345
HB9MO/352
HBØLL/330
HI8LC/316
I2JR/320
I2RFJ/311
I2ZCE/150
IV3YYK/268
I4AND/315
I4EAT/316
IK6BOB/267
IK7CJV/285
JA1OND/320
JA1SJC/210
JF1KKV/312
JH1HLQ/323
JA2BAY/317
JA2DN/302
JE2LPC/251
JG2CLS/186
JA3ARM/176
JA3DM/226
JA3RRN/305
JA4UQY/271
JA6GIJ/313
JA7MFL/251
JA7QFU/253
JAØDWY/307
KP4DQ/175
LA7FD/294
OH3SR/337
OK1ADM/349
OK2PO/267
OK3YEB/201
OZ6EI/274
PA3DRZ/203
PT7WA/319
PY4BR/286
SM5BZQ/173
SM6NT/176
SM7EXE/334
SM7LOX/230
SM7TV/324
SMØBFJ/332
SMØCCM/323
SMØDJZ/320
SMØDRB/271
SP2JKC/229
SV1ADG/306
TF3SV/330
VE2WA/295
VE3ADP/228
VE3BTQ/159
VE3CWE/311
VE3JCV/229
VE3JGC/252
VE3NI/308
VE3XK/325
VE4OX/344
VE6AXB/151
VE7EW/159
VU2TTC/251
WP4D/283
XE1MDX/308
XE1XRC/177
YO3AC/335
YU1AB/325
YU1BZ/296
ZL2VS/255
4Z4XW/214
AK1L/292
K1HDO/306
K1HZ/323
K1IN/251
K1LEC/260
K1NJE/332
K1VSJ/250
K1WC/302
KA1CRP/150
KA1MPA/154
KA1X/284
NJ1T/176
W1BWS/310
W1ECH/307
W1EOA/332
W1QUS/319
W1RED/326
W1XK/250
WA1TCA/227
WB1EAZ/305
K2MYR/124
K2POF/251
K2QIL/310
KB2NU/315
KK2B/150
KV2Y/300
KW2P/318
KX2S/238
N2ZZ/157
NY2E/294
W2ELH/300
W2KKZ/283
WA2CBU/290
WB2EKK/176
WB2KPE/312
AG3S/243
AI3N/306
AI3R/311
K3NW/281
KC3EN/203
KC3J/178
KV3D/290
W3FX/195
AA4AV/279
AA4BA/302
AG4S/300
K4CNW/310
K4ELK/314
K4EZ/360
K4GFI/323
K4JBY/149
K4KPH/305
K4SV/293
KB4SA/305
KC4UG/261
KD4S/316
KF4YB/290
KI4M/313
KK4BS/149
N4BLX/311
N4CQ/316
N4LZL/204
N4WB/329
N4WW/339
NA4D/309
W4UXI/285
W4VUL/288
W4YJ/364
WA4JTI/323
WA4SSI/270
WA4TBH/176
WA4VCC/311
WA4YBV/298
WB4NFO/305
WB4PUD/309
K5FNR/260
K5GL/299
K5HKX/155
K5MC/262
K5WE/311
KF5PE/156
NA5S/289
W5AWT/317
W5CP/338
W5CWQ/319
W5DL/349
W5FGO/283
W5INL/304
W5KV/220
W5MCH/294
W5PLN/300
W5PWG/256
W5QIX/320
W5TZN/260
W5UCQ/332
W5VHP/166
WA5CMI/156
WB5LBJ/DU/313
WB5ZDP/252
WS5O/264
K8SIK/272
K6UD/325
N6WK/312
NQ6X/279
W6BDD/150
W6KFV/329
W6MND/317
W6OK/299
W6OSP/300
WA6HYB/125
K7ZM/214
KA7GXO/175
KA7T/271
KC7EI/301
KD7X/257
N7KA/312
N7US/324
N7WS/257
NB7N/131
NX7K/310
W7FG/312
W7HRD/303
WB7CLU/312
K8KAE/333
KC8MK/250
KC8PG/296
KD8IW/291
KG8V/329
N8AXY/307
W8IQ/322
W8QBA/308
W8YA/335
W8YGR/346
AB9O/314
K9AGB/336
K9BB/324
K9GM/334
K9JF/334
KA9OTD/201
KB9OC/323
KD9BG/290
KJ9I/302
KS9Z/315
N9AG/214
N9RD/289
W9FD/353
W9NT/214
WB9EJE/240
WD9GQV/300
KØDEQ/292
KØGSV/325
KDØRT/125
KOØZ/153
NSØB/200
WKØF/169

(continued on page 72)

Ham Radio on Mt McKinley

By Earl W. Korf, K2IC
PO Box 153
Lincroft, NJ 07738

KA3PLZ: HELLO BUDDY. THIS IS KA3PLZ FROM THE SUMMIT OF MT McKINLEY. I BELIEVE THIS IS THE FIRST TIME THIS HAS BEEN DONE.

KL7OT: OK! CONGRATULATIONS.

KA3PLZ: THANK YOU VERY MUCH AND HOPE YOU ARE FEELING BETTER SOON. RIGHT NOW IT'S 5 BELOW ZERO WITH LIGHT WIND ON TOP OF ALL CLOUDS. WILL SEND YOU A UNIQUE QSL CARD.

KL7OT: OK GREAT, AND THANKS, AND SURE NICE TALKING TO YOU. TAKE IT EASY ON THE WAY DOWN.

KA3PLZ: ROGER, AND THANKS, AND SURE NICE TALKING TO YOU. KA3PLZ CLEAR.

The above QSO took place on July 8, 1986 at 8:30 PM Alaska time. Blake Ward, KA3PLZ, standing on the summit of Mt McKinley, 20,320 feet, talked on 146.52 MHz simplex to J. J. Jones, NL7A, then was phone patched to Buddy Clay, KL7OT, who was in an Anchorage hospital. This is believed to be the first phone patch from the summit of Mt. McKinley.[1]

Plans for this trip, named the Pittsburgh Denali Expedition, were made in the fall of 1985 by three graduate students who met at Carnegie-Mellon University in Pittsburgh. They were Blake Ward, KA3PLZ, Bernd Bruegge and Richard Korf.

In the spring of 1986, Blake and Bernd drove from Pittsburgh to Anchorage with three new hand-held transceivers and a good supply of alkaline batteries. In Anchorage, they met Richard and arranged for the phone patches. On their drive north to Talkeetna, they visited Del, KL7JKW, and Rosemary Hanrath, KL7LA, who volunteered to monitor their frequency and relay weather information. The climbers then flew to the landing on the lower Kahiltna glacier at 7000 feet. A 2-meter simplex contact (90 miles with 3 W) was made with KL7LA, the first of many daily contacts made during the 28-day expedition.

After a 19-day climb, in which they ditched their sleds and skis, they arrived at the summit. Over 35 contacts were made from the summit in sub-zero temperatures during their 1-hour-and-15-minute stay. A speaker-microphone with an on-off switch was used because it could be handled by heavily-gloved hands, and the rig could be kept warm inside the the climber's clothing. Only a few minutes of interruptions occurred during the changing of rigs and batteries. The first transmissions from the summit were phone patches made to family and friends. Then about 25 calls from local hams were taken on the Polar Amateur Radio Club's repeater. All of the QSOs were tape recorded. The climbers returned safely on July 16 after four-day delay because of the weather and unsafe airplane landing conditions at their pickup point. In conclusion, Alaskan hams highly impressed the climbing team. The monitoring, relaying of weather information, arranging for aircraft pickup and the many adeptly handled phone patches contributed to the success of the climb.

(l-r) Rich, Blake and Bernd revel at the summit.

[1]This was not the first time Amateur Radio was used on Mt McKinley. Byron Robertson, WA7SBG, used a 2-meter hand-held transceiver during his ascent in May 1982.

Blake Ward, KA3PLZ (l), and Rich Korf (r) at the microphone talking to the author, K2IC (Rich's father), via phone patch to New Jersey.

Mt McKinley's West Buttress and South Face viewed from the Kahiltna Glacier with the expedition's route indicated by the lines and arrows. *(photo by Jim Okonek)*

1988: The Amateur Radio Year in Review

The League continues to lead the fight against the 220 grab into 1989, as membership soars to an all-time high.

By Sheldon Ball, KC1MP
ARRL Editorial Assistant

If the average ham was asked to pick the 1988 event that affected Amateur Radio the most, he or she would undoubtedly choose the reallocation of the bottom 2 MHz of the 220-225 MHz band from the Amateur, Fixed and Mobile Services as coprimary users to Land Mobile alone by three Federal Communications Commissioners (acting with a shortage of two members since the beginning of the year). Their decision was handed down August 4—otherwise known as Black Thursday. Our October *QST* editorial blasted the decision and stated that amateurs' long-standing respect for the Federal Communications Commission will never be quite the same. The FCC proposal, first issued as General Docket 87-14 on February 12, 1987, continues to be a battle for the League and the Amateur Radio community.

The Commission's decision came after it had received an estimated 5000 to 7500 written comments against reallocation. Only about 15 comments supporting reallocation were received. These were from land mobile trade associations and from companies that make (or plan to make) amplitude-compandered single-sideband (ACSSB) gear for land mobile use.

In June, Congressional Resolutions were introduced lauding the work of amateurs in providing communication for all sorts of disasters. These "Sense of the Congress" resolutions stated that Congress supports amateurs, and government agencies should take amateurs' needs into account when making decisions affecting the Amateur Service. By late October, the Resolutions had 107 cosponsors in the House and 52 in the Senate. Amateur Radio made a lot of new friends in Congress during 1988.

Senator Pete Wilson (R-CA) reoffered his Resolution as an amendment to new Section 10 of the FCC authorization bill. The amendment was accepted and agreed to in the Senate and House. President Reagan signed it into law on November 3. While Section 10 does not force the Commission to change its decision, it could become an important building block toward a solution to the problem.

Hams added to their 75-year record of public-service communications throughout 1988. Here, Eddy Kosobucki, K4JNL, takes a turn as tactical net director during a re-enactment of the Battle of Chickamauga. The Generals could have used such communications in 1863!

Over 600 Petitions for Reconsideration have been filed, including those on behalf of the Department of Defense and the ARRL. In the meantime, hams do not have to vacate 220-222 MHz until after "service rules" have been written for Land Mobile use of the band, and plans have been set for coordination between government and private land mobile users.

As 1988 closes, the League continues to research remedies. ARRL President Larry Price, W4RA, has vowed, "The League will continue to pursue every available administrative, judicial, and legislative remedy to ensure that radio amateurs have access to spectrum they need to serve the public."

Part 97 Rewrite

In PR Docket 88-139, the FCC proposed to restructure Part 97, the Amateur Radio Service rules. Except for the statement of the basis and purpose, the Commission completely reorganized Part 97.

The League filed extensive comments and offered an alternative text for Part 97. The biggest objection to the original document was the shift away from due process to greater FCC administrative authority. The League's text revised these provisions. The FCC had succeeded in reducing the length of the present rules from 30,073 words to 24,397. The League's rewrite further reduced the length to 17,045 words without eliminating necessary substance, yet retained the basic structure of the rules as proposed by the FCC. The ARRL version is styled as "Part 96," a number not previously assigned to any portion of the FCC rules.

Public Service

Amateurs assisted in communications during Hurricane Gilbert. Gilbert devastated parts of the Caribbean, Mexico and the US during the week of September 11. The Hurricane Watch Net monitored the progress of the storm and provided the latest coordinates to radio amateurs in the affected areas. Reports coming from the hams in the path of the storm were related to the Hurricane Center. However, the November *QST* editorial observed that Amateur Radio must provide a more disciplined response to disasters if we're to continue to deserve our hard-earned reputation as a disaster communications service.

In December, an earthquake devastated Armenia. A verbal third-party-traffic agreement between the Soviet Union and the United States was made. In response to a request from Soviet officials, *QST* columnist Vern Riportella, WA2LQQ, lined up the donation of six complete packet VHF stations from Tandy Corporation, Yaesu USA and AEA. League laboratory employees made up cables to integrate the equipment into separate packet stations. The completed stations were packed and flown to the Soviet Union.

A Memorandum of Understanding between the League and the National Weather Service was signed on January 19. The Memorandum makes official the close cooperation that has long existed between the two organizations in respect to weather spotting and other organizational matters.

Satellites

Early in the year, UoSAT-OSCAR 11 returned to normal service after problems with the onboard computer software were solved.

After a successful launch on June 15, activity has been brisk on AMSAT-OSCAR 13. This new satellite is easier to use than its predecessor, AMSAT-OSCAR 10. AMSAT-OSCAR 13 carries four separate transponders covering frequencies from 145 MHz to 2.4 GHz. This new bird is

hardened to withstand the rigors of space and should operate for more than five years.

Operating

1988 brought us some spectacular propagation conditions as Cycle 22 continued. Superb 10-meter conditions and 6-meter openings continue to be reported.

Hams helped celebrate the bicentennial of the US Constitution. Special-event stations sporting "*200*" call signs were a huge success throughout the year. Throngs of hams participated in operating and contacting these stations. All states and the District of Columbia were represented. ARRL HQ joined in the activity, and W2ØØAW made thousands of contacts.

The League announced an all-digital contest—the ARRL RTTY Roundup—slated for debut in January 1989. Participation was generally up in all contests. Record scores were set in several League contests, and scores and the number of entries are expected to continue to increase with the increase in solar activity.

In commemoration of the League's 75th anniversary, the Board of Directors called for a year-long operating celebration. The ARRL Diamond Jubilee Award is a handsome certificate available to any ham or SWL who logs 75 CRRL/ARRL sections; 75 different DXCC countries on a combination of 18- and 24-MHz WARC bands; or 75 US Novice and Technician (below 30 MHz) stations with exchanges of more than "hello and goodbye." See October 1988 *QST*, page 59, for complete details.

In November, hams began making 2-meter contacts with the Soviet Space Station MIR. Signals from U1MIR and U2MIR were excellent. Relief crews are expected to continue the amateur operations.

Early in the year, the Associated Press reported on a study that linked hams' exposure to RF energy with incidences of cancer. The study claimed that there were more deaths from certain types of leukemias among Silent Keys than for the general population of white males in a typical year. The study also showed that hams had fewer deaths than the general population from certain other kinds of leukemia, and in the opinion of competent professionals, there were serious flaws in the study's methodology. The ARRL Committee on Biological Effect of RF continues to study the subject.

SKITREK

Thirteen Soviet and Canadian skiers completed a 91-day, 2000-km trek from the USSR across the North Pole to Canada in June. The location of the team was transmitted on UoSAT OSCAR 11. Canadian and Soviet hams provided communication teams to support the skiers and the operation was termed "monumentally successful."

Technical Developments

AMSAT (Radio Amateur Satellite Corp) and TAPR (Tucson Amateur Packet Radio Corp) entered into a joint digital signal processing (DSP) project. Lyle Johnson, WA7GXD, Tom Clark, W3IWI, and Bob McGwier, N4HY, played key roles in this project. They now have the basic design of a DSP board, and some software has been written. The DSP board (hardware) will be able to perform a variety of functions depending on the software. For example, the same hardware can be used as a modem, a scan converter or a low-frequency spectrum analyzer.

The sunspots and late-June sunshine really brought out the Field Day participants like KØNA! Improved HF conditions were also reflected in QSL Bureau workload, contest scores and applications for ARRL operating awards.

AMSAT organizations in the US, Argentina and Brazil joined forces with the Center for Aerospace Technology at Weber State College (Ogden, Utah) to produce four small packet-radio satellites. TAPR is providing initial financial support, and the ARRL Lab is participating in design and construction of these "microsats."

The ARRL Digital Committee is working on a proposed version 2.1 of AX.25, the amateur packet-radio protocol. This backward compatible version will clean up some minor problems and will extend the address field to accommodate reciprocal call signs.

Work has also started on a longer-term upgrade of AX.25. This upgrade is being called version 3.0 and will feature more improvements of the protocol. Version 3.0 will not be backward compatible with earlier versions.

Paul Rinaldo, W4RI, traveled to Geneva for a meeting of CCIR Study Group 8, Mobile Services. Paul presented five documents on the Amateur and Amateur Satellite Services for publication in the CCIR green book.

A number of amateurs attended two meetings on the topic of HF packet radio in the Washington, DC area with officials of FEMA (the Federal Emergency Management Agency). Both groups will continue their efforts to further technological development of HF packet radio and to work toward compatibility between Amateur Radio systems and FEMA emergency packet radio systems.

HQ Technical Activities

AMSAT's microsat program was

Leonid Labutin, UA3CR, visited the US in the fall. Among his many stops was the AMSAT-NA Sixth Space Symposium and Annual Meeting in Atlanta. *(photo courtesy KE3Z)*

Dr Thomas Clark, W3IWI, showing a full-size model of the microsat. Tom spoke on AMSAT's microsat project at the AMSAT-NA Sixth Space Symposium and Annual Meeting in November. *(photo courtesy KE3Z)*

supported by a major lab program led by Jon Bloom, KE3Z. The program resulted in design of the microsat power module. Construction of flight hardware by Jon and Bruce Hale, KB1MW, is scheduled for early 1989.

The Headquarters Operators Club station, W1INF, is now equipped for Mode-L (24 cm uplink, 70 cm downlink) satellite operation.

Thanks to a number of amateurs at Hewlett-Packard, the lab received a donation of a reconditioned network analyzer system. The system covers the frequencies ranging from HF to 1300 MHz.

Publications

Publications for the year featured the 1989 (66th) edition of *The ARRL Handbook*, a completely revised *ARRL Antenna Book* (15th ed), *W1FB's Novice Antenna Notebook*, the *Satellite Anthology* and the *ARRL Extra Class License Manual* (3rd edition).

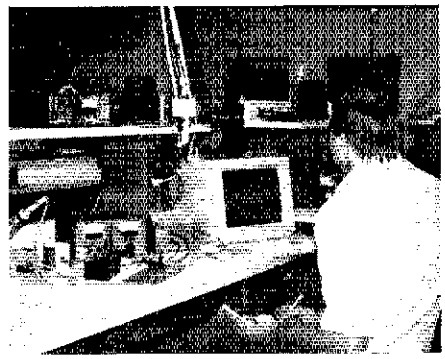
Conference proceedings were printed for the 7th Computer Networking Conference, 6th AMSAT-NA Space Symposium and Annual Meeting, 22nd Central States VHF Conference and Microwave Update '88. ARRL publishes these proceedings in order to encourage the exchange of ideas among amateur experimenters and thereby further development in these areas.

QST technical articles of note for 1988 include the wrap-up of a two-part series by Steve Powlishen, K1FO, on an optimum design for 432-MHz Yagis; a phasing-type direct-conversion SSB receiver presented by *RF Design* magazine editor Gary Breed, K9AY; the Neophyte Receiver by John Dillon, WA3RNC; a two-part article by John Grebenkemper, KI6WX, on phase noise; and an introduction to the coplanar twin-loop antenna by O. G. Villard, Jr, W6QYT.

QEX, the ARRL experimenters' exchange and AMSAT satellite journal, continued to carry articles of interest to the more technically inclined. Articles covered topics such as microwave antennas, facsimile, UHF amplifiers, practical spread-spectrum circuits, microprocessor controller for special projects, algorithms and methods for AMTOR, and visual observation of satellites and orbiting objects.

Year's end saw the introduction of a new series of Morse-code practice tapes. There are four sets of two 90-minute practice cassettes. The first three sets cover speeds from 5 to 22 WPM. For speeds below 18 WPM, the code is generated using characters sent at 18 WPM with the spacing between characters increased to slow the overall code speed (Farnsworth timing). The code in Set 4 is generated with standard code timing, and provides practice at speeds from 13 to 14 WPM as preparation for the General class code exam.

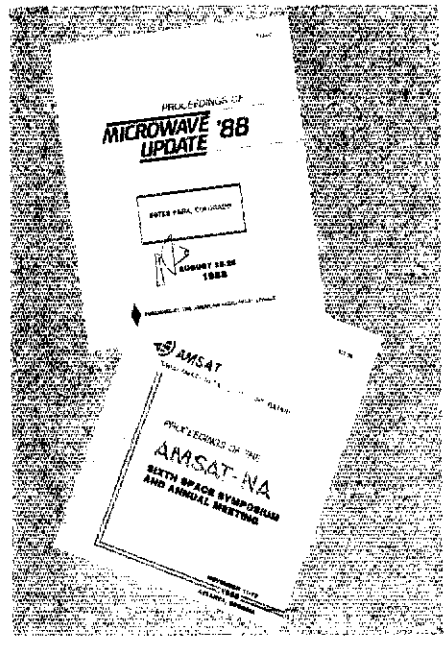
Field Services completed work on a slew of new titles for the Field Organization. Clubs are supported by the *Special Service Club Manual* and *Club Presidents' Workbook*. Also in print were a *Special Events Communications Manual*, *Training Guide: The Amateur Auxiliary to the FCC's Field Operations Bureau*, the *Technical Coordinator's Manual* and a new *Section Manager's Survival Guide*



Senior Laboratory Engineer Jon Bloom, KE3Z, uses an automated test system that was built in the ARRL Lab to optimize the microsat voltage regulator circuit breadboard.

League Membership Reaches New Heights

In April, the League reached an important milestone—more FCC-licensed radio amateurs on our membership rolls than at any time in our history. Membership at the end of the year, including Full and Associate Members, was approximately 156,000—an increase of over 6,000 members from the end of 1987—and we continue to net several hundred new members each month.



The ARRL published proceedings of the Microwave Update '88, the AMSAT-NA Sixth Space Symposium and others. The League publishes these proceedings in order to encourage the exchange of ideas among amateur experimenters.

Growth in Licensing

FCC license statistics showed an overall growth rate for the Amateur Radio Service from October 1, 1987 to September 30, 1988 of 1.54 percent. The Technician class led the way with an impressive 8.7% growth, followed by Extra Class with 6.8% growth. Advanced class mustered a slight increase of 0.2%, and Novice and General classes posted losses of −3.7% and −1.3% respectively.

Using the same time frame, 1988 witnessed 21,080 new licenses and 26,342 upgrades. Compared to averages for the previous five years, the Service is running only slightly ahead in terms of new licenses and about 25% ahead in terms of upgrades.

Project Suncoast Seniors

Local amateurs from Hillsborough and Pinellas Counties, Florida participated in a new-ham recruitment pilot project that targets nonamateurs aged 50 and over. This project coordinated the many strengths of the ARRL Field Organization, affiliated clubs, registered instructors, Volunteers Examiners and others toward bringing the fun and excitement of Amateur Radio to more people. The lessons learned from the pilot project can be used nationwide in 1989.

No-Code Licensing

By the end of the year, the no-code issue was again being discussed. The Executive Committee unanimously voted that the ARRL President appoint a committee to explore the implications of a no-code license and make recommendations to the Board. In 1988, Communications Canada considered restructuring Canadian amateur licensing. Under a draft version of the new Canadian proposal, there would be a no-code VHF/UHF license different from the present no-code digital license.

17-Meter Band

The FCC proposed to open the 17-meter band to amateurs by July 1, 1989. Until that time, the band remains an alternative allocation to the Fixed Service. In early fall, the

Project Suncoast Seniors targeted nonamateurs aged 50 and over to become new hams. After recently taking classes sponsored by the Metropolitan Repeater Association of Pinellas Park, Florida, these proud upgrades show off their certificates. (*photo courtesy WA1DHM*)

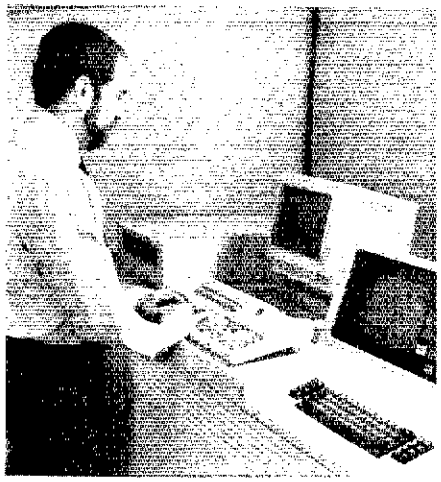
League requested the FCC issue an Order permitting immediate interim use of 18.068 to 18.168 MHz on a secondary, noninterference basis.

ARRL Foundation

The Foundation had a highly successful year, contributing to the advancement of Amateur Radio in a variety of ways. The Jesse Bieberman Meritorious Membership Program was reactivated. It provides a one-year membership extension for longtime League members over age 65 who have a known financial need. Three new scholarships were announced in 1988, and the Victor C. Clark Youth Incentive Program made several grants to youth groups. 1988 witnessed more contributions and higher dollar-value contributions than ever before, making many programs possible.

IARU Region 3 Meeting

The League sent a delegation to the 7th Conference of IARU Region 3 in Seoul, Korea in October. The ARRL delegation included First Vice President Jay A. Holladay, W6EJJ; International Affairs Vice President Tod Olson, KØTO; Executive Vice President David Sumner, K1ZZ; and International Programs Manager Naoki Akiyama, N1CIX. Work involved consideration of HF and VHF band plans (with particular emphasis on 1.8, 3.5 and 14 MHz), packet-radio standards and frequency allocations, and preparation for a possible future WARC.



League membership at the end of December was at an all-time high of approximately 156,000. The new IBM System 38 computer keeps track of Members' mailing addresses and orders, as well as other administrative tasks. ARRL Computer Supervisor John Proctor is shown operating the console.

ARRL Potpourri

The ARRL film *The New World of Amateur Radio* won the Gold Medal in the Science and Technology category of the 1988 International Film and TV Festival of New York.

HQ is now on-line and up-to-date with the acquisition of a new IBM System 38 mainframe computer. After retiring the old Honeywell system, which lacked the storage capabilities needed for the expanding membership and publications sales databases, HQ is now able to further assure the rapid and accurate processing of Members' applications and orders.

W1AW Renovation

In March, the League announced a major renovation of America's flagship Amateur Radio station. After 50 years of nonstop code-practice and bulletin service, W1AW needs a total interior and exterior upgrade, plus new equipment and antennas for bulletin and code-practice service, as well as for visitors' and emergency operating. As of this writing, the W1AW Renovation Fund Drive has raised approximately $305,000. Construction will coincide with the 75th anniversary celebrations in 1989.

Summary

In conclusion, 1988 was a dynamic year for Amateur Radio. Many major issues go unresolved at year's end, so watch the pages of *QST* to see how the stories unfold.

W1AW Renovation Update

How to Contribute to the W1AW Renovation Drive

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

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

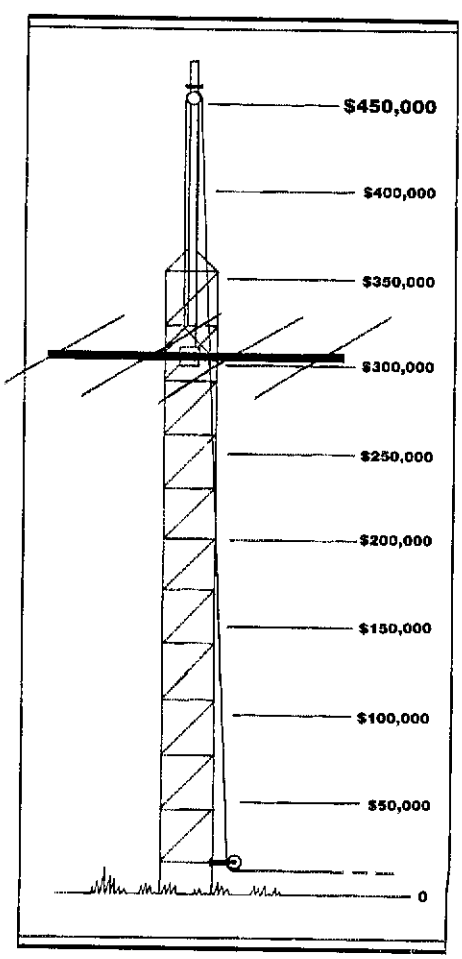
All contributions are tax deductible to the extent allowed by law, as ARRL is a 501(c)(3) tax-exempt organization. Does your employer have a match-contribution program? Some major employers will match your contribution.

Recognition

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

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

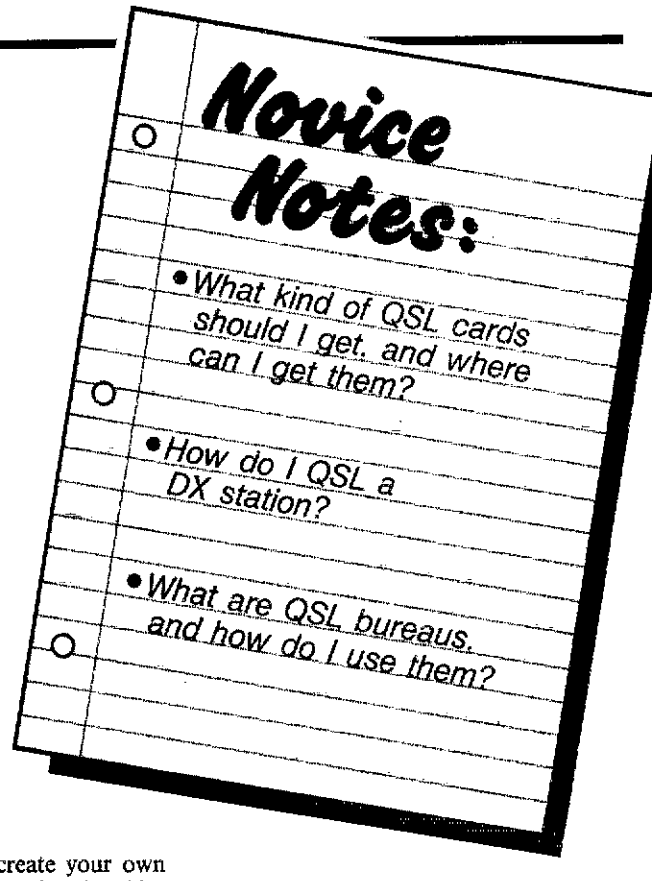
All contributors will receive a handsome certificate, suitable for framing. Members of the *Hiram Percy Maxim* and *Kilowatt Clubs* will, in addition, have their name and call sign inscribed on a special plaque that will be on permanent display in the renovated W1AW Building. Members of the *Kilowatt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



Paper Tiger

With some basic information, QSLing can be easy and fun!

By Rick Booth, KM1G
c/o Offshore Publications
PO Box 817
Needham Heights, MA 02194



The poet said eyes are a window on the soul. If he had a ham radio license, he might have said the same of QSL cards. Yours, and how you use them, say a lot about you.

First, some background: QSL does *not* in and of itself mean a postal card. It is a Q signal, just like other Q signals, born in radio's infancy by the necessity for CW shorthand. QSL means either "Can you acknowledge receipt?" or "I am acknowledging receipt" depending on whether it's sent with a question mark. It's also used so often today in conjunction with the act of exchanging QSL *cards* that you'd think it refers to the card itself. Not necessarily. When another operator "QSLs" your 599 report, for example, he or she is merely indicating that a valid two-way contact has taken place. In terms of the QSL *card*, QSL is generally understood to mean a written or printed confirmation of a radio contact.

Be that as it may, your part of the QSL card equation comes in two steps: Getting yourself some cards and sending them. There are finer points to each, some of which may not be obvious. Learn them early, and your fellow hams will like what they see through the "poet's" window!

Getting Your Cards Printed

One quick and usually inexpensive card source is commercial printing houses, many of whom advertise in *QST* and other publications. Finding them isn't hard—just turn to the "Ham Ads" section of this issue. Choosing among them may be a bit more dicey, especially if you like to preserve your individual identity. By going commercial, you're buying predesigned cards, unique only to the extent that *your* name, address and call sign are printed on them. Hundreds, perhaps thousands, of other amateurs are using the same design. New hams often buy from stock houses—check your incoming mail and you'll notice some startling repetition.

Other options exist short of custom printed cards. Some specialty houses make stick-on labels that you can use with an ordinary postcard (if you have access to a PC, you can also generate your own labels with all the appropriate QSO details). Or, you can have a rubber stamp made at a novelty store, using that in conjunction with an ordinary postcard to create your own QSLs. This is certainly a functional and inexpensive arrangement, but it does lack something in originality.

If you want to stand out from the crowd, have your cards custom printed, budget permitting. Technology has simplified printing in the past few years; hardly a crossroads doesn't have an instant printer where you can get cards for little more than you'd pay a stock press. If this is your first card, don't print too many, perhaps only a few hundred. The discount for 3000 may seem attractive, but life on the bands has a way of changing us—the card you want today may not be the one you'll want tomorrow, especially if you plan to upgrade your license and change your call in the near future. In that case, you'll be stuck with a lot of expensive bookmarks!

Bargains

Custom-printing bargains exist, if you're willing to compromise. You might piggyback on another customer's job. Cardstock left over from another job may suit your needs. How about ink? For a simple one-color job, any contrasting combination might do—say red, black or blue on white, or vice versa. If the printer doesn't have to re-ink the press, and has your stock cut and waiting, he may settle for less money. Another common method for obtaining inexpensive cards is to get in on a group order placed by your local radio club. Check with the club officers to see if they have this sort of arrangement with a local printer. Keep in mind that even though the price of cards gets cheaper the more you order, only order as much as you realistically expect to use.

Once you locate a printer, assuming you have the bucks to go the custom-design route, you'll need a design, be it with graphics (cartoon, picture, emblem and so on) or without. Obviously, without is easier and less expensive, though less distinctive. Essential information that must appear on the QSL card includes your call sign, name and mailing address (and station location, if different from your mailing address). Include your county, too, since many hams in this country *and* around the world collect US counties for the US County Award sponsored by *CQ* Magazine. The blanks where you fill in the confirming QSO details should include plenty of room for the other station's call (provide enough room in that box—some calls are longer than you think), date (including year), time (in UTC, *never* local time), band, mode and signal report (RS or RST). Your rig/antenna configuration is optional, but if you include it, don't buy a new rig or use a different antenna until you use up all your cards! Anther helpful item is to include a "PSE/TNX QSL" line or equivalent; circle either PSE or TNX, depending on whether you are requesting a return card or responding to the one you received.

Pay as You Go: Return Postage for QSLs

If you're sending your card to a another stateside ham, or to a stateside QSL manager who represents a DX station, always include an SASE (self-addressed, stamped envelope) if you want his or her card in return. Although all of us have limitations to the amount of money we can spend on postage, it's not sporting to expect the other station to foot the entire bill for *your* card. After all, the other ham has enough to contend with, especially if he makes large volumes of contacts, so anything you can do to help minimize postage costs and time spent addressing envelopes is greatly appreciated. The SASE is an envelope on which you've put a 25-cent stamp and which you've addressed to yourself. All the other amateur has to do is look you up in the log and fill out the card.

How do you know if the DX station has a US QSL manager? He'll usually tell you "QSL via AA2Z" or the equivalent. Otherwise, such information is obtainable from sources such as the "How's DX" column in *QST*, the weekly W1AW DX Bulletin transmission, the various DX newsletters that you can subscribe to, or by asking an active DXer in your local radio club.

If you are sending a card to an overseas ham, remember that *US* stamps on your self-addressed return envelope are *not* valid inside that country. To provide for return postage from a foreign land, preferably by airmail, you have three options: International Reply Coupons (IRCs), postage stamps issued by that particular country, or a "green stamp" (US dollar bill).

- *IRCs.* In almost any country of the world, an IRC (which should be available at the US Post Office in your town) can be exchanged at a local post office for enough local stamps to return a QSL card via surface mail. Several IRCs can be exchanged for enough postage for an *airmail* return. The number of IRCs needed for airmail return varies from country to country. A table published in the *The Radio Amateur's Callbook* lists by country how many IRCs are needed for an airmail reply. The "retail" price for an IRC, if you buy them at your local Post Office, is 80 cents each. However, since IRCs are not widely purchased by the general public and seldom cashed in, but are continuously recycled throughout the Amateur Radio world, don't be surprised if your local post-office employee doesn't have a clue as to what they are. You might find, moreover, that you can get a much better deal by investigating the possibility of buying IRCs from a local ham, such as a QSL Manager or active DXer, who happens to have amassed a large quantity.
- *Internal Stamps.* If you propose to include *unused* stamps issued by the government of the DX station's own country, you'll have to go to a stamp dealer and acquire them, and you'll have to determine what the appropriate postage is for an airmail reply. Since figuring all this out may become problematical, using IRCs may be the better approach.
- *Green stamp.* Almost everywhere, a US dollar exchanged into the local currency is generally enough to pay for an airmail response (and, of course, is cheaper than, say, the "retail" price of two or three IRCs). However, don't ever send a green stamp unless the DX station *specifically* requests that you do so. In certain countries, possession of US currency is illegal; sending a dollar to a DX operator in that sort of country may get the operator into trouble. Generally, you can't go wrong with IRCs, so if you're not sure, please go the IRC route. To discourage pilferage, it's generally a good idea to make sure the enclosures cannot be seen through the envelope. For this same reason, it is sometimes helpful not to put call signs on the envelope.

You might consider trying out your design on a few ham friends *before* the presses roll. It's not a bad idea to show it to someone with an art, typesetting or graphics-design background, either. What looks "socko" to you might not seem so to a more trained, not to say objective, eye.

That's it; that's all you need. Whatever other personal data you include on the card is up to you. You've no doubt seen those alphabet soup cards: DXCC, WAS, WAZ, QCWA and so on. Don't worry if at this stage in your ham career you don't have any of these abbreviations to tack on; remember, everything *nonessential* competes with the essential QSO details, making the latter harder to find. Someday a rare DX operator will be scanning your card, comparing it with his log entries, and he'll really appreciate your simplicity. Incidentally, there are *exactly* two ways to fill out a QSL: Perfect and Wrong. Be careful, be accurate and be neat. Use a ball-point pen. If you make a mistake on a card, throw it away. Marked-over or altered cards (even if such modifications are made in good faith) are *not* acceptable for awards. What if you're the DX station's *only* North Dakota contact?

Putting the blanks for QSO information on the back of the card may appear to be space economy, but it can be false economy. With your call/address on one side and the QSO data on the other, the recipient has to flip the card over to get it all. Try that on 1000 cards sometime, or even 10,000! That's not far-fetched, either. Rare "DXpeditions" (trips by radio amateurs to hard-to-work spots for the specific purpose of putting that area "on the ham map") get that many and more. Better if you can put everything on the same side of the card.

Graphics

Let's hope you have a graphic. Nothing fancy, perhaps just a simple drawing. It can reflect what you do, where you're from, who you are, or it can just be something you like. Photos are nice, but they complicate printing, which can translate into expense. Aim for what printers call simple line art. Occasionally you'll see QSL cards with comic strip or other recognizable characters. That *may* be trouble if such characters are proprietary. Before you use any art of this nature, check to see if such material is copyrighted.

And please use common sense. Your card will trot the globe, an ambassador without portfolio, as it were. Shun anything that might strike offense. Naturally that includes the off-color. But think hard before putting something "funny" on it. How will your gag play in another culture that has different values from ours? For the same reason, please think twice about being overtly nationalistic or religious, too.

Sending Your Cards

Ah, you're back from the printer. That was quick. Say, good-looking material! Fairly stiff, right size (3½ × 5½ in), good contrast so the printing shows up well. Now you're ready to send them.

The first few hundred aren't hard. You'll probably have a backlog of cards to answer or QSOs for which you want to obtain return confirming QSL cards. Every Novice goes through the ritual of replying to scores of new friends and acquaintances. It does get a little frightening when you see the postal bill, but pretty soon you'll be caught up and only have to maintain the status quo, that is, as you work 'em. Just be caught up by the time Novice Roundup rolls around!

The Importance of the SASE

Here's a pitch for those Novices from those hard-to-get spots. These hams get inundated with cards. Everyone is shooting for WAS (the ARRL Worked All States award), and you can't get "there" without them. If you work a stateside state you really want, include an SASE (self-addressed, stamped envelope) with your card. See the sidebar "Pay as You Go: Return Postage for QSLs."

Be patient, especially with DX stations/DXpeditions, stateside QSL managers for DX stations, and special-events stations. Many of these are run on a "shoestring" by volunteers in their spare time. Even getting special cards printed up by the operation's participants, much less filling them all out, can be complicated. At this writing, I'm still trying to finish QSLs from an April operation; strange, but true. What I learned about DXpedition QSLs would fill another article!

For now, you've got your stack of cards, and you're ready to roll. Better get back to the rig; 10 is still open!

The Bureau System

QSL cards going to DX stations overseas do not necessarily have to be sent directly to the DX station (assuming you can obtain a mailing address for him), but can be sent via the ARRL Outgoing QSL Service. If you are pursuing various DX awards (such as DXCC, the ARRL DX Century Club) that require possession of valid QSL cards as proof of contact, or you just like to collect DX cards, the expense of a direct airmail QSL with return airmail postage for each and every DX station you work will be more than you may be comfortably able to afford. Here's where the League's Outgoing Bureau comes in; it's the best and most cost-effective way to send cards to DX, absent a stateside QSL manager.

One of the principal benefits of League membership is access to the Outgoing Bureau. Your ticket to using this Bureau is your *QST* mailing label and two dollars per pound of cards (approximately *150* cards equal a pound, which is a lot of DXing!). Your cards will be promptly processed by the Outgoing Bureau staff at HQ; bulk shipments of cards overseas are made on a weekly basis, destined to QSL Bureaus in each country, usually maintained by the ARRL-equivalent national Amateur Radio society in each nation. From there, sorters organize the cards for delivery to individual amateurs. Eventually your card will be answered, and the foreign bureau will ship reply cards back to the US in bulk to the ARRL Incoming Bureau (see below). The process takes awhile (approximately one year round trip), but insofar as your main amateur DX "audience" is concerned—Europeans, Russians and JAs—it's really quite a savings, as long as you're patient. It also eliminates getting bogged down with buying IRCs, looking up QTHs (assuming such addresses are available to you in the first place), addressing envelopes and buying stamps. Since these countries are not rare for the most part, it's generally worth the wait because of the convenience and the savings, unless you have a special, compelling need to get a card immediately.

Particularly for amateurs in Europe and Japan, *a significant* part of their Amateur Radio operating is following up each radio contact with a QSL card to the station contacted. Indeed, they are quite generous with their cards, and it won't be long before cards are enroute from them to you. Here the process reverses itself, with foreign bureaus sending cards to the ARRL Incoming Bureau System for ultimate delivery to individual amateurs in the US (and Canada).

Within the US and Canada, the ARRL Incoming Bureau System is made up of local call-area bureaus (that is, organized generally by call-sign district). Most of the cards from the DX bureaus go directly to the individual ARRL bureaus, which are managed and staffed by volunteers. At these individual bureaus, the incoming cards are sorted by the first letter of the call-sign suffix. This sorting divides the work load into portions that can be handled by a single individual or several individuals per letter. To obtain your cards from the bureau serving your call area, send a 5 × 7½ in, self-addressed envelope to the bureau serving your district. Once the envelope is filled up (depending on how much postage you affix), the bureau staff will send your cards to you.

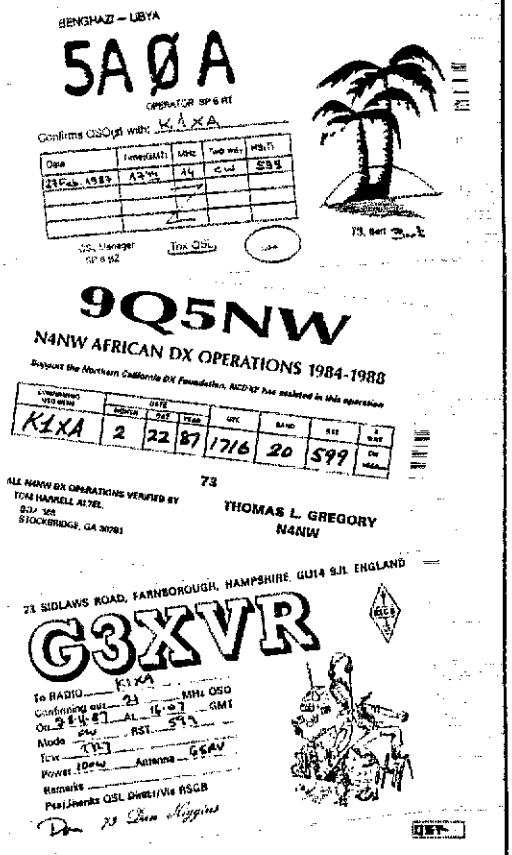
For complete details on the operation of both the Outgoing QSL Service and the Incoming Bureau System, including the address of the Incoming QSL Bureau serving your call district, send an SASE to ARRL HQ with your request for complete QSL Bureau information.

Sample QSLs

Bert, SP6RT, made many contacts from super-rare Libya as 5A0A. His card is a unique design, yet not elaborate. It certainly gets the job done, as all the necessary information is clearly evident. Note that even though he used a one-sided QSL format, he was able to include some attractive artwork. Notice the precise handwriting of QSL Manager SP6BZ that provides all the QSO details clearly and explicitly—with no markovers! Note, too, the *Tnx QSL* text; a simple underline permits Bert to acknowledge receipt of your card. Bert also left room to confirm contacts on three other bands, if that was appropriate.

9Q, Zaire, is another rare country, in this case activated by Tom, N4NW, as 9Q5NW. This is another functional yet attractive QSL card. Sometimes ambiguity sets in insofar as the month and the day is concerned (for example, would 8/7/87 be August 7, 1987, or 8 July 1987?). Note that Tom uses separate boxes for the month, day and year to eliminate any confusion. (Another approach is to always spell out the month, such as 22 FEB 1987 or FEB 22 1987. Some hams, particularly in Europe, use roman numerals to signify the month, in this case 22 II 1987). Note that the time is indicated in UTC only. The band is given in meters; *14 MHz* would also be acceptable. The exact frequency is seldom, if ever, necessary. Also, in a time-saving measure, Tom has preprinted *CW* and *SSB* under the *2-way* heading; all he has to do is cross out the mode that was *not* used to indicate the one that *was*.

Dan, G3XVR, places all his data on one side of the card, but manages to make room for a humorous cartoon as well as the Radio Society of Great Britain emblem nevertheless. Notice that he has left himself room to write in the kind of rig, antenna and the power that he was using for that particular contact, rather than preprinting information that would not keep pace with station improvements.



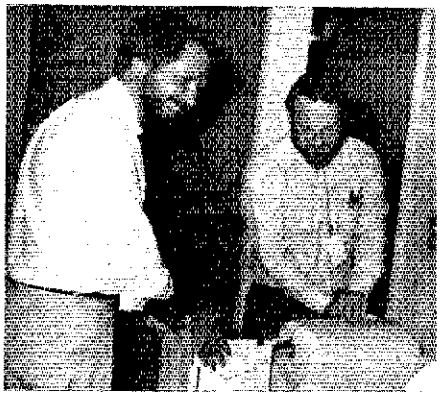
Ballot Counting at HQ: Democracy in Action

By Sheldon Ball, KC1MP
ARRL Editorial Assistant

Ballot counting for the ARRL Division Directors and Vice Directors is done with painstaking attention to detail and accuracy. Ballots are returned by members to an independent auditor. The auditor retains custody until ballot-counting day and supervises the entire process. All participants wear identification badges, and access to the ballot counting area is limited. The following photo story documents what happens on this exciting day in the conference room at Headquarters. (These photographs were taken throughout the day during ballot counting on November 21, 1988. If you don't know the outcome of your Division race, see last month's Happenings column, page 62.)

Counting went smoothly. The crew was able to leave at normal quitting time. After the results were verified by the Tellers, an election announcement was written for that evening's W1AW bulletins.

1 The ballot boxes arrive sealed, along with a Price Waterhouse auditor. Here, Ballot Teller Ed Metzger, W9PRN, Central Division director, lugs a box of votes to the envelope opening machine.



2 Assistants to the Executive Vice President, Mike Riley, KX1B (l), and Bob Schetgen, KU7G (r), operate the envelope slitter.

3 First the outer envelopes are opened and cleared away—then the second envelopes, containing the ballots, are opened and the ballots are sorted. Here, Perry Williams, W1UED, alternate teller, collects sorted ballots from EVP Secretary, Kim Fay.

4 League staffers representing all departments are needed to process the 39,421 valid ballots. Work begins promptly at 8 AM to ensure getting the results in by day's end. In the foreground (l-r), Joanna Hushin, KA1IFO, QSL Bureau manager; Bernice Dunn, KA1KXQ, convention program manager; Jo-Ann Arel, field organization assistant; and Jay Mabey, NU0X, *ARRL Letter* editor, sort ballots. In the background, John Melly from Price Waterhouse; John Nelson, W1GNC, deputy manager of Publications; Perry Williams and Hugh Turnbull, W3ABC, Atlantic Division Director, monitor the workers and help keep them supplied.

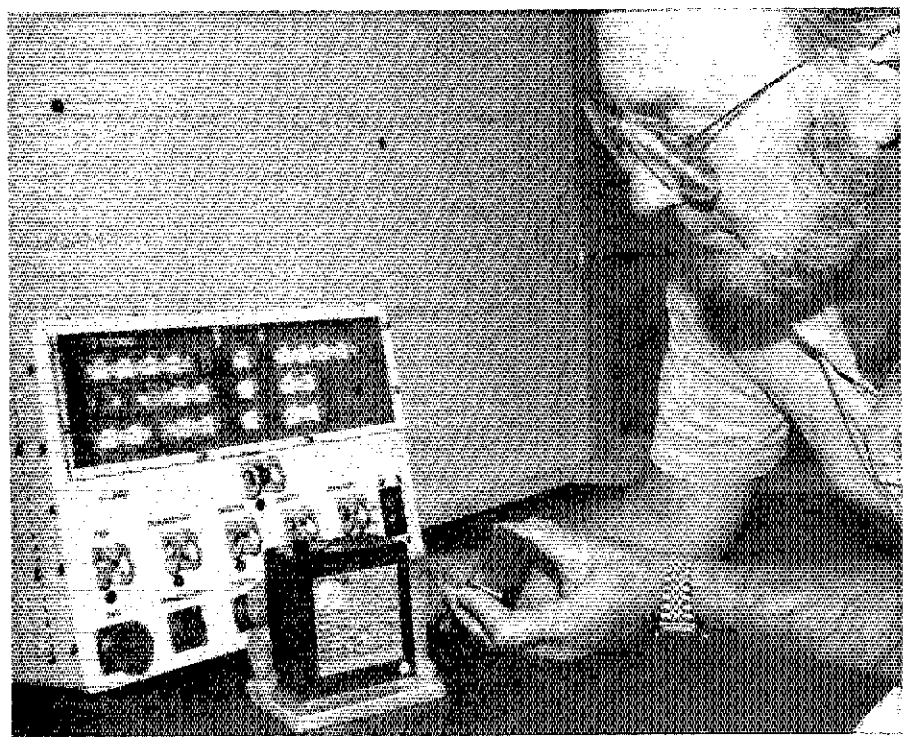
5 Ballot Tellers, Directors Turnbull and Metzger; distinguished guest Sir Richard Davies, G2XM, president of the RSGB; Larry Price, W4RA, president of the ARRL; and John Nelson watch ballots drop through the old reliable Pitney Bowes Tickometer, which counts the stacks of ballots.

6 Paul Grauer, WØFIR, Midwest Division director, and William Kullback from Price Waterhouse record the results.

SAREX: The Next Generation

It's time, once again, for the unique synergism that Amateur Radio and the Space Program create!

By Mary E. Schetgen, N7IAL
Assistant Secretary,
The ARRL Foundation



Lou McFadin, W5DID, of the Johnson Space Center ARC, inspects one of the new Lambda power supplies (r) donated by ARRLF. Compare it to the power supply it's replacing on the left! *(photo by Chuck Biggs, KC5RG)*

We hams are very fortunate! Not only are we able to enjoy the thrill of land-based communications for which amateurs can be proud of their historic contributions in experimentation and development, but we're also helping blaze new trails in space-age communications. No longer the stuff of imaginative science fiction buffs, contacts between your station and an orbiting spacecraft can be an exciting reality in the 80s. OSCAR fans have long known the fun and challenge of conducting QSOs relayed through Amateur Radio's highest repeater, and all hams who remember their participation in the last SAREX mission need no convincing as to the amateur's role in space! Jon Bloom, KE3Z, ARRL Senior Lab Engineer and SAREX Working Group member, gave us the following briefing on the history and future of the SAREX missions:

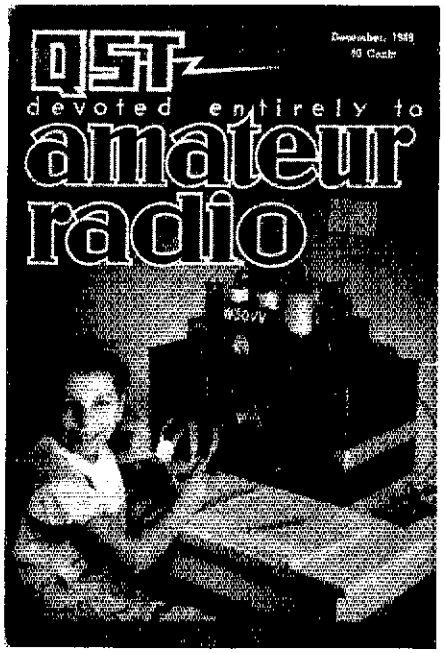
SAREX, the Shuttle Amateur Radio Experiment, is an ongoing program of amateur participation in the manned space program. The first ham in space was Owen Garriott, W5LFL, who operated from the space shuttle *Columbia* during the mission STS-9 in November and December 1983. Owen's operation consisted solely of 2-meter FM voice communications using a specially modified hand-held radio provided by the Motorola ARC of Ft Lauderdale, Florida. This mission showed that amateur activities could be performed aboard the shuttle without adversely affecting the mission. Naturally, hams responded quite enthusiastically.

The second mission, the first one to be designated SAREX, was that of Tony England, WØORE, which took place in July and August 1985 aboard the space shuttle *Challenger* during mission STS-51F. This mission provided the first flight of the specially built SAREX hardware which added slow-scan television (SSTV) capabilities to the Shuttle amateur station through the use of a Robot 1200 SSTV unit. The highlight of this operation was the participation of more than 6000 young people through organizations such as the Scouts, the Young Astronaut Program and school clubs. Thousands of hams worldwide excitedly listened in on these contacts, while others, at club stations equipped with SSTV receiving gear, first heard the telemetry tones, then *viewed* the first-ever amateur pictures from space.

Prior to the January 1986 Challenger accident, planning was underway for another flight of SAREX hardware. A mission carrying the Astro-1 payload with Ron Parise, WA4SIR, was scheduled for launch shortly after the *Challenger* mission that ended so tragically. The SAREX hardware was scheduled to be modified by the inclusion of a packet-radio TNC and an antenna that could be deployed throughout the mission, in an upgraded experiment called SAREX-2. The Astro-1 mission has now been resheduled to the spring of 1990 aboard mission STS-35. Unlike previous ham-in-space flights, the orbit of the Astro-1 mission will not allow for amateur participation nationwide. Stations in the northern third (approximately) of the US will be unable to contact the Shuttle. ARRL, AMSAT and the Johnson Space Center ARC are now in the process of planning the details of this mission. At JSC, an HK-21 TNC donated by Heathkit is being incorporated into the SAREX-2 hardware, as are new power supplies that are smaller and more efficient than the old ones. These power supplies have been donated by the ARRL Foundation.

Along with packet, another "first" is being added to the SAREX-2 capabilities: a fast-scan television uplink. This will allow authorized ground stations to send live TV pictures to the shuttle. Not only will this be a first for Amateur Radio, but for the US space program as well—as live TV signals have never been sent *to* a US manned spacecraft!

Although final approval and inclusion in the mission flight manifest of STS-35 is still pending with NASA, expectations are that it will be a go for WA4SIR's Astro-1 flight. We'll keep you posted as we get closer to the mission time.



Our former *QST* (Dec 1948) covergirl (l), now attorney Jane Bieberman DeNuzzo, W3OVV (r), with her husband Frank, W6SWM, want to sincerely thank all who have supported the Meritorious Membership Program. Jane has remained active on 2 meters and HF, with 150 DXCC countries confirmed. Jane's son David is KB6JHT.

A VALENTINE TO OUR CONTRIBUTORS

While we at the Foundation have appreciation for all our generous contributors, there has been especially gratifying support shown for the Jesse A. Bieberman Meritorious Membership Program in the form of letters and contributions. In this season of love, we thought you'd like to see an ARRLF "sweetheart" and daughter of the Meritorious Membership Program's namesake (above).

Contributors Corner

We wish thank the following for their generous contributions to:

The Goldwater Scholarship Fund
Bolingbrook Amateur Radio Society
Manuel Blumkin, K5JEB
Rochester Amateur Radio Association, Inc (NY)
Bob Simons, KI6HX
Phillip Oliff, KB6OSM
Raymond E. Jordan, II, KA2BVS
J. Douglas Jackson, N4SLS
George E. Owens, W3HMY/WA1HSE

The Satellite Fund
Colin C. Dumbrille, VP9C/VE2BK

The Victor C. Clark Youth Incentive Program Fund
Dave Ritter

The Edmond A. Metzger Scholarship Fund
Rose M. Keith
(in memory of George G. Keith, W9QLZ)
John L. Swartz, WA9AQN
(in memory of William C. Ritt, W9MPI)

L. Phil and Alice J. Wicker Fund
L. P. Wicker, W4ACY

The Bill Bennett, W7PHO Scholarship Fund
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Larry H. Laird, W9NJU
Jack W. Stanton, W9PSP
William C. Dwyer, VK3DMP
Harold L. Fritz, KØDZD
Dennis W. Parker, KD4BY

The Jesse Bieberman Meritorious Membership Fund
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The WARC Fund
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John N. Zevir
Louis R. Bligh, KA1HB
Richard A. Vogel, W4XB
Donald E. Warren, W8FQE
Paul R. Attix
C. A. Kearney, WB8ZUS
Robert W. Downs, WA5CAB
Brian J. Battles, WA1YUA
Jeff Horn, N7EDA
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Tri-City Amateur Radio Club (CT)
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Cleo E. Digby, W8DLJ
Thurman W. Carteret, N4QNY
Michael L. Cohen-Rosenberg
James F. Starkey, Sr, WØKGY
Donald Anderson, KR3N

As received and acknowledged during the month of **November.**

THE ARRL FOUNDATION, INC.

"for the advancement of amateur radio"

Strays

NTIA ACCEPTING PUBLIC COMMENTS ON HDTV STANDARD

The National Telecommunications and Information Administration (NTIA) is accepting public comments on production standards for High Definition Televison (HDTV). The Notice of Inquiry requests comment and information to assist the Department of Commerce in assessing the US position for the International Radio Consultative Committee (CCIR). Public comments should be submitted to the Office of the Chief Counsel, NTIA, Room H4717, 14th St and Constitution Ave, NW, Washington, DC 20230 by March 1, 1989.

I would like to get in touch with...

☐ any radiomen who served in WW II aboard the *USS Appalachian* AGC-1 from 1943-46 for the purpose of a reunion. Aaron Weissman, K3VWP, 404 W 38th St, Wilmington, DE 19802.

☐ WW II shipmates on the *USS Independence* CVL-22 for QSOs and letters. Leo Mallas, W7NLU, 4152 W Bilby Rd, Tucson, AZ 85746.

☐ anyone with an operating manual for a Hewlett Packard dc VTVM, model 412 A. Horace Caudrey, VE3THC, 123 Marcos Blvd, Scarborough, ON Canada M1K 5A7.

Happenings

Conducted By Phillip Sager, WB4FDT
Editorial Manager, Regulatory Information Department

EPA Will Not Issue RF Exposure Guidelines

The Environmental Protection Agency (EPA) no longer plans to issue federal guidelines for public exposure to radio-frequency and microwave radiation during the 1989 and 1990 federal fiscal years. In 1986 the EPA had outlined four options for nonionizing radiation risks and held a public hearing on the subject. These options, which did not appear to affect radio amateurs, are outlined in August 1986 *QST*, page 51.

The broadcast industry was surprised at the EPA decision and fears that without federal guidance from the EPA, there will be a proliferation of state and local rules much stricter than those presently adopted by the American National Standards Institute (ANSI).

The EPA is still scheduled to release an assessment of the cancer threat posed by low- and high-frequency electromagnetic radiation by the end of the year. This assessment could influence the perception of the health threat of electromagnetic radiation and again increase pressure on the EPA to issue federal guidelines.

FCC RECONSIDERS CABLE TV TERMINAL EMISSION STANDARDS

Back in the summer of 1987, the ARRL found itself on the same wavelength as the National Cable Television Association (NCTA) in advocating tougher cable-TV-terminal emission standards. In Docket 85-301, the Commission subjected cable system terminal devices (CSTDs) to field strength emission limits of Part 15 of the Commission's rules, rather than the more stringent Part 76, thus permitting RF leakage at higher levels than was previously permitted.

The NCTA filed a petition for reconsideration suggesting an alternative approach. The NCTA proposed that the FCC distinguish between emissions from the "internally generated" sources of radiation (such as local oscillators) and emissions of signals that are introduced into the terminal device (such as external RF signals).

Internally generated cable leakage would be subject to the more strict Part 76 limits, whereas the externally generated signals that enter the cable system through cable terminal devices would be subject to Part 15 standards.

Since this view was, in part, the same as the ARRL's, we filed a brief statement in support of the NCTA petition for reconsideration. In our statement we said: "This counterproposal (by the NCTA) is sound from an engineering point of view and promises to minimize instances of interaction between cable systems and amateur stations. It is a far better alternative than that adopted by the Commission thus far."

The Commission has now ruled on the NCTA petition. The FCC said: "We agree...that the application of Part 76 emission limits...would be the surest way to prevent harmful interference. However, we are not convinced that such a conservative measure is necessary or in the public interest. The Part 76 emission limits were designed to apply to open air cable installations where radiated emissions would not be attenuated significantly by surrounding structures. CSTDs (cable system terminal devices)...are located within subscriber premises and share a common environment with other devices (cable ready television receivers or VCRs) which are connected to cable systems. Although those devices are presently allowed higher emission levels than the cable system, they have historically demonstrated that they are not a threat to the operation of the cable system or to other radio services. Therefore, we feel that it would be unnecessarily burdensome and costly to require manufacturers of CSTDs to comply with tighter emission standards when their devices pose no greater threat than cable-ready television receivers or VCRs." The Commission therefore will maintain its previous decision to apply the Part 15 emission limits to CSTDs.

FCC PROPOSES TO EXPAND 6-METER REPEATER SUBBAND

The FCC has proposed, in Docket 88-527, to expand the 6-meter repeater subband by 1 MHz, to include 51-52 MHz. The proposal is in response to two petitions filed by two repeater groups on the West Coast, The Southern California Six Meter Club (SCSMC) and The Southern California Repeater and Remote Base Association (SCRRBA). Both groups requested expansion of the 6-meter repeater subband in order to accommodate a growing number of repeaters in the band.

The FCC stated "It appears that an expansion of the 6-meter repeater subband would provide for additional flexibility in the use of the 6-meter band. The amateur community could determine for itself the exact usage to which the 1 MHz of additional spectrum would be put. In urban areas, the 1 MHz could be utilized to make possible additional repeater operation. In less populated areas, where there may be no present need for additional repeater operations, the spectrum could continue to be available for other types of operation."

The FCC noted it was concerned with the effect the expansion may have on the present users of the 51-52 MHz segment and invited comments on the need for repeater expansion and its impact on existing users. Comments on the proposal were due by January 27, 1989, with reply comments due by February 28, 1989.

MIDWEST BALLOON LAUNCH IS SUCCESSFUL

Bill Brown, WB8ELK, and Phil Frazier, KA8TEF, conducted the most successful balloon launch to date from the Midwest

FCC-ISSUED CALL SIGNS UPDATE

The following is a list of the FCC's most recently issued call signs as of December 1.

District	*Group "A" Extra*	*Group "B" Advanced*	*Group "C" Tech/Gen*	*Group "D" Novice*
0	WØØZ	KEØZM	NØJYT	KBØDNE
1	NUIP	KC1MV	N1GDL	KA1UP
2	WM2L	KE2KJ	N2IUO	KB2GPA
3	NT3A	KD3KP	N3GRH	KA3TVE
4	AB4LX	KM4LB	N4ULP	KC4HSF
5	AA5IZ	KG5PQ	N5NNP	KB5HWC
6	AA6LQ	KJ6OV	N6TUM	KC6AXI
7	WV7L	KF7PO	N7LYP	KB7GER
8	WM8X	KE8VK	N8KDJ	KB8FTC
9	WE9P	KE9NV	N9HZB	KB9BSQ
Guam	KH2K	AH2CD	KH2DN	WH2ALU
Hawaii	**	AH6JJ	NH6SD	WH6CBB
Alaska	**	AL7KO	NL7PC	WL7BSS
Virgin Islands	NP2E	KP2BN	NP2CT	WP2AGE
Puerto Rico	**	KP4PW	WP4SK	WP4IGE

**indicates all 2 × 1 calls have been issued in these areas.

October 23. The balloon was launched at Findlay, Ohio, and its on-board "packet package" consisted of an ICOM 2AT and Pac-Comm TNC. The flight provided two hours of spirited packet-radio activity before the balloon burst and a parachute lowered the package back to earth. *(TNX* Gateway)

220-MHZ DISTANCE RECORD FALLS

The old distance record of 1181 miles on 220 MHz set in 1982 by Al Ward, WB5LUA, and Peter Shilton, VE3EMS, fell to the advances of two challengers recently.

The new record of 1289 miles was set September 9 by Richard Roderick, K5UR, Little Rock, Arkansas, and David Olean, K1WHS, West Lebanon, Maine, besting the old record by more than 100 miles!

Roderick utilized a transverter, GaAsFET preamplifier and 135-watt amplifier. The antenna was 17 elements at 90 feet. Olean used a transverter, 1-dB NF preamp, and an 8877 amplifier at the legal limit. His antenna system consisted of four 220B Boomers.

OSCAR 13 HANDBOOK AVAILABLE

AMSAT-UK, in collaboration with AMSAT-DL, have completed the first *OSCAR 13 Operator's Handbook*. The 60-page book provides all the critical data needed to utilize OSCAR 13 and understand how it works. Some of the topics discussed are: history of OSCAR 13, band plan, station requirements, communicating with the bird, transponders: modes and scheduling, antenna systems, and telemetry formats and decoding information.

The *Handbook* is available in North America from Project OSCAR. For further details, send a SASE to AO-13 Handbook, Project OSCAR, PO Box 1136, Los Altos, CA 94023-1136.

QSL ADDRESS FOR U1MIR

We have recently been made aware of the following address for those who have worked Musa and Vlad onboard the orbiting Soviet space station, Mir. Send QSL cards to B. Stephanov, Box 679, Moscow 107207, USSR.

FCC SHUTS DOWN UNLICENSED RADIO STATION

FCC Engineers shut down an illegal radio repeater station in Manhattan, New York recently.

The station, located at the residence of William Matos on South Street in downtown Manhattan, was operating on 148-149.9 MHz, frequencies reserved for use by the US government for fixed, mobile and satellite communications. The unauthorized repeater was being used for personal communications by an estimated dozen individuals in the New York area.

Speaking of unlicensed radio stations, remember the pirate shipboard station called Radio New York International? Anchored off Long Island, the ship was broadcasting rock-and-roll on the high end of the AM broadcast band. It was boarded and taken off the air by FCC and other federal agents in the summer of 1987, creating a national news event.

It seems that Radio New York International's founders had again publicly announced plans to resume the broadcasts from another ship, so the government filed suit to enjoin them from doing so. The case was heard in US District Court in Boston. The judge, in granting summary judgement for the government, said that the First Amendment does not grant anyone the right to broadcast by radio and that government regulation of broadcasting is constitutional. The judge stated that the FCC must allocate the limited available broadcast frequencies by way of the licensing process, and that this type of regulation best serves the public interest. The judge further said that such regulation of the radio bands does not infringe upon the constitutional rights of the defendants.

INTERNATIONAL THIRD-PARTY TRAFFIC—PROCEED WITH CAUTION

Occasionally, DX stations may ask you to handle a third-party message to a friend or relative in the US or its possessions. This is all right as long as the US has an official third-party traffic agreement with that particular country and the traffic is noncommerical and of a personal, unimportant nature. During an emergency, our State Department will often work out a special temporary agreement with the country involved, but in normal times, never handle traffic without first making sure it is legally permitted.

US amateurs may handle third-party trafic with the following countries:

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

*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).

WALKER A. "TOMMY" TOMPKINS, K6ATX, SK

Walker A. "Tommy" Tompkins, K6ATX, 79 (see *QST* Profiles, *QST* May 1986, p 60), became a Silent Key on Thanksgiving Day. As author of the Tommy Rockford youth fiction series, Tompkins has left a legacy for future generations of radio amateurs.

A noted author, historian, television screenwriter, radio broadcaster, newspaper columnist and ham operator, Tompkins was well known for delving into the local history of the Santa Barbara, California area with his twice-daily historical vignettes on a local radio station. Tompkins, licensed since 1952 as K6ATX, the call sign that made his alter ego Tommy Rockford famous, introduced many young people to the world of Amateur Radio with his books *SOS at Midnight, CQ Ghost Ship, DX Brings Danger, Death Valley QTH, Grand Canyon QSO* and a new book, *Murder by QRM*, scheduled for release by ARRL in early 1989. He has also written about Amateur Radio in *National Geographic, Parents, Popular Mechanics, CQ* and *QST* magazines.

Tompkins is survived by his wife Barbara, a son, two daughters and two grandsons. Amateur Radio has lost a true friend and ambassador with the passing of "Tommy," K6ATX.

TV CABLE COMPANY ORDERED TO FORFEIT $2000 BY FCC

The Philadelphia Field Office of the FCC has ordered the Raystay Company, trading as TV Cable of Carlisle, Pennsylvania, to forfeit $2000 for alleged repeated violations of the FCC signal leakage standard. During two separate inspections of its cable system, FCC personnel found a total of 25 instances of excessive signal leakage. The FCC's rules prohibit cable television systems using frequencies between 54 and 216 MHz from exceeding a maximum signal leakage standard of 20 microvolts per meter measured at a distance of 10 feet from its cable. Compliance with this rule is required to ensure that cable television systems do not interfere with over-the-air users.

The Raystay Company requested a review of the $2000 forfeiture by the Commission, which was denied.

ARRL FILM WINS GOLD MEDAL

The ARRL film *The New World of Amateur Radio* won the Gold Medal in the Science and Technology category of the 1988 International Film and TV Festival of New York. The hefty (6.7 oz) gold-plated brass medal is now on display in one of the new trophy cases gracing the lower hallway at ARRL HQ.

It was especially pleasing to note that our video had eight competitors including Public Broadcasting "heavyweights" WGBH in Boston and WNET in New York.

CONNECTICUT HAM FINED

According to an FCC News Release, John Gawron, Jr, KA1SDR, of Fairfield, Connecticut was fined $750 for alleged pirate radio activity.

Gawron, was monitored by the FCC operating on 7.414 MHz. The unauthorized station was playing popular music and gave the call letters "CBOR."

Unlicensed radio operation is a violation of Section 301 of the Communications Act and unlicensed operators may be subject to fines of up to $100,000 and/or one year in prison.

DARA ANNOUNCES SCHOLARSHIPS

The Dayton Amateur Radio Association (DARA) is now accepting applications for its 1989 Scholarship Program. The program is open to any licensed amateur graduating from high school in 1989.

Awards will be based on a combination of financial need and academic accomplishment, with consideration given for service to Amateur Radio and community involvement. There are no restrictions on the student's course of study. Applicants are not restricted to those preparing to pursue four-year baccalaureate degrees; those working toward associate degrees or planning to attend an accredited technical institution will also be considered.

Each winner will receive $1000 toward tuition at the school of their choice. All entries must be postmarked no later than May 15, 1989, and award winners will be announced on or about June 1. For further information and application forms, write to Scholarship Committee, 317 Ernst Ave, Dayton, OH 45405.

BRAMSAT PROJECT "DOVE"

One of the four AMSAT-NA MicroSats now under construction and scheduled for launch in June of 1989 is the Brazilian Project "DOVE."(DOVE stands for Digital Orbiting Voice Encoder). This BRAMSAT MicroSat has as its main feature a demonstration voice synthesizer, as well as the spacecraft telemetry.

In prelaunch preparations for DOVE, AMSAT-NA Science Education Advisor Rich Ensign, N8IWJ, has announced the availability of a special informational bulletin for schools which explains the project's creation process. Amateur operators worldwide are encouraged to assist schools with reception once the MicroSat has been launched. For further information, please send a business-size SASE to Rich Ensign, N8IWJ, AMSAT-NA Science Education Advisor, 421 N. Military Dr, Dearborn, MI 48124.

SECTION MANAGER ELECTION NOTICE

To all ARRL members in the Maryland-DC, Nevada, New Hampshire, Northern New Jersey, Rhode Island, San Joaquin Valley, Utah, and West Texas Sections:

You are hereby solicited for nominating petitions pursuant to an election for Section Manager. Incumbents are listed on page 8 of this issue.

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

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

(Place and date)
Field Services Manager, ARRL
225 Main Street, Newington, CT 06111

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

Any candidate for the office of Section Manager must be a resident of the Section, a licensed amateur of Technician class or higher, and a Full Member of the League for a continuous term of at least two years immediately preceding receipt of a petition for nomination. Petitions must be received at Headquarters on or before 4:00 P.M. Eastern Standard Time March 10, 1989.

Whenever more than one member is nominated in a single Section, ballots will be mailed from Headquarters on or before April 1, 1989. Returns will be counted May 22, 1989. SMs elected as a result of the above procedure will take office July 1, 1989.

If only one valid petition is received for a Section, that nominee shall be declared elected without opposition for a two year term beginning July 1, 1989.

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

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

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

Richard K. Palm, K1CE
Field Services Manager

REPEAT NOMINATING SOLICITATION

Since no petitions were received for the Missouri Section Manager election by the deadline of September 9, 1988, nominating petitions are herewith resolicited. See the above notice for details on how to nominate.

UNITED STATES RECIPROCAL AGREEMENTS

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

V2	Antigua and Barbuda	DL	F.R. Germany	PJ	Neth. Antilles
LU	Argentina	SV	Greece	ZL	New Zealand
VK	Australia	J3	Grenada	YN	Nicaragua
OE	Austria	TG	Guatemala	LA	Norway
C6	Bahamas	8R	Guyana	HP	Panama
8P	Barbados	HH	Haiti	ZP	Paraguay
ON	Belgium	VS6	Hong Kong	OA	Peru
V3	Belize	HR	Honduras	DU	Philippines
CP	Bolivia	TF	Iceland	CT	Portugal
A2	Botswana	VU	India	J6	St Lucia
PY	Brazil	YB	Indonesia	S7	Seychelles***
VE	Canada	EI	Ireland	9L	Sierra Leone
CE	Chile	4X	Israel	H4	Solomon Islands
HK	Colombia	I	Italy	ZS	South Africa
TI	Costa Rica	6Y	Jamaica	EA	Spain
5B	Cyprus	JA	Japan	PZ	Suriname
OZ	Denmark	JY	Jordan	SM	Sweden
J7	Comm. Dominica	T3	Kiribati	HB	Switzerland
HI	Dominican Republic	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*			YU	Yugoslavia

*Includes all its overseas Territories.

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

***Cancellation claimed by Seychelles.

It is possible for amateurs to obtain temporary licenses in many countries that do not have a reciprocal agreement with the US. All countries, except Canada, require US amateurs to apply for a temporary license in order to operate. Contact the Regulatory Information Dept at HQ for further information.

Moved and Seconded ...

MINUTES OF EXECUTIVE COMMITTEE
Meeting Number 432
Baltimore, Maryland
December 10, 1988

AGENDA

1. Approval of Minutes of August 27, 1988, Executive Committee Meeting.
2. FCC Matters.
2.1. Review of the ARRL's continuing response to FCC proposals in General Docket 87-14, re 220-222 MHz.
2.2. Update on the ARRL comments in FCC's PR Docket 88-139, Reorganization and Deregulation of Part 97.
2.3. Proposal for the handling of RFI matters.
2.4. Status of PR Docket 88-467 regarding 18 MHz.
2.5. Consideration of ARRL position regarding PR Docket 88-527, proposed expansion of the 6-meter repeater subband.
2.6. Other FCC matters.
3. International Affairs:
3.1. Report on ARRL representation at the Region 3 Conference, Seoul, Korea.
3.2. Report on the IARU Administrative Council meeting, Seoul.
3.3. Progress report on planning for the Region 2 Conference, Orlando, Florida.
4. Review of manner of Washington representation.
5. Consideration of methods to be used in recording Board Meeting proceedings.
6. Discussion of long-range planning.
7. Local antenna/RFI matters.
8. Proposed adjustments to boundaries of Texas ARRL sections.
9. Review of progress on Board directives:
9.1. By the Vice Presidents and/or Chairmen for the Committees.
9.2. By the Executive Vice President on Board directives affecting Headquarters.
9.3. By the Executive Vice President on W1AW fund raising and renovations.
10. Recognition of new Life Members.
11. Affiliation of clubs.
12. Approval of conventions.
13. Date and place of next meeting.
14. Other business.

Pursuant to due notice, the Executive Committee of the American Radio Relay League met at 8:30 AM Eastern Standard Time, December 10, 1988, at the Airport Marriott Hotel, Baltimore Washington International Airport, Maryland. Present were President Larry E. Price, W4RA, in the Chair; First Vice President Jay A. Holladay, W6EJJ; Executive Vice President David Sumner, K1ZZ; and Directors Tom Frenaye, K1KI; Paul Grauer, W0FIR; Leonard M. Nathanson, W8RC; and Rodney J. Stafford, KB6ZV. Also present were International Affairs Vice President Tod Olson, KØTO; Secretary Perry Williams, W1UED; Directors Marshall Quiat, AGØX and Hugh A. Turnbull, W3ABC; Director-Elect John C. Kanode, N4MM; and Counsel Christopher D. Imlay, N3AKD.

1. On motion of Mr. Frenaye, the Minutes of the August 27, 1988 meeting were adopted as printed.

2. FCC matters:

2.1. Regarding the 220 MHz reallocation matter, FCC General Docket 87-14, Counsel Imlay distributed copies of replies to oppositions to the ARRL petition for reconsideration in the Docket. Mr. Imlay recommended that the League seek oral argument on reconsideration, to focus on the Sense of the Congress in Section 10, Public Law 100-594, that: "Government agencies shall take into account the valuable contributions made by Amateur Radio operators when considering actions affecting the Amateur Radio Service."

2.2. With respect to PR Docket 88-139, Reorganization and Deregulation of Part 97, the Secretary reported that copies of the ARRL comments including the alternative "Part 96" text have been distributed to recipients of the *ARRL Letter* and made available to others on request. Efforts are underway to build support for the ARRL position, both within and outside the FCC.

2.3. Mr. Turnbull, as Chairman of the RFI Task Group, reported briefly on discussions with Robert M. Mroz, Engineer in Charge of the Baltimore FCC Office, regarding volunteer assistance in radio frequency interference matters. He announced that Mr. Mroz and Marlene Barber of the Baltimore office would be present during the luncheon recess to discuss the matter.

2.4. Mr. Imlay distributed copies of Reply Comments filed by ARRL in PR Docket 88-467, Amateur use of the 18.068-18.168 MHz band. He reported that seven comments, in addition to those of the ARRL, were available in the FCC reference room, all in support of the allocation but with differing ideas of how it should be utilized.

2.5. It was moved by Mr. Nathanson that the ARRL file comments in FCC PR Docket 88-527, supporting expansion of the 6-meter repeater subband to 51-54 MHz. Mr. Frenaye moved that the matter be postponed for consideration at the 1989 Annual Meeting of the Board, but there was no second. The question of Mr. Nathanson's motion then being called, a tie was found to exist; the Chair voted No, so the motion was lost.

2.6. Other FCC matters:

2.6.1. Mr. Price reported that national media publicity was given to the November decision by the International Maritime Organization (IMO) to implement the Global Maritime Distress and Safety System, a step that may lead to the end of Morse code in the Maritime service. This action has led to speculation on what this might mean to Amateur Radio. The question was further explored in an editorial for the January issue of *QST*, entitled "Why Morse Code?" Copies of the editorial, written by Messrs. Price and Sumner, were distributed. On motion of Mr. Nathanson, it was unanimously voted that the President appoint a special committee of six members drawn from the Board, the radio industry and the Amateur community at large. The committee is to explore the implications of a no-code amateur license and make a report to the ARRL Second Board meeting of 1989. A budget of $5,000 was established for the committee.

2.6.2. The Committee briefly discussed RM-6559, submitted by Nicholas W. Sayer, N6QQQ, requesting FCC to make frequencies available for Technician Class F1B emissions in the Novice bands, and RM-6594 by Bradley Wells, KR7L, requesting that FCC move the 80 meter Novice band to 3675-3725 kHz, but took no formal action.

2.6.3. The August 27 Executive Committee Meeting had asked Counsel to seek a declaratory ruling from the Federal Communications Commission that, under the provisions of the Communications Act of 1934 and the existing FCC regulations, hearings are required before any normal privileges of amateur operators are altered or suspended. Counsel Imlay reported that the two cases which were a basis for this request had been resolved in favor of the amateur. In addition, the issue is addressed in the Part 97 rewrite proceeding. Without dissent, the Committee agreed that the Part 97 rewrite proceeding is the appropriate forum for pursuit of this issue at this time. The Committee was in recess from 10:30 to 10:45.

3. International affairs:

3.1. Messrs. Holladay, Olson and Sumner reported on the Region 3 IARU Conference, which was held in October in Seoul, Korea. A report on the Conference appears in January *QST*.

3.2. Messrs. Holladay and Sumner reported on the IARU Administrative Council meeting, held in Seoul following the Region 3 conference. An IARU Calendar published on December 9, 1988, presents proposals from the Council meeting for amendments to the IARU Constitution and for the election of Richard Baldwin, W1RU, and Michael Owen, VK3KI, as IARU President and Vice President, respectively.

3.3. Mr. Olson presented a report for the Ad Hoc Committee planning for the 1989 Region 2 Conference in Orlando, October 16-20. The Omni Hotel was selected as the site for the Conference. Tentative schedules and a list of details to be worked out were attached to the report.

4. Mr. Price reviewed ARRL's representation in Washington, observing that measures intended to prevent one individual from being overloaded were not completely effective. Mr. Sumner reported on current and near-time projects in the Washington area, with plans for assistance to the Washington Area Coordinator by other staff members.

5. The Executive Committee proceeded to a discussion of methods to be used in recording Board Meeting proceedings. Mr. Stafford moved that a proposal presented by Executive Vice President Sumner be substituted for the court reporter called for in his motion at the August meeting of the Executive Committee, but there was no second, so the motion was lost. After further discussion, on motion of Mr. Grauer the following was adopted:

"Believing that a complete and accurate record of meetings of the League Board is of vital importance, the Executive Committee directs the Executive Vice President and the Secretary to take all appropriate steps to ensure that Minutes are produced in a timely, accurate and cost-effective manner."

During the course of the above, the Committee was in recess from 12:02 to 2:18 PM for lunch and informal discussions with Mr. Mroz and Miss Barber of the FCC Baltimore Office.

6. Mr. Sumner reported on preliminary staff preparation for long-range planning, in support of the officers who have been charged with this responsibility. The Officers will discuss long-range planning at a meeting prior to the 1989 Annual Meeting of the Board. At this point, Mr. Price suspended the agenda to recognize Mr. Grauer. Mr. Grauer then presented to the President a check for $6,500 from the 1988 ARRL National Convention Committee, of Portland, Oregon. The donation is intended for the unrestricted fund of the ARRL Foundation. (Applause!)

7. Counsel Imlay reported briefly on local antenna/RFI matters, notably those involving Boulder County, Colorado, Winfield Village, Illinois, and Foster City, California. Mr. Imlay also presented a brief report on the Dallas pacemaker case which, however, is still not resolved.

8. On motion of Mr. Frenaye, the counties of Wilbarger and Baylor, Texas, are transferred from the West Texas to the North Texas section, and the counties of Shackelford, Callahan, and Coleman are transferred to the West Texas section from the North Texas section. The moves were initiated by, and have the support of, ARRL members in the counties affected by the move.

9. Review of progress on Board directives:

9.1. Mr. Quiat, as Chairman, reported that the Membership Services Committee had completed all its tasks. Mr. Olson reported briefly for the ARRL Committee on the Biological Effects of RF Energy.

9.2. Mr. Sumner presented a chart reporting the status of Board directives from earlier meetings and answered questions about matters thereon.

9.3. Mr. Sumner presented a report on the W1AW building renovation, fund raising and equipment. Donations have reached the $274,000 mark. A direct-mail solicitation is being prepared for mailing to members; response is expected to bring the fund drive to its goal. The detailed structural design plans and blue-prints are essentially complete. Electrical and mechanical requirements are being re-evaluated to see whether costs can be reduced. Selection of equipment for bulletins and code practice is in its final stages. Antenna configuration remains under study.

10. On motion of Mr. Nathanson, the names of 48 newly elected Life members were recognized, and the Executive Vice President was directed

to list their names in *QST*.

11. On motion of Mr. Grauer, the following clubs were declared affiliated:

Category 1

Albemarle Amateur Radio Society, Elizabeth City, North Carolina
Blue Springs Amateur Radio Club, Blue Springs, Missouri
Booneville Amateur Radio Club, Booneville, Mississippi
Bozo and the Lids, Dyer, Indiana
Central Mississippi Repeater Association, Starkville, Mississippi
Dallas/Fort Worth IBM Amateur Radio Club, Bedford, Texas
Davis County Amateur Radio Club, Kaysville, Utah
Greenfield Amateur Repeater Association, Greenfield, Indiania
Houston Ham Conventions, Houston, Texas
Keno Amateur Radio Club, Keno, Oregon
Longview East Texas Amateur Radio Club, Longview, Texas
Margaretville Amateur Radio Club, Margaretville, New York
Naked Chicken Contest Club, West Hartford, Connecticut
Salem Area Amateur Radio Association, Salem, Ohio
South East Metro Area Radio Club, Cottage Grove, Minnesota
Summit Amateur Radio Association, Inc., Randallstown, Maryland
Tri-State Amateur Radio Club, Newtown Square, Pennsylvania

Category 3

Paradise Valley High School Amateur Radio Group, Phoenix, Arizona
Rutland Town School Amateur Radio Club, Rutland, Vermont

With the election of these clubs, the League has 1,648 clubs in Category 1, 22 in Category 2, 116 in Category 3, and 4 in Category 4. During the course of the above, Mr. Turnbull departed from the meeting, at 3:32 PM.

12. Convention matters:

12.1. On motion of Mr. Grauer, an operating specialty convention for 10/10 International was approved for August 11-13, 1989, at Milwaukee, Wisconsin.

12.2 On further motion of Mr. Grauer, the Executive Committee ratified its mail votes sanctioning the following conventions: Virginia State Convention, Virginia Beach, September 16-17, 1989; North Florida Section Convention, Orlando, April 7-9, 1989; Texas State Convention, Houston, November 10-12, 1989; Michigan State Convention, Saginaw, August 27, 1989; Roanoke Division Convention, Charlotte, March 18-19, 1989; Southwestern Division Convention, Los Angeles, California, August 25-27, 1989.

13. The next meeting of the Executive Committee will be held at the call of the President in accordance with Article 6, probably in March or April, 1989.

14. Other business:

14.1. On motion of Mr. Nathanson, the 1988 budget for the Volunteer Resources Committee was increased by $1,000 to a new total of $7,000.

14.2. Mr. Imlay reported that the Environmental Protection Agency had suspended work on guidelines for exposure to RF energy. On the one hand, this is encouraging because the EPA's reason for doing so was that no hazards had been proven. On the other hand, the EPA action poses the possibility of state and local governments adopting a hodge-podge of regulations without adequate scientific foundation.

14.3. At this point, Messrs. Williams and Imlay departed from the room at 4:13 PM. A discussion of staff matters ensued. On motion of Mr. Stafford, a report by the President on behalf of the Administration and Finance Committee was adopted. The Committee was in recess from 4:35 to 4:40 at which time Messrs. Williams and Imlay rejoined the assembly.

14.4. Mr. Sumner reported that Headquarters is in the process of surveying the regional monitoring stations, as part of its ongoing evaluation of the Volunteer Monitoring System/FCC *Amateur* Auxiliary. Results of the study will be reported to the Board at its 1989 Annual Meeting. There being no further business, on motion of Mr. Grauer the meeting adjourned at 4:47 PM.

LIFE MEMBERS

Pamela K Adams, KB4ZRS; William T Baker, WA9L; Ann Beck, N8JMC; Roger Burch, WF4N; Kathleen J Callanan, W8KKM; Philip J Carpenter, K1DFC; Jean R Cebik, N4TZP; Rita Joy Cernuch, KB5DJF; Myron L Cherry, WM4Z; Jon A Davies, II, KC4HKT; Joseph R Davis, KC4HKL; Robert Dehaney, WU5T DJ0MBC; Sal Di Salvo, WA2YXC; Jon S Eastman, KB6ZBI; Peter V Ernster, WA6TQQ; John C Goller, K9UWA; Dwight Good, WD7VI; Loretta M Graff, N7LCO; Edward V Hammond, KB1DG; J C Haskell, KA1CZI; Cornelius M Head, WB9ZGE; James G Herkimer, WB2ANO; G N Hittinger, N6HUG; Terry E Huber, WB6TOW; Mark H Kimmel, N4NWY; George F Ledoux, K1TKJ; Neil Little, WA4AZL; Andy W Lowe, NF9T; Willard B Lunt, KR1R; Robert L Merrill, KC1HH; Tom Miller, Jr, N3CKK; Scott E Montgomery, N9GLL; Alan J Murray, WA1YOY; John W Nelson, Jr, N0JCQ; Clifford Neuman, N1DMM; Janice G O'Hara, WA2OPY; Emmett Paige, Jr, W2IPG; Byron P Peebles, Jr, WB3KTX; Daniel R Pickering, KA5TAA; Jackie Sheperd, KF7K7; William H Spoore, KB4ODW; Joyce L Stroeher, N7JPW; William A Sturm, N8EOQ; David R Tomeraasen, N6NCB; Masao Ueki, WG2P; Kim S Waterhouse, WA7AIM; J D Weiss, NK7W; Jim Zurcher, WB7OTM.

Strays

SAFETY FIRST

☐ There are reasons for accidents involving radio gear, but never *good* reasons. Take no chances with electricity. Even a low-voltage shock can be serious—sometimes fatal.

Heed the ARRL safety code: While there's no reason for you to be involved in a ham-related accident, that possibility always exists if you are not thinking safety. Following the ARRL safety code will make your ham experience more enjoyable. Read it and practice it.

1) Kill all power circuits completely before touching anything behind the panel or inside the chassis or the enclosure.

2) Never allow anyone else to switch the power on and off for you while you're working on equipment.

3) Don't troubleshoot gear when you're tired or sleepy.

4) Never adjust internal components by hand. Use special care when checking energized circuits.

5) Avoid bodily contact with grounded metal (racks, radiators) or damp floors when working on the transmitter.

6) Never wear headphones while working on gear.

7) Follow the rule of keeping one hand in your pocket.

8) Instruct members of your household how to turn the power off and how to apply artificial respiration. (Instruction sheets on the latest approved method can be obtained from your local Red Cross office.)

9) If you must climb a tower to adjust an antenna, use a safety harness. Never work alone.

10) Do not install antennas at levels that permit humans or animals to come in contact with them. Not only might the victim sustain a serious RF burn, he or she could run into the antenna and be injured.

11) Do not operate high-power UHF or microwave gear that has inadequate shielding against radiation. Similarly, do not look into or stand near microwave antennas when transmitter power is being fed to them.

12) Do not install antennas near electrical power lines.

13) Don't drink alcoholic beverages when working on equipment or installing antennas.

Take time to be careful. Death is permanent.

MOVING, CHANGING YOUR CALL?

☐ When you change your address or call sign, be sure to notify the Circulation Department at ARRL HQ. Enclose a recent address label from a *QST* wrapper if at all possible. Address your letter to Circulation Department, ARRL, 225 Main St, Newington, CT 06111. Please allow six weeks for the change to take effect. Once we have the information, we'll make sure your records are up-to-date so you'll receive *QST* without interruption. If you're writing to HQ about something else, please use a separate piece of paper for each request.

WRITING TO HQ.?

☐ Each year, ARRL HQ receives some 350,000 pieces of correspondence, which translates into a lot of cards and letters that have to be sorted, routed to the proper department and answered. To help us continue to provide prompt, efficient service to our members, we ask that you follow these guidelines when writing to ARRL.

1) Use a separate piece of paper for each separate request.

2) Type your letter (if possible), or print or write clearly.

3) Include your name, address, call and membership number from your *QST* label.

4) Enclose a business-sized, self-addressed, stamped envelope if a reply is required.

5) Address your request to a particular individual or department, if possible, especially when responding to correspondence received from HQ.

6) Send a check or money order (IRCs for foreign requests) when applicable. Do *not* send cash.

I would like to get in touch with...

☐ anyone who served aboard the aircraft carrier *USS Bogue*, CVE #9, during WW II, especially those in the communications and signaling "K" Division. James Priestly, KA1LIK, 55 Neshobe Rd, Mashpee, MA 02649.

How's DX?

Conducted By Ellen White, W1YL/4
19620 SW 234 St, Homestead, FL 33031

NO WIN

[The following material is courtesy of W6BDN.]

As a rule DX doesn't usually listen "up" on 40-meter sideband. DXpeditions do, and a few stations provide some action. But for the most part, contests present the best opportunities. Unfortunately, for me (with a modest antenna and an unfavorable location) the pickings are pretty thin. Usually many many hours of listening and calling only produce a few new band-countries per contest. I don't hear too many potential additions, and those I do hear are usually tough to get.

On the second night of a recent DX contest, there was a French station coming in quite nicely on 40-meter sideband. I really would have liked to work him. France certainly isn't rare, but it would be a new band-country for me. He, of course, was transmitting in the lower 100, and listening in the US part of the band. I checked his listening frequency before deciding to call. If the East-Coasters are present in droves (chasing Europeans, etc), it's most likely hopeless for me (in the west). I could hear only a few supplicants; it was worth giving it a try.

I dutifully responded to his QRZeds without any success. I rechecked his listening frequency (my transmitting frequency) every now and then to evaluate the competition. Since my anticipated yield of new ones is low, I'm rather persistent with any prospect.

After nearly an hour of trying, I was about ready to give up. The XYL tapped me on the shoulder and handed me the telephone. It was a nearby ham who called to notify this rude DXer of his transgressions: I was QRMing a local QSO with my incessant calling, and being very inconsiderate of the rights of others—oh boy.

I was sure of my precedence on that frequency. However, unlike a simplex QSO, it is difficult to stake out an indisputable claim when calling sporadically. It didn't look like I was going to get him and I'm easily intimidated. So I went hunting elsewhere. It was obviously a no-win situation.

INTERNATIONAL DX CONVENTION

The Northern California DX Club is sponsor this year for the April 21-23 extravaganza, to be held at the Plaza Park Holiday Inn, Visalia, California, tel 209-651-5000. Rooms go fast! Advance convention registration (which also covers several meals) goes via David Engle, KE6ZE, 1063 Summerwood Ct, San Jose, CA 95132 (an SAE would be appreciated).

K4LTA, 10 YEARS OF CARIBBEAN DXING

K4LTA and XYL N4FKO will be on St Vincent in mid-February, with accompanying operators to include K4PJ, WE5P, KB5CBW, W5PWG and others. J8DX will be used during both portions of the ARRL DX Contest, and will be a multioperator single-transmitter entry. (Cards via W5PWG.) QSL routes for the individual operators, using

Troster's Tips

About Phonetics

I have always liked those neat little phrases that spell out a call phonetically. Some are quite descriptive and/or funny. These words are great for the local net, or possibly within the USA, where all the words or idioms can be understood. But I have heard US stations using these amusing phonetic phrases in DX pileups. They are not appropriate in calling a DX op who may not be familiar with English or American idioms.

Example: K6LFH is "Little Fat Head;" K6TMB is "That's My Boy;" WB6UOM is the "Ugly Old Moose." Or, W6CF is "Chicken Feathers." Now this is the call of Dr James A. Maxwell, distinguished radio historian, DXer and contester-extraordinaire, author, and member of the ARRL DX Advisory Committee. (Not too distinguished a moniker for such an eminence.) But, no name is necessary. "Chicken Feathers" is Maxwell on the local 2-meter CATS Net. But Chicken Feathers ain't nobody in a big DX pileup.

But how do these appellations, such as "Chicken Feathers," translate into Malay or Turkish? They don't. How do you translate "Chicken Feathers" into German? (Well, I'll tell you: Huehnerfedern, that's how—and I got that translation from CF himself!) But what will a German op put in his log for that one?

Ditto Spanish. Would a Spanish-speaking op log in W6 Pollo Plumas as W6PP? OK, we're having fun and stretching the point. But you get the idea. Stay with internationally recognized abbreviations, or understandable names.

Actually, many multi-multi contest stations have multilingual ops. On the US West Coast, Japanese-Americans are great ops to have to "run JAs" in Japanese. In this area, we have AA6AD who speaks about 8 European languages and is a real tiger in a DX phone contest! If you speak the other language, use it.

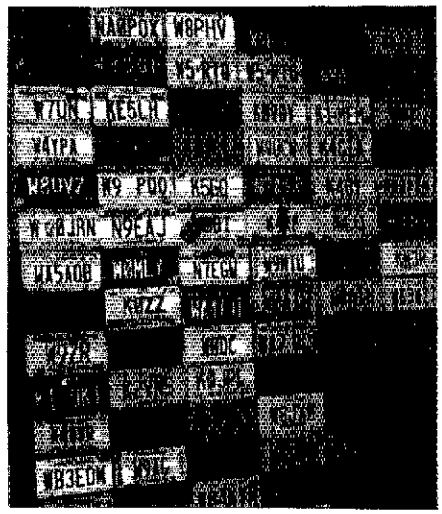
Conclusion: if you're calling DX, don't get too cute with your phonetics. Save 'em for the locals. Select your phonetic words carefully so they are understandable to other station ops who do not speak your native language. The ARRL/ICAO phonetic alphabet is always acceptable. But some ops like to use well-known geographic names, such as Germany or Italy, which are widely understood. Try to find those words with nice clicking or popping sounds which might attract attention.—*73, de "6 Italian String Quartets" . . . . what's yours?*

P.S. Hey, what do you call these little phonetic phrases, anyway? Be kind, now.
P.P.S. Are you monitoring the Northern California DX Foundation 14.1 MHz beacon net? You should, you know.
(More from W6ISQ in an upcoming issue.)

their home calls portable, will be to their home call. Exceptions: W5PWG and KB5CBW via David Short, 9330 Ruth Rd, Rosharon, TX 77583. US stations are reminded of the necessity of including an SASE when requesting cards. Stations outside the US are encouraged to go via the bureau.

LISTEN FOR MY FRIEND
(Variations on a theme)

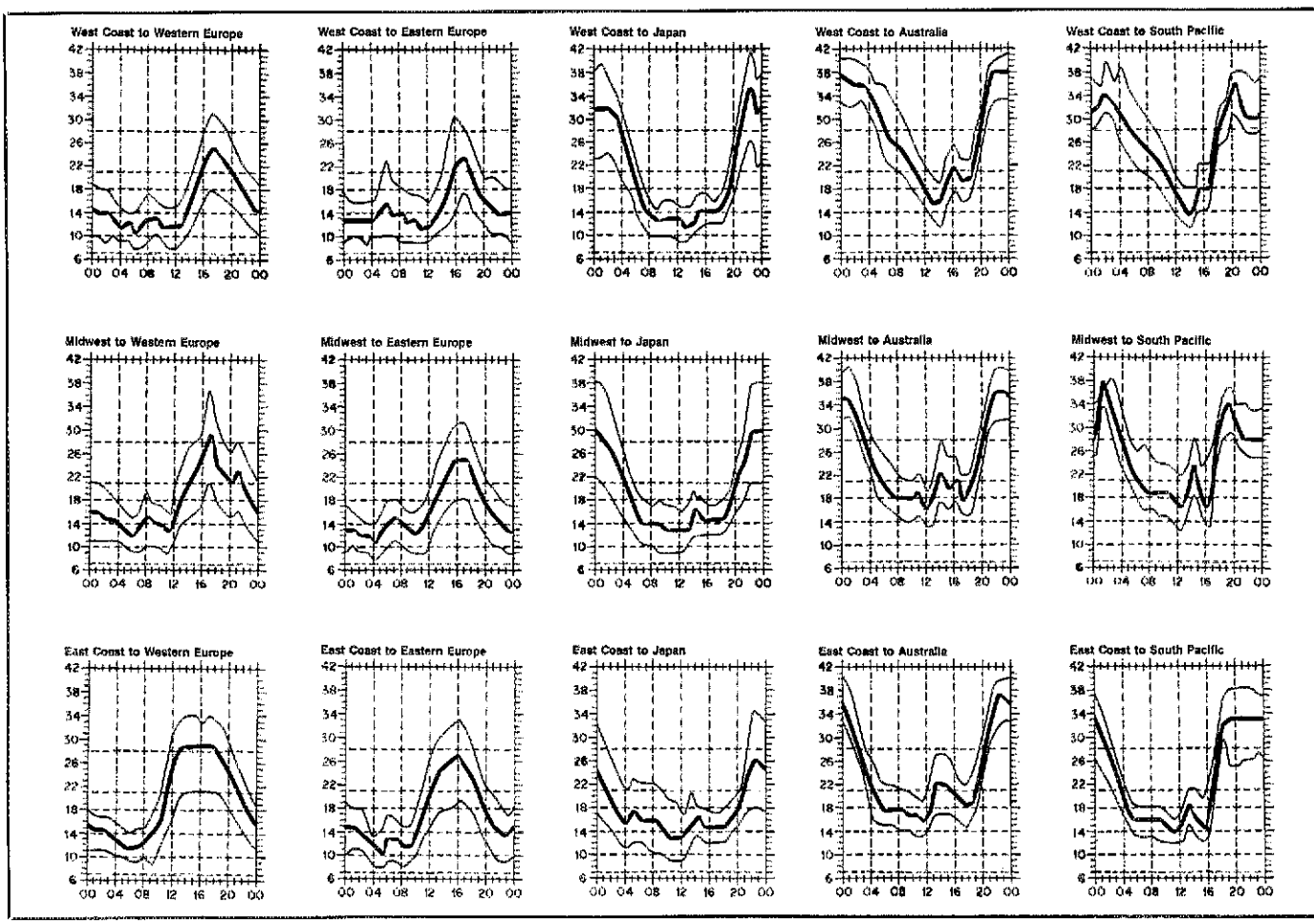
At the end of 1988 and the start of 1989, the following words from OT W6OB bear your consideration. The scene takes place on 14.195 MHz. "VU2ABC this is W6ABC. Hi there Joe, good to hear you again. You are 57 today, but you were 59 yesterday at this time. I hear many US stations calling you so I won't keep you." The scene changes to Art, the new ham down the road, a new novice DXer living at home with his parents. Art has a 100-watt transceiver and an inverted V. He hears the VU2ABC with good signals and is calling the pileup. He has two chances, slim or none—as W6ABC has a kW and a 6-element monobander. Now we're at VU2ABC's location. Joe likes to talk to old friends about many things, mostly about low-band antennas. That kind of talk is good for the ham community, as there is a lot of that kind of information available here in the US



JH1VRQ notes that Aki, JA5DQH, has an alternate hobby. This well-known DXer (KH5/T32/KP2, etc) is winner of the first 160-meter Asian DXCC and inventor of the 1.8-MHz Aki Special antenna. Other shack walls contain DX license plates!

Hans, DF3FI, is now retired and very active in Darmstadt in the pileups. (*Thanks DK7PE*)

that is not as readily available in many Third World countries. But let's go back to Art, who has 87 QSLs, needing a few more to make DXCC. He has never worked a VU. I would like to help Art make a DX contact, but when I use those words "listen for my friend Art, W6 . . . . ," it goes over like a lead balloon. This is where the DX station can control the situation on his end. After the DX station has his talks with his old buddies, but before he pulls the switch, it would be help-



When are the bands open? These charts predict this month's average propagation predictions for high-frequency circuits between the US and various overseas points. One chart showing East Coast to West Coast is also included. On 10 percent of the days of the month, the highest frequency propagated will be at least as high as the uppermost curve (highest possible frequency, or HPF). On 50 percent of the days of the month, it will be at least as high as the middle curve (maximum usable frequency, or MUF). On 90 percent of the days of the month, it will be at least as high as the lowest curve (optimum traffic frequency, or FOT). The horizontal axis shows Coordinated

ful if he could standby briefly for hams who have never worked him. (W6OB's suggestion has merit; we need not always be muscle-flexing.—Ed.) In yet another vein, N4MMI recently wrote hoping to alert DX stations to listen below 28.5 MHz for the many Novices/Technicians anxious for a contact.

THE CIRCUIT

☐ **Oman:** Effective Dec 23, the prefix structure for all Omani Amateur Radio stations was revised, and will now include the prefix A4 plus a one-digit number 0 to 9. Local Omani stations will use A41AA to A41ZZ; 3 will be for special-events stations, 5 for expatriates/visitors, and 7 for club stations.

☐ **9J2BD:** Bill Dunn, WD5IRR, is now on the air from Lusaka, 10-15-20 meter CW/phone. QSL via WD5IRR CBA.

☐ **5BWAZ:** 5B4TI recently applied for his second 5BWAZ and would like to hear from any others who have accomplished this feat. Mike notes that it took him two-and-a-half years to confirm the contacts for this second award. (He also holds 5BWAZ #102 from his previous operation as A71AD.)

☐ **Routings:** ZP5XDW is now retired in the ZP6 area and plans a lot of activity. QSL via Doug Wooley, Ayala Solis 1898, Caacupe, Paraguay. 8P6BBS (CQWW phone) via KH6WZ, Wayne Yoshida, 9812 Dandelion Ave, Fountain Valley, CA 92708. ZX0F, via Atilano de Oms, PY5EG, Box 37, Curitiba, PR 80001, Brazil.

QSL Corner

Administered By Joanna Hushin, KA1IFO

ARRL OUTGOING SERVICE RATES ARE GOING UP

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

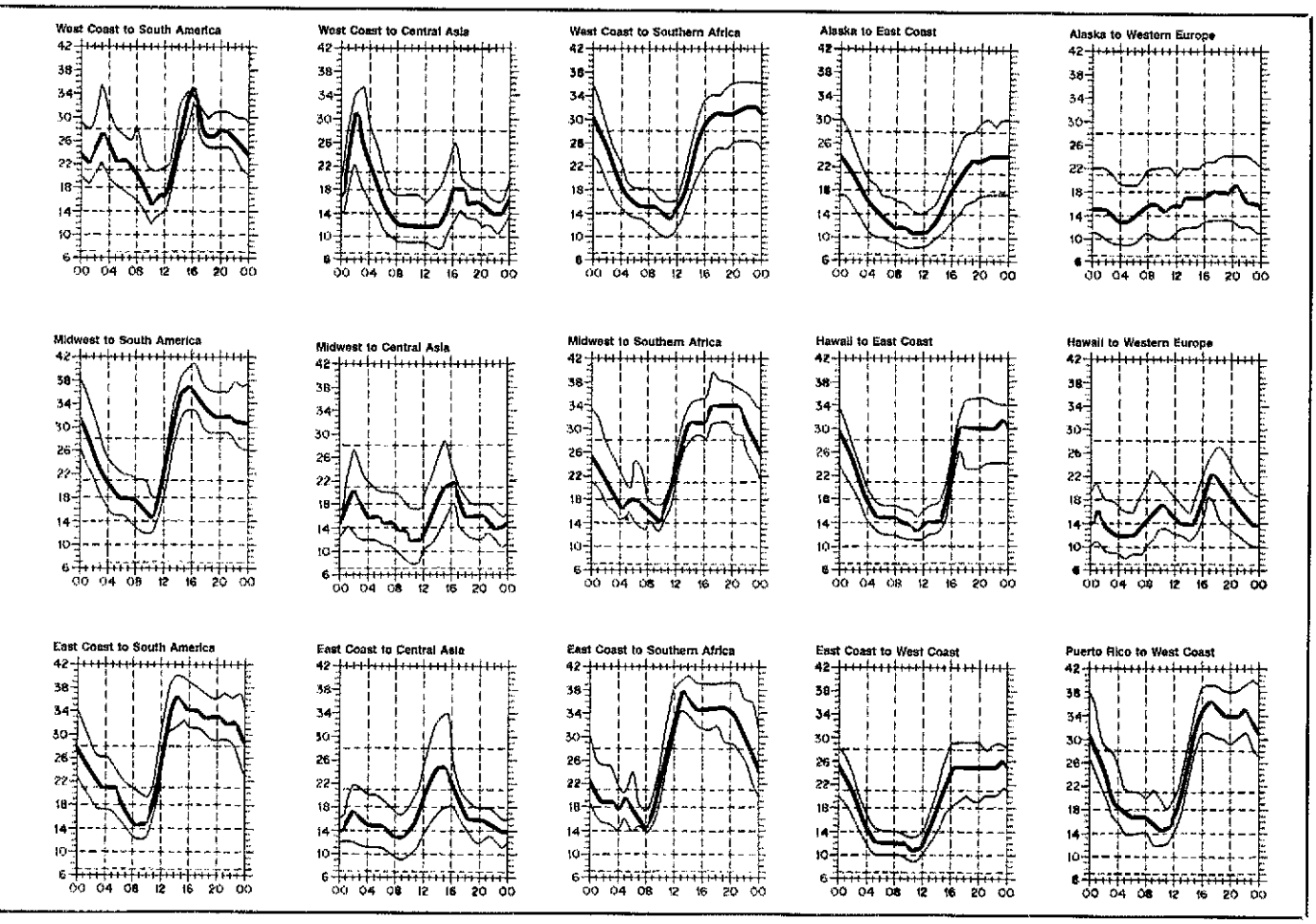
Here is some information for those of you who would like to QSL a QSL manager or direct to the station location. It is passed along as we receive it and, therefore, may not be accurate. The call sign in parentheses is the QSL manager.

DU1/KZ5Z	(NA5U)	JT1T	(JT1KAA)
EA9EA	(EA7LQ)	KC6CS	(JE1JKL)
EA9/KA3V	(NA5U)	KC6MZ	(JA2KVD)
FK8FU	(NA5U)	KC6YW	(JA2KVD)
OH0XX	(OH2BBM)	VR6ID	(KB6ISL)
PJ8CW	(AB1U)	YJ0A	(NA5U)
PJ8JP	(AB1U)	ZB2/KA3V	(NA5U)
PJ9JT	(W1AX)	ZB2/ K5BDX	(NA5U)
PJ0K	(NK4U)	ZK1XI	(NA5U)
PJ2/ AA4GM	(NK4U)	ZZ0F	(PY7ZZ)
PJ2/ K4EIH	(NK4U)	3B1DB	(NA5U)
PJ2/ W3HHG	(NK4U)	3B8DB	(NA5U)
PJ2/WR4S	(NK4U)	3B9DB	(NA5U)
PY0FC	(PY7XC)	3DA0AH	(Fred Maxwell, Box 2726, Mbabane, Swaziland)
P40BC	(W1YRC)	3DA0BJ	(KX8V)
S01A	(EA2JG)	4K2YL	(RA3AM)
S01MZ	(EA2JG)	6V6A	(F2CW)
SU1EK	(WA6OWU)		
VP2MFL	(NA5U)		
VP2MFY	(NA5U)		

QSL MANAGER VOLUNTEER

WY5Q

☐ QSL Corner, Dec 1988 *QST* page 74, contains information and addresses for the ARRL Incoming Bureau. QSL Corner, Sep 1988 *QST* page 59, contains information on the operations of the ARRL Outgoing Service. For additional information on bureau operations (Incoming and Outgoing), send a self-addressed, stamped envelope to ARRL QSL Bureau, 225 Main St, Newington, CT 06111.



Universal Time (UTC); the vertical axis, frequency in MHz. See April 1983 *QST*, pp 63-64, for a more-detailed explanation. The 3rd edition of *The ARRL Operating Manual* contains similar charts for a range of sunspot numbers and times of the year. Data provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for February 16 to March 15, 1989, assume a sunspot number of 151, which corresponds to a 2800-MHz solar flux of 194.

DX Century Club

(continued from page 52)

Phone

AL7BL/285 HK4AHX/126 JA4UQY/271 VE4OX/326 W1MQK/151 KK4HD/225 W5INL/304 KB7UG/240 W8RT/340
CT1AVR/207 HK4DHR/297 JAØDWY/297 VE5EAC/260 WB1EAZ/305 KT4P/311 W5JME/314 KC7EI/301 W8YGR/315
CT4UW/266 I1BSN/317 KA2CC/210 VE7EW/156 K2YIY/323 N4BHJ/283 W5PLN/295 KC7TO/306 WA8SXM/250
CX6BZ/258 I1LNU/289 OA4ED/269 VU2TTC/217 KV2Y/293 N4BLX/311 W5SGI/297 KY7U/216 WD8PUG/306
DJ3AR/320 I2BVG/322 OE2WJL/301 WP4D/207 N2ZZ/131 N4CQ/314 W5SZ/341 N7US/324 K9BB/309
DJ3CP/309 I2JR/320 OE2YMO/254 XE1ILI/156 NX2H/125 N4RFN/202 W5UCQ/319 N7WS/255 K9BIL/309
DK6NP/309 I2KAJ/294 OH2VZ/272 XE1MDX/306 NY2E/293 N4WW/333 WB5LBJ/DU/313 NB7N/127 KB9OC/322
DL1EY/310 I2YBC/326 OH3SR/336 XE1XRC/177 W2ELH/294 W4FPS/330 WB5NDN/223 NK7Y/270 KC9LB/206
DL3MAA/149 IN3DYG/303 OK1ADM/343 YO3AC/322 W2GK/342 W4TMN/126 WB5TED/311 NX7K/304 KS9Z/315
DL7FT/343 IV3YYK/266 ON6NY/306 ZL1AMO/314 W2KKZ/259 W4YJ/361 K6ICS/152 W7CNC/198 W9DNE/335
DL7HU/350 I4AND/272 OZ8EI/228 8P6OV/284 WB2KPE/304 WA4JTI/321 K6SIK/265 W7FG/197 W9IVB/165
DL7MAE/301 IK6BOB/263 PAØLEG/315 9J2JI/122 WB2SZH/306 WA4VCC/310 K6UD/313 W7FJE/290 W9ZX/303
EA3AOC/318 IK7CJV/284 PT7WA/314 AK1L/283 KA3HXO/297 WA4YBV/297 N6CGB/270 W7YR/320 KØDEQ/179
EA5JC/203 I8LEL/324 SM5BRW/301 K1HDO/286 KC3KE/275 WD4KXB/299 NQ6X/279 WB7CEH/256 KØEPE/339
F2MO/346 IC8EGO/317 SM5BZQ/145 K1NJE/330 KC3VE/294 K5YCP/3285 W6CN/318 WB7CLU/310 KØGSV/314
F6FYD/212 IØUAV/128 SM6CTQ/316 K1YDG/229 W3EE/158 KA5BOA/162 W6OK/296 WB7WQE/274 KØJZM/273
F8HIZ/300 IØZV/350 SM7LOX/227 KA1ION/224 W3YHR/285 KA5V/312 W6QON/200 WN7M/224 KØSE/308
FE6IFF/231 JA1OND/306 SMØDJZ/309 KA1X/275 AA4V/257 KE5JE/205 WE6H/259 KB8WC/294 KBØHJ/291
G3VOF/312 JH1HLQ/320 SMØDRB/260 KB1WH/205 AA4ZK/218 N5CFN/156 AK7K/178 N8ASV/214 KBØU/309
G4BWP/295 JA2BAY/317 SV1IW/311 W1BWS/303 K4ADN/277 NA5S/272 K7JXR/266 N8AXY/306 NØEXW/178
G4GEE/203 JG2CLS/133 VE1OC/225 W1CRL/290 K4GFI/323 W5BWA/150 K7ZM/206 N8HTT/254 WØHBH/311
HB9DDW/160 JA3AFR/322 VE3BTQ/145 W1KKG/135 KB4FQ/311 W5CP/304 KB7TQ/275 W8CNL/331 WØJLC/223
HC5EA/309 JA3RRN/284 VE3CWE/277 W1MGP/251 KD4S/316 W5GVP/284 KB7TW/279 W8IQ/175 WBØCGJ/269

CW

AL7BL/161 I4AND/272 JA3RRN/216 SM6CTQ/305 XE1OX/207 W2HN/272 WB4CSK/290 WB6RSE/314 AB9O/149
DK6NP/298 I4EAT/270 JAØDWY/249 SM6CVX/310 YO3AC/280 W2KKZ/200 WM4Z/226 N7US/280 K9BIL/281
DK8KC/236 IK6BOB/160 OH2BN/306 SMØCCM/298 AK1L/240 K3YGU/200 K5MC/251 NX7K/200 W9DH/288
DL7MAE/300 JA1OND/264 OH4OJ/244 SMØDJZ/300 KA1X/200 AG4S/285 W5CJZ/202 W7YS/225 KØDEQ/278
DL9TJ/250 JA1SJC/186 OK1DWJ/128 SP2JKC/226 W1BWS/286 KN4B/254 WB5ZDP/201 KC8PG/291 NSØB/151
F6HWM/258 JF1KKV/293 OK2PO/206 VE3CWE/264 WA1FCN/251 N4WW/322 K6UD/266 N8AXY/279 WØHBH/241
G4BWP/274 JI1XTZ/210 PT7WA/273 VE3JCV/204 KQ2O/260 NA4D/254 KI6T/201 W8IQ/151 WØIZ/310
G4EDG/280 JR1TNE/291 PY2KP/231 VU2TTC/176 NY2E/233 NI4Y/249 N6LHN/200 W8YGR/259 WØNQ/200
HB9CXR/167 JG2CLS/155 SM5BRW/283 WP4D/272 W2ELH/214 WA4JTI/296

RTTY

CE3GN/156 I2JR/156 AB9O/132

160 Meters

OK1DWJ/128 K1ZH/205 N4WW/211 K5UR/221 K7SP/115 W8AH/191

10 Meters

JG1NBD/297 K2TQC/254 WA2VUY/289 N4MM/291 N4WW/300 W4DR/318 K5OVC/290 NX7K/131 WØHBH/139
SMØDJZ/252

The following is a list of those amateurs who have qualified for 10 Meter DXCC during the period from July 1 to September 30, 1988. For those members whose applications were recieved by July 1, award number is shown, followed by member's call sign and total number of DXCC countries confirmed on 10 meters. The award number has been omitted for awards earned after July 1, 1988.

Complete applications received by July 1, 1988

1. W4DR/317
2. G3KMA/315
2. K2FL/315
4. K4DY/307
5. K2OLG/298
6. K2ARO/297
6. W9ZR/297
8. JG1NBD/296
9. K3BEQ/295
10. N4WW/294
11. N4KG/292
12. K4CKS/291
13. K6YRA/290
13. SMØAJU/290
15. N4MM/288
16. AA6AA/287
16. WA2VUY/287
18. K3FN/286
18. K5OVC/286
18. WB6PSY/286
21. K1MM/284
22. K5UR/281
23. W1NG/280
24. JA2FCZ/278
25. OH2BOZ/277
25. K4PI/277
27. OK1MP/271
28. K6SVL/270
29. K1MEM/269
30. K6EID/267
31. K1EFI/266
31. OZ3SK/266
33. WØPGI/265
33. WB5SKQ/265
33. W4VQ/265
36. W8AH/264
37. W1JR/261
38. DJ4XA/259
39. N4VZ/257
39. VE6WQ/257
41. JA4DLP/254
41. WB5RQM/254
43. SMØDJZ/251
43. WØWP/251
45. WA8CAE/250
46. JA3CMD/248
46. K2TQC/248
46. JH1IED/248
49. DL3RK/246
49. K6EMN/246
51. K4II/245
51. W7FP/245
53. N2MF/244
53. W5EU/244
53. W8UVZ/244
56. JA1GTF/243
56. W3AP/243
58. W6ISQ/241
59. SMØDRB/234
60. K5MBE/232
60. W7LZF/232
62. K4KUZ/231
63. SM5BHW/230
64. K8LJG/228
65. W1KSZ/227
66. PAØXPQ/226
67. KE9A/223
68. KS9R/222
69. K5US/220
70. F3AT/219
71. JA1MDK/216
71. K1RAW/216
71. W1RR/216
71. KB8DB/216
75. JA3BG/215
75. W1GL/215
77. DJ5JH/214
77. K2UO/214
79. K3UA/213
79. K5HGL/213
81. W4FRU/212
81. N6JV/212
83. W4RNZ/211
84. WA1LOU/210
84. WA9IVU/210
86. HB9RG/209
87. K1KOB/208
87. AA4V/208
87. K4XO/208
90. W1BFT/207
90. W6CF/207
90. W9WHM/207
93. JA1NTK/206
94. KØRRY/204
94. WØSR/204
96. G4IJW/203
96. K5AQ/203
98. W1AX/202
98. W9MMZ/202
100. N5FJ/201
100. K7UR/201
102. W4RA/198
103. K5UC/197
104. SM3DXC/196
104. KØDEQ/196
106. K1IU/195
106. N6ET/195
108. WB2DND/194
108. K8CH/194
110. K5KLA/193
110. K7SP/193
112. JE1VPC/191
113. W8DCH/188
114. JA1DFQ/186
115. JR3RVO/185
115. AG9S/185
115. KR9O/185
115. KØQQ/185
115. NØZA/185
120. W4WJ/184
121. WB1EAZ/183
122. JG1TSF/182
122. XE1OX/182
122. N9US/182
125. DK2BI/181
125. K1ZZ/181
125. AI6Z/181
128. K2OVS/180
128. W5IO/180
130. K5GOE/179
131. W1SIX/178
131. W5LLU/178
133. W5EIJ/177
133. W8BCL/177
135. N6JM/176
136. W9WYM/175
137. N7US/174
137. W1EED/174
137. KB1BE/174
137. W6SZN/174
141. DL1EV/173
142. WBØYJT/172
142. WØIZ/172
144. W2HZ/171
144. K7FE/171
146. VE2WY/170
146. JA1ADN/170
148. N2KW/169
149. W2HXF/167
150. KW4V/164
151. WF4G/163
152. W1ENE/163
153. KM1D/162
154. WB9NOV/161
155. WA2DHS/158
156. EA5AN/157
157. K6MA/156
158. WØJF/155
159. NS7Z/153
160. KC7V/152
160. ZS6BCR/152
162. K9ALP/151
162. K5HYB/151
162. WF5E/151
162. W7HR/151
166. K5OTI/149
167. W8KG/147
167. VE3JGC/147
169. K8OQL/146
170. DK8KC/145
170. KD6WW/145
170. WA7UVO/145
173. KJ3Q/144
173. W2FCR/144
175. AA2Z/142
175. N9CPW/142
175. N3BQS/142
175. WW6F/142
179. K1DRN/140
180. AB9O/139
181. N2BAT/138
181. K4MF/138
183. W3BWU/136
184. N9AG/135
184. K9FD/135
184. KAØCDN/135
184. JA2NNF/135
188. WA5ZIJ/134
188. VE7AHA/134
190. K4XI/133
191. W2FR/132
192. WØIJR/131
192. JA2ORW/131
194. K4DSE/130
194. KE7LU/130
194. KA9I/130
194. AK2O/130
198. KR8I/128
199. WØYDB/127
200. K4SE/126
200. W6EJJ/126
202. W5HTY/125
203. DL3SBI/123
204. WA4YLD/122
205. NG8T/121
205. WØHBH/121
205. KZ4V/121
208. VE7DX/120
209. WB7OHF/117
210. NE4A/116
210. NX7K/116
212. WE6H/115
212. WA4BAO/115
214. N3COG/114
214. K1NTR/114
216. DL9TJ/113
216. KA2AJT/11
218. W8IQ/112
218. W2KKZ/112
220. W6QL/111
220. K7LJQ/111
220. W6CTL/111
223. KB2WN/11
223. NE8Q/110
223. K7NN/110
226. YU2WM/10
226. W8WEJ/10
228. KA4YAE/10
228. AE2L/108
230. W7BYK/10
231. KSØZ/106
232. AE6H/105
232. K6SIK/105
232. N3CWP/10
232. WA6DTG/1
236. JAØUMV/10
236. K4JSG/104
236. W2VYX/10
236. VE7EOA/10
236. KB2VK/104
241. K1GW/103
241. WA2UUK/1
241. KR9P/103
244. K2LZJ/101
245. WA4ECA/1

Applications received from July 5 to September 30, 1988

JA1ELY/307 OZ4ZT/123 G4AFJ/159 SM5DUT/109 W5TZN/123 K9VIQ/100 KE9U/183 DK5WL/143 N4TL/136
AF2O/244 OZ1ACB/120 JA8TRT/156 DL1PM/278 W3KV/117 SM5AKT/229 GØAEV/107 4Z4DX/265 KBØG/124
JH1EDB/131 K4UTE/243 HB9AUT/127 W1WS/136 YBØABV/106 WA9WJE/135 DL1BS/204 WA8YTM/136 Z21GL/118
YS1GMV/100 W9YSX/234 K6KLY/119 KA4GYU/105 K9IW/137 W6NLG/127 NØAMI/230 JR7TJP/101 N6DJY/102
OZ1LO/292 K8OM/132 KØPVI/104 KT1H/109 K6OJO/180 WB2P/238 N4BSN/224 OE1KJW/100 JH1VRQ/227
KI3L/252 W7GUR/223 KC9C/103 W1YY/246 WØYK/251 LA8CE/129 KB2XJ/105 WA4SFF/107 NY5F/105
OZ3PZ/220 F6FHO/221 DL3ML/119 JF1SEK/110 K5TSQ/199 W6KPC/154 N4QGH/103 JH1BSE/231 JA4JVX/219
WAØVBW/170 DL7DW/210 N7RT/240 WB4TDH/110 CX2AAL/111 K3QMX/202 JA5PUL/206 N4JJ/108 WA6ARG/150
K7ZA/169 JA7COE/190 W7TE/166 AA4TV/136 WE2L/106 SM5DYC/188 WA4QMQ/213 JA1BN/195 W2NUS/109

Conducted By Luck Hurder, KY1T
Deputy Manager, Field Services Department, ARRL

1 AM and All is Not Well!

By Kelly Bruce, WD4DAT, District Emergency Coordinator, Alabama

It finally happened—all the planning and all the drills led us to the real thing on Sunday, November 20, 1988. We are very thankful that no one was killed and that very few were injured in what could have been a very serious situation.

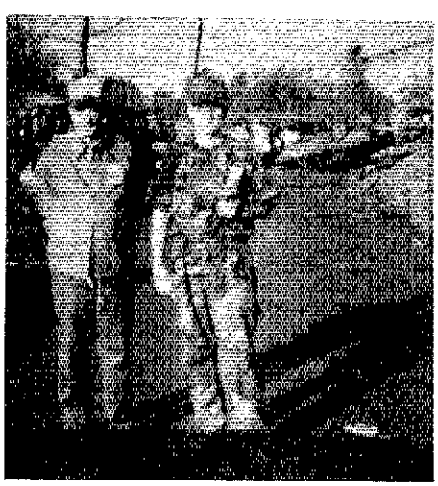
Tuscaloosa, Alabama is located in the west central part of the state about 60 miles southwest of Birmingham. We get our fair share of severe weather each year, including a tornado in 1975 that caused extensive damage and killed one person. Tuscaloosa-area hams provide weather spotting for Emergency Management and primary communications for the American Red Cross.

Sunday night, stormy weather entered our city and we were under a tornado watch by the National Weather Service. This condition lasted until midnight with only heavy rain and thundershowers. Then it happened...

About 1 AM, a tornado entered the southwestern portion of the city without any warning. The twister touched down in several residential neighborhoods causing extensive damage. Over 100 homes were damaged, with 12 to 15 completely destroyed. Cars were overturned and hundreds of trees were uprooted. All utilities were completely cut off.

At 3 AM, I received a call for help from Mr Buck Medley, director of the local American Red Cross. At first, I thought I was dreaming. My wife, Kathy, KA4JIC, quickly convinced me that I was not, at which point my wheels finally got rolling.

Several homes were completely destroyed during the Alabama Tornado.



Glenn Gray, N4AII (l), and Palmer Norred, WA4HUO (r), provided emergency communications in the aftermath of a tornado which hit Tuscaloosa, Alabama.

Dee Chandler, KC4AZX (l), with the American Red Cross food van.

Have you ever wondered just how policy is made for the National Traffic System? How do you go about infusing your ideas into the NTS? Who do you talk to about changes in the way things are done in the handling of traffic?

While the Field Services Department of ARRL HQ interfaces with the National Traffic System and provides support and guidance when required, it is the area staffs who provide the input for policy decisions. Anyone who handles traffic generally follows NTS guidelines which were originally proposed by these area staffs.

There are three area staffs—the Eastern, Central and Pacific. Each represents a geographical area encompassed by the appropriate NTS area traffic net. Membership is tailored to provide representation for various region nets, area nets, and the Transcontinental Corps (TCC). For example, in the Pacific Area Staff, six region nets are represented; both cycles of RN6, RN7 and TWN. Additionally, both cycles of the Pacific Area Net are represented. Designated representatives are the individual managers of each net. TCC is represented by the managers of both day and night cycles. In addition, the Pacific Area Staff has three Members at Large (MALs). These individuals represent the entire traffic community within the Pacific Area. While each of the net managers is primarily concerned with the functioning of their individual nets, MALs can present problems and ideas which affect the entire traffic community. With the exception of MALs, who are elected for two-year terms, other area staff members hold their position as long as they remain net managers.

While I have used the Pacific Area Staff as an example, each area staff is of similar composition. The membership will be slightly different depending on the number of region nets represented and the number of MALs. Each area staff holds periodic meetings which are funded by the ARRL. These meetings depend on budgetary constraints and the possible items for discussion.

These area staffs are your representation in the National Traffic System. Got a better idea? Got the solution to a routing problem? Perhaps some thoughts for traffic handling in the future? These are the people to talk to about your ideas. The names and calls of the various TCC, area and region net managers are listed in the current *Net Directory*. This information is also available from the Field Services Department and, closer to home, your section traffic manager. If you are at all active in the NTS, then you probably already know some of these people.

The three area staffs are your representatives, but all too often, NTS members fail to forward their good ideas, thoughts and solutions to these people. If you have a better way of doing things or the possible solution to some problem, please contact one or all of the members of your appropriate area staff. As with any advisory group, their usefulness and worth is only as good as the input which you provide.

My first reaction was that this was the big one—the *real* thing. What did I need to do, and what should I bring with me? I quickly loaded the car with every 2-meter radio and antenna that I had, including the equipment that our club purchased just six months previously for moments such as this. I loaded extra coax, mag-mount antennas, power cords, power supplies—the works.

Upon arrival at the disaster site, the first order of business was to set up the base station. Teams were already being dispatched to the area, each with an Amateur Radio operator on board for communications. Food service teams were also being sent to collect food for the victims and workers. Two command bases were eventually established: one in the heart of the destruction and another on the main road to town. The sight was somewhat unbelievable, with some houses simply razed to the ground and dozens of others torn apart. Debris were everywhere!

Communications were promptly established with all mobile teams as well as with the American Red Cross base station. This was the first time that the Red Cross had communications with all of the disaster teams at once, enabling them to know exactly what was going on at all times. Mr Medley told me after it was all over that they would never go into a disaster site again without the hams.

The communications performance was outstanding. Throughout the day, emergency calls were relayed, including calls for medicine, food, shelter and inquiries about the status of victims and relatives. Amateur Radio operators even manned cellular phone systems that the city provided to allow temporary telephone service. Damage assessment communications were also provided by amateurs, with several damage-survey teams being dispatched.

Several ham teams were sent out on foot to survey additional damage and provide communications to outside areas. Amateurs collected boxes from stores and the local hospital so victims could pack their belongings. A temporary shelter was set up at the local elementary school, and communications were established there.

Throughout the day, hundreds of messages were passed between the various teams and areas. All day Sunday, activity continued with police, fire and utility trucks trying to set new lines and clean up the damage. By late Sunday afternoon, the food services and communications teams of the Red Cross were cleared as the situation was in hand and our job was completed.

The hams had been on the job for 15 hours nonstop and had provided a tremendous public service for the victims. It was a learning experience for us all. I, for one, discovered just how prepared I was (and was *not*!) for such a situation. After it was all over our group identified ways in which we needed to make adjustments in order to be better prepared next time.

The Red Cross officials told me time and time again how amazed they were at the abilities and speed with which the hams were able to communicate. In the days that followed the disaster, I was told that city and state officials met in closed-door session and spoke of how proud they were of the Amateur Radio operators who assisted.

We know that sometime in the future, we will be in another similar situation. We hope that such a time is far in the future, but when it does come, the slogan of the West Alabama Amateur Radio Society will once again show our community that "We Are Always Ready to Serve."

IN SERVICE

Lake of the Woods, Ontario-Minnesota border—October 31. A simulated search-and-rescue operation by Amateur Radio Operators, police and civil defense directors in Canada and the United States may have been one of the first joint efforts by the two countries.

The simulated exercise called for an aircraft en route from Fargo, North Dakota to Kenora, Ontario, carrying seven persons to be reported down on the Canadian-US border. Word of the simulated crash was flashed to area radio amateurs by VE3JJA from Kenora. Within a half hour, aircraft carrying Amateur Radio operators were in the air, utilizing a network of three 2-meter repeaters, an emergency base station and two control stations. The radio amateurs in the aircraft spotted the downed aircraft and landed to set up a base station near the scene.

Amateurs used hand-held transceivers and repeaters to relay information to the Ontario Provincial Police and to call for an air ambulance for the victims of the crash. When 2 meters went out of range, communications were carried on by two control stations, one in Roseau and one in Kenora, on 75 meters.

Ambulance, police, search, rescue and all other details were handled by Amateur Radio in the make-believe emergency. The exercise was a culmination of a two-year effort by Canadian and US amateurs to combine a search-and-rescue and emergency communications service for the huge wilderness area surrounding and including Lake of the Woods.

VE3JJA directed the exercise from Kenora and was assisted by VE3EFY, VE3JJX, VE3NNF, VE3ZAN and VE3LMB. VE3SNO and VE3VGU operated the Sioux Narrows repeater. Minnesota radio amateurs who participated were WØDCM, WØHQL, WØWJK, KØDID, KAØCHZ, WBØQCY and KØOTE.

Field Organization Reports
November 1988

ARRL Section Emergency Coordinator Reports

Twenty-eight SEC reports were received, denoting a total ARES membership of 17,944. Sections reporting were: EPA, GA, IA, IN, LAX, MI, MN, MO, MS, NFL, NH, NM, NNJ, NTX, NV, OH, PAC, SCV, SD, SDG, STX, VA, VT, WA, WMA, WNY, WTX, WV.

Transcontinental Corps

Area	Successful Functions	% Successful	TCC Function Traffic	Total Traffic
Cycle Two				
TCC Eastern	107	90.00	514	1035
TCC Central				
TCC Pacific	113	94.17	498	956
Summary	220	92.08	1012	1991
Cycle Three				
TCC Eastern	52	86.67	39	78
Cycle Four				
TCC Eastern	114	95.00	488	987
TCC Central	58	80.60	324	744
TCC Pacific	98	81.67	504	1045
Summary	270	85.75	1316	2776
October 1988 report:				
Cycle 3				
Eastern Area	54	87.10	32	64
Cycle 4				
Eastern Area	115	92.74	452	911

TCC Roster

Eastern Area, Cycle 2: KW1U Director. K1EIC WA1FCD KA1MDM KT1Q W1QYY KW1U WA2FJJ W2FR NN2H W2MTA N2XJ N3AZW N3EMD NC3V NJ3V WA3YLO AA4AT WD4FTK N4GHI WB4PNY N4SS W8PMJ NJ8S WB8YDZ VE3ONR

Eastern Area, Cycle 3: KN1K Director. WA1FCD NN2H WA2SPL N3EMD KK3F W3OKN AA4AT K8TPF KA8WNO

Eastern Area, Cycle 4: KN1K Director. KB1AF N3AZW W1CE W1EFW W1NJM W1QYY WA1TBY KW1U W2FR W2GKZ NQ2H KB2HM W2LWB W2RQ WA2SPL N2XJ N3FM W3GL WB3GZU W3PQ KQ3T NC3V N4GHI K4SCL N4SS N4TE W4UQ K4WJR K4ZK W8BO W8PMJ N8XX VE3FAS VE3GSQ

Central Area, Cycle 4: K5GM Director. W4ZJY WB5J K5MXQ WZ5N WR5O N5TC K5TL W5TNT K5BW W9CBE WB9UYU AIØO KSØU.

Pacific Area, Cycle 2: ND5T Director. W5JOV KB5UL K6UYK WF6O WA7CBN KF7R W7TGU W7IGC WDØCKC NØHFZ NØIA VE6CHK.

Pacific Area, Cycle 4: KØDJ Director. N2IC ND5T W5QVK K6LL W6EOT W6INH W6VZT K7GXZ W7EP W7GHT W7LG W7VSE KA7CPT KN7B NN7H NR7E KØEZ KØTER KCØD KJØG.

National Traffic System

Net	Sess	Tfc	Avg	Rate	% Rep	% Rep to Area
Cycle Two						
Area Nets						
EAN	30	933	31.10	.853	95.6	
CAN						
PAN*	60	455	7.58	.554	98.8	
Region Nets						
1RN	60	492	8.20	.477	100.0	100.0
2RN	60	416	6.93	.498	94.0	100.0
3RN	30	219	7.30	.500	93.3	100.0
4RN						100.0
RN5	60	573	9.55	.426	85.0	
RN6	55	142	2.58	.252	98.3	
RN7	60	421	7.01	.586	94.4	100.0
8RN	60	355	5.91	.336	98.3	93.3
9RN	60	287	4.78	.353	84.0	
TEN	58	545	9.40	.348	83.0	
TWN	60	297	4.95	.369	88.3	98.3
ECN						80.0
Cycle Three						
Area Net						
EAN	29	224	7.72	.479	88.6	
Region Net						
1RN	30	134	4.46	.312	92.9	96.5
2RN	28	132	4.71	.427	98.6	89.6
3RN	29	42	1.44	.190	90.8	96.5
4RN						82.7
8RN						86.2
ECN						86.2
Cycle Four						
Area Nets						
EAN	30	1122	37.40	1.392	99.5	
CAN	30	1104	36.80	1.605	100.0	
PAN	30	758	25.26	.897	98.3	
Region Nets						
1RN	60	444	7.40	.468	96.4	100.0
2RN						100.0
3RN	60	203	3.38	.339	97.8	100.0
4RN	60	620	10.33	.426	97.0	100.0
RN5	60	509	8.49	.678	72.0	100.0
RN6	60	318	5.30	.650	98.0	98.3
RN7	60	338	5.63	.410	78.2	100.0
8RN	59	317	5.37	.369	93.0	100.0
9RN	60	335	5.58	.420	95.4	
TEN	60	474	7.90	.713	81.0	100.0
TWN						100.0
ECN						
ARN	30	91	3.03	3.333	100.0	96.6

*PAN operates both cycles one and two.

ARRL Section Traffic Managers reporting: AL, AR, AZ, CT, DE, EMA, EPA, GA, ID, IL, KS, MDC, ME, MI, MN, NC, NFL, NH, NTX, OH, OK, OR, ORG, PR, RI, SB, SC, SD, SDG, SFL, SV, TN, UT, VA, VT, WA, WMA, WNY, WPA, WVA.

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, upon sending notification of qualifying months to ARRL Public Service Branch, will be awarded a special PSHR certificate from HQ.

411
KC9CJ
142
WB2OWO
141
N4GHI
131
NG1A
128
WA4QXT
123
KA3DLY
122
WA2SPL
120
WB2ZJF
K4NLK
119
N4EXQ
WA9VND
K5MXQ
118
W2QNL
117
WF6O
114
KD7ME
113
W2RRX
W2MTA
WB1HIH
112
KF5BL
111
N9BDL
KV5X
N5KCL
110
W9CBE
W9YCV
N2EIA
KT1Q
WB6DOB
N1CPX
109
WB4DVZ
WX4H
WA4PFK
108
W7LNE
NØDPF
W4ANK
107
WB7WOW
WAØHTN
WB7VSN
AA4TE
106
N4MEJ
103
K8TVG
WB4KSG
KA7AID
N6NLW
KW1U
102
KD8HB
W4JLS
WA4JDH
KI4YV
NM1K
WA1FCD
101
AG9G
WGØS
WG7H
W7VSE
100
N2XJ
KB4WT
W4PIM
AA4HT
WA1TBY
99
K5UPN
N3EMD
98
KØERM
WA4EIC
97
NØFQO
K9CNP
WD8KQC
96
W7GHT
KJ4VT
K4VWK
K4MTX
W4CKS
K4ZK
KA1GWE
95
WØOYH
WA2FJJ
WA9VLC
WB8SYA
94
KØBXF
93
W3FA
92
WB4ZTR
AA4ZV
KB1AF
91
WØOUF
KA7EEE
90
KA2ZKM
NO3M
KAØARP
W6VOM
89
WT7A
KA1FVY
88
NDØN
87
K2YAI
86
K2VX
WB4WQL
N3AZW
N3EGF
85
W5YQZ
AA4AT
KAØKPY
84
N4KSO
KA7SYG
KB9LT
W1KX
WD4KBW
N8FPN
KA1NXT
KA1IFC
WA3WIY
83
KA2INE
N8GPU/T
N4SMB
82
K6UYK
WA4RUE
81
WA1JYV
80
W6INH
KJ4NK
W4RWB
79
WBØZNY
KA2QOO
N8CEI
78
WAØTFC
77
KJ9J
AK1W
76
WA3UNX
N7BGW
W1RWG
K3JL
75
KA4HHE
KD2UV
KA9QXI
NC9T
74
NN2H
KF5RD
NØIYE
WA6QCA
K1GGS
W1KK
73
KB4LB
K3GHH
72
K4ZUY
71
NØBDG
WD4COL
NC3V
WA6QBX
N1CVE
70
KA9RII
NJ3V
N1DHT
NW8M
68
WB2QIX
67
N2ABA/T
KØQBE
K9ZBM
NOØA
KA4FZI
KA1MDM
66
KA2UBD
N8FWA
KAØUEQ
N3COY
K4IWW
WB8R
KA8CPS
65
KI6ZH
W4HON
KA2ZNZ/T
K8JDI
WB0WNJ
WB8YPG
N8HSC
K7IVQ
64
NY8W
W1PEX
63
KD8KU
K3RXK
KC3Y
WA8DHB
62
WB2FTX
N2DXP
W9UMH
NS9Q
KC2HJ
WD8KBW
WB8KWC
N8EFB
61
WA4TXT
WS7U
KDØNH
W9DM
N4ORZ
K1EIC
60
KP4DJ
W2FR
WØOUD
AIØO
N4SDS
KP4DJ
KA1LIH
59
W8IIO
KA6HJK/T
58
N4MMM
56
KA1RVN/T
55
N1FLO/T
53
KA6TND/T
48
N2EVG/T
47
KB2BNW/N
KA1HPO/T
41
N8HRW/T
40
N2IKR/T
N4LST
KA1QFV/T

The following stations qualified for PSHR during the month of Oct but were not listed in the Jan PSHR column: N2AKZ NB2D N2GPA N2HLZ N2IMP KA2JMA/T K2TWZ KA2UIU/T KA2VZX K3JL K2YQK W7GHT N8FWA (Sep) N8FWA.

Brass Pounders League

The BPL is open to all amateurs in the United States, Canada and US possessions who report to their SM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in the standard ARRL form.

The Brass Pounders League Medallion is available to individual operators who achieve BPL and are listed in the BPL column for the third time. This medallion is a one-time-only award, ie, it is not issued more than once. It is not necessary that the three months involved be consecutive. Any three months will qualify an operator. Stations that qualify for the BPL medallion, upon written notification of the qualifying months to the ARRL Public Service Branch, will be awarded the callsign-engraved BPL medallion.

Call	Orig	Rcvd	Sent	Dlvd	Total
W3CUL	691	874	1297	87	2949
W8AKF	320	920	1092	206	2538
WB9YPY	0	1195	102	728	2025
WA2SPL	32	862	900	32	1826
WD4IIO	419	351	650	88	1508
KB4N	0	767	727	0	1494
W1PEX	0	249	1032	10	1291
WBØWNJ	230	192	722	6	1150
W3VR	354	259	496	31	1140
WBØTAX	0	525	525	0	1050
KC9CJ	7	558	38	342	943
WA4JDH	1	405	442	1	849
K4DOR	59	334	388	6	787
WA1FHB	1	374	373	2	750
WA9VND	11	334	325	35	705
N3AZW	20	326	322	32	699
WF6O	3	323	334	16	676
KA1IFC	17	344	289	15	665
N4GHI	58	260	233	35	586
KT1Q	1	300	262	9	572
WX4H	0	279	275	12	566
W2MTA	1	321	221	2	545
K5UPN	0	293	246	1	540
W3IWI	0	271	268	0	539
N1CPX	14	225	278	14	531
W4NFK	12	254	247	9	522
K6UYK	31	236	244	3	514
AL7IN	0	254	254	0	508

BPL for 100 or more originations plus deliveries:

KØDKM	139	WB5OHK	118
WB6DOB	129	KY1T	103

Independent Nets

Net Name	Sess	Tfc	Check-Ins
Amateur Radio Telegraph Society	26	206	353
Clearing House Net	30	320	341
Early Bird Net	30	302	579
Empire Slow Speed Net	30	67	417
Golden Bear Amateur Radio Net	30	215	1687
IMRA	26	1029	1728
Mission Trail Net	30	146	911
NYSPTEN	30	71	502
Southwest Traffic Net	30	241	1630
West Coast Slow Speed Net	29	109	432
7290 Traffic Net	46	362	3065
75 Meter ISSB Net	30	722	1230

Correspondence

Conducted By John Hennessee, KJ4KB
Regulatory Information Dept Assistant

THE "HOLY MEN" AND 220

☐ As soon as I read the editorial entitled "Black Thursday" [in October *QST*, concerning the loss of 220-222 MHz to the Private Land Mobile Service], it set off a warning bell.

I used to think that the FCC Commissioners were some sort of "holy men," always guarding the spectrum. Perhaps a Congressional investigation would be in order. At least it would bring public opinion, for whatever that's worth, into the picture and the "holy men" would have some explaining to do.

At least you will have some frequencies around 220 (in the USA); over here (in Sweden), we have none.—*Ben Lane, SMØRDE and W7FNE, Sollentuna, Sweden*

THE GEORGE BUSH LETTER

☐ Both Perry Williams, W1UED [Washington Area Coordinator at ARRL HQ], and the League in general are to be congratulated for the printed communication with George Bush which appeared in December 1988 *QST*. While I supported the other candidate in the recent presidential election, I sincerely feel that the League needs to cultivate contacts in the highest reaches of government in order to keep the heat on agencies such as the FCC and to ensure that this body is generally supportive of Amateur Radio.

As the general erosion of our frequencies points out, the amateur community, through the ARRL, needs to keep reminding our elected officials that 450,000 points of light also have 450,000 votes.—*W. J. Kleronomos, KDØHG, Lyons, Colorado*

[For more information on ARRL efforts in Washington, see the article entitled "President Reagan Signs Bill Lauding Amateurs" which appears on page 60 of January *QST*.—Ed.]

☐ At my age of 75, I sometimes intend to do some letter writing, but I sometimes decide to wait until next week. When I do that, it never gets done. I want to thank Perry Williams, W1UED, and ARRL for sending that fine letter to Vice President [now President] George Bush. It is well written and represents the thoughts of all amateurs.—*Gerald E. Jelley, W8PGC, Casstown, Ohio*

LOST SPECTRUM—WHAT'S THE ANSWER?

☐ I have noticed a cooling of the FCC towards the Amateur Radio Service over the past few years. I think this is due to several things. Many of these are a direct result of the practices which many operators have adopted over the past several years; however, many of them are the direct result of the policies of the main spokesman group for amateurs which is, in my opinion, the ARRL.

First, amateurs must again learn to cooperate with one another and settle their petty disputes without running to the courts or to the FCC at every turn. It appears to me that if we insist upon acting like children, we will be treated like children. I think the FCC feels that at this time, we are acting like unruly brats and they just might start treating us like a parent would treat such a child if we don't get our act together.

Second, and now we begin to get to the heart of the matter, the total number of amateurs must be drastically increased. I am thinking that a 10 to 20-fold enlargement almost immediately, with most of these being in the younger age range, would not be out of line.

Third, I think that the Amateur Radio community should admit that it was wrong and heartily support a no-code entry level license. I have tried many times to interest people (young, old and middle aged) and they are usually impressed with Amateur Radio, but then they ask if they have to learn the Morse code. I usually say that it is only 5 WPM and their answer is usually "I will get to it when I have the time." This, of course, means never. Before the reader of this letter thinks that these people would probably not make good hams, I would like to state that the only people I ask repeatedly to become hams, I could either vouch for or would vouch for them if asked.

I think that a no-code license would be of great benefit because it would drastically increase the number of amateurs, especially young amateurs, and the quality would not suffer appreciably—have you listened to 75 meters lately?—if a proper written test were developed and used as a screening method. Also, this license class could be used to help restore the balance that I think the FCC feels was destroyed when the amateurs turned thumbs down on their proposal for such a license in the past.—*William D. Cleveland, WD5IBY, Baytown, Texas*

A NO-CODE VHF DIGITAL LICENSE

☐ As a Life Member, I applaud my League in continuing to lead the fight against our loss of 220-222 MHz. I was one of the many hams who filed comments with the FCC and have written our Congressional leaders. Let us all hope that we will be successful in the battle (to regain 220-222 MHz as amateur).

While it is this immediate threat that has galvanized us, I think we owe it to ourselves and to future hams to reflect on what we can do to prevent additional spectrum losses. Most pointedly, it is time that we admitted that the recent Novice Enhancement is not working and revisit the issue of a no-code license. The greater reality of the FCC's action on 220 MHz is that we are in a fight for self-preservation. Our members remain relatively static in the face of advancing communications technology and the consequent demands from other services for additional spectrum.

Please be mindful of the fact that I have been a ham for 25 years. I entered this hobby as a 12-year old. Yes, I agree that we need to attract new hams from all age categories, but it is the youngsters at the age I was when I became a ham who will provide us with the long-term growth and give us the numbers necessary to protect our frequency allocations.

There is no way that we can convince young kids today that Morse code is a relevant skill that should be an entry-level requirement to ham radio. We should take a good hard look at ourselves and our avocation. The single greatest technological spur to ham radio since SSB technology in the 50s has been packet radio and other related digital modes of the 80s. These modes have captured the imagination of old-timers and newcomers in our ranks like virtually no other. Further, packet radio provides us with an enormous tool to increase tremendously the number of dedicated, technologically progressive hams if we use it wisely.

We have all heard (and cannot deny) the complaint that a major obstacle to attracting school-age youngsters to ham radio is the high cost of equipment. Yet, here we have an exciting computer-related communication mode in a society where large numbers of youngsters already possess personal computers! With that investment already made, all we need to tell the kids is to scrape together enough money for a stripped-down VHF FM rig and an antenna and you can put that computer on the air once you pass a digital radio-oriented exam.

Now please do not get me wrong. I fully agree that a no-code digital license should require a thorough theory exam covering both radio fundamentals and basic digital

information. I further believe that the privileges of such a license should be restricted to digital modes on the VHF/UHF bands with some limited satellite opportunities to whet their appetite. But I will bet you that if we did this, between the general ham radio information that these digital hams would pick up from the packet bulletin boards plus (that obtained from) ham magazines, they would quickly begin upgrading (including learning the code) so as to enjoy the full experience of ham radio.

Those of us in this great hobby called ham radio know what a good thing we have going. The problem is that our avocation is viewed at large as an arcane one that is difficult to master. For many it is made even more so by our insistence on Morse code knowledge in order to take part. While I agree that we should pay homage to the humble roots of our hobby that CW represents, I think it is time we recognize that many people who would be a real credit to our hobby do not agree with the importance we have placed on an increasingly obsolete technology. There is indeed a place for sentimentality, but we also have an obligation to progress. And finally, let us concentrate on the fact that the loss of 220-222 MHz is a clarion call for self-preservation. If we do not start doing something now to substantially increase our ranks, we may find one day that the only bands left to us are CB and cellular telephones.—*George Schnepf, KE2IV, Flushing, New York*

CW—OF PROVEN VALUE

☐ I'm not too thrilled with a no-code license. I feel that there is and always will be a place for CW in ham radio. It has been proven to be a reliable form of communication when conditions are not favorable for other modes. There are numerous stories of people being saved because they "knew the code." I also think it tests just how much someone really wants his license.—*Jim Volant, WB8LUH, Gaylord, Michigan*

☐ One man's program may not be another man's lifestyle. Given a real emergency, will everyone's computer run on 10.3 volts of waning battery to a random length of wire and still get the message through?—*John R. Knott, W1HLE, Iowa City, Iowa*

☐ In my 49 years as a licensed amateur, I have seen many changes in radio communication. One change we must definitely never see is a no-code license. After serving many years as a radio operator in the US Navy, then at ship-to-shore WSL and later as Chief Radio Officer on four different ships, I can assure you that CW is here to stay.—*Donald A. Miller, W2MQB, East Hampton, New York*

ALL MODES FOREVER!

☐ There is room within our hobby to accommodate the talents, experimentation and interests of all members of our great fraternity. It is my hope that the right of all amateurs to pursue their particular interests, regardless of speed or efficiency, will and should be protected and respected. "CW forever"...and all other modes too!—*Steve Stevison, N8BTB, Cleveland, Ohio*

BUST ILLEGAL CBERS

☐ The letter from Lyle Smithers, W5LW, in October 1988 *QST* addresses a problem which I feel needs to be addressed. It is the increasing number of CB operators illegally using the lower portion of 10 meters. As many of these operators are using CBs modified to operate on frequencies up to 28.315, steps should be taken to stop the manufacture and sale of these rigs.—*Terry C. Clark, N4TUB, Rockingham, North Carolina*

HURRICANE GILBERT—THANKS HAMS!

☐ I was recently employed aboard the chemical tanker named the SS Marine Chemist/KMCB as Radio Officer. This was during the time Hurricane Gilbert was roaring through the Caribbean and Gulf of Mexico. My ship was in the area and it was threatened by Gilbert. Listening to the services provided by amateurs helped us keep track of the hurricane. Thanks very much for your efforts.—*Charles Arce, Oakland, Florida*

HAMS REALLY DO HAVE FUN!

☐ Every time I receive a new *QST*, I read it from cover to cover—every advertisement and article. I thoroughly enjoy them all. But, there are some articles which really thrill me. One such article is "The Brief Flight of the Eclipse" by Steven Ford (which appeared in November 1988 *QST*). I have shown this article to some young people locally and they are interested in becoming involved in Amateur Radio and in model rocketry together. So, if only one of many becomes a ham, the article has provided entertainment to all and enticed another!—*John A. Lycan, WB8TIZ, Special Boat Unit 26, FPO Miami, Florida*

INTERNATIONAL TRAVEL HOSTS EXCHANGE PROGRAM

☐ I want to thank you very much for your sponsorship of the International Travel Host Exchange (ITHE). Over the past 4 or 5 years I have had the pleasure of entertaining hams in my home from all over the world.

Last year on my vacation I stayed with hams in England and Switzerland, and I have just returned from New Zealand where my wife and I stayed with eight different ham families.

Aside from the economic savings, it is interesting to meet different people and to share their way of living, etc. However, in the majority of my QSOs on the air, I find that the majority of hams, even ARRL members, are not aware that the ITHE exists. So I would suggest that anyone who has accommodations in his home, write to the ITHE at the ARRL and participate in a very rewarding experience.—*Monty Bancroft, W6NJW, Los Angeles, CA*

WATCH THOSE BAND EDGES!

☐ An open letter to all users of the 28.3-28.5 MHz region: As an "OO" and a fellow amateur, I appeal to all Novice and Technician operators, please, please, please ... don't trust your digital readout. Even if you do trust it, 28.300.00 MHz is not a safe place to be on USB! Stay at least 3 kHz away from the band edge. While we're on the subject, will someone please find out who is telling new amateurs "when we are on upper sideband there is no energy being transmitted on the lower sideband." This is a statement I just heard a Novice make as he was splattering 20 kHz down into the CW portion of 10 meters.

Some days I find amateurs around 28.275 MHz on FM...or on 28.297 on USB. The *FCC Rule Book* published by ARRL does not cost all that much. Buy one, then read it!—*Walt Cross, KE6EP, Chico, CA*

GREAT STUFF!

☐ "A Cake, a Present and a Little Drink" by GWØJOE (December, 1988 *QST*) holds it own with the Christmas stories of O. Henry himself. Great stuff. Mr Trevor MacDiarmid Artingstoll should be writing for *The New Yorker* magazine.—*Michael Hudgens, W6YQ, Playa del Rey, CA*

INDOOR ANTENNAS WORK!

☐ If the contention of N1FGB (December, 1988 *QST*, page 55) that indoor antennas work needs a vote of confidence, then here 'tis.

Last winter I had stuck a 10-meter dipole a foot below the ridge-pole in the attic of my two-and-one-half story aluminum-sided home and fed it, without a balun, with 60 feet of RG58C. It's only 7 feet or so above a mass of air-conditioning sheet metal. It was a temporary affair; come good weather I'd surely put up a close-spaced 3-element beam atop my garage roof.

I never did. In 10 months, using an IC-740 on SSB, I've worked all continents, 100 countries and need but four nearby states for WAS. Nearly anything I can hear, I can work (depending on the severity of the competition). The singular characteristics of the 10-meter band—which have made it so popular during solar peaks—no doubt enhanced these results, but cannot obscure the fact that the full-size dipole—indoors or out—is a very reliable performer.—*Bud Weisberg, K2YOF, Bergenfield, NJ*

Washington Mailbox

Conducted By John C. Hennessee, KJ4KB
Regulatory Information Dept Assistant

Reciprocal Licensing in Our Shrinking World

We live in a dynamic society—the Space Age. Our world appears to constantly grow smaller as does our concept of time and distance. Today, we don't really think of foreign countries as being oceans away as we did just 50 years ago, but rather, we think of distance in terms of the number of hours it will take us to enjoy a comfortable airline ride to an exotic land. Ham radio operators have a unique perspective on the whole concept of time and distance —other countries are only as far away as our radio shack.

Amateur Radio has certainly not been left out of the technological boom, as anyone can see by flipping through the pages of *QST*; radios seem to be getting smaller and more portable. It's only natural for hams to want to take and operate their rigs when visiting foreign countries so that they can enjoy their trip to its fullest. Unfortunately, it's not quite that simple. Amateurs visiting foreign lands need authorization from the licensing administration of that country before Amateur Radio operation can commence. If that country has signed a reciprocal agreement with the US, then this authorization is called a reciprocal operating permit.

The US has signed reciprocal licensing agreements with over 70 countries. A reciprocal agreement assures that you will be issued a permit without taking an examination and going through reams of paperwork. Hams who are citizens of and licensed by their home country, after applying for and obtaining a permit, can operate in a foreign country without passing any further examinations. Canada is the sole exception. The US and Canada share special treaty agreements which make your FCC license automatically valid in Canada and vice versa. The subject of Washington Mailbox in October 1988 *QST* was "Amateur Operation On the High Seas." This month's column is an extension of that installment in which we will examine the reciprocal licensing process.

Q. I am going to a foreign country with which the US has a reciprocal agreement and I want to operate my Amateur Radio station. What do I need to do?

A. You must obtain a reciprocal operating permit from the licensing administration of the country which you are visiting. *The fact that the US and the host country share a reciprocal agreement does not exempt you from obtaining a permit.* If you want to operate your ham station in a foreign country, you must always first obtain a permit. As stated earlier, Canada is the only exception.

Q. Where and how can I apply for an operating permit?

A. Write to the ARRL Regulatory Information Department and let us know which country you are going to visit. We will send you information sheets which will give instructions on how to apply and, if available, an application form for that particular country. Please enclose a business sized self-addressed stamped envelope (SASE) with each request for up to three countries. Non-US amateurs should contact their national Amateur Radio society since the information may be different.

Q. I am visiting a country which does not have a reciprocal agreement with the US. Can I still obtain a permit to operate there?

A. In many cases, yes. *The absence of such an agreement does not necessarily mean that you can't obtain a permit to operate.* Many of the countries not holding a reciprocal agreement with the US will grant permits on a courtesy basis. Most countries require 30 to 90 days to process your request—and sometimes much longer. Always keep copies of everything you send to a foreign licensing administration. You may need that copy later!

Q. Can I apply less than one month in advance of my trip?

A. You can, but you take a chance. The problem occurs after the application has been filed and you are in the foreign country awaiting the permit. Give them your address in the host country only if it will be received while you are there. Always pay in advance or promise to pay any applicable licensing fee. Always plan ahead! Waiting longer to apply lessens your chance of obtaining a permit in time.

Q. How can I pay an application fee?

A. Some administrations do charge fees for the issuance of a permit. It is best to send a bank draft drawn on a bank which does business in the country concerned. You can also draw an international money order and send a copy of the receipt, unless you are instructed otherwise by the administration. Personal checks are seldom accepted in foreign countries.

Q. I have not yet received my permit and I am leaving very soon. Can I take a transceiver into the country without authorization?

A. *Most countries will not allow you to bring in communications transmitting equipment without the proper license or permit.* If you have applied for, but have not received the permit, show the customs officer a copy of your completed application. A few countries will allow you to obtain the permit after you have entered the country. In cases such as this, show your FCC license. This will help justify the fact that you are carrying communications transmitting equipment. It is quite likely that your equipment will be held at the customs point until you show the permit or license, or until you leave the country. In any case, *never try to secretly take equipment into the country, or it may be confiscated.*

Q. How can I locate local hams in the country I am visiting who will be willing to meet with me?

A. The ARRL administers the International Travel Host Exchange (ITHE) program and cooperates with other IARU sister societies. The names and addresses of program participants are sent as a part of the information packet sent by ARRL if that country has participants.

Q. When visiting a foreign country, what operating privileges am I allowed?

A. You are under that country's communications jurisdiction and you must comply with its rules. Never assume that amateurs in a foreign country are allocated the same frequencies as US amateurs, since frequency allocations can and do vary widely from country to country. You may use whatever privileges the administration issuing the permit says you can.

Q. What kind of identification procedure will I use when operating in a foreign country under a reciprocal permit?

A. *You will identify in the manner the licensing administration of host country specifies.* Some countries may issue a call sign to you and others require that you use your home call sign preceded or followed by the proper letter/number combination of the country prefix. Foreign hams operating in the US are reminded that they must sign using the US letter/number combination followed by their home call (for example, W1/G5RV).

Q. Will there ever be an international or automatic reciprocal license for all countries?

A. The concept of an international license is not new. In fact, many western European countries have already adopted such a system among themselves. The FCC has been involved in talks with the

Organization of Telecommunications Administrations of the Americas (which uses the Spanish acronym "CITEL") concerning an international permit among all of the countries in Region 2, composed of North and South America and adjoining waters. It is hoped that by the year 2000, an international license will become a reality.

The bottom line on applying for a permit to operate your ham station in a foreign country is: *always plan ahead.* Study that country's requirements well in advance of your departure date. Administrations may take many months to issue permits. Never operate without proper authorization. If you plan ahead, you should find the process of applying for a permit to operate your amateur station overseas to be pleasant and simple.

[Note: Questions in this column are typical of those asked of the FCC and other agencies. Questions and answers which appear are prepared by ARRL staff and have been informally reviewed by the FCC's Personal Radio Branch for agreement with current FCC policy. This does not represent a formal interpretation of the rules by the FCC.]

VHF/UHF Century Club Awards

The ARRL VUCC numbered certificate is awarded to amateurs who submit written confirmations for contacts with the minimum number of Maidenhead grid-square locators indicated in *italics* for each band listing. Numbers listed after calls refer to endorsements. The totals shown are current as of December 10, 1988. An SASE will bring you the rules and application forms.

50 MHz

100

334	K8SHO
335	NC9L
336	N5ISA
337	WB0KEK
338	WA6DAW
339	N5JYX
340	WA0TKJ

K1TOL	450
N2AHN	275
KB4CSE	175
N4MW	250
KX4R	225
W5FF	475
W5JME	300
N5JYX	125
W5RCI	225
K6EID	225
WB8BKC	350
WA8LLY	200
KA9MGR	350
WB0CQO	150

144 MHz

100

260	WB4SLM
261	WD5ICC
262	KF5PE
263	N4FWE
264	W1AIM
265	N5JYX
266	VE3PCW
267	KE8FD
268	N1BUG

N2AHN	125
N4MW	125
KB4WM	150
W4ZD	275
KX4R	125
W5RCI	175
N5WS	175
K5YY	325
DL6LAU	250
AA7A	125
N9AQ	200
NC9F	125
W9JGV	150
AF9Y	250

220 MHz

50

34	KB8JI
35	WA0TKJ
36	KA9MGR
37	WB9CAS

W5RCI	60
WB8BKC	90

432 MHz

50

141	WB4SLM
142	KC5SH
143	KB4WM

N2AHN	70
KB4WM	60
W5RCI	150
WB8BKC	130
W0JRP	60
N0LL	70

902 MHz

25

WB8BKC	35

1296 MHz

25

WB5LUA	110
W5RCI	40
KD5RO/2	30
N6CA	40
WB8BKC	65
W0RAP	55

2304 MHz

10

34	WA0TKJ

KD5RO	20
VE3LNX	15

10000 MHz

5

N6CA	10

Exam Info

ARRL/VEC
225 Main St, Newington, CT 06111

ARRL/VEC 1989 TESTING PROCEDURES

Locating a Test Session: Sessions are advertised publicly via local Amateur Radio club newsletters and repeaters, and in several regional and national publications. Computer bulletin boards are also frequently used to post information. The ARRL/VEC offers a computer-generated printout of sessions scheduled in any state and several overseas locations; send an SASE and tell us the state(s) for which information should be included.

Registering to Take an ARRL/VEC-Coordinated Exam: In all cases, a completed FCC Form 610 application and a check or money order for the test fee (made out to the ARRL/VEC) should be sent to the team where you will be tested.

Most VE Teams will accept walk-in candidates; ie, preregistration may not be needed. To be sure before the session, contact the VE Team that will administer your exam(s) to determine what information they need, if any. If you write to a VE Team for information, send an SASE to cover postage and handling.

Test Fee: For ARRL/VEC-coordinated sessions held during calendar 1989, the test fee is $4.75 per candidate per session, regardless of the number of elements the candidate takes at the session. No test fee will be charged to persons taking only Novice exams (Elements 1A [5-WPM code] and 2 [Novice written]).

What to Bring to the Session: Bring the *original* plus a photocopy of your current *signed* FCC-issued amateur license, and the *original* Certificate(s) of Successful Completion of Examination (CSCE) that was issued to you by any VE Team within 365 days before your exam session date.

Also bring along two forms of positive identification (including a photo ID, if possible) and at least two pencils and a pen. Scratch paper, answer sheets and all other test materials will be provided at the test session.

Licensed candidates who cannot provide their current amateur licenses to the administering VEs can still be tested at ARRL/VEC sessions. However, in such cases the administering VEs can issue CSCEs for credit only for those elements that were passed at the session; CSCEs cannot be immediately issued for upgrades in these cases. In order for any upgrade that would otherwise have been earned at the session to be processed properly, such candidates must then provide the ARRL/VEC with a copy of the missing license (plus any CSCE[s] for which element credit above the license currently held is claimed).

Calculators: Nonprogrammable and "scientific" calculators are allowed; pocket computers that store words and/or formulas are not allowed. Programmable calculators will be allowed only at the discretion of the administering VE Team; be prepared to demonstrate that the calculator memories have been properly cleared.

Exam Format: Written-element exams are four-choice multiple-answer tests. A score of 74% or more is required to pass a written-element exam. Most VECs assemble their tests based on the ARRL/VEC-issued multiple-choice question pools.

Code test transmissions are played from an audio tape prepared by the ARRL/VEC with message content similar in format to an ordinary Amateur Radio QSO. However, the format may not follow any particular pattern or sequence of statements. The code test may be passed by correctly answering at least 7 out of 10 comprehension questions *or* by copying on paper at least one continuous minute of perfect copy from the code test transmission.

Code tests may be copied on typewriters, but prior arrangement with the VE Team is required so that other candidates will not be disturbed. Based on the FCC's recommendation, the ARRL/VEC does not require a code sending test.

ARRL/VEC Retest Policy: A candidate who fails an element may be retested at the same session *if* the administering VE Team has a *different* version of the failed element and *if* they determine that they have both the time and other resources available to accommodate the retest. A candidate for retest is required to pay another test fee, and may be required to complete a fresh application Form 610 at the Team's request. The administering VE Team has the right to deny a candidate the opportunity of retesting at that session.

Special Tests: Candidates who require special assistance, materials or equipment because of physical disability must attach to the application a signed-and-dated physician's statement that certifies the nature of the disability, plus a brief letter explaining what special assistance, materials and/or equipment must be used to conduct the examination (see Section 97.26[g] of the FCC's Rules). Be sure to notify the VE Team well in advance so that special arrangements can be made. If tape-recorded written tests or special-pitch code test tapes are needed, contact the ARRL/VEC at least one month in advance of the session to ensure that materials will be available. Further questions about testing persons with disabilities should be addressed to the ARRL Program for the Disabled at HQ.

How to Become an ARRL/VEC-Accredited Volunteer Examiner: Qualified Advanced or Extra Class licensees (see Section 97.31 of the FCC's Rules) are invited to notify the ARRL/VEC of their interest in becoming accredited VEs. Send us your name, call sign, license class and full mailing address for additional information.—*Jim Clary, WB9IHH, Manager, ARRL/VEC*

The World Above 50 MHz

Conducted By Bill Tynan, W3XO
Send reports to HCR 5 PO Box 574-334,
Tierra Linda Ranch, Kerrville, TX 78028
or call 512-257-1296 to record late-breaking information.

A Little Housekeeping

Last month, I told you the new address for reports to The World Above 50 MHz. By the time you read this, I should be moved in and have the answering machine hooked up. The number is 512-257-1296. The last four digits, at least, should be easy to remember. The machine is now on a party line, in interest of saving considerable monthly charges, so the chance of getting a busy signal is somewhat greater than heretofore. If you do, please try again. I would assume that the best time to call is during weekdays, late at night or early in the morning. But, not knowing the habits of the others on the line, I can't be sure.

Please do not send any more mail to Burtonsville, MD. Mail arriving at that box should be forwarded for a while, but it's better to not take chances. I don't yet know how fast the postal service will be. Being a rural area, it my take a day or two longer than to the old address. So, it's best to mail time-sensitive reports a little earlier than previously. Remember, my deadline is now the 10th of each month. That is for the cover date two months hence; eg, this is being written in December—just prior to the move to Texas. Before you decry this long lead, remember that my column goes into the mail about the middle of each month—about six weeks before you see *QST* in your mailbox. I have absorbed the shortened time, particulary for the boxes. Thus, as has been the case for a number of years, all box inputs, with the exception of the 6-Meter DX box and the EME Annals, must be received by the 5th. For these two, I must have the information by the first day of the month. The table lists the months in which each box appears as well as the dates all inputs must be received. Everyone who is active on any of the bands and modes covered is urged to submit a report. It's one way of showing those considering a plunge into VHF what they might expect.

While on the subject of the boxes, this might be a good time to review the information needed for each. New forms for 2 meters and above, as well as the EME Annals, should be printed by the time you read this. These forms are easier to fill out, so there should be less excuse not to report. For these bands, it is no longer necessary to list a station for each state or country worked, merely provide the figures requested. The use of this system means that I can no longer calculate the totals. Believe it or not, many reports fail to include them. Of particular concern and confusion is the Call Area column. The heading for each box provides a clear definition of how call areas are defined for this purpose. Remember, for listing in the boxes, contacts need not be confirmed by QSL as the boxes are merely listings of what can be accomplished on each of the VHF and UHF bands in various locations. For awards, such as DXCC, WAS, WAC and VUCC, contacts must be confirmed and these confirmations checked. Despite the simplification in the report forms for 2 meters and above, the 6-meter DX reporting forms remain unchanged. This is because the specific station worked, as well as the date of the contact, are very important in some cases. We must be sure not to take credit for countries where 6 meters is not authorized. We are all very fortunate that more and more countries are allowing their amateurs to operate on the band. Note that the 6-Meter DX box will be run twice per year, rather than just once. This is in the light of the improved propagation now being experienced.

Please remember to update your standings at least every two years, even if you don't have any new states. I believe, and most responding to the survey run last summer feel, that the boxes should reflect current active stations. You probably have worked a few new grids anyway, so that provides something worthy of reporting.

The World Above 50 MHz can only reflect what you submit, so keep those box updates and other reports coming.

Box	Month(s)	Date(s) Inputs *Must* be Received
6-Meter DX	May and Nov	Mar 1 and Sep 1
2 Meter	Jan and Jul	Nov 5 and May 5
1¼ Meter	Feb and Aug	Dec 5 and Jun 5
70 Cm	Mar and Sep	Jan 5 and Jul 5
Microwaves	Apr and Oct	Feb 5 and Aug 5
EME Annals	Jun	Apr 1
VUCC Annual List*	Dec	Prepared at HQ from VUCC information on file. No VUCC reports should be sent to me.

*Does not appear as part of The World Above 50 MHz.

ON THE BANDS

6 Meters—Although the fall 1988 F2 season may have fallen short of what a few unbridled optimists predicted for it—numerous long-lasting and strong openings to Europe—it has pretty much followed what a number of forecasters expected. They contended that we could look for several good openings to South America and possibly a few scattered breaks to southern Africa. The chance of significant openings to Europe was slight, in their view. Although the pattern was close to what these people anticipated, there have been a few surprises, most involving propagation to the Pacific. Perhaps these were surprising because this is the first time we have had so much activity on 50 MHz in the right places. During previous cycles, operation of the ZLs and VKs was limited to above 51 and 52 MHz respectively, and 6-meter stations in the South Pacific islands were very scarce. Another surprise, of which the relationship to the solar cycle is completely unknown, is the greater-than-normal amount of sporadic E which occurred throughout the fall months. As stated in last month's column, it appears that Cycle 22 is about on track. We should be seeing a few European openings from the eastern part of the country about the time this appears in print, and the western states should be in for some more Pacific fun come March or April.

As a sample of what is yet to come, a few weak openings between the Northeast and Europe began to take place as the final month of 1988 got underway. Perhaps one of the more interesting of these occurred the morning of Nov 30, although it probably should not be classified as a European opening as such. During a short period around 1400Z, stations in the Northeast were able to work Europeans by beaming southeast. Likewise, the Europeans got results only when they beamed southwest. Signals were fairly weak and had the characteristic backscatter sound. During the same period, many US stations were working P43AS with very strong signals. The area open to Europe was generally limited to the northeastern states and eastern Canada, but W4OO reports contacting three Gs, a GW (country number 76) and two CTs, all between 1452-1520Z. In addition, VP5D QSOed some 42 Gs, Fs and PAs as well as completing cross-band contacts with OK3CF and EA4CGN. Bob also worked HC5K and CT4DTQ and heard the FY7THF beacon. HC5K worked several Europeans, certainly providing a new country for them.

The first direct path F2 opening between the East Coast of North America and western Europe apparently took place the morning of Dec 6, followed the next few days by similar occurrences. None of these could be called good openings, with signals quite weak and lasting less than an hour. They were characterized by the higher-power US and Canadian stations being heard, but two-way attempts were generally not successful due to the low power the Europeans are forced to run. Exceptions were registered by a few Canadian stations such as VE1YX, VE1BNN and VE1RG, plus a few US stations, who were able to work several G stations. Although weak, these openings had all the characteristics of F2, and beam headings were what one would

1¼ Meter Standings

For WAS holders, listing is WAS number, call, state, call areas worked and grids worked. For others, call, state, US states worked, call areas worked and grids worked. Call areas are the 10 US call areas plus KH6 and KL7 plus each VE and XE call area plus DXCC countries not located within the continental limits of the US, Canada or Mexico. In order to make the standings a true reflection of stations currently active on 1¼ meters, those not reporting activity within the past two years are subject to being dropped. They will be reinstated upon written presentation of continuing activity. It is not necessary to have worked additional states or grids in order to remain in the standings or be reinstated, merely an indication of continued interest and activity. WAS holders are listed whether or not they report regularly. However, they are encouraged to update their grids and call areas. Compiled December 10, 1988. Deadline for receipt of next updates is June 5, 1989.

WAS Holders

1	W0VB*	MN	13	—
2	W0SD*	SD	—	—
2	WB0TEM*	IA	—	—
4	K5FF*	NM	14	—
5	W5FF*	NM	13	—
6	WB5LUA*	TX	—	—
7	VE3EMS*		14	—
8	W3GPY*	PA	—	—
9	K9KFR*	IN	—	—
10	KA0Y*	IA	—	—
W1JR*		MA	47	15	86
W2SZ/1		MA	23	9	55
K1FO		CT	23	7	—
AF1T		NH	21	10	—
W1GXT		MA	17	9	—
W1EJ		NH	15	8	—
W1QXX		MA	15	5	21
K1LPS		VT	14	6	35
W1RIL		MA	13	8	27

* Some states worked via EME
—Information not supplied.

WA1HYN	RI	12	7	28
W1FAJ	CT	12	7	15
KA1DHO	MA	11	4	14
WC2K	NJ	32	11	81
WB2NPE	NJ	25	10	59
W2PGC	NY	23	10	39
N2WK	NY	22	10	61
K2GK	NY	22	8	57
WB2IEY	NY	17	8	50
N2BJ	NY	16	7	40
K2YCO	NY	14	7	—
KU2A	NY	10	6	22
KD5RO/2	NY	10	4	18
WB3LJK	MD	28	10	56
K3HZO	MD	24	9	37
WA3FYJ	PA	23	10	44
W3ZZ	MD	22	8	53
W3RUE	PA	18	10	20
W3XO	MD	17	6	19
KB3QM	DE	16	—	68
AC3T	DE	15	6	13
W3IP	MD	13	6	—

KA3B	PA	7	4	9
KC4EG	KY	36	9	55
WA4PCS	KY	32	7	—
WD4DGF	TN	31	9	63
WS4F	GA	29	9	51
WA4CQG	AL	26	8	—
WA4SBC	VA	21	7	25
WB4SLM	GA	21	—	49
N3AHI/4	GA	20	8	—
N4MW	TN	14	6	29
K4CKS	GA	11	2	—
W5RCI	MS	35	8	64
K5UR	AR	34	9	102
K5SW	OK	26	8	71
W5HN	TX	23	7	28
WA5VJB	TX	17	6	—
WB5AFY	TX	12	5	39
W5NZS	OK	12	—	25
KE5EP	TX	7	—	9
WA5DBY	TX	3	1	3
N6AMG*		3	3	—

W4WD/7	UT	37	10	25
W7JF*	MT	17	9	—
W8IDU	MI	26	8	—
WB8PAT	OH	23	8	42
K8AXU	OH	19	7	27
W8VO	MI	11	7	—
WB9QJR	IL	21	8	50
WB9MSV	IL	19	7	47
W0UC/9	WI	15	8	33
KB9NM	WI	5	4	—
K0ALL	ND	30	10	—
K0DAS	IA	29	10	—
K0TLM	MO	23	7	53
K0IFL	MO	22	7	50
KC0QR	NE	21	6	48
KF0M	KS	16	5	28
W0RT	KS	12	5	—
W0JRP	MO	7	3	19
VE1UT	NS	7	4	—
VE3LNX		20	9	50

expect for the path. These openings are probably the harbinger of what is to come about the time this issue of *QST* arrives, and what we can expect in much greater strength and duration next fall.

Another interesting opening is reported by W4WHK. Dave says that at 2225Z Nov 23, he worked ZD8MB, for apparently the first 50 MHz contact between a US station and Ascension Island since Cycle 21. His contact was followed by ones by W5HUQ/4, N4TAE and W4BCL. Dave comments that an E_s link to a TE path may have made the contacts possible, as the VP5D beacon was in at the time.

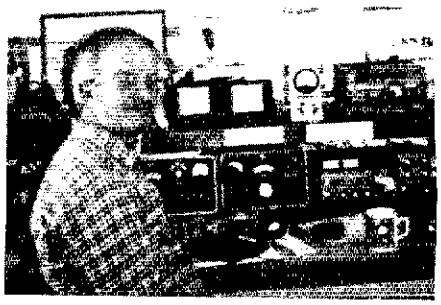
A very complete report of events taking place this fall comes from K8EFS relating the activities of ZS3E. It chronicles Kosi's contacts for the months of October and most of November. On almost all of the days during this period, ZS3E encountered some kind of opening to Europe or the Mediterranean. One of the more notable was on Oct 18, when a five-hour opening brought contacts with some 16 UK stations plus four French operators, PAØHIP, CT1WW, 9H1BT and SZ2DH. One of the most interesting of Kosi's openings occurred Nov 12. It began at 1300Z with the UK, Portugal and Malta. Then, beginning at 1416, VE2DFO and VE2FUT were worked followed by K1TOL, K1JRW, K2QIE, K8WW, WF8C and W2CAP/1 at 1432. Then, the North American stations disappeared, but the Europeans remained in for sometime afterward.

K5ZMS provides a good illustration of how good conditions have been in some areas of the world. Ray notes that this fall alone, all six continents have been worked from the Japanese islands.

The Higher Bands—WB4SLM Centerville, GA EM82 writes that "November 1988 will be a month long remembered." Vic cites first an unusual 2-meter E_s opening on the 12th. Note that the 6-meter section mentioned more than the usual amount of E_s this fall. But for it to reach 2 meters this time of year is quite extraordinary. Not only was it an untimely opening, but it netted Vic state no. 36 in the form of K1LPS in Vermont. The excitement had hardly died down from this when a tropo opening erupted Nov 14—producing a 23 cm QSO with K5UR EM35. Signals ran 559 both ways despite WB4SLM's power of only 7 Watts into 3 dB of line-loss to a 55-element loop Yagi. Vic also heard N4WM EM55 at 569, and WB5LUA EM13 at 559 on 23 cm, but couldn't make the grade with either station. Other 23-cm activity includes contacts with WB5ROR EM23, N5KLC EM10 as well as other stations in EM32. Nov 19 and 20 brought a grid-hopping jaunt by WB8IGY, producing 23-cm contacts with EM83, EM82, EM81, EM80, and EL86. Not a bad haul for two days. Vic goes on to report that a major tropo session developed Nov 24 and lasted through the 27th. This produced propagation from east Texas to New York state. New grids for WB4SLM on the 25 were N5HVJ EL59 on 70 cm, N4AZI EM40 on 23 cm for a new state and grid, WB5NAA EM31 on 70 cm, KA5ULI EM30 on 2 meters and W4CNQ EM62 on 70 cm with S9 plus signals. The following day, Vic was at it again working KC4EG EM78 on 70 cm for a new state, WB8IGY/M4 EL94 on 1¼ meters and 70 cm, N4AZI EM40 on 2 meters and 1¼ meters (using his 2-meter antenna), KB4KM EM63 on 23 cm (with that operator holding his antenna out the window). The next morning at 1300Z, KB5PX was still in solid after three days. QSOs that morning included K4HLY FM18 and K2GAL FM29 on 2 meters, K9OYD/4 FM18, W4FSO FM14 and KJ4SO FM05 on 70 cm. On 1¼ meters, Vic worked W4HB FM17 for grid number 45 and state no. 21 and then added WD4MYM for grid number 46. On November 27 WB4SLM notes that he worked almost everyone in FN20 as well as WA3HMK FN10 on 2 meters. A QSY to 70 cm provided Grid number 69 on that band via a contact with K3HZO FM18. The next day, the 28th, WB8IGY/M4 provided EL99, EM91, and EM93 on 1¼ meters for a total of 49. On 70 cm, WB8IGY handed out EM93 for a total of 70. The same rover also provided EM90, EM91 and EM93 on 23 cm for a total of 21 for WB4SLM. Vic notes that 33 percent of the grids he has worked on 1¼ meters were provided by portable operations such as that mounted by WB8IGY. He passes along his appreciation, and I am sure the rest of us join him, for the great effort and sacrifice expended by those who conduct these operations.

K1FJM/4 in south Florida also reports the superb tropo conditions during this period. Pete notes working stations in EM74 and 75 on both 2 meters and 70 cm in the morning hours of Nov 24. He comments that W2GU/4, on Signal Mountain, TN was particularly strong and that WB8IGY, using only a 4-element Yagi was able to work him on 2 meters with no difficulty.

Art Hubert, N2AU, has begun publication of a fact-packed, quick-reaction VHF biweekly newsletter. For information, send an SASE to 436 N Geneva St, Ithaca, NY 14850.



Uruguay has long been a much sought-after South American country. One who is trying to meet that need is CX8BE.—*Photo courtesy CX8BE*

Conducted By Bob Atkins, KA1GT
103 Division Ave, Millington, NJ 07946

10-GHz Moonbounce

As I reported in the November 1988 column, 10-GHz EME contact has finally been made after a lot of effort on the part of Jim Vogler, WA7CJO, Dave Chase, KY7B, Kent Britain, WA5VJB, and Greg Rave, KF5N. I thought readers might like to see a photo of one of the systems used (sent along by Kent, WA5VJB). The following two paragraphs are excerpted from information sent by KF5N about the contact.

The 12-foot dish at WA5VJB is a commercial, surplus unit made of thick fiberglass. It consists of a large center section and two outer petals. When the dish was delivered at Kent's house, one of the petals had been nearly destroyed! Over the next several weeks, Kent attempted to repair the damaged petal, and to make the dish surface as nearly parabolic as possible by adding shims between the petals and the center section of the dish, smoothing inaccuracies in the dish surface and improving the hand-crank positioning system.

Clouds and rain were found to be excellent attenuators of 10-GHz signals. Another enemy to be contended with was the wind—a light bump on the edge of the dish would put the main lobe of the dish well off the moon, so the positioning system depended on low wind and the aid of a moon-noise indicator for successful positioning. Most of the EME work done during July and August 1988, was done when winds were less than 5 mi/h—much less than during earlier attempts made by Kent and Terry, W5ETG. During one of these earlier attempts, the wind lifted the dish *off the mount*—a pretty impressive feat, considering that it took seven people to lift the dish into position after its delivery! (Terry and Kent called it a day after that event!)

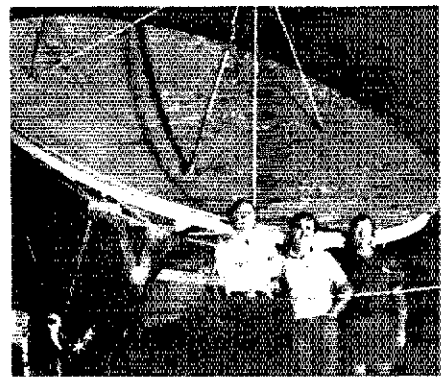


Fig 1—The Bedlam Microwave Society of Arizona: (l-r) Jim Vogler, WA7CJO, Dave Chase, KY7B, and Terry Wilkinson, WA7LYI, stand beside the dish used at the Arizona end of the first-ever 10-GHz EME contact made in August. See text for details.

KY7B reports that the WA7CJO/KY7B/WA7LYI team (the Bedlam Microwave Society of Arizona—Fig 1) is looking for 10-GHz EME skeds. According to Dave, anyone with a 10-foot dish and 20 W of transmitter power should be able to make EME contact with them. Contact Dave Chase, KY7B, PO Box 20331, Phoenix, AZ 85036, to make schedules.

903-MHz EME

I have received notice that the 903-MHz DX record has been extended as a result of a moonbounce (EME) contact made between Dave Hallidy, KD5RO, and Al Ward, WB5LUA. More details on this contact when I receive them.

SATELLITES ON 2304 MHz

At this writing (November 1988), Paul Wilson, W4HHK, is observing two satellites on 2304 MHz, which is outside the bands allocated to satellites. They are believed to be of the Russian Cosmos series, because their characteristics are identical to those of previously observed Cosmos-series satellites. The frequency at AOS (acquisition of signal) is 2303.99 MHz, and 2304.015 MHz at LOS (loss of signal).

The orbits of these satellites seem to be sun synchronous. Estimated rise times are 0000 UTC for one satellite and 1255 UTC for the other. Paul is able to copy signals in the 0200-0445 and 1455-1635 UTC time periods. With his 18-foot dish and a 0.65-dB NF preamp, signals peak at 30 dB over noise just prior to LOS. The signal amplitudes are rock steady (less than 0.5-dB variation). No modulation has been detected over most of the passes, except for barely detectable subcarriers at 1-MHz intervals (out to 4 MHz) just prior to LOS.

These satellites make good signal sources for testing 2304-MHz receivers and antennas, as they can be heard at many locations.

NOISE FIGURE AND GAIN MEASUREMENT

Table 1 shows preamplifier and converter NF and gain measurements made at the 1988 Microwave Update conference in Estes Park, Colorado. Thanks to the North Texas Microwave Society *FEEDPOINT* for this information.

Table 1

Call	*Description*	*NF (dB)*	*Gain (dB)*
903 MHz			
WB5LUA	ATF10135	0.43	15.62
WD4MBK	MGF-1402	0.69	18.79
W3HQT	Demo-33LNA	0.93	11.48
1296 MHz			
WB5LUA	ATF10135	0.53	14.75
W3HQT	DEM MGF-1402	0.80	12.77
W4OJK	W6PO NE72089	1.48	9.30
WBØQIY	SSB Converter	1.50	20.00
KØKE/WØKJY	NE41137	2.14	10.18
2304 MHz			
WB5LUA	ATF10135	0.55	12.46
WB5LUA	ATF10135 neg bias	0.63	13.40
WA5VJB	ATF10135 self bias	0.63	12.26
WD4MBK	WA8NLC design MGF-1404	0.67	20.00
W4OJK	WA8NLC design MGF-1402	0.78	15.71
WD4DFS	WA8NLC design MGF-1402	0.89	16.81
KØKE	MGF-1402	0.90	15.13
W3HQT	LMW	0.90	13.43
KXØO	SSB transverter	2.60	31.20
KØKE	Amplica TVRO LNA	4.1	40

Call	*Description*	*NF (dB)*	*Gain (dB)*
3456 MHz			
WA5VJB	2 × ATF10135	0.90	22.81
WB5LUA	2 × ATF10135	0.98	22.84
KØRZ	Converter/Avantek LNA	2.12	30.75
KXØO	Converter	3.90	23.38
WB4EFZ	MSA06/MSA06/MSA01	4.26	15.05
WA8NLC	Converter	4.57	15.19
5760 MHz			
WB5LUA	2× ATF10135	0.90	17.64
KØKE	Transverter	3.50	30.00
KØRZ	HB mixer/IF amp	11.80	19.72
10368 MHz			
WB5LUA	ATF13135	1.22	6.28
WB5LUA	ATF13135	1.23	7.63
WB5LUA	2 × ATF13135	1.52	17.90
WB5LUA	2 × ATF13135	1.85	15.10
KXØO	SSB transverter	3.26	13.68
KØRZ	Transverter	4.14	13.46

FM/RPT

Conducted By Stan Horzepa, WA1LOU
75 Kreger Dr, Wolcott, CT 06716-2702
CompuServe ID no. 70645,247

The Last Word On Resistive Ignition Cabling

After reading my comments about resistive ignition wiring in the October 1988 installment of FM/RPT, Gary Fuchikami, WH6C, wrote to provide more information on the subject.

I am currently employed as a tune-up technician for a national retail chain, and to my knowledge, all cars today that are sold in the US for passenger use come equipped with "resistive ignition cabling" (I'm not certain about large, industrial gasoline-powered vehicles over 10,000 Gross Vehicle Weight Rating). They do vary in construction materials. The most common for the later vehicles with high-energy ignition systems are those with a nylon or rayon type string center that is impregnated with a carbon-type material and is covered by a silicone rubber jacket. The other variation consists of a metal wire core which is wound as a resistive element throughout the entire length of the cable or it may merely have a wire-wound resistor or carbon resistor in a plastic-molded housing at the spark plug end.

These "late model" cables do not suffer from cracked insulation because of the nature of the silicone jacket. Earlier types of ignition cables were usually made with a hypalon jacket, which did indeed suffer from cracking because of the effects of the high temperatures in the engine compartment, as well as being very prone to damage from engine oil, etc.

The local auto parts houses here (the more reputable ones, anyway) make it a point to tell anyone desiring to purchase "straight metal cabling" without resistive characteristics that it is for use only in race vehicles. On the later vehicles that require the 14-mm 5/8-inch type spark plugs, it is almost impossible to find nonresistor spark plugs in the required heat ranges for most conventional vehicles. Because of this, it does help reduce the RFI even if the owner decides to replace his cables with regular wire type cabling; the resistors in the plugs help to reduce the current to prevent total obliteration of radio signals in the neighborhood.

By the way, I have been in the trade for 15½ years and I have been to Los Angeles six or seven times for one-week training sessions and specialize in the area of automotive tune-up and electrical systems. Our company has an excellent training program and ours has kept us up to date on most domestic and foreign systems, focusing lately on electronic engine controls (computer systems) and electronic fuel injection.

AERONAUTICAL MOBILE?

I am an infrequent flyer. I average one round-trip per year, so perhaps this is not new to all of you, but it is new to me and worth repeating.

On my way to "WallyWorld" aboard a Delta Air Lines flight, I found a card stuffed in the magazine rack in front of me. The card contained a message that was repeated in six languages. The English version follows.

"Under the provisions of Federal Regulation 91.19, only the following portable electronic devices may be operated while on board the aircraft: portable voice recorders, electronic nerve stimulators, tape players, electronic calculators (hand-held), hearing aids, electronic watches, heart pacemakers, electronic games (hand-held), electric shavers, computers (battery powered). Any other electronic device may radiate signals which can interfere with the aircraft's navigation and communication systems. In recognition of this and to ensure your safety, any other electronic device may not be operated while on board the aircraft."

I guess that answers all those inquiries about using a newly acquired hand-held FM transceiver aboard a commercial flight heading home from Dayton in April.

REPEATER LOG

According to October 1988 reports received, repeaters were involved in the following public-service events: 881 vehicular emergencies, 18 fire emergencies, 15 medical emergencies, 7 criminal activities, 6 weather emergencies, 5 public-safety events, 3 power failures and 2 drills/alerts.

The following repeaters were involved (followed by the number of events): K1UN/K1ISR/WA1UCO 2, W1SGL 2, W2VL 18, NK2W 17, WA2ZWP 6, WA3BXW 9, W3LIF 1, WA4SWF 2, K5OS 5, WA6BJY 7, WD6DIH/KA6EEK 385, W6FNO 301, W6ME 94, K6TZ 7, W9PEV 81. QST

Mini Directory

As a convenience to our readers, here is a list of items of particular interest and when they most recently appeared in *QST*.

Advisory Committee Members	May 1988, p 55
Club Contest Rules	Jan 1989, p 104
Considerate Operator's Frequency Guide	Jan 1989, p 77
DXCC Annual Listing	Jan 1989, p 71
Frequency/Mode Allocations	Jan 1989, p 77
Hamfest Calendar Rules	Apr 1988, p 73
License-Renewal Information	Jan 1989, p 76
Major ARRL Operating Events and Conventions—1989	Jan 1989, p 65
Packet-Radio Frequency Recommendations:	
Below 225 MHz	Sep 1987, p 54
Above 225 MHz	Mar 1988, p 51
QSL Bureaus	
Incoming	Dec 1988, p 74
Outgoing	Sep 1988, p 71
Reciprocal Operating Agreements	Oct 1988, p 63
Third-Party-Traffic Agreements	Oct 1988, p 63
VUCC Annual Listing	Dec 1988, p 85
What is Amateur Radio?	Dec 1988, p 88

Strays

51-YEAR SEARCH

☐ In 1937, as as SWL in Shawnee, Oklahoma, I heard W4EEE in Athens, Georgia, on 20-meter phone. I sent him an SWL card reporting his strong signal and requested his QSL, which I received a few days later. I was very proud of that card—not only because of the unique call, but also because it was my very first QSL. That card generated a great interest to get my own license, which I did the next year (I became W5HFM).

I never could seem to upgrade to a first-class license so I could contact W4EEE on 20 meters, but I sure spent a lot of time looking for him on 40-meter CW. But I had no luck—that is until a few days ago when I worked George on OSCAR 13 with my present call, KE5TS. We had a great QSO, and today I received another beautiful QSL from George for a real two-way QSO on the satellite...just 51 years after I first heard him.—*Kenneth Riley, KE5TS*

I would like to get in touch with...

☐ Midas Muffler employees and/or ASE certified mechanics to form a net or sked. Jay Geiger, 95 Ernst Ave, Bloomfield, NJ 07003.

☐ hams between the ages of 60 and 70 who would like to exchange tape recordings about Amateur Radio and mechanics. Ron Lucking, G1IIU, 62 Ember Farm Way, East Molesey, Surrey, England KT8 OBL.

On Line

Conducted By Stan Horzepa, WA1LOU
75 Kreger Dr, Wolcott, CT 06716-2702
CompuServe ID no. 70645,247

Netiquette: Using the Packet-Radio Network of 1989

The packet-radio network of 1989 consists of an assortment of systems. TexNet has haciendas and the ROSE blooms in some garden states. TCP/IP has its defenders and plain vanilla digipeaters still perk along, while NET/ROM and its breed are everywhere. Meanwhile, a variety of bulletin boards (WØRLI, WA7MBL, etc) continues to push megabytes of mail through this pipeline of dissimilar plumbing. It may seem hard to believe that it all works!

But it could work better, especially those parts of the network that are burdened by user applications operating at slower data rates—for example, user-to-user and user-to-PBBS communications operating at 1200 bauds where the user is typing on a keyboard at a typical rate of 25 WPM, or approximately 23 bits/s. If everyone conformed to a few rules for operation on such a user-intensive network, the network could be used more efficiently and would work better. In this regard, I offer the following network rules or "netiquette" to packet-radio newcomers and old-timers alike.

Just Say No to Nodes

The first rule is don't use the network unless it is absolutely necessary. If fewer people used the network, there would be less demand for its use, less contention between its users and, as a result, it would operate more efficiently. If you are a user who is connected to another user and you do not need a digipeater or network node to maintain that connection, then move off the network frequency to an unused frequency and conduct your communications there. Similarly, if you are a user who is connected to a PBBS and you do not need a digipeater or node to maintain that connection, then do not use a digipeater or node to conduct your communications. Since the PBBS is rockbound, you cannot move off the network frequency, but freeing up a digipeater or node still promotes some increased network efficiency, especially if you can maintain the connection using a lower power output that is undetected by the digipeater or node.

The converse of the first rule is the second rule, which states that a user should use the network when it provides the only means of maintaining a connection with a "local" or "remote" user or "local" PBBS. For the purposes of these rules, a "local" user or PBBS is one that is local to a digipeater or node that is also local to your station. That is, your station and the "local" user or PBBS can access the same digipeater or node directly without using any intervening digipeater(s) or node(s). On the other hand, a "remote" user or PBBS is one that is local to a digipeater or node that is remote to your station; in order to access the digipeater or node that is local to a "remote" user or PBBS, your station must use intervening digipeater(s) or node(s).

If you must use a digipeater or node to maintain a connection with a local user or PBBS, then by all means use the network facilities to maintain the connection. Similarly, it is permissible to use the network facilities to maintain a connection with a remote user. However, using the network to communicate with a remote PBBS leads us to the third rule of netiquette, and that is do not attempt communications with a remote PBBS. To enforce this rule, many PBBSs are already configured to reject access by remote users; that is, the PBBS will not accept connect requests from users beyond a SYSOP-selectable maximum number of intervening digipeaters or nodes. For example, if the maximum number is set to two, users who require three or more digipeaters or nodes to connect to that PBBS will have their connect requests rejected.

PBBS Economics

The purpose of the third rule is simply due to supply and demand. Using a PBBS is a very popular pursuit among packet-radio operators and, as a result, the demand for PBBS usage is very high. However, the supply of PBBSs is low relative to the demand. This is due to the fact that the number of PBBSs that can exist in any one locality is limited by the number of frequencies that are available for packet-radio usage and by how close co-channel PBBSs can be located geographically without causing undue interference with each other. Such interference results in the ineffectiveness of each operation and decreases the network's overall efficiency.

To solve this supply-and-demand problem, preferential treatment is given to local users of the PBBS. This is not an undue burden on the remote users because, if supply and demand warrant the exclusion of remote users to a PBBS, it can be assumed that this exclusion is occurring in a somewhat-populated region. In such a region, there probably is a PBBS that is local to every pocket of packet-radio activity (no LAN is an island). On the other hand, if a PBBS is located in the "boonies," then there is no great supply-and-demand problem and remote users need not be excluded. In such a case, a remote PBBS is a "local" PBBS to the remote user.

With regards to sending traffic to a remote PBBS, one does not need to be connected to a remote PBBS to leave traffic there. All you have to do is leave a message on the local PBBS addressed to whoever at (or "@") the remote PBBS and the network will automatically forward the message to the addressed remote PBBS. And with regard to missing something of interest that is posted on a remote PBBS, remote users are not missing much in reality, because most bulletins that are of general interest are usually sent to all of the PBBSs in the particular geographic area of interest, whether that area is a county, state, region or nation.

That concludes the rules of netiquette. (By the way, I promise to practice what I preach. I will conform to these three rules of netiquette whenever I use the the packet-radio network in Connetiquette.)

NOVICE PACKET-RADIO HOT SPOTS ADDENDUM

The following list of Novice packet-radio activity centers updates the list published in the November 1988 installment of On Line. New Jersey, Northern: 223.42 MHz (the following operations are run by the Major Armstrong Memorial Amateur Radio Club):

- K2LSX-3 network node providing access to the EastNet backbone network and K2LSX-2 on 145.03 MHz.
- W2FMN-4 PBBS accessible via W2FMN-7 or K2LSX-3.
- W2FMN-7 KA-NODE digipeater.
- W2FMN-9 gateway to 145.09 MHz.
- New York, Huntington: 223.42 MHz: N1DL-4 PBBS.
- New York, Woodside: WA2EXE-4 PBBS is off 223.42 MHz.—*John T. Gubernard, K2LSX*

On Line 1988 Index

On Line was inadvertently left out of the 1988 Annual Index. Here it is, as it should have been listed.

Conducted By
Vern "Rip" Riportella, WA2LQQ
PO Box 177, Warwick, NY 10990

Modes S and L: Satellite Communication Pioneers and Frontiers

Amateur satellite builders and users are pioneers in several senses of the word. For example, how many amateurs know some of their colleagues are now operating OSCARs on frequencies as high as 2.4 GHz? Moreover, even though the term "ham radio" is widely recognized throughout the general population, how many even know that hams have built and operated their own earth-orbiting satellites? Very few, indeed. Those on the very leading edge of this esoteric enterprise are those who build and operate the higher-frequency OSCAR transponders, Mode S and Mode L.

Mode S uses an uplink on 70 cm and produces a downlink on 13 cm. Together with Mode L (24 cm up, 70 cm down), these modes provide the new frontier for OSCAR builders and users, pioneers in the quest for more usable spectrum and more effective satellite communications.

The newest OSCAR, AMSAT OSCAR 13 (AO-13), was launched last year and is equipped with both Mode S and Mode L transponders. It also has the now-traditional Mode B transponder, which uses 70 cm up and 2 m down. AO-13's Mode S transponder was designed and built by a US team under the leadership of Bill McCaa, KØRZ, of Boulder, Colorado. The transponder was first turned on last autumn, and proved to be quite successful as Bill's report shows:

AMSAT OSCAR 13 Mode S transponder tests began September 17. Here is a summary of the results.

Preliminary Transponder Test Results

I found that the transponder passband limits were:

Uplink	*Downlink*
435.602	2400.715
435.636	2400.749

(all frequencies corrected for Doppler shift)

On the negative side, I found it took a linearly polarized uplink signal of about 44 dBW (25 kW EIRP) to saturate the transponder. The 44 dBW was obtained by feeding 350 W to four 4.2-wavelength Yagis. Any increase in power above this level produced no additional downlink signal. The downlink signal was 6 dB above the receiver noise. I am using a 3-foot dish and a receiver with a 1.5-dB noise figure.

I heard my downlink signal moments after the Mode S transponder came on (2022 UTC 17 Sep) and worked VE4MA on CW at 2025 UTC. I sent VE4MA a 539 report and received a 569 report from him. I believe this CW contact is the first QSO on Mode S. We then tried SSB, and VE4MA reported my signal very copiable at 57, using his 12.5-foot dish. I could also copy my SSB downlink, but couldn't copy VE4MA's SSB signal. I believe VE4MA is using 40 W to 8 Yagis on 435 MHz. VE4MA was able to copy his own SSB downlink signal.

At 2039 UTC, I worked WB5LUA on CW. I sent him a 519 report and received a 539 report from him. WB5LUA was using a 4-foot dish and 40 W into a 15-turn helix. WB5LUA was later heard saturating the transponder. However, he was using 800 W into the helix.

KØKE reported hearing WB5LUA and KØRZ, but heard his own signal just before the transponder went off. He was using 40 W, four K2RIW 19-el Yagis and receiving on a 4-foot dish. I heard no other signals during the half-hour period. The transponder went off at 2052 UTC.

The design of the Mode S transponder is such that it is not possible for the beacon to be commanded on when the transponder is on. After I'd completed the design of the Mode S transponder, I wished I'd made it possible for the beacon to be on with the transponder. Through some unknown mechanism, I guess I got my wish. Because the beacon *was* on with the transponder, it may help explain the need for additional uplink power required to access the transponder.

VE4MA estimated my uplink signal (44 dBW) to be equal to the beacon signal, and to be about 24 dB out of the noise on his 12.5-foot dish with circular

For more information on getting started on OSCAR and information on AMSAT membership and membership benefits, call AMSAT at 301-589-6062 or write: AMSAT, PO Box 27, Washington, DC 20044. Please include a business-size SASE.

Table 1

AMSAT-NA OSCAR 13 Mode S Station List (Sources: KØRZ, DB2OS, JR1WZI)

Call	*Name*	*Uplink Equipment Power/Antenna*	*Downlink Equip Antenna/Preamp NF*	*Beacon S/N dB*
DK2ZF	Rolf	unknown	unknown	
DF5DP	Bert	unknown	20-dBd Yagi	10*
G2BFO	David	unknown	unknown	unknown
GW3XYW	Stu	unknown	10-ft dish	unknown
IN3HER	Raimund	unknown	1.5-meter dish	10
JA1UHY	Hisa	10 kW ERP	2-m dish, 0.9	20
JR1WZI	Ken	4 kW ERP	5-ft dish, 3	10
JA4BLC	Row	65 kW ERP	40-el loop	3
JR4AEP	?	unknown	unknown	unknown
JR4BRS	Toshe	10 kW ERP	4-m dish,	20
KØKE	Eric	40 W, 8 × 19 K2RIW Yagi	12-ft dish, 0.9	8
KØRZ	Bill	600 W, 4 × 15 NBS Yagi	4-ft dish, 0.8	12*
ON6UG	Freddy	100 W, 2 × 15 Yagi	1.2-m dish	20*
VE4MA	Barry	1 kW, 8 × 19 K2RIW Yagi	12-ft dish, 1.0	23
WA3ETD	John	unknown	4-ft dish	6
W4ODW	Gene	600 W, 4 × 19 K2RIW Yagi	2 × 60 loop Yagi	unknown
WB5LUA	Al	800 W, 10-turn helix	4-ft dish, 0.8	10
WBØQIY	Doug	100 W	4-ft dish	6

* Includes PSK telemetry decode

Table 2

AMSAT-NA OSCAR 13 Mode L Station List
(Sources: KØRZ, W6ABN, W4FJ, JR1WZI)

Call	Name	Uplink equipment	Downlink equipment
AJ9C	Mike	10 W, 1 × 45 loop Yagi	1 × 19 F9FT, GaAs
DK2UO	Heinz	? W, 2-m dish	unknown
DK2ZF	Rolf	80 W, 2-m dish	unknown
DF3XG	Gerhard	80 W, 1.2-m dish	2 × 9 Yagi
DJ3OS	Bernd	5 kW ERP	unknown
DF4HR	Michael	80 W, 1 × 28 Yagi	unknown
DF5FP	Burt	unknown	unknown
DJ5BV	Gerd	300 W, 4 × loop Yagi	4 × quagi
DP5DP	Robert	70 W, 2 × 48 Yagi	unknown
DL6QO	?	unknown	unknown
DJ9PC	Peter	200 W, 3-m dish	3-m dish
DL9GU	Ed	150 W, 1.2-m dish	4 × 22 Yagi, GaAs
DL9ZV	Eberhard	40 W, 1 × 43 Yagi	unknown
F9FT/TK	Franck	200 W, 2 × 55 F9FT Yagi	1 × 21 F9FT, GaAs
G2BFO	David	100 W, 4 × 23 F9FT Yagi	4 × 19 F9FT Yagi, GaAs
G3RUH	James	20 W, 15-turn helix	16-turn helix, GaAs
G4DDK	Sam	unknown	unknown
G4JY	Art	40 W	unknown
G5TU	John	15 W, twin helix	unknown
GØDLJ	Pete	unknown	unknown
GW3XYW	Stu	75 W, 6-m dish	10-turn helix, GaAs
IN3HER	Raimund	100 W, 3.2-m dish	4 × 20 Yagi, GaAs
I5CTE	Peter	45 W, 1.3-m dish	1 × 19 Yagi, GaAs
I5UXJ	Alfred	300 W, 4 × 55 Yagi	unknown
I7FKQ	Francesco	unknown	unknown
I8CVS	Dominic	100 W, 4 × 23 Yagi	unknown
JA1NYB	?	unknown	unknown
JA1SYK	Hiro	30 W, 2-m dish	4 × 21 Yagi, GaAs
JR1WZI	Ken	30 W, 1.5-m dish	4 × 15 Yagi, GaAs
JA2ODV	Taro	unknown	unknown
JA4BLC	Row	30 W, 2 × 26 Yagi	2 × 17 Yagi, GaAs
JA4DNC	Nito	20 W, 2-m dish	unknown
JR4BRS	Toshe	30 W, 3-m dish	4 × 21 Yagi, GAas
JR4GGT	Kaquo	unknown	unknown
JG6FMH	?	unknown	unknown
JA7EC	Shoji	unknown	unknown
JH7JKW	Nikio	? W, 2-m dish	2 × 21 Yagi
JAØIXX	Miki	30 W, 22-turn helix	4 × 15 Yagi, GaAs
KA1IFX	Ron	10 W, 2 × 44LBX KLM	unknown
K2RDX/6	John	10 W, 40-turn helix	1 × 36 Yagi, GaAs
KD5RO/2	Dave	15 W, 1 × 45 loop Yagi	unknown
KB6BQQ	Alex	80 W, 5 ft dish	2 × 18C KLM, GaAs
KJ6AL	Doug	150 W, 2 × 35 loop Yagi	1 × 40CX KLM, GaAs
K7WUP	Shirlef	75 W, 4 × 35 quagi	2 × 12-turn helix
KC7GY	John	35 W, 2 × 45 loop Yagi	1 × 40CX KLM, GaAs
KD7YZ	Bob	5 W, 12.5-ft dish	1 × 40CX KLM
KE7NR	Don	10 W, 2 × 55 F9FT Yagi	unknown
KL7GRF	John	10 W	unknown
KL7NO	Al	50 W, 2 × 28 loop Yagi	4 × 18C KLM, GaAs
KL7YV	Frank	100 W, 2 × 45 loop Yagi	4 × 18C KLM, GaAs
K8TL	Tom	30 W, 1 × 23 F9FT Yagi	16C Cushcraft
K8YAH	Ron	130 W, 4 × 23 F9FT Yagi	4 × 21 F9FT Yagi
KE9I	Jerry	29 W, 1 × 45 loop Yagi	1 × 19 Yagi, GaAs
KØGCJ	John	10 W, 1 × 45 loop Yagi	unknown
KØKE	Eric	50 W, 1 × 23 F9FT Yagi	1 × 19 K2RIW Yagi
KØRZ	Bill	120 W, 4 × 38 loop Yagi	4 × 15 NBS Yagi, GaAs
KØSMI	Hank	4.5 W, 4 × 23 F9FT Yagi	2 × 30LBX KLM, GaAs
KAØCIC	Bill	10 W, 1 × 55 F9FT Yagi	2 × 14 Yagi
LU2DDU	Daniel	15 W, 1 × ? Yagi	unknown
LU3DCA	Michael	50 W, 1 × 45 loop Yagi	4 × 19 K2RIW, GaAs
LU3DH	Jack	70 W, 1 × 28 loop Yagi	unknown
LU7DJZ	Ramon	100 W, 2 × 25 Yagi	unknown
N1CHM	Tom	13 W, 1 × 44 KLM Yagi	1 × 44C KLM
N4OUL	Blenn	100 W, 1 × 44 KLM Yagi	unknown
NA6E	?	unknown	unknown
N9QX	Leo	25 W, 2 × 45 loop Yagi	1 × 19 F9FT, GaAs
NWØX	Charlie	9 W, 4 × 38 loop Yagi	1 × 18C KLM
NYØT	Keith	12 W, 1 × 44 KLM Yagi	unknown
OE5ACL	Karl	15 W, 4-m dish	unknown
OR9ERC	Eric	50 W, 1 × 23 loop Yagi	unknown
ON6UG	?	unknown	unknown
PAØSSB	Jan	200 W, 2-m-long helix	unknown
PEØAGO	Tony	50 W, 2.2-m dish	1 × 24 Yagi, GaAs
UA1ZCL	?	unknown	unknown
VE2AED	Howard	100 W, 1 × 44 loop Yagi	unknown
VE7CLD	Gunter	100 W, 12-ft dish	12-ft dish, GaAs
VE7VL	Val	20 W, 12-ft dish	2 × 16 KLM Yagi
VK2ALU	Lyle	40 W, 1.8-m dish	2 × 14 Yagi, GaAs
VK4TL	John	unknown	unknown
VK5QR	Reg	100 W, 2-m dish	4 × 10-turn helix, GaAs
VK7ZSF	Frank	unknown	unknown
W1NU	Vic	7 W, 1 × 45 loop Yagi	unknown
WA2LQQ	Rip	250 W, 16-ft dish	1 × 40CX KLM, GaAs
WB3CZG	Ray	50 W, 4 × F9FT Yagi	unknown
WA3ETD/1	John	150 W, 2 × 24 loop Yagi	2 × 18C KLM, GaAs
W3KH	Buck	20 W, 5-ft dish	88-el J-beam
WA3WBU	John	30 W, 2 × 45 loop Yagi	unknown
W4AUZ	Shep	10 W, 1 × 45 loop Yagi	1 × 18C KLM, GaAs
W4FJ	Ted	90 W, 4 × 23 F9FT Yagi	10-turn helix
WD4FAB	Dick	15 W, 1 × 45 loop Yagi	unknown
W4ODW	Gene	40 W, 4 × 45 loop Yagi	4 × 19 K2RIW Yagi
WA4OFS	Harry	100 W, 2 × 45 loop Yagi	8 × 19 K2RIW Yagi
W4WSR	Ott	80 W, 4 × quagi	2 × 12 K2RIW, GaAs
W4ZPG	John	80 W, 2 × 45 loop Yagi	unknown
WD5GQM	Fred	60 W, 4 × 26 loop Yagi	4 × 13 Yagi, GaAs
W5HEZ	Jack	10 W, 4 × F9FT Yagi	unknown
W5IU	Keith	10 W, 4-ft dish	4 × 18C KLM, GaAs
W5SXD	Dick	10 W, 1 × 44 KLM Yagi	unknown
WA5ZIB	Andy	unknown	unknown
W6ABN	Stan	50 W, 4-ft dish	1 × 18C KLM, GaAs
W6GHV	Ken	10 W, 12-ft dish	12-ft helix
W6YQ	Mike	unknown	unknown
WB7ABP	Dick	15 W, 10-ft dish	2 × 10-turn helix, GaAs
W7GBI	Charley	6 W, 25-ft dish	25-ft dish
WF7S	Bill	10 W, 1 × 44 Yagi	unknown
WA8OLM	Greg	unknown	unknown
WD9HAK	Emil	75 W, 8 × loop Yagi	4 × 20 F9FT Yagi
WØEKZ	Bud	30 W, 12-ft dish	1 × 40CX KLM, GaAs
WØHHE	Al	100 W, 20-ft dish	20-ft dish, GaAs
WØIT	Stan	100 W, 1 × 55 F9FT Yagi	88-el J beam, GaAs
WØKJY	Jim	150 W, 1 × 45 loop Yagi	1 × 22 K1FO, GaAs
WBØP	Dave	unknown	unknown
WBØQMN	Tom	8 W, 16-ft dish	8 × 30LBX KLM, GaAs
WBØRLY	Joe	30 W, 4 × 23 F9FT Yagi	2 × 416B Yagi, GaAs
WØRUE	John	unknown	unknown
XE1XA	Max	5 W, 20-ft dish	unknown
XE1TU	Dave	unknown	unknown
YT3MV	Matjaz	25 W, 1.2-m dish	10-turn helix (in USA)
ZL1AOX	Ian	unknown	unknown
ZL3AAD	Graham	2 W, 20-ft dish	unknown
ZS6AXT	Ivo	100 W, 1.5-m dish	19-el Yagi

feed. The SSB signal quality was quite good, and he heard no evidence of limiting in the transponder. He could not hear the transponder noise floor.

I received an SWL card from WB5LUA, addressed to AO-13, reporting reception of the Mode S beacon on September 6, 1988 at 2111 UTC on 2400.664 MHz at 10 dB above the noise. Al was using a 4-foot dish, coffee-can feed and an ATF-10135 preamp.

Lists of the currently active AO-13 Mode S and Mode L stations are shown in Tables 1 and 2, and are compiled by the sources indicated.

[Question marks in the tables indicate unknown information. An entry such as "2 × 60-loop Yagi" means two 60-loop Yagis; 4 × 19 F9FT Yagi is four 19-element F9FT Yagis; 2 × 18C KLM is two KLM 18C antennas, etc —Ed.]

Strays

I would like to get in touch with...

☐ RV campers, particularly coast-to-coast travelers, to exchange camping and traveling information on the air and to arrange eyeball QSOs. Paul Van Nostrand, W4HVD, 3725 Lifford Circle, Tallahassee, FL 32308.

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.

Colorado (Golden)—February 19. *Sponsor:* Aurora Repeater Assn. *Time:* 8 AM-3 PM. *Place:* Jefferson Co Fairgrounds at 15200 W 6th Ave. *Contact:* Judi, WDØHNP, tel 303-460-1413, or write Jan, KA7TYU, PO Box 39666, Denver, CO 80239.

Florida (Brooksville)—February 25. *Sponsor:* Hernando Co. ARA. *Time:* 8 AM. *Place:* Hernando Co Fairgrounds Auditorium located 4 miles south of Brooksville on US Hwy 41 South. *Features:* refreshments, free parking, overnight parking is available for vendors. *Talk-in:* 146.115/715. *Admission:* advance $2, door $3, all vendors must have an admission ticket (for advance tickets send an SASE and $2 to Hamfest Chairman, PO Box 1721, Brooksville, FL 34605). *Tables:* $8 (table reservations can be confirmed by sending your check and SASE to the Hamfest Chairman). *Contact:* tel Pat Brayton, WB4EXA, tel 904-796-4840 after 6 PM.

†**Florida (Pensacola)—February 18.** *Sponsor:* Pensacola Area Hamfest Assn. *Time:* 8 AM-4 PM. *Place:* take Exit 6 South from I-10, go approximately 7 miles to 17th Ave (second light), turn right and go 9 blocks to Mallory, turn right to Hamfest. *Features:* refreshments, VE exams. *Talk-in:* 146.16/76. *Admission:* $2.

†**Florida (Sarasota)—February 18-19.** *Sponsor:* Sarasota ARA. *Time:* Saturday 9 AM-5 PM, Sunday 9 AM-3 PM. *Place:* Sarasota Co Fair Grounds, 3000 Ringling Blvd. *Features:* technical forums, ladies events, awards, VE exams. *Talk-in:* 146.13/73, 146.31/91, 147.90/30. *Admission:* advance $5, door $6. *Contact:* A. E. Matlick, 1817 Buccaneer Ter, Sarasota, FL 34231, tel 813-923-7008.

†**Florida (Stuart)—February 25.** *Sponsor:* Martin Co ARA. *Time:* 9 AM-3 PM. *Place:* Frances Langford Park, Jensen Beach. *Talk-in:* 147.66/06 *Contact:* Martin Co ARC, PO Box 1901, Stuart, FL 33495.

†**Georgia (Dalton)—February 25.** *Sponsor:* Dalton ARC. *Time:* dealers 7:30 AM, public 9 AM-5 PM. *Place:* North Georgia Fairgrounds. *Features:* refreshments, VE exams, forums. *Talk-in:* 144.63/145.23. *Admission:* $2. *Contact:* Harold James, N4OTC, tel 404-673-2291 or James Jordan, K4FLG, tel 404-278-0630.

†**Illinois (Sterling)—March 12.** *Sponsor:* Sterling Rock Falls Amateur Radio Soc. *Time:* setup Saturday from 6-9 PM and Sunday at 6:30 AM, doors open to public 7:30 AM-3 PM. *Place:* Sterling High School Field House, 1608 4th Ave. *Features:* refreshments, space to accommodate self-contained campers overnight, VE exams (write to Jim Buikema, NR9G, 207 West Park St, Morrison, IL 61270, tel 815-772-3793 after 3 PM). *Talk-in:* 146.25/85. *Admission:* advance $3, door $4. *Tables:* $5 including electricity (bring your own cord). *Contact:* Susan Peters, KA9GNR, PO Box 521, Sterling, IL 61081, tel 815-625-9262.

†**Indiana (Indianapolis)—March 12.** *Sponsor:* Morgan Co Repeater Assn. *Time:* setup Saturday 3 PM-9 PM, setup Sunday 6 AM-8 AM. *Place:* Indiana State Fairgrounds Pavilion Building. *Features:* VE exams, ladies' programs, free parking. *Talk-in:* 145.25. *Admission:* no advance, $5 at door. *Tables:* 8 ft tables (including space) $8 each. No space without table will be sold (advance reservations suggested). *Contact:* for table reservations or information send SASE before February 24, 1989 to Aileen Scales, KC9YA, 3142 Market Pl, Bloomington, IN 47403, tel 812-339-4446.

†ARRL Hamfest

Indiana (LaPorte)—February 26. *Sponsor:* LaPorte ARC. *Place:* LaPorte Civic Auditorium. *Talk-in:* 146.52 or 146.01/61 with PL of 131.8. *Admission:* $3.50. *Tables:* $3 reserved in advance. *Contact:* send SASE to LaPorte ARC, PO Box 30, LaPorte, IN 46350.

†**Indiana (Winchester)—March 5.** *Sponsor:* Randolph ARA and Parker City "220" Club. *Time:* 8 AM-3 PM. *Place:* Winchester National Guard Armory. *Features:* flea market, forums, free parking, refreshments. *Talk-in:* 147.90/30 and 222.44/224.04. *Admission:* advance $3, door $4. *Tables:* spaces only $3, 3 by 8 ft tables $5 (tables limited). *Contact:* Kedrick Robbins, W9QUH, RR 1, Box 389, Parker City, IN 47368, tel 317-468-6568.

†**Iowa (Davenport)—February 26.** *Sponsor:* Davenport RAC. *Time:* 8 AM-3 PM. *Place:* Davenport Iowa Masonic Temple. *Features:* flea market, VE exams (walk-ins accepted), forums, and refreshments. *Talk-in:* WØBXR repeater 146.28/88. *Admission:* advance $2, door $3. *Tables:* $7 each with an additional $2 charge if ac hookup is required. *Contact:* for general information, Dave Johannsen, WBØFBP, 2131 Myrtle St, Davenport, IA 52804, tel (D) 319-324-9164 or (N) 319-323-4204; for VE exam information, Al Broendel, N9OK, 2712 38th St, Rock Island, IL 61201

†**Kentucky (Cave City)—March 4.** *Sponsor:* Mammoth Cave ARC Inc. *Time:* 8 AM. *Place:* Cave City Convention Ctr. *Features:* VE exams (walk-ins welcome, bring your original license and a copy if you are upgrading), forums, flea market, refreshments. *Talk-in:* 146.34/94. *Admission:* $3. *Tables:* $3 each. *Contact:* Mike Goad, N4HCO, 1379 Whites Chapel Rd, Glasgow, KY 42141.

Correction to last month's column: The February 11 ham radio/computerfest in Cave City, KY is sponsored by SAMI, KAØBKD, not the Mammoth Cave ARC as listed. The talk-in repeater frequency was listed incorrectly; the correct frequency is 144.81/145.41 MHz.

The Mammoth Cave ARC is sponsor of the ARRL-sanctioned hamfest to be held March 4, in Cave City, KY; see listing above.

†**Louisiana (Lafayette)—March 11-12.** *Sponsor:* Acadiana ARC. *Time:* Saturday 9 AM-5 PM, Sunday 9 AM-1:30 PM. *Place:* Holiday Inn Central Holidome, South of I-10 on Hwy 167. *Features:* dealers, forums, flea market, VE exams, ladies' activities and tour. *Admission:* $2. *Contact:* June Bodensteiner, 129 Patricia Anne, Lafayette, LA 70508, tel 318-837-9484.

Massachusetts (Marlboro)—February 18. *Sponsor:* Algonquin ARC. *Time:* 10 AM-2 PM. *Place:* Marlboro Middle School Cafeteria, Union St, off Rte 85. *Features:* flea market (wheelchair accessible). *Talk-in:* 146.01/61 and 146.52. *Admission:* $2. *Tables:* advance $8, door $10. *Contact:* Dan, KB1WW, tel 617-481-1587, or write AARC, Box 258, Marlboro, MA 01752.

Massachusetts (Northampton)—March 5. *Sponsor:* Mt Tom ARA. *Time:* setup 7 AM, public 9 AM-2 PM. *Place:* Smith Vocational School, Rte 9. *Features:* VE exams (walk-ins welcome), flea market (handicapped parking and access). *Talk-in:* 146.34/94, 223.82 and 146.52. *Admission:* $2, under 12 free with adult. *Tables:* advance $10, door $12. *Contact:* Bob, WB1EQS, tel (D) 413-532-6411, Mickey, N1CDR, (N) 413-562-1027 or write MTARA Flea market, 6 Laurel Ter, Westfield, MA 01085.

†**Massachusetts (Sandwich)—March 11.** *Sponsor:* Barnstable Radio Club. *Time:* setup 8 AM, public 10 AM. *Place:* take Exit 2 off Rte 6, head north, HT Wing School on right about 1 mile from exit. *Features:* refreshments, VE exams, free parking (wheelchair accessible). *Talk-in:* 147.045/645. *Admission:* no advance, door $2.50. *Tables:* $8. *Contact:* Donald Haaker, WA1AIC, tel 508-778-5673 or Rich Mannal, KA1OVN, tel 508-771-0168.

†**Michigan (Dearborn)—February 26.** *Sponsor:* Livonia ARC. *Time:* 8 AM-4 PM. *Place:* Dearborn Civic Ctr, 15801 Michigan Ave at Greenfield Rd. *Features:* VE exams, free parking, refreshments. *Talk-in:* 144.75/145.35 and 146.52. *Admission:* $3 (with table reservations). *Contact:* SASE to Neil Coffin, WA8GWL, c/o LARC, PO Box 2111, Livonia, MI 48151, tel 313-427-3905.

Michigan (Delton)—March 4. *Sponsor:* State Technical Institute ARC. *Time:* 8 AM-2 PM. *Place:* Delton Middle School (Delton is located about 20 miles Northeast of Kalamazoo on M-43). *Features:* technical seminars, swap and shop, distributor's display, VE, CET and NABER exams. *Talk-in:* 146.25/85, 223.08/224.68. *Admission:* $2. *Tables:* $2 and $3. *Contact:* State Technical Institute ARC, Attn: Hamfest, Alber Dr, Plainwell, MI 49080.

Michigan (Traverse City)—February 11. *Sponsor:* Cherryland ARC. *Time:* 8 AM-2 PM. *Place:* East Bay Elementary School, 3962 Three Mile Rd, N, located approximately ½ mile south of US 31. *Talk-in:* 146.25/85. *Admission:* $3. *Tables:* $6 *Contact:* Mike Hubbard, N8JXY, 5772 Vance Rd, Interlochen, MI 49643, tel 616-276-9143.

Minnesota (Medina)—February 25. *Sponsor:* Robbinsdale ARC. *Time:* 7 AM-2 PM. *Place:* Medina Ballroom, 10 miles west of Minneapolis on Hwy 55, 4 miles west of Interstate 494. *Features:* VE exams. *Talk-in:* 147.60/00. *Admission:* advance $3, door $5. *Contact:* Dennis Pollard, KZØI, 4016 Kentucky Ave, North, Crystal, MN 55427, tel 612-535-7189 call after 6 PM.

†**Missouri (Kansas City)—February 19.** *Sponsor:* Mid-America FM Assn Inc. *Time:* 9 AM-4 PM. *Place:* National Guard Armory. *Features:* flea market. *Talk-in:* 146.34/94. *Admission:* free. *Contact:* Ruth Atkeisson, WBØPVI, tel 816-331-6033.

†**New York (Valhalla)—March 5.** *Sponsor:* Westchester Emergency Communications Assn. *Time:* 8:30 AM-3:30 PM. *Place:* Westchester Community College, Exit 4 from I-287; easy access from Bronx River Pkwy or Sprain Brook Pkwy. *Features:* forums, VE exams, free parking. *Talk-in:* 147.66/06, 222.8/224.4, 442.475/447.475. *Admission:* no advance, door $4. *Contact:* Bob Wilson, N2DVQ, or Sarah Wilson, N2EYX, 2 Soundview Ave, White Plains, NY 10606, tel 914-997-8491 (answering machine).

†**North Carolina (Elkin)—February 19.** *Sponsor:* Briarpatch ARC and Foothills ARC. *Time:* 8 AM-5 PM. *Place:* National Guard Armory, 2 miles west of I-77 from Exit 85. *Features:* VE exams. *Talk-in:* 144.77/145.37 and 146.52. *Contact:* Ed Mulholland, KA4WWV, Rte 4, Box 702, North Wilkesboro, NC 28659, tel (D) 919-838-2171 ext 2427, (N) 919-667-1568.

Ohio (Cuyahoga Falls)—February 26. *Sponsor:* Cuyahoga Falls ARC. *Time:* 8 AM-3 PM. *Place:* Akron High School, easy access from Tallmadge Ave, offramp of North expressway (Rte 8), Rte 8 connects to all major expressways and Ohio Turnpike. *Features:* refreshments. *Talk-in:* 147.87/27. *Admission:* advance $3, door $4. *Tables:* advance $5, door $6, half tables available, sellers may bring their own tables. *Contact:* send SASE for ticket orders and table reservations to Bill Sovinsky, K8JSL, 2305 24th St, Cuyahoga Falls, OH 44223, tel 216-923-3830.

†**Ohio (Mansfield)—February 12.** *Sponsor:* Inter-City ARC and Mansfield Amateur Service Emergency Repeater Inc. *Time:* 7 AM-4 PM. *Place:* Richland County Fairgrounds. *Talk-in:* W8WE 146.34/94. *Admission:* advance $3, door $4. *Tables:* advance $6, door $8 (also half tables available, advanced ticket/table orders must be received and paid by February 2, 1989). *Contact:* for general information or advanced tickets/tables send SASE to Dean Wrasse, KB8MG, 1094 Beal Rd, Mansfield, OH 44905, tel 419-589-2415 after 4 PM.

Oregon (Salem)—February 18. *Sponsor:* Salem and Oregon Coast Emergency Repeater Associations. *Time:* 9 AM. *Place:* Polk Co Fairgrounds. *Features:* flea market, exhibits and commercial dealers. *Talk-in:* 146.26/86. *Admission:* advance $5, door $6. *Contact:* Salem Repeater Assn, PO Box 784, Salem, OR 97308.

†**Pennsylvania (Belle Vernon)—March 5.** *Sponsor:*

Two Rivers ARC. *Time:* setup 7 AM, public 8 AM-3 PM. *Place:* Rostraver Volunteer Fire Hall, Rte 51 south, 3 miles north of I-70 and PA 51 Interchange. *Talk-in:* 146.13/73. *Admission:* $1. *Tables:* $6 for full or $4 for half (50% in advance). *Contact:* Lou Zimmerman, 911 Roland Dr, Pittsburgh, PA 15221, tel 412-351-1562 between 9 AM-10 PM.

South Carolina (Charleston)—February 25. *Sponsor:* Charleston ARS. *Place:* National Guard Armory, 69 Hagood Ave, opposite Johnson Hagood Stadium. *Contact:* E. Linwood Sikes, N4LS, 16 Trumbo St, Charleston, SC 29401, tel 803-723-4000.

Texas (Harlingen)—March 4-5. *Sponsor:* South Texas Amateur Repeater Society, Inc. *Time:* Saturday 9 AM-4 PM, Sunday 9 AM-2 PM. *Place:* Casa de Amistad (Civic Ctr) on Fair Park Blvd (from north, exit US 77 at the Fair Park Blvd exit, travel east ½ mile; from the west, exit US 83 at Lewis Ln exit, travel east to US 77 and join Fair Park Blvd, ½ mile to Casa de Amistad). *Features:* FCC and SCT forums, packet demonstrations, dealer displays, indoor flea market, VE exams, RACES/ARES meeting, ARRL forum, RV parking, nonham activities, refreshments. *Talk-in:* 147.99/39 English, 146.10/70 Spanish. *Admission:* advance $5, door $6. *Tables:* advance $7, door $10. *Contact:* Dr David Woolweaver, K5RAV, 2210 S 77 Sunshine, Harlingen, TX 78550, tel 512-425-7744. Hotel reservations at special rates—Valley Adventures 1-800-338-0560.

Texas (Orange)—February 25. *Sponsor:* Orange ARC. *Time:* vendors 7 AM, public 8 AM-5 PM. *Place:* National Guard Armory Bldg, Meeks Dr. *Features:* bring ham gear or parts that you wish to sell or trade. *Talk-in:* 147.78/18. *Admission:* free. *Tables:* individuals $4, dealers $10, first come first serve basis.

Vermont (Milton)—February 25. *Sponsor:* Seventh Annual Northern Vermont Winter Hamfest. *Time:* 9 AM-3 PM. *Place:* Milton High School, Rte 7 in Milton; 4 miles North of exit 17 off of I-89. *Features:* flea market, demonstrations, auction, forums, meetings, VE exams will be held at 1 PM, no preregistration is necessary, bring copy of current license and two forms of identification. *Talk-in:* 144.87/145.47, 146.25/85. *Admission:* no advance, door $2, under 18 free. *Contact* Mitch Stern, WB2JSJ, tel 802-879-6589 evenings.

† **Virginia (Vienna)—February 26.** *Sponsor:* Vienna Wireless Soc. *Time:* 7:30 AM-3 PM. *Place:* Vienna Community Ctr, Park St, SE, two blocks southeast of Maple Ave, (Rte 123). *Features:* refreshments. *Talk-in:* 146.085/685, 146.19/79. *Admission:* at door $4. *Contact:* Bill Mills, KC5PF, 1740 Tonys Ct, Amissville, VA 22002, for table reservations contact Harry Kaklikian, W4ACN, 4941 Andrea Ave, Annandale, VA 22003.

West Virginia (Fayetteville)—February 26. *Sponsor:* Pleateau ARA. *Place:* Fayetteville High School. *Admission:* $4. *Tables:* $3. *Contact:* John Witt, W8OQC, 135 Daniels St, Fayetteville, WV 25840, tel 304-574-0532.

Coming Conventions

1989

February 4-5
Florida State, Miami

February 25-26
Ohio State, Cincinnati

ARRL NATIONAL CONVENTIONS

June 2-4, 1989—Dallas/Fort Worth, Texas
June 8-10, 1990—Kansas City, Missouri

MAINE STATE CONVENTION

February 11, 1989, South Portland

The Maine State Convention will be sponsored by the Portland Amateur Wireless Association. It will be held at the Sheraton Tara Hotel adjacent to the Maine Mall, which has easy access from I-95 and I-295 South Portland exits. Doors will be open from 10 AM-4 PM. Admission will be $5 in advance and $6 at the door. Features will include indoor flea market, manufacturers/dealers exhibits, ARRL speakers/forum, VE exams, technical and operations seminars and free parking. Talk-in will be on 146.13/73 and 146.52. For further information contact Jeff Weinstein, K1JW, PO Box 6111, Portland, ME 04105, tel 207-874-0700 from 9 AM-5 PM weekdays.

OHIO STATE CONVENTION

February 25-26, 1989, Cincinnati

The 1989 Ohio State Convention will be sponsored by the Committee for Amateur Radio/Hamilton County Amateur Radio Public Service Corps. It will be held at the Cincinnati Gardens Exhibition Ctr, Seymour Ave, at Langdon Farm Rd (Ohio Rte 561). Ticket sales start at 8 AM, doors are open from 8:30 AM-5 PM Saturday and from 8:30 AM-4 PM Sunday. Admission will be $5 in advance (send in no later than February 18 with an SASE) and $6 at the door. Features will include ARRL forum, ARES forum, Novice and ham-related forums, VE exams, flea market, commercial vendors, Wouff Hong ceremony, free parking, handicapped parking, refreshments, banquet Saturday night $15, ladies' programs both days. Talk-in will be held on 144.59/145.19, 144.61/145.21, 146.28/88. For further information contact John Haungs, WA8STX, 10615 Thornview, Cincinnati, OH 45241, tel 513-563-7373 or Stan Cohen, 2301 Royal Oak Ct, Cincinnati, OH 45237, tel 513-531-1011. Vendor Chairman Joe Halpin, 11615 Geneva Rd, Forest Park, OH 45240, tel 513-851-1056, (flea-market tables $12.50, commercial $40 per booth).

Attention Hamfest and Convention Sponsors

ARRL HQ maintains a date register of scheduled events that may assist you in picking a suitable date for your event. You are encouraged to register your event with HQ as far in advance as your planning permits. Note that the hamfest and convention approval procedures for ARRL sanction are separate and distinct from the date register: Registering dates with ARRL HQ does not constitute League sanction, nor does it guarantee there will not be a conflict with another established event in the same area.

We at ARRL HQ are not able to approve dates for sanctioned hamfests and conventions. For hamfests, this must be done by your Division Director. For conventions, approval must be made by your Director and, additionally, by the Executive Committee. Application forms can be obtained by writing to or calling the ARRL Convention Program Manager, tel 203-666-1541 ext 283.

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.

Strays

C'MON, WRITE FOR *QST*

☐ Writing...Did you ever think about writing? C'mon! Sure your have! Well, how about writing for *QST*? Hams have a *wide* range of interests. We've gone from spark to space in 75 years! Tell other *QST* readers about *your* interests, *your* accomplishments. We'll pay you $50 per published page to tell your story. If you submit the manuscript electronically, we'll give you an additional $6 per published page.

If you'd like, we'll send you an Author's Guide. It'll give you an idea of how to organize your material, put in on paper and/or disk, and answer most—if not all—of the questions you may have.

Send your manuscript or request for an Author's Guide to: Chuck Hutchinson, K8CH, Technical Editor, *QST*, 225 Main St, Newington, CT 06111. Or, give us a call at 203-666-1541 between the hours of 8AM and 4 PM Eastern.

"INTERNATIONAL POSTAL RATES AND FEES"

☐ For those who send DX QSLs direct, or otherwise communicates by mail with DX stations, there is a useful pamphlet available free at the local post office. It is Publication 51, "International Postal Rates and Fees." It covers all sorts of mailings to a long list of countries. *Tnx to W1BIY*

HALLIGAN CELEBRATES BIRTHDAY ON QCWA INTERNATIONAL NET

☐ The 90th birthday of William J. Halligan, W9AC, the founder of Hallicrafters, was celebrated on the December 11, 1988 schedule of the QCWA International Net. This birthday QSO party was kicked off by NCS Herb Gleed, W6FQ, in Los Angeles, California. He called QCWA President Leland Smith, W5KL, in Jasper, Arkansas, who announced that Bill was at his station in Bal Harbour, Florida, ready to acknowledge birthday greeting messages from as many stations as possible.

W5KL then read letters to Bill from President Reagan and Governor James Thompson of Illinois. Bill also received greetings from QCWA officers and from many of the net's 70 check-ins. Bill is a member of the Chicago Area and Everglades, Florida QCWA Chapters and Florida Section of the Radio Club of America, Inc. *Tnx to David Talley, W2PF*

CREDIT WHERE CREDIT IS DUE

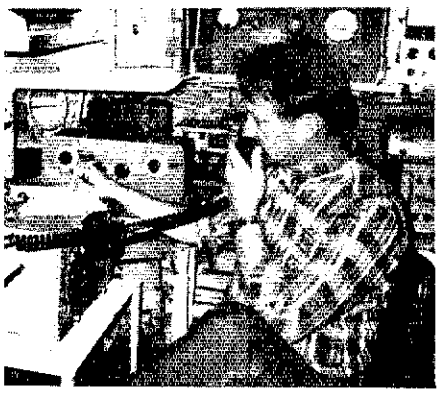
☐ Last month's Up Front photograph of Stacey Garner, KA9WDE, receipient of the 1987 Hiram Percy Memorial Award, was taken by Jackie McGlothlin, N9CAP.

Club Spectrum

Conducted By Rick Palm, K1CE
Field Services Manager, ARRL

Here And There

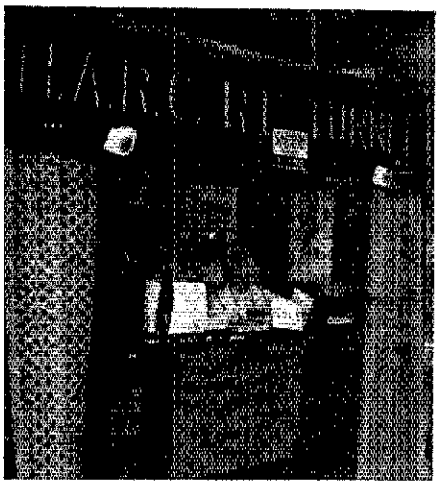
The nation's League-affiliated clubs are an active bunch. Here's a portfolio of photos of several clubs "caught in the act." If you would like to see your club's activities in this column, send your photos and brief stories to K1CE at HQ.



On Armed Forces Day, the Maryland Mobileers ARC operated a special-events station aboard the Submarine Torsk in Baltimore Harbor. The station operation honors the Submarine Service; operators made 400 contacts. (*Tnx N3BMB*)

Tale of two clubs: Members of the University ARC of East Tennessee State University and Virginia Tech ARA enjoy the festivities at the Tri-Cities Hamfest held at Gray, Tennessee recently. These two clubs manned a flea-market table together and had lots of fun and fellowship. (*WA4UCI photo*)

Knowing your "roots," and honoring the memory of your founders, is as important for affiliated clubs as it is for ARRL in this 75th anniversary year. Members of Radio Club de Cuba en el Exilio, a Miami-based ARRL affiliate, laid a wreath on the grave of Alberto Giro, WB4WKO/ex-CO2QY, on the anniversary of his death. Alberto founded the RCC in Havana in 1928. (*Photo courtesy AA4CM*)



Here's a unique exhibit display idea from the Hollywood (Florida) ARC. HARC's RF Tunnel houses photographic and video displays of club activities such as Field Day and space shuttle communications. During one Miami Tropical Hamboree, 400 hams strolled through the tunnel. That's Minnie Levine, WA4RLS, at the entrance. (*Tnx WA4KXQ*)

To promote camaraderie among St Louis area clubs, the St Charles ARC has created the "Rotating Beam Award." The award is presented during an unannounced visit to the recipient club's meeting. It then becomes the recipient's responsibility to pass it along to another club in a similar manner. Here, St Charles ARC official W0OGS (r) presents the first award to Egyptian Radio Club Deputy Pharoah NA9X.

A new Affiliate! New England Division Director Tom Frenaye, K1KI, (l) presents Interstate Repeater Association (New Hampshire) President Bud Gray, W1HMT, with a handsome Affiliation certificate. Welcome, IRA, to the 2000 ARRL-affiliated clubs nationwide! Info on how your club can do it too is available from ARRL HQ. (*N1FIJ photo*)

New Special Service Clubs

East Alabama ARC, Auburn, AL
Golden Empire ARS, Inc, Chico, CA
Grand Island ARS, Grand Island, NE
Gwinnett ARS, Lilburn, GA
Heart Of America Radio Club, Kansas City, MO
Kimberling ARC, Kimberling City, MO
Scottsdale ARC, Scottsdale, AZ
Southwestern Virginia Wireless Assn, Inc, Roanoke, VA

IARU News

Conducted By Richard L. Baldwin, W1RU
HC 60, Box 60, Waldoboro, ME 04572

Amateur Radio Administration

In November, 20 delegates representing developing nations in Africa gathered in Harare, Zimbabwe to take part in a week-long seminar on the administration of the Amateur Radio Service. This seminar was sponsored jointly by the International Telecommunication Union (ITU), the International Amateur Radio Union (IARU) and the Zimbabwe Posts and Telecommunications Corporation (PTC). The administrations participating included Angola, Botswana, Malawi, Mozambique, Tanzania, Zambia and Zimbabwe. The instructors for the seminar were Richard L. Baldwin, W1RU, president of IARU, and Mirko Mandrino, YT7MM, a member of the Region 1 IARU Executive Committee. The seminar had the full and enthusiastic support of the Zimbabwe administration, and the facilities were excellent.

These are the participants in the Amateur Radio Administration Course in Zimbabwe in November 1988. These are the people who may someday, at an ITU conference, have a considerable voice in the future of the Amateur Radio Service.

The purpose of the Amateur Radio Administration Course is twofold. It provides the participants with a thorough review of those International Radio Regulations adopted by the ITU which have any bearing on the Amateur Radio Service. It also shows how those International Radio Regulations can be converted into domestic regulations which not only encourage the growth of Amateur Radio, but also serve the best interests of the administration.

During the week-long seminar the participants not only learn a great deal about the regulation of the amateur service; they also learn much about the Amateur Radio Service itself, its history and development, and why it is a valuable service whose growth should be encouraged. We have been delighted to observe that those who have participated in this seminar in the past have a better appreciation of the amateur service. They also have supported the amateur service at ITU conferences, where many of them have appeared as delegates.

The Amateur Radio Administration Course has been presented three times—once each in Tokyo, Nairobi, and Zimbabwe—under the sponsorship of the ITU. It has also been given several times in Newington, Connecticut under the sponsorship of the United States Telecommunications Training Institute. By the time these words appear in print, the course will have been given yet another time, in Kuala Lumpur, Malaysia—again under the sponsorship of the ITU and with the support of the Malaysian administration.

This continuing series of seminars is another way in which the International Amateur Radio Union is carrying out its objective of promoting understanding of the Amateur Radio Service. This ensures that the amateur service will have the support that it needs and deserves at World Administrative Radio Conferences of the ITU. Your membership in your national society—the American Radio Relay League in the United States, for example—makes this program possible.

This is an excellent place to mention the Zimbabwe Amateur Radio Society, the IARU's member society in Zimbabwe. ZARS officers were active participants in the preparations for the course (they have an excellent rapport with their administration). Their secretary, Molly Henderson, Z21JE, attended each day's sessions. Other officers attended as time permitted. At all times at least two representatives of ZARS were present. On one evening, ZARS president Dudley Kaye-Eddie, Z22JE, had all members of the seminar visit his home for an on-the-air demonstration of Amateur Radio. Incidentally, currency restrictions in Zimbabwe make it very difficult to import Amateur Radio equipment, and the result is that a number of members of ZARS have done some first-class homebrewing. QST

Strays

***QST* congratulates...**

☐ Reynold L. Nitsch, W4NTO, who has been selected to receive the 1988 Roanoke Division ARRL Service Award. This award was created by the late Vic Clark, W4KFC, in 1968. All service performed by a nominee since his or her licensing is considered. John C. Kanode, N4MM, Roanoke Division Director, would like nominations for 1989 from clubs and individuals in the Division. Nominations should include a resume of Amateur Radio activity.

☐ Harry Raye, W1SMQ, of Perry, Maine, who is featured in the November 1988 issue of *Yankee* magazine as having the easternmost house in the United States that is located on the 45th parallel (ie, halfway between the equator and the North Pole).

Silent Keys

Administered by Nancy A. Slipski

It is with deep regret that we record the passing of these amateurs:

N1BGW, John Cunningham, Weymouth, MA
KA1CS, Leon W. Weston, Winthrop, ME
W1CT, George L. Downs, Weston, MA
W1DSP, Robert W. Churchill, Beverly, MA
W1IMV, Henry M. Broderick, Windsor, CT
WA1IPN, Joseph J. Klecowsky, Sr, West Haven, CT
K1LIT, Olin A. Smith, Windsor, CT
W1LJL, Edward Szachowicz, Brockton, MA
K1NOE, Frederick M. Lorance, Stoneham, MA
W1OLM, Donald O. Erskine, Lyndonville, VT
W1PHX, Dayton W. Galvin, Tucson, AZ
KA1QAK, Alexander P. Aderer, Keene, NH
K1RGD, Ralph T. Stetson, Jr, Socorro, NM
W2ALD, Raymond A. O'Neill, Jr, Cranford, NJ
W2HIN, Gilbert N. Lahullier, Clifton, NJ
W2JSR, George V. Wischebrink, Uniondale, NY
W2MBO, Leslie J. Shaw, Fredonia, NY
WB2OBD, Frank Rumpeltin, Avenel, NJ
KB2RZ, Walter McKeon, Walden, NY
K2SEN, Paul G. Tarbox, Allentown, PA
W2SIA, Joseph Balgian, Rocky Point, NY
WA2UJS, Harold A. Creighton, Hamburg, NY
K2VYD, Julius Countess, Sunrise, FL
WA2WPE, Mills W. Soper, Cedar Run, NJ
N3DXX, Forbes I. Moore, West Chester, PA
W3FL, Sydney W. Tymeson, Takoma Park, MD
K3HSE, Charles J. Colbert, Irwin, PA
W3IKJ, Frank H. Norman, Levittown, PA
W3MEQ, George B. Hodges, Jr, Williamsport, PA
K3MNW, Wesley P. Heller, Sr, Philadelphia, PA
K3MO, Joseph G. Papp, Verona, PA
W3QZT, David E. Atherton, Chambersburg, PA
W4CH, N. J. Boruch, Wilmington, NC
K4CK, W. J. Houston, Auburndale, FL
KE4CT, Ken Brandon, Charleston, SC
W4CWO, Kenneth G. Ackermann, Birmingham, AL
K4DPY, Thomas G. Brawley, Cape Coral, FL
K4EKF, Frank J. Hogue, Toccoa, GA
*N4EZ, Fabius Toole, Jr, Aiken, SC
KA4FYM, Paula C. Bartlow, Lacey's Spring, AL
W4GH, George K. Hickin, Macon, GA
K4GSV, John R. Bell, Herndon, VA
K4GV, V. E. Hollinsworth, Naples, FL
K4HOS, Carter H. Phillips, Warner Robins, GA
WA4IJE, Emmett G. Conway, Springfield, VA
N4KB, Edward Hart, Jr, Bonita Springs, FL
K4NLX, Dan Goddard, Savannah, GA
K4NV, John A. Robinson, Burlington, NC
W4OLM, Aubrey U. Meadows, Jr, Columbia, SC
KB4PNW, Elizabeth D. Healy, Tallahassee, FL
KB4PQK, James F. Beasley, Harrodsburg, KY
WA4PQQ, Arthur E. Hook, Columbia, SC
W4QKG, Howard R. Fulkerson, Ashland, KY
K4RC, Hayden A. Ross-Clunis, Williamsburg, VA
W4SNX, Elmo M. Bynum, Jackson, TN
KA4UVR, John M. Ray, Jr, Athens, TN
NO5B, Chet G. Pascoe, Houston, TX
KB5G, Richard A. Stickley, Harrison, AR
K5GWA, Lawrence H. Reding, Shawnee, OK
W5PM, John A. Swanson, Jr, Covington, LA
NZ5X, James L. Welch, Weatherford, TX
WB6GCQ, Marcellus E. Bernhardt, Costa Mesa, CA
KJ6GO, Len Daley, Huntington Beach, CA
N6HIV, Violet I. Meniktos, Santa Rosa, CA
W6OED, Eugene B. Etchells, El Cajon, CA
KB6UJM, Charles Maier, Whittier, CA
WA6URG, Allan Sonin, Laguna Hills, CA
KB6YPF, M. A. Fox, Porterville, CA
KB7CU, Garland F. Grabert, Bellingham, WA
KA7EUI, Angus R. MacDonald, Sun City, AZ
W7FQB, Charles L. Gies, Bellevue, WA
W7FVU, Robert L. Williams, Portland, OR
K7GL, Leslie L. Sterling, Somers, MT
W7IGN, Lyle G. Truedson, Clatskanie, OR
W7LMP, Lloyd J. Gearhart, Yarnell, AZ
*K7MF, Richard A. Schaak, Vaughn, WA
*WA7NXP, John C. Ebright, Federal Way, WA
W7PRC, Andrew B. Smith, Bellevue, WA
WA7WOX, W. J. "Walt" Bury, Sun City, AZ
KA8ABW, Albert E. Wiehn, Euclid, OH
N8AXW, Charles R. Ewald, Tiffin, OH
WA8CXP, John Crom, Findlay, OH
W8ETF, John B. Dodd, St Albans, WV
N8HEW, Allen McClintic, Woodhaven, MI
WB8KGV, Raymond V. Kaufmann, Wellsburg, WV
W8NRU, Neil F. Johnson, Houghton Lake, MI
W8PCA, Paul A. Tracht, Jeddo, MI
K8PRW, William A. Schott, Lima, OH
WA8QBS, Michael J. Galla, Sr, Birmingham, MI
W8SFI, Donald D. Ralston, Steubenville, OH
WA8UMF, James R. McCollum, Cincinnati, OH
W8WAG, Raymond B. Jones, Lakewood, OH
W9CLI, Charles Theodo Mason, Zion, IL
W9DRJ, Eugene Westerwelle, Ottawa, IL
WB9DWA, T. Charles "Chuck" Smith, Trinidad, CO
WD9IMX, Carol J. Ruesch, Eagle River, WI
W9RCP, Ervin A. Pick, Sr, Jefferson, WI
WB9SQC, William R. Wellman, Paoli, IN
W9TQ, Victor O. Tresidder, Sr, Menomonee Falls, WI
WØAIL, H. Kenneth Payne, Leawood, KS
WDØFDN, William A. Branch, Fredericktown, MO
WØNQX, Eddie V. Shirley, Jr, Lincoln, MO
WØQJU, Elmer J. Cramer, Forsyth, MO
WØTHK, Joseph N. Funk, Cottage Grove, WI
WØVAE, Arley F. Rowberg, South Benson, MN
WØWIQ, John E. Worlitz, Grand Forks, ND
KØZFL, Philip D. Rowley, Alamosa, CO
WBØZUP, D. F. "Bud" Carpenter, Mankato, MN
OE1ER, Erwin Heitler, Vienna, Austria
VE7GI, Frank L. Taylor, Aldergrove, BC

*Life Member, ARRL

In order to avoid unfortunate errors in the Silent Keys column, reports of Silent Keys are confirmed through acknowledgment only to the family of the deceased. Thus, those who report a Silent Key will not necessarily receive an acknowledgment from HQ. Canadian reports should be sent to the CRRL HQ address on p 9.

Note: All Silent Key reports sent to HQ must include the name, address and call sign of the *reporter* as well as the name, address and call of the Silent Key in order to be listed in the column. Please allow several months for the listing to appear in *QST*.

50 Years Ago

February, 1939

☐ Prompted by more horror stories about amateurs seriously injured or killed by contact with high transmitter voltages, including the recent electrocution of *QST*'s Editor Ross Hull, the League will embark on a pointed campaign to make amateur radio operating safer.

☐ To start off, W1CBD provides important information on resuscitation from electrical shock—what to do and how to do it—with pictures of a demonstration by local electric utility personnel.

☐ "Splatter" is a new, short column highlighting contents of the current issue. Issuance of call-letter license plates in Michigan is particularly newsworthy.

☐ FB8AB, on a commercial expedition to the south Indian Ocean, used ham radio to call for help when the ship got stranded and ran out of fuel. West coast amateurs relayed the SOS to authorities and assistance was sent.

☐ For those of us who live in the wide open spaces, without the convenience of plug-in power, W1TS has designed a six-tube battery-operated single-signal superhet using the new 1.4-volt low-drain tubes.

☐ Get ready for the DX competition next month. Because of interference last year to vital emergency operations, and the new F.C.C. rules labeling those two bands as primary in disaster work, the 160- and 80-meter bands are withdrawn from contest use.

☐ Amos of the popular radio show "Amos 'n' Andy" is now W6QUT. The real life Freeman Gosden was a radio op in World War I.

☐ L. W. Olander of E. F. Johnson uses two "Q"-bar matching sections to feed out-of-phase antenna elements, to provide a two-band directional system.

☐ *QST* pays tribute to brother-sister team W9BSP/W9UA for eight years as an A.R.R.L. volunteer code practice station.

☐ What's your crystal frequency? W3ZF discusses the factors which can make the actual frequency different from that on the label and maybe get you a "pink ticket."

☐ There are now more than 100 members of the DX Century Club, with G6WY on top with a 141 total.

☐ PAØCM shows us an electronic system for break-in voice operation, use of which should relieve congestion in the 'phone sub-bands.

☐ If you're tight for antenna space, W1LJI describes a top-loading setup which makes even 160-meter usage practical for vertical radiators.

25 Years Ago

February, 1964

☐ Many amateurs have suggested regular publication of "The Amateur's Code" as a part of the ARRL program to improve amateur operation; the Editor obliges with the "golden rules" authored years ago by former League General Counsel Paul Segal, W3EEA.

☐ A part of that program is reduction of power to the minimum needed for communication, and W1CUT outlines some basic methods for convenient power control.

☐ Because the bands are less populated than those of lower frequency, it is not inconsistent with the program for W1HDQ to describe some kilowatt amplifiers for 50 and 144 Mc.

☐ K2PEY, W6GXN and WA6JZN are joint authors of a symposium examining noise-figure measurement, both theory and practical aspects, particularly on v.h.f. and above.

☐ W1ICP shows us, though aimed especially at beginners, how to rewind a TV power transformer and then use a voltage-doubling circuit for an intermediate-power rig.

☐ As part of the League's golden anniversary commemoration, *QST* announces two article contests: one on "What ARRL Means To Me," and a second covering the broad field of more efficient use of amateur frequencies as well as operating in the "public interest, convenience and necessity."

☐ W4JA used an inexpensive surplus unit to build a selective audio filter with measured bandwidth of 200 cycles at 20 db. down.

☐ The historical section of this issue, in the golden anniversary year, highlights the formation of the League in 1914, the organization of the country into six divisions, and the proposed coast-to-coast trunklines.

☐ A number of v.h.f.-and-above amateurs are anxiously awaiting the launch of reflective satellite Echo II, hoping to bounce a signal off the inflated balloon.

☐ Hallicrafters founder William J. Halligan, W9AC, was honored for completing his fiftieth year in electronics.—*W1RW*

Conducted By Joan Gibson, KG1F
RR 1, Box 1465, Waterbury, VT 05676

WE7D and WE7B Take Top Honors in 1988 YL/OM Contest

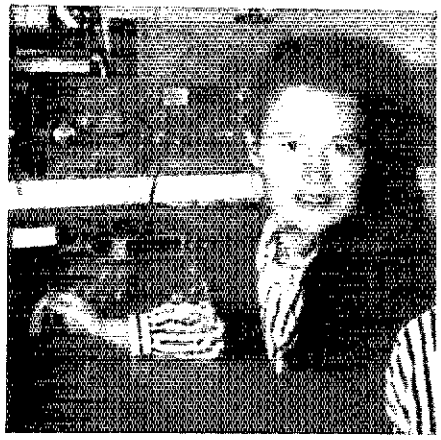
Contesting's competitive spirit is alive and well in the Zitting household. At least it rose to ambitious heights during two weekends in February 1988 when Nancy and Laura worked long and hard to take top honors in the YL/OM Contest sponsored by YLRL. Nancy, WE7D, and Laura, WE7B, claim they can't ever remember Amateur Radio not being in their lives in one form or another. "Antenna wires strung above the yard, garbled noises coming from the shack and QSL cards were all common everyday things," reports Nancy.

A few years ago, their father, W7MR, offered to help the young women get their licenses. "I don't know if he knew what he was getting into, but we jumped at the proposal and committed ourselves (for a couple of weeks anyway) to studying code.

"As all amateurs know, it is easy to practice code for a day or two and then neglect it for a month or two," remembers WE7D. "Finally, our father decided to use a little psychology. He offered to take us with him during Field Day if we would get our licenses. With visions of a wonderful two-day camping trip, we went to work in earnest, and in 1986, Laura and I were new General class radio operators—just in time for Field Day."

Their first Field Day was most enjoyable despite the obstacles. The wind blew down their tent and the rain followed shortly thereafter. "Huge gusts of sand swirled through the air the entire time we were operating, choking the generator and causing the rig to blow up. We came home with sand in and on everything, and our log sheets displayed the grand total of 21 contacts," recalls Nancy. Their enthusiasm was not daunted and a couple of months after Field Day, both YLs upgraded to Advanced, and then to Extra in 1987.

Laura and Nancy worked the YL/OM Contest in 1986 and found that competing against each other wasn't very profitable, so last year they decided to join forces. Since CW is Laura's specialty, she worked the CW segment of the contest, and Nancy gladly took the phone portion. They both enjoy contesting, but Nancy admits that Laura is the more active contester and rarely lets a contest pass unnoticed. In 1988, Laura was awarded a plaque for highest contesting score (1987-88) in the state by the Utah Contest Club, as well as a plaque from ARRL for Single Operator Under 18 in the 1988 International DX Contest.



WE7B, Laura Zitting, demonstrated contest savvy with a skillful ear and fist for CW by taking top honors in the 1988 YL/OM CW Contest.

WE7D, Nancy Zitting, prefers SSB contesting and not to be outdone by sister, WE7D, earns the Gold Cup in the 1988 YL/OM SSB Contest. *(photos courtesy of WE7D and WE7B)*

1988 YLRL YL-OM CONTEST RESULTS

Phone Contest Results

YL			OM	
WE7D	106,314	Gold Cup	VP2E/W2GBX	5,197
KC9V	66,792	2nd Place	W7ULC	2,436
I3KVW	59,878	3rd Place	W1HOZ	2,250

YL PHONE

DF9YY*	51,912	VE4ST*	7,381	I1IEP*	2,436
WA2EOV*	42,637	WA4SRD	7,245	DF3TE	1,330
KA4EEO*	38,150	HA8KAX*	7,161	N1EAF/4	1,291
WA8FSX/7*	34,072	W6JEP*	5,400	GM4YMM*	1,221
KØEPE*	31,609	KAØBAT	4,800	AX3KS*	912
N5IMW*	31,288	NØCBG	4,590	DF9ZL	405
KU7F	20,967	VE7YL*	4,207	VK3CYL	360
KF7GU	18,592	N4LZL	3,396	DF3BN	315
N9GTX*	7,500	SM7JKY*	2,958	LA2PFA*	297
KD8SC*	7,441	WA2NFY	2,688	KB4VAR	150

OM PHONE

W3IEZ/4*	1,287	KAØBHO*	312	YU3WZ*	90
HB9MX*	888	W5EIJ*	221	VE7XO*	70
W6HAL*	714	W5RDW/4	195	SM4BTF	18
W9LNQ*	540	W3EE*	132	YU7SF	9
W7AHZ*	456	GØDYO*	121	SP1HJK	9
W9CA	312	AX3XB*	99		

CW Contest Results

YL			OM	
WE7B	40,117	Gold Cup	W7ULC	1,762
K5YL	33,726	2nd Place	W9DYG	1,543
W6JEP	18,060	3rd Place	VE3KK	1,291

YL CW

NS9V*	15,300	K8ONV/4	7,120	DJ6US*	1,980
WA8FSX*	13,608	WA2WHE*	6,256	WA2NFY	1,932
CS8YH*	13,572	NV8W*	4,329	DF2SL	1,368
VE7YL*	9,324	VX6OCO*	4,230	N4LZL	1,039
WA4SRD*	9,027	KL7LH/W7	3,465	OZ7YL*	836
N5IMW*	8,775	KA5GIS/1*	2,551	AX3KS*	684

OM CW

W9FFQ*	945	W8YGR*	540	W7HO	224	WA3JXW	110
HP1AC*	913	W9DU	480	NØFMR	195	YU3WZ*	90
W6ZT*	780	W5RDW	420	EA7XC*	186	HA5LZ*	60
W1HOZ*	714	K6XO	420	W3EE*	180	AX3XB	37
WØIZV*	702	VE6UP*	308	W8DM	165	W3UIU	30
KØBM	586	AA4XM	292	W5EIJ*	165	YU7SF	6
NØFFZ	585	W2AAU*	288	HB9MX*	132		
W4TYU*	576	W9LNQ	270	W7RD	120		
VE2RO*	552	AE7K*	234	W5NR	120		

*denotes certificate winners
Check logs: SMØCSX, G4EZI, KA2GGB

Results, 3rd IARU HF World Championship

"What a great contest! I worked a bunch of new countries and had a great deal of fun, to boot!"—NVØU

By Billy Lunt, KR1R
Contest Manager

In the midst of prime vacation time, 1367 participants glued themselves to their operating positions for the 24-hour third running of the IARU HF World Championship, July 9-10, 1988. The bands were hot and full of activity! Reports indicate that 15 meters was the prominent band in this year's contest. K6MJ stated that this was the best 21-MHz opening that he has ever heard. He worked all continents in just 38 minutes! WA5IYX claimed, "This was the highest solar flux for this July event since the early 1980s. The results on 15 meters showed with an opening to Europe lasting well after 2 hours past local sunset on this end." K3IXD observed, "There was a lot of QRM on 20 meters, although 15 meters was wide open. I worked YB with my beam on Europe and Europeans with my beam on Japan using only 100 watts SSB output."

Fifteen wasn't the only band to be blessed with great propagation. All bands seemed to produce QSOs and multipliers aplenty. It was "a flip of a coin" as to what the best band was during any given time throughout the contest. PA3CWL explained, "I enjoyed the contest very much because conditions were so great. I should have made more QSOs on 80 and 160 meters, but things were going so well on 20 that I forgot to QSY in time. HI HI!" KA1GQW marveled over the great band conditions and good operators making the contest a pleasure, while exclaiming, "Go sunspots!" Although WB2EKK couldn't spend a lot of time in the contest, he raved about the great conditions and noted that S79D, FH5EF and KX6HN responding to his CQs were nice highlights. K4XS spent some time on 10 meters and claimed, "There were very good conditions to Europe." From the other side of the pond, I4UHF proclaims, "Fantastic propagation to the US on 20 meters in the night! What a pile-up!" Conditions like these spark new life into contesting and explain the overall increase in scores for this year's contest.

Twelve IARU member-society HQ stations sent their logs to Box AAA for checking. HG6ØHQ more than tripled last year's leader score to finish first among the HQ stations with 9.5 million points. Second-place Y61HQ scored 4.98 meg with OK7AA close behind with 4.97 meg. Thanks to all the HQ stations that participated and gave us those extra multipliers.

All top 6 spots in the mixed-mode category scored over a million points as compared to last year's winning score of 838k. On top of the list is Tom, K1KI, who scored an impressive 1.4 million points to claim 1st place mixed-mode world. RU1DZ finished 2nd place with 1.3 million points and was followed by Rich, K1CC, with 1.2 million points. RB5IM, HA5PP, and KL7Y all scored over one million points and finished in 4th, 5th and 6th places respectively.

Bettering his last year's score by 300k, Spyros, 5B4MF, reclaims the 1st place world, phone-only category with 1.25 million points. Rasa, YU4EU, guest op at 4N4A, was right on his heels finishing only 4k points behind for a strong second place world phone. K4XS finished up in third-place world and first-place W/VE with 1 million points. WB9HAD scored 686k points for second-place W/VE, followed by NU6S in third-place W/VE with 481k.

The first-place world CW winner for 1988 was C43T (YU1RL, op) from Cyprus with 1.6 million points. P4ØGO mustered 1.5 million points for a strong second place, and HAØMM scored 1.2 million points for third-place world CW. K1TO finished fourth-place world and first-place W/VE followed by WM5G (KRØY, op), finishing fifth-place world and second-place W/VE CW.

In the multioperator class, the entire top 10 scored over a million points and the top two even made over two-million points each—not bad for a 24-hour contest! Contest team HG1S edged out RL1P and crew for the top honors with the gang at UQ1GWW finishing 3rd in the multioperator category. The troops at N5AU were the only W/VE multiop station to score over a million points and make the world top ten, finishing in 9th place. N5RZ scored 998k for second-place W/VE and K6TMB scored 925k for third-place W/VE.

Again this year, the CW-only category proved to be the most popular. The second most popular category was phone, followed by mixed mode and multioperator. With the increase in 10-meter propagation, and US Novices and Technicians on 10-meter phone, maybe popularity order among entry classes will change in 1989. Who knows? Tell your friends and neighbors about the fun you had in the contest and invite them to play in next summer's event. See you July 8-9, 1989 for the 4th running of the IARU HF World Championship.

Rasa, YU1RL, guest op at C43T, pounded brass to the tune of 1.6 megs to win first-place World CW from Cyprus.

Soapbox

I took the family fishing and therefore missed some of the contest. Next year, I'll try to work the entire contest (NL7DU). I enjoyed this year's event and am looking forward to the 1989 competition (VE6APN). I operated most of Saturday until the neighbors complained of TVI then I had to wait until after midnight to operate (AA4Q). It is too bad that 10 meters never opened up. The little TA33 Jr and 100 W did a good job on 20 meters (KI6ZH). There seemed to be much more activity than last year (AA6EE). Very interesting conditions. This contest is a good way for the new DXers to work new countries (N6JM). Gee, I was determined to work through the entire night of this contest, but it was just my luck to fall asleep in the final hours of the contest. I woke up one hour after the contest ended. Because I was so disgusted, I couldn't get back to sleep until several hours later! Oh well, see you next year (WE7B). I was 8 hours late getting started and failed to reach my initial personal goals, as well as my modified ones. Twenty meters folded 2 hours before the end of the contest. My relationship with the YL (bless her, she got her ticket and helped me log) was put under great stress. Obviously, I'm disappointed with the number of contacts and the score . . . so when is the next contest? (AA5CH). The highlight of the contest was working W1AW! (KK7Z). My first contest using a computer! Thanks to Ken, K1EA (KM9P). Foiled again by lady luck! My amplifier blew up 22 minutes into the contest. I had to operate barefoot into a tribander stuck in a southwesterly direction (K1PLX). Lost 3 hours to a local thunderstorm

IARU Headquarters Stations

HG6ØHQ (HA1YA, HA4s XH, XT, HA5s DW, FM, GF, LN, WE, HA6s ND, OQ, HA7RY, HA8IE, HAØDU, ops) 9,567,719- 11011- 259

Y61HQ (Y21s TL, YK, Y22TK, Y23EK, Y24UK, Y25ZO, Y32s JK, TK, VK, Y33VL, Y37XJ, Y42s GK, LK, MK, ops) 4,987,920- 7262- 210

OK7AA (OK3s CBU, CFA, CMZ, CQJ, CQR, CQW, CSQ, CUM, DT, EA, JW, LU, LZ, RM, TAP, TCL, TDP, TJI, TMM, YCM, YL, YX, ops) 4,976,722- 6655- 218

LZ7A (LZ1s AT, BB, CL, CY, GC, HA, IX, PJ, RF, UU, ZF, ZO, LZ2s AB, FL, RS, SC, VP, ZA, ops) 4,348,970- 6960- 217

YQØA (YO3RG, YO4s ATW, AVR, BEW, BEX, FM, HW, PX, SX, XF, YO6s AWR, AZM, BQT, MZ, YO8s BAM, CQQ, DP, EB, YO9s APJ, FE, ops) 3,678,363- 6348- 211

OE5XXL (OE5s CA, DI, DIN, JDL, JTL, KE, ops) 1,855,050- 3431- 166

GB75DX (G4s BWP, GIR, ops) 1,395,250- 2733- 125

W1AW (KY1T, N1FOZ, NG1J, W1OD, WA1MBK, WB1CRH, KJ4KB, WA4CMS, ops) 1,391,529- 3085- 139

JA3RL (JF1RPZ, JI2GUT, JA3s MAU, NDM, JG3s KUT, RPL, JI3s ERV, OYM, JR4ISF, ops) 747,947- 2107- 113

HLØHQ (HL1AYE, HLØJ, ops) 13,344- 287- 15

ZL6A (ZL2s BHF, SJ, ops) 1,404- 22- 13

EIØRTS (EI2CL, op) 1,273- 25- 19

Top World Scores

Mixed

Call	Score
K1KI	1,440,904
RU1DZ	1,301,994
K1CC	1,229,580
RB5IM	1,087,243
HA5PP	1,067,520
KL7Y	1,004,224
K3ZO	973,216
VU2TJW (K3TW,op)	930,088
LZ2KSQ (LZ1F-156,op)	878,695
UAØSAU	843,320

Phone

Call	Score
5B4MF	1,250,210
4N4A (YU4EU,op)	1,246,185
K4XS	1,043,984
RB5MT	1,015,208
HA5NP	954,912
DL8PC	895,832
RB5DX	877,189
UM8MDX	836,740
KH2F	763,392
UW9WK	748,650

CW

Call	Score
C43T (YU1RL,op)	1,649,070
P49GO	1,509,348
HAØMM	1,266,264
K1TO	1,172,162
WM5G (KRØY,op)	1,029,240
UWØLT	1,019,008
N2IC/Ø	969,180
K4VX/Ø (KM9P,op)	959,636
K1ZZ	958,958
K8AZ (K8NZ,op)	902,473

Multioperator

Call	Score
HG1S	2,359,104
RL1P	2,127,246
UQ1GWW	1,747,872
LZ9A	1,740,272
4J4F	1,703,160
OH6LK	1,696,385
UP1BWW	1,685,834
OH1AF	1,648,890
N5AU	1,636,250
OK5R	1,530,252

Top W/VE Scores

Mixed

Call	Score
K1KI	1,440,904
K1CC	1,229,580
K3ZO	973,216
WB5BIR	676,791
K3IPK	641,900
KZ5D	640,120
AD5Q	532,233
WZ4F	466,128
AA4S	463,294
KI6EZ	343,988

Phone

Call	Score
K4XS	1,043,984
WB9HAD	686,738
NU6S	481,778
NK1F	394,001
K8SVL	263,712
W1GD	258,984
KBØC	145,597
NØST	135,954
N4MM	103,224
N4UH	102,438

CW

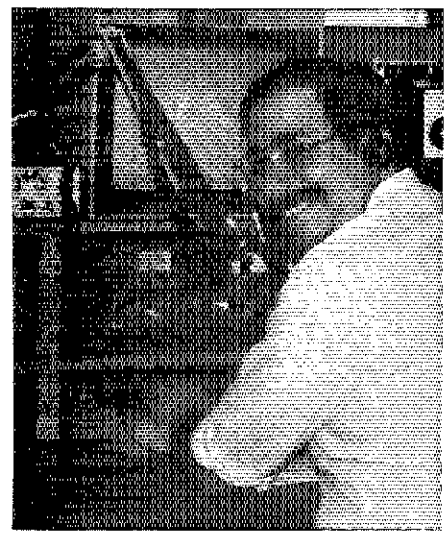
Call	Score
K1TO	1,172,162
WM5G (KRØY,op)	1,029,240
N2IC/Ø	969,180
K4VX/Ø (KM9P,op)	959,636
K1ZZ	958,958
K8AZ (K8NZ,op)	902,473
WA6VEF	745,358
K8CC	738,738
WB2Q	679,752
KZ2S	678,951

Multioperator

Call	Score
N5AU	1,636,250
N5RZ	998,244
K6TMB	925,514
NR5M	830,520
K5DX	752,082
AA4NC	747,542
KD2SX	735,879
N5EA	675,324
AI8D	645,376
K9SD	536,877

during peak European openings on the low bands Saturday night. Thanks to John, K1NG, and Rick, KI1G, for sharing the wealth (KD2SX). Thanks for the nice contest. The bands were good during the whole thing (N2GZL). Multi-single the old fashioned way—1 radio, 2 guys! Good contest! I wish it was in the winter though (AA4NC). I really enjoyed the contest (WA5DTK). Unfortunately, I had to QRT a lot due to the large thunderstorms! Generally, conditions seemed pretty good most of the time (excluding the thunder crashes) (W4YN). Lots of activity. I had my best CW hour ever! Next year, I'll operate the full contest on all bands (NØBSH). Great contest! For the first time, I didn't even mind being off the air for an hour due to a thunderstorm (KO9Q). Nice event. I managed 7 hours despite the usual Saturday commitments. Definitely will try to plan more time next year (W9HE). The contest was very good with excellent band openings on 15 and 20 meters (OH1AA). Nice to see 15 meters open all through the contest. Sorry, I had to work this year, or I could have made a big score! (GB6AR). It was an enjoyable contest. It is a pity that there was little activity from African countries and Canada. I like the 24-hour period and the IARU HQ Station multipliers (GM3CFS). A fine contest this year and certainly increasing in

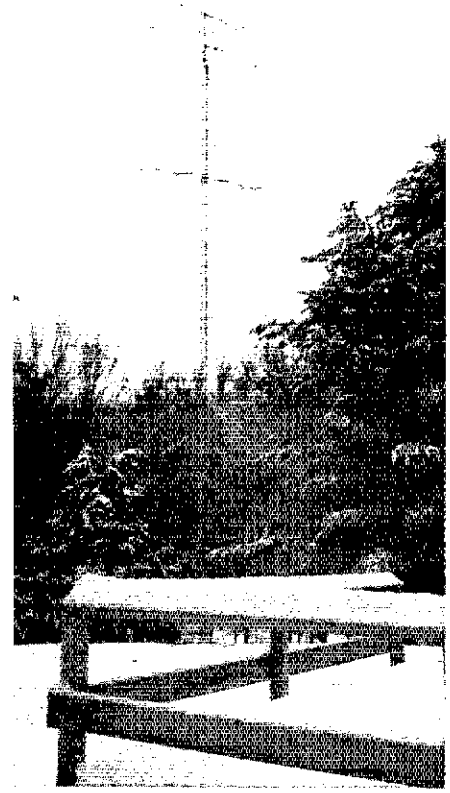
The operators at JA3RL, the IARU HQ station in Japan. Pictured from left to right are JG3RPL, JI3OYM, JA3MAU, JG3KUT, JI3ERV, JI2GUT, JR4ISF, JF1RPZ.



Fourth-place W/VE mixed-mode winner, Allen, WB5BIR, is busy at his keyboard.

The crew at multioperator station SP5KVW huddle together for a group photo.

popularity. There was plenty of activity and some great DX (GW4RHW). It is the most fun contest of the year (ON6CR). Not a bad score for my alternate station (down valley). I hope to do better next year (DL6FBL/A). Fantastic contest! Thanks for the pleasure! (LZ1F-156). Great fun having a guest op like Reg, VE1BNN, and nice propagation on 15 meters (LZ9A). Thanks for the fine contest. It was a good time (SP5JXK). I didn't put on a serious operation; I only wanted to hear the bands in Southern Europe. The amplifier was available only from 2 AM local when TV quit (OK1RI/SV). This was a FB contest! I wish there was a QRP category (Y24TG). I operated the contest QRP (1 W). My antenna is not good on 40 and 10 meters (YO3FGO). It was rather difficult to work DX stations with my QRP station. However, it was an enjoyable contest. (YO5COJ). Fine contest! It was great for testing my new QRP rig (YO3BDP). Thanks for the fine contest. This was my first try at it. I hope to CU next year (YT3FM). Thanks for the FB contest! There was good activity. Unfortunately, the conditions on 28 MHz weren't so good (RZ3DZ). Thanks for the nice contest! (UB5FBV). Great contest! (UB5BZ). There was poor propagation to JA (UT4UXW). Thanks for the FB contest! (UP3BO). Fantastic contest! Good conditions! Thanks to all those who participated for the fun. We'll try next year for a better score and larger multiplier total (UP1BWW). FB contest! (UR2RND). Thank you for the nice contest. I was able to work a new country, P40GO, and worked more than 50 multipliers! (UA9CBO). Many thanks for the contest (UW9SW). Cheerio! (UI9BWE). Excellent contest! This is the first time we used our special call for this contest with very poor conditions —HI HI! This was also the first time we used a computer duping system. What a great help that was. Thanks to all those who worked us and made for an enjoyable contest (RL1P). The 24-hour format is much easier on the body and family. I would like to see more IARU society stations active (WA4UAZ). Worked the contest with only 50-W output (CT1BWW). I could only participate in the contest for 2 hours because of problems at work (EA3ELM). Unfortunately, Saturday and Sunday are working days over here (JY9LC). Many thanks for the fine contest. I am being relocated and hope to be active from Dar es Salaam, Tanzania (5H3) by late 1988 (VU2TJW/K3TW). I was very glad to participate in the contest (JA7DLE). Good conditions on 15 meters! (JA8YBY). Low-band conditions were very poor this year, but there was quite a bit of life to 15 meters—and even some on 10 meters (ZL1AIZ). Most Europeans did not know that Minami Torishima is in zone 90. To them, there is no zone after 75! Maybe things will be better in a few years! (KA2CC).



Dan, K1TO, put his station and antenna farm to good use on CW—he came in at the top of the W/VE heap and number 4 worldwide.

Scores

Scores are listed by ITU zone and then by country within that zone. The line score indicates the call sign, total score, QSOs, multipliers and entry class. The entry class letters indicate: A—single operator, mixed mode; B—single operator, phone only; C—single operator, CW only; D—multioperator, single transmitter.

ZONE 1

Alaska

KL7Y	1,004,224	1783	136	A
NL7HT	43,290	222	45	B
NL7GP	343,512	810	104	C
NL7DU	86,754	334	57	C
KL7CQ (+KL7PU)	216,756	920	54	D

ZONE 2

Alberta

VE6DZ	85,760	330	67	A
VE6SWL (VE6BPI,op)	3,819	51	19	A
VE6BF	171,024	460	84	C

British Columbia

VE7IQ	1,651	37	13	C

ZONE 4

Ontario

VE3OEQ	12,296	74	29	A
VE3TJL	1,130	35	10	B
VE3KP	327,712	896	88	C

ZONE 6

W6

East Bay

KI6EZ	343,988	902	92	A
KS6Q	24	6	3	B
K6TMB (+K3EST,N6IG),	925,514	1033	163	D

Los Angeles

K6SVL	263,712	684	96	B
KI6BN	55,440	204	77	B
AI6Z	64,675	283	65	C

Orange

NM6L	10,024	118	28	B
W6SX	5,859	78	21	C
K6MJ	5,549	43	28	C

Santa Barbara

WA6FGV	144,792	615	72	A
AA4Q	60,838	252	67	C
N6HK	9,568	90	23	C

Santa Clara Valley

AC8Y	270,564	841	84-A
N6NF	145,562	500	73-A
NU6S	481,778	963	122-B
WA6HRK	6,832	70	28-B
WA6VEF	745,358	1245	142-C
N1EE/6	15,262	147	26-C

San Diego

WA6UFY	9,802	92	29-A
KI6ZH	37,572	169	62-B
AA6EE	16,302	122	39-C

San Francisco

K6LRN	3,775	83	25-C

San Joaquin Valley

WW6O	71,864	334	52-B

Sacramento Valley

N6JM	37,920	150	60-A

W7

Arizona

KK7Z	13,905	129	27-B
K6LL	598,817	1200	117-C

Idaho

WO7Y	82,080	357	57-A

Montana

KW7I	9,207	79	31-B
K8JT	145,584	508	72-C

Nevada

WB7VVH	4,104	50	19-B
NF7P (+NC7K)	456,220	1053	108-D

Oregon

W7YAQ	153,621	379	101-C
KA7FEF	10,933	113	29-C

Utah

WE7B	217,487	799	79-A
KE7KF	19,600	229	25-B

Washington

KB7VD	9,990	77	30-B
K7RA	77,280	295	69-C
K7LED (KA7CSE,WA7UVJ,ops)	35,144	210	46-D

Zone 7

W5

Arkansas

AA5CH (+KB5GQK)	13,394	94	37-D

Louisiana

KZ5D	640,120	1248	130-A

Mississippi

WA5OYU	75,072	284	69-A

New Mexico

WS5O	50,730	277	57-A

North Texas

KD5GD	47,112	239	52-B
N5IET	35,504	178	56-B
KG5JH	13,980	118	30-B
WM5G (KRØY,op)	1,029,240	1400	180-C
N5AU (WN4KKN,KM5X,KY5N,N5TR, WB5VZL,ops)	1,636,250	2222	187-D
N5RZ (+W5FO)	998,244	1594	162-D

Oklahoma

N6CL	25,529	130	49-A
N5JKN	88,752	308	51-B
N5CG (+KF5FM)	222,768	843	63-D

South Texas

WB5BIR	676,791	1319	139-A
AD5Q	532,233	1145	117-A
NZ5V	61,185	259	65-A
WA5IYX	43,940	223	52-B
KG5U	477,792	1058	108-C
K5MA	46,403	243	49-C
NX8G	39,100	222	47-C
W5NR	10,725	76	33-C
NR5M (+K2TNO,K5LZO,KE5IV, N5HHS,NT5D,WB5N,DL3YBM)	630,520	1544	135-D
K5DX (+K5GN)	752,082	1244	163-D
N5EA (+K5GA,W5ASP,WA9VLI, GW3ECO)	675,324	1386	117-D

WØ

Colorado

WØIZV	41,830	192	47-A
NØST	135,954	380	63-B
WBØZ	38,250	198	51-B
KØCS	9,126	77	26-B
WØBWJ	1,830	28	15-B
N2IC/Ø	969,180	1516	145-C
ACØS	151,329	497	73-C
NØCNV	7,512	68	24-C
WØKEA (+K9MWM,KVØK,NDØE)	486,913	910	133-D

Iowa

KFØH	159,276	519	78-A
WØPPF	9,614	114	23-B

Kansas

KØVGB	47,640	225	60-A
WBØYJT	35,045	216	43-A
NØFMR	11,480	98	35-C

Minnesota

NØHOQ	4,774	57	22-B
WEØK	486	20	9-B
KFØT	39,928	181	56-C

Missouri

NSØB	40,430	150	66-A
NVØU	26,550	182	45-B
WBØGFV	581	27	7-B
K4VX/Ø (KMØP,op)	959,638	1544	142-C
KMØL	7,925	85	25-C
KCØLX (+KØQNS)	66,429	275	61-D

Nebraska

AKØG	48,350	287	60-A
KØSCM	61,688	332	44-C
WBØSYV	40,725	263	45-C
KØSW	7,857	85	27-C

ZONE 8

W1

Connecticut

K1KI	1,440,904	1846	184-A
K1CC	1,229,580	1852	162-A
WB9IHH	32,945	193	55-A
WE8G	17,312	158	32-A
NM1K	8,029	61	31-A
KA1YP	94,738	420	67-B
KC8PE	78,624	370	52-B
KA1HGY	46,526	288	43-B
N1FQO	20,064	180	32-B
K1NCD	16,842	123	42-B
KA1QAS	14,400	151	30-B
KA1MIS	1,062	64	9-B
K1TO	1,172,162	1730	157-C
K1ZZ	958,958	1539	154-C
W1HUE	48,422	221	62-C
AA2Z	19,040	139	34-C
KA1ION (+NET)	151,938	526	69-D

Eastern Massachusetts

WB2DND	65,144	216	68-A
K1CLN	56,050	215	59-B
WA1NPZ	52,896	262	57-B
N6EK/1	97,747	401	73-C
W1AX	23,400	116	50-C
KB1VL	14,652	100	37-C
W1OPJ	975	21	13-C

Maine

K1SA (+KA1PRD,KY1K,N1FHS,W1OO)	82,611	287	67-D

New Hampshire

NK1F	394,001	945	101-B
W1LQC	10,121	82	29-B

Rhode Island

K1PLX	46,704	261	58-B
KA1GQW	182,186	602	71-C
KD2SX (+K1NG,KI1G)	735,879	1368	141-D

Vermont

NO1K	12,635	119	35-A

W2

Eastern New York

KC2QF	202,209	637	89-A
WB2Q	679,752	1453	108-C
K2POF	180,240	495	80-C
N2AZS	92,470	401	70-C
K2SHZ	50,752	144	61-C

NYC-Long Island

KB2G	69,498	325	66-B
N2GC	139,770	1553	90-C
W2GKZ	9,152	76	26-C

Northern New Jersey

W1GD	258,884	652	99-B
WB2K	91,287	329	63-B
KE2CG	45,885	197	57-B
KZ2S	678,951	1291	123-C

Southern New Jersey

WA2LBT	63,220	330	73-A
KB2BF	66,745	409	35-B
N2VW	9,576	84	28-B
N2GZL	12,204	452	27-C
W3ELJ	9,534	100	21-C

Western New York

W2TZ	137,224	505	68-C
W2FTY	70,112	329	58-C

W3

Eastern Pennsylvania

K3IPK	641,900	1468	100-A
W3ARK	84,200	248	60-A
NQ3S	30,438	257	38-A
KB3TS	20,586	129	32-B
K3ZPG	3,318	44	21-B
NM2Y	137,116	480	83-C
WC6U/3	45,262	268	53-C
KL7HIR/3	42,608	247	54-C

Maryland-DC

K3ZO	973,216	1669	136-A
WB2EKK	103,296	463	64-A
NO3X	72,808	314	59-B
K3IXD	35,847	149	59-B
KA3QER	1,586	36	13-B
W3LPL (WB3JRU,op)	543,000	1073	125-C
W3HXI	109,296	378	72-C

Western Pennsylvania

K5ZD/3	38,850	192	50-A
WB3CQA	7,538	78	27-B

W4

Alabama

WZ4F	466,128	1128	108-A
NS9P	462	32	7-A
AA4XM	2,208	32	16-C

Kentucky

N4XM	155,936	492	88-C

North Carolina

AA4S	463,294	1086	103-A
W4VP	75,245	187	101-A
N4UH	102,436	476	63-B
KA4RVS	72,407	336	61-B
KJ4TI	51,755	263	55-B
KF4GW	27,892	158	48-B
K4PB	114,920	384	85-C
K4JYS	94,320	426	60-C
AA4NC (+AA4GA)	747,542	1479	139-D

Northern Florida

KC4CSD	57,368	232	71-B
WC4E	119,984	445	78-C
WB4DIW	47,515	215	65-C
KD1U	18,765	137	45-C
WA4SSB	3,725	37	25-C

Southern Florida

WA4CTC	49,764	188	66-A
WA5DTK	17,754	173	22-A
K4XS	1,043,984	2123	142-B
KO4J	88,854	404	54-B
WK4F	24,531	155	39-B
WD4AHZ	174,023	489	101-C
W4YN	11,352	100	22-C
N4BP (+WV5Z)	338,586	1248	74-D

Tennessee

K4JHT	83,281	303	67-B
AA4DO	241,239	645	97-C
N4IR	53,235	348	32-C
KS2X (+KA2PGW)	25,632	140	48-D

Virginia

N4MM	103,224	378	68-B
N4XD	63,504	264	63-B
W4KMS	803	25	11-B
W4XD	33,800	183	52-C
K6ETM	4,199	59	17-C
WB4UBD	1,120	20	16-C

W8

Michigan

WD8RHO	16,842	109	42-B
K8CC	738,736	1427	126-C
WG8M	29,274	187	42-C
NX8J	2,448	33	18-C
AI8D (+AA8U,K8MJZ,KC8EK)	845,376	1287	128-D

Ohio

K8MR	301,665	742	105-A
K8NI	7,749	95	27-A
KA8ZNZ	70,176	329	68-B
K8AZ (K8NZ,op)	902,473	1487	143-C
N8BC	107,984	372	66-C
K8EF	58,868	200	66-C
WD8LLD (+WD8AUD)	530,250	1200	105-D

West Virginia

K8OQL	20,535	115	37-A
W8VEN	4,313	55	19-B
N8II	315,594	856	89-C
WB8YZV (+N4SLR,N8JPR)	9,725	442	39-D

W9

Illinois

WD9DGE	44,064	284	54-A
WB9HAD	686,738	1495	122-B
KG9Z	27,475	263	35-B
W9LYA	1,200	26	15-B
N9AEJ	189,360	544	85-C
K9MMS	61,290	267	54-C
K9SD (+K9HWU,KC9AL,WB9SBO, KØs BFR,FU,W8HBH)	538,877	1081	121-D
NJ9Z (+NX9O)	32,175	207	39-D

Indiana

KB8C	145,597	507	79-B
W9JOO	65,046	259	66-C

Wisconsin

NI9C	79,698	343	74-A
WD9EGC	1,725	287	5-B
NØBSH/9	525,635	1299	95-C
KO9Q	157,052	549	71-C
KB9S	127,205	483	65-C
W9HE	41,818	189	58-C

ZONE 9

VE

Maritime-Newfoundland

VO7AW	35,464	140	62-A
VE1CBF	56,364	210	66-B

ZONE 10

Mexico

XE1VV	92,016	309	72-A

ZONE 11

Bahamas

W8KKF/C6A	15,330	141	30-B

Dominican Republic

HI3AMF	44,363	329	37-B

St Vincent and Dependencies

J87CD	86,580	341	52-B

Virgin Islands

WB9TBU/KP2	2,600	38	20-C

Aruba

P40GO	1,509,348	2099	146-C

Costa Rica

TE8T (TI4SU,op)	58,140	270	60-C

Cayman Islands

ZF2AH (WA6VNR,op)	28,908	251	33-C

ZONE 12

Colombia

HK1LDG	104,858	852	27-B
HK3NTI	16,710	123	30-B
HK3MAH	518	16	7-B

Peru

OA4ZV	69,584	327	44-C

Venezuela

YY1C (YV1CP,op)	269,115	719	77-B
YV1DWQ	194,400	534	75-B
4M3B (YV3BKC,op)	42,032	250	37-B
YV7QP	5,780	69	17-C

ZONE 13

Brazil

PP7JCO	17,568	93	42-C

ZONE 14

Chile

CE3BFZ	37,596	196	39-C

Argentina

LU3F (LU6FAZ,op)	385,330	719	110-B
LU6ETB	261,528	538	102-B
LU1FYZ	29,304	190	37-B
LS6E (LU6EJP,op)	19,318	156	26-B
LU1YU/D	8,496	70	24-B
LU1F (LU1FLY,op)	3,932	53	16-B
LU6U (LU6UO,op)	180,880	530	70-C
LU1EWL	22,088	112	44-C

ZONE 15

Brazil

PY3TD	35,568	313	23-C

ZONE 16

Argentina

LR1V (LU1s VK,VV,LU2YE,LU5UL, LU7VCA,LU9VAB,ops)	725,392	1286	116-D

ZONE 17

Iceland

DL3LAB/TF	73,831-	474-	43-B
DK2OY/TF	121,481-	590-	59-C
TF3SD	13,020-	86-	35-C

ZONE 18

Norway

LA5QFA	95,841-	355-	69-B
LA2AD	5,876-	74-	26-B
LA6ZFA	5,590-	59-	26-B
LA3WBA	4,560-	63-	16-B
LA8DY	54,717-	280-	61-C

Finland

OH6AP (OH6NIO,op)	367,400-	1040-	104-A
OH6NEV	77,616-	298-	77-A
OH7EU	27,608-	493-	56-A
OH3MP	19,976-	150-	44-A
OH1AA (OH7XE,op)	627,224-	1361-	104-B
OH6AC (OH6WZ,op)	541,680-	1085-	122-C
OH9KK/2	140,306-	483-	87-C
OH9NUE	92,800-	320-	80-C
OH3NM	21,252-	150-	33-C
OH8RV	15,210-	140-	30-C
OH6RC	11,950-	64-	50-C
OH2VZ	11,919-	103-	29-C
OH8TU	280-	16-	7-C
OH6LK (+ OH6EI)	1,696,385-	2577-	157-D
OH1AF (OH1s CN,EH,HS,NOA, NSJ,ops)	1,648,890-	2644-	155-D
OH2BAH (+ OH2s BJN,BMD)	488,735-	1253-	103-D

Denmark

OZ5EV	224,280-	515-	105-B
OZ1LTB	27,210-	246-	30-B
OZ1INN	18,864-	245-	24-B
OZ1KVF	2,040-	63-	12-B
OZ8T	1,245-	25-	15-B
OZ1FEJ	780-	19-	12-B
OZ1DYI	340-	16-	10-B
OZ1JVN	84,436-	339-	76-C

Sweden

SMØDJZ	106,382-	337-	86-A
SM5ARL	125,748-	441-	84-B
SMØJOQ	21,175-	116-	55-B
SM4CMG	1,611-	89-	9-B
SK6AW (SM6DED,op)	274,740-	742-	95-C
SM1BVQ	94,563-	345-	79-C
SMØJSM	53,514-	261-	54-C
SK6GX (SM6ORZ,op)	10,584-	162-	27-C
SM7LAZ/6	2,415-	50-	23-C

ZONE 19

European Russian RSFSR

RU1DZ	1,301,994-	2012-	171-A
UA1OGH	168,300-	607-	75-A
RA1AA	276,246-	778-	103-B
U1BA	39,260-	238-	52-B
UA1OLL	31,030-	316-	29-C
UA1ZGD	23,932-	339-	49-C
UA1OQO	15,402-	131-	34-C
UZ1NWP (UA1NAU,UN1s-888-598, -888-599,ops)	91,264-	431-	62-D

ZONE 20

Asiatic RSFSR

RA9XF	63,638-	310-	47-A
UA9XHJ	206,569-	527-	89-C
UV9CC	74,124-	284-	58-C
UA9XFJ	41,640-	251-	40-C
UZ9CWG (UA9s CAI,CPL,-154-894,ops)	231,196-	577-	92-D

ZONE 21

Asiatic RSFSR

UA9LU	306,612-	666-	102-C
UZ9JWR (RA9s JR,JX,UA9JEV,ops)	912,429-	1438-	147-D

ZONE 22

Asiatic RSFSR

UA6BEZ	33,768-	322-	24-C

ZONE 23

Asiatic RSFSR

UA0QF	187,650-	560-	75-B

ZONE 26

Asiatic RSFSR

UZØKWT	62,455-	433-	58-A

ZONE 27

Ireland

EI7DJ (EI1CS,EI2s GN,GR,EI3EG, EI5s GM,FK,EI8AU,EI9s FT,GQ,ops)	111,663-	615-	57-D

France

F6BVB	164,016-	716-	67-A
F1JDG	31,410-	407-	30-A
F8WE	187,085-	352-	155-B
F1JPA	4,774-	150-	11-B
FE6FNA	2,394-	37-	18-B
F5IN	255,717-	918-	77-C
F3XB	183,600-	568-	90-C
F3JL	156,156-	470-	91-C
F6EPQ	13,354-	183-	22-C
F8INQL	12,312-	136-	27-C
F6CCI	4,662-	62-	21-C

England

GB6AR (G4XKR,op)	71,332-	297-	68-B
G4OBK	686,964-	1361-	131-C
G3ESF	123,328-	448-	82-C
G4ZFE	57,555-	399-	45-C
G6NK	16,280-	123-	37-C
G4ZME	4,256-	74-	16-C
G6OI (G4s IEB,XOM,GBZMP,ops)	104,896-	521-	84-D

Scotland

GM4WEW	20,049-	133-	41-B
GM3CFS	131,494-	430-	86-C

Wales

GW4RHW	233,541-	750-	77-A
GWØAJI	17,945-	159-	37-B

Luxembourg

LX1GQ	223,500-	882-	75-B
LX2EA	11,017-	157-	23-B

Belgium

ON5WL	18,200-	145-	40-A
ON4KST	187,938-	826-	53-B
ON6CR	45,300-	215-	60-B
ON5CZ	13,685-	135-	35-B
ON6JG	954-	40-	9-B
ON4XG	109,296-	445-	69-C
ON6LO	22,040-	198-	29-C
ON6AH (+ ON6s MH,QR,VL)	508,101-	1471-	89-D

Netherlands

PA2GER	41,503-	301-	49-A
PA3EOB	18,060-	124-	43-A
PAØDUO	132,076-	354-	106-B
PA3EMN	84,546-	358-	77-B
PAØLOU	211,169-	623-	97-C
PA3CWL	200,100-	641-	92-C
PA3BTH	58,725-	235-	75-C
PAØPUR	56,538-	269-	54-C
PAØVLA	54,471-	259-	67-C
PA3BNT	10,105-	69-	43-C
PA3DHR	8,844-	110-	28-C
PA3BNH	4,264-	54-	26-C
PA3DKX	3,925-	41-	28-C
PA3AMA	1,060-	24-	10-C
PAØKHS (+ PE1LBX,PA3s ADJ,DQW, ENJ,EYZ,PAØs NZH,TGA)	418,676-	2056-	47-D

ZONE 28

Federal Republic of Germany

DL6FBL/A (NF1T,op)	639,727-	1609-	121-A
DF2RG	16,506-	135-	42-A
DL8PC	895,832-	1678-	136-B
DL2BAY	32,850-	346-	25-B
DK5KJ	6,720-	121-	24-B
DH9OAG/M	630-	31-	7-B
DL1VJ/A	551,616-	1112-	136-C
DL4BBO	541,347-	1319-	111-C
DJ8IF	99,562-	539-	67-C
DL2OBF	66,220-	441-	55-C
DK8KC	48,674-	277-	55-C
DL1TH	32,572-	274-	34-C
DL6LBB	25,164-	165-	54-C
DL4GBR	9,334-	119-	26-C
DF3QN	8,880-	133-	30-C
DL3HAH (+ DL1HBT,DL3HCY)	520,300-	1300-	110-D

Hungary

HA5PP	1,067,520-	2091-	139-A
HA6OI	414,184-	1200-	92-A
HAØIT	326,619-	1109-	103-A
HA5HH	162,770-	703-	82-A
HA3NU	62,784-	257-	72-A
HA7ZT/2	10,640-	138-	28-A
HA5NP	954,912-	1741-	147-B
HA8XX	169,120-	561-	80-B
HAØMM	1,266,264-	2108-	172-C
HA1XY	340,092-	942-	108-C
HA5LZ	326,900-	725-	140-C
HA7UI	257,697-	867-	99-C
HA8JP	225,192-	750-	88-C
HA5KF/1	139,776-	485-	83-C
HA6NL	105,840-	801-	40-C
HA5BA	39,200-	256-	56-C
HAØDD	38,704-	200-	59-C
HA6VA	35,322-	204-	58-C
HAØLG	25,350-	277-	26-C
HA5MM	20,358-	174-	39-C
HA3GO	17,616-	231-	24-C
HG1S (HA1s AG,AH,DAC,DAE,TD, TJ,SV,ops)	2,359,104-	3539-	192-D
HG9R (HA4XX,HA9s OA,PP,RG,RP, RU,ops)	1,438,320-	2692-	156-D
HA5KKC (HA5s KP,LV,MA,MD,MO, OG,ops)	705,775-	1853-	109-D
HG6V (+ ops)	621,150-	1557-	123-D
HA5KBM (+ ops)	596,965-	1415-	115-D
HA8KZC (HA8s UB,XF,ZC,YT7KW, YU7s DD,EU,WW,ops)	451,647-	1508-	107-D
HA1KRR (HA1s DRM,DRR,XO,XU, ZN,ZZ,ops)	439,816-	1303-	104-D
HA3KNA (HA3s FQ,NS,NU,QU,QV,ops)	424,664-	1267-	109-D
HA8KVK (+ HA8VK)	331,379-	968-	107-D
HA6KNX (+ ops)	66,267-	563-	37-D
HA5KDB (HA5s BBC,MY,ops)	46,893-	314-	49-D
HA9KSF (HA9s AR,SU,ops)	9,728-	92-	38-D

Switzerland

HB9DLU	44,296-	317-	49-B
HB9DX	34,944-	246-	52-C
HB9OA	12,048-	121-	48-C
HB9DFY (+ HE9WIV)	158,166-	546-	101-D

Liechtenstein

HBØ/DL1SBF	9,483-	105-	29-C

Italy

IO2QMU	131,670-	484-	90-A
IK2JEX	40,596-	251-	53-A
IK6HJW	26,286-	268-	39-A
IKØLLK	14,313-	162-	39-A
I4UFH	709,517-	1649-	107-B
IKØKHP	76,834-	349-	82-B
I8SAT	70,460-	373-	52-B
IK3HMD	54,912-	289-	64-B
IKØDWN	44,649-	397-	41-B
I4CSP	20,874-	183-	49-B
IN3XUG	9,350-	84-	34-B
IA5PLB	8,950-	115-	35-B
IO8RFD (I8RFD,op)	270,952-	1082-	88-C
IK2GSN	148,608-	1072-	43-C
IØZUT	108,478-	413-	73-C
I1XPQ	105,193-	475-	73-C
IK8EJN	68,742-	266-	67-C
IA5KBA	60,316-	695-	68-C
IK8ADY	1,278-	51-	9-C
I1VTX	420-	30-	7-C
IK2CFH (+ I2VXJ,IK2s BGD,EGL)	645,400-	1739-	100-D
IO6BOB (+ I6BQI,IK6IMZ)	293,447-	956-	103-D

Sardinia

ISØLYN	10,692-	93-	44-A
ISØOMH	49,445-	389-	55-C

Bulgaria

LZ2KSQ (LZ1F-156,op)	878,695-	1677-	158-A
LZ1KNP	75,700-	476-	50-A
LZ1VA	49,870-	206-	65-A
LZ5A	575,740-	1315-	110-B
LZ2WA	374,880-	1129-	88-B
LZ2QV	103,761-	544-	81-B
LZ2KSB	171,990-	634-	98-C
LZ1TA	119,188-	482-	83-C
LZ1IT	26,793-	350-	39-C
LZ1PJ	55-	5-	5-C
LZ9A (LZ2s CC,DF,GR,HE,PO, VE1BNN,ops)	1,740,272-	2665-	184-D
LZ1KVF (LZ1Cs 75,94,187,ops)	85,280-	520-	65-D
LZ1KAP (+ ops)	684-	40-	6-D

Austria

OE1TKW	16,779-	114-	47-A
OE/DL2DN	4,726-	53-	34-A

Czechoslovakia

OK1VD	587,520-	1332-	128-A
OK2RU	442,496-	1019-	128-A
OK1XW	186,270-	628-	105-A
OK2PGT	102,598-	443-	86-A
OK1CK	101,024-	456-	77-A
OK1KZ	80,036-	409-	68-A
OK1OFM	73,392-	368-	66-A
OK3CDZ	48,876-	306-	57-A
OK3TEW	32,283-	211-	51-A
OK1MHI	12,098-	85-	46-A
OK2BHQ	8,085-	97-	21-A
OK2PDT	3,452-	110-	19-A
OK3TIR	42,408-	311-	36-B
OK3CXS	29,230-	263-	37-B
OK1DKS	23,549-	178-	47-B
OK3CTX	18,060-	148-	43-B
OK3YK	17,214-	171-	38-B
OK1AJY	8,734-	117-	22-B
OK2BTC	1,760-	35-	11-B
OK2BXD	612-	17-	12-B
OK3KAG	522,144-	1189-	126-C
OK2PZW	288,510-	811-	118-C
OK3FON	155,288-	432-	94-C
OK3ZWX	134,936-	452-	101-C
OK2PCF	119,000-	485-	85-C
OK1MNV	108,320-	437-	80-C
OK1TW	93,659-	333-	73-C
OK3YCA	93,388-	352-	74-C
OK2HI	77,526-	333-	73-C
OK3CEL	58,616-	300-	68-C
OK1FFU	52,326-	307-	54-C
OK3CVF	49,610-	296-	55-C
OK2QX	44,484-	171-	66-C
OK1MKU	32,830-	206-	49-C
OK1DVK	25,872-	122-	56-C
OK1DRR	23,717-	175-	37-C
OK1FGS	21,856-	181-	32-C
OK1MIZ	18,522-	191-	42-C
OK3TAY	17,894-	257-	46-C
OK1AYU	9,050-	78-	25-C
OK1FGA	7,440-	84-	24-C
OK1DZJ	4,354-	121-	14-C
OK3CDN	2,408-	80-	14-C
OK3TUM	1,595-	67-	11-C
OL8CVU	1,428-	66-	12-C
OK1DWJ	1,020-	41-	12-C
OK1DSA	913-	70-	11-C
OK2PKX	810-	41-	10-C
OK2ON	756-	36-	9-C
OK1AQW	650-	14-	13-C
OL9CSW	180-	19-	6-C
OK1DZD	40-	9-	1-C
OK5R (OK1s ADM,ADS,ALW,AWZ,ops)	1,530,252-	2424-	162-D
OK1KSO (OK1s AEZ,AIL,AMF,JJB, WT,ops)	738,585-	1415-	135-D
OK3KEE (OK3s CTL,MB,YEC,ops)	394,464-	1040-	112-D
OK1KLV (OK1s ADF,FDT,ops)	283,680-	931-	96-D
OK1ORA (OK1s AYD,-2838-22318,ops)	186,534-	679-	86-D
OK2KLI (+ ops)	184,368-	593-	92-D
OK1KDZ/P (+ ops)	136,420-	561-	76-D
OK2KDS (+ ops)	95,566-	420-	71-D
OK2KMR (+ OK2BQZ)	64,960-	357-	64-D
OK2KOD (OK2s BDI,BHM,WAZ,ops)	17,523-	122-	33-D
OK2KYD (+ ops)	3,150-	50-	21-D

Poland

SP9JPA	60,912-	308-	72-A
SP9BRP	37,459-	272-	47-A
SP9MRM/A	19,266-	189-	38-A
SP9ADV	16,368-	147-	44-A
SP6CZ	74,734-	271-	86-B
SP6QWP	55,758-	250-	63-B
SP9EMQ	25,607-	278-	29-B
SP3IBS	13,244-	110-	43-B
SP3DIK	10,773-	104-	27-B
SP9AVZ	7,695-	151-	19-B
SP3JHY	1,394-	62-	19-B
SP9HZF	756-	58-	7-B
SP9BBH	81,130-	325-	70-C
SP3BGD/8	42,822-	295-	54-C
SP5JTR	33,858-	165-	54-C
SP1AEN	32,340-	311-	26-C
SP8FNA	23,460-	133-	68-C
SP8ZFJ (SP2FAP,op)	11,718-	145-	29-C
SP6BEN	10,440-	142-	18-C
SP5JXK	9,744-	142-	24-C
SP6BFK	3,638-	73-	34-C
SP4AVG	2,751-	55-	21-C
SP2JGK	2,590-	141-	10-C
SP9AKD	2,004-	167-	12-C
SP3LPR	261-	29-	9-C
SP5KVW (SP5s MXZ,OAU,ops)	575,488-	1274-	128-D
SP5PBE (SP5s ANJ,ELA,ops)	214,176-	858-	96-D
SP3PLD (SP3s IBM,NYS,ops)	196,942-	582-	102-D
SP2KFV (+ ops)	55,404-	350-	54-D

Greece

OK1RI/SV J41NA (SV1NA,op)	468,906-	1511-	93-B
	50,826-	411-	43-C

German Democratic Republic

Y35VM	480,760-	991-	136-A
Y57WG	453,876-	1195-	109-A
Y25TO	348,705-	855-	123-A
Y53ED	321,566-	931-	103-A
Y21VF/A	307,581-	918-	111-A
Y41JH	290,000-	835-	116-A
Y55UG	256,414-	631-	105-A
Y59UJ	165,282-	634-	78-A
Y21QI/P	152,448-	601-	96-A
Y27FN	152,387-	556-	97-A
Y32PI/P	150,300-	551-	100-A
Y83XN	140,519-	649-	83-A
Y42HA/P	135,700-	578-	92-A
Y31EM	119,868-	488-	84-A
Y36RG	108,668-	400-	89-A
Y21WI	106,622-	414-	89-A
Y46IF	103,608-	571-	72-A
Y22WK	86,700-	535-	75-A
Y25PE	61,989-	366-	49-A
Y43QF	48,765-	293-	74-A
Y24SH/A	47,256-	258-	68-A
Y67UL	42,280-	243-	56-A
Y32WF	35,624-	219-	61-A
Y27BG/A	31,671-	176-	69-A
Y41PG	27,170-	174-	55-A
Y61XM	14,098-	100-	38-A
Y26JD	14,012-	208-	31-A
Y22HF	13,842-	119-	38-A
Y37EO	11,690-	115-	35-A
Y25KF	11,160-	168-	36-A
Y23CM	10,793-	75-	43-A
Y87VL	10,388-	87-	28-A
Y25VD	9,042-	134-	33-A

Y26WM 8,736- 68- 42-A
Y27AL/A 7,511- 69- 37-A
Y31NJ 5,880- 74- 28-A
Y32KI 3,888- 50- 36-A
Y54ZI 3,808- 68- 28-A
Y26IL/A 3,380- 92- 26-A
Y34OL 2,706- 58- 22-A
Y23KF 2,304- 60- 18-A
Y24YH 2,142- 29- 18-A
Y25MO 2,128- 75- 19-A
Y44WA/P 1,836- 69- 12-A
Y22AN 376- 35- 8-A
Y25II 322- 36- 7-A
Y22XF 256- 20- 8-A
Y34OL/A 135- 13- 9-A
Y23XF 105- 13- 7-A
Y22EK 334,950- 855- 105-B
Y22YD 211,692- 251- 92-B
Y54TA 167,688- 750- 92-B
Y48HL 139,410- 561- 90-B
Y38YK 94,752- 371- 84-B
Y22VI 46,128- 304- 62-B
Y25KA 25,824- 205- 48-B
Y78OL 20,832- 119- 62-B
Y46ZC 18,850- 377- 50-B
Y22RK 14,703- 145- 39-B
Y25MI. 10,197- 129- 33-B
Y23TN/A 10,064- 123- 37-B
Y51QO 10,036- 158- 26-B
Y25TI 5,568- 74- 29-B
Y44TN 3,738- 58- 21-B
Y43XE/P 3,276- 63- 18-B
Y53ZL 2,376- 39- 24-B
Y38WE 1,116- 44- 12-B
Y21MB/P 154- 14- 7-B
Y51XE 428,458- 1121- 118-C
Y43VL 138,112- 342- 104-C
Y28QH/A 119,647- 636- 73-C
Y25SG 101,101- 384- 91-C
Y56ZA 97,836- 327- 93-C
Y22WF 87,885- 1395- 63-C
Y56WG 71,214- 308- 78-C
Y24TG 37,450- 273- 50-C
Y37ZE 35,949- 200- 69-C
Y34RG/P 21,015- 179- 45-C
Y51XG/P 19,504- 151- 46-C
Y31JA 15,272- 86- 46-C
Y23TL 14,580- 112- 36-C
Y25TG 14,150- 93- 50-C
Y21CL 13,107- 85- 51-C
Y39SM 9,744- 132- 21-C
Y77YH 7,975- 106- 29-C
Y23GB 5,225- 51- 25-C
Y36VM 4,680- 50- 36-C
Y41UF/P 2,772- 54- 22-C
Y42WB 2,365- 47- 11-C
Y27BN 2,064- 67- 12-C
Y56SG 1,344- 32- 16-C
Y25XA 640- 40- 10-C
Y23LM 228- 18- 6-C
Y47YM 102- 13- 7-C
Y23FM 90- 11- 6-C
Y49ZL 20- 2- 2-C
Y35L (Y26IL,Y33s UI,,ZL,ops) 1,143,445- 2018- 163-D
Y38I (Y44s TI,UI,XI,ops) 1,050,979- 2025- 139-D
Y37I (Y23FI,Y25KI,Y62YI,ops) 569,240- 1307- 133-D
Y52CG (Y22FG,Y52ZG,ops) 432,460- 1042- 140-D
Y39CH (Y39s OH,SH,ZH,ops) 391,376- 971- 122-D
Y43CO (Y21RO,Y22XO,Y43GO,ops) 372,960- 1082- 120-D
Y32CN (Y32s VN,WN,YN,ops) 368,875- 907- 125-D
Y33CC (Y21BC,Y22IC,Y33VC,ops) 313,375- 957- 109-D
Y47CN (Y25ZN,Y47s YN,ZN,ops) 262,854- 826- 112-D
Y53CN/P (Y53s UN,XN,ops) 252,945- 828- 105-D
Y33GJ/P (Y33s PJ,UJ,Y45RJ,ops) 198,996- 658- 103-D
Y88SQP (Y21s EA,FA,Y25JA, Y42DA,ops) 175,119- 662- 93-D
Y48CJ (Y23RJ,Y48s RJ,SJ,ops) 94,496- 464- 82-D
Y58CH (Y58s UH,WH,ZH,ops) 64,159- 299- 83-D
Y77CN (Y77s TN,ZN,ops) 55,862- 364- 62-D
Y68CA (Y66s WA,VA,ops) 19,866- 156- 43-D
Y31CE (Y24BE,Y31UE,ops) 14,582- 145- 46-D
Y54CE (Y54s SE,ZE,-98-E,ops) 11,384- 246- 49-D

Romania

YO8KOC 233,172- 562- 153-A
YO3NL 76,752- 332- 82-A
YO7BGA 24,433- 181- 53-A
YO9CBZ 17,976- 168- 42-A
YO4AAC 6,475- 111- 25-A
YO9FBB 923- 31- 13-A
YO6VZ 39,122- 291- 46-B
YO6CFB 28,946- 172- 41-B
YO2BZV 14,586- 136- 39-B
YO9AHX 9,950- 138- 25-B
YO2BZ 7,900- 118- 25-B
YO9BVG 7,781- 94- 31-B
YO9CSM 2,880- 75- 18-B
YO9HD 1,130- 61- 10-B
YO5KAQ 833- 53- 21-B
YO3FGO 253- 20- 11-B
YO3DCO 100- 7- 4-B
YO9CZW 95- 11- 5-B
YO4ZF 75,229- 342- 77-C
YO3AAQ 34,348- 189- 62-C
YO4BRD 31,278- 300- 36-C
YO4BQV 18,824- 240- 26-C
YO9DAF 7,915- 141- 15-C
YO5ALH 7,847- 121- 19-C
YO4ASD 7,580- 109- 20-C
YO8RL 4,265- 78- 27-C
YO5CCJ 1,512- 117- 6-C
YO3BDP 1,320- 17- 10-C
YO2BKK 138- 34- 3-C
YO6BTY 40- 8- 5-C
YO0KJJ (YO2s ABW,ADQ,BP,GL,ops) 145,320- 563- 84-D

Yugoslavia

YT2ER 157,113- 505- 99-A
YU1RA 64,740- 312- 65-A
YZ2S 43,860- 300- 43-A
YU2CAH 20,580- 100- 35-A
4N4A (YU4EU,op) 1,246,185- 2162- 153-B
YU3HR 588,200- 1552- 100-B
YU7FT 68,576- 312- 76-B
YU7SF 145,065- 499- 95-C
YU1BM 97,179- 410- 87-C
YT3FM 89,644- 402- 73-C
YU1AT 55,796- 321- 58-C
YU5GX 53,341- 367- 41-C
YU7KM 45,705- 293- 55-C
4N2V (+ops) 496,674- 1248- 123-D
4N4B (YU4s DU,IS,ops) 338,611- 1105- 91-D
YU2W (YT2s FI,GW,YZ2ABX,ops) 92,694- 591- 42-D
4N2Y (+ops) 83,660- 362- 70-D

ZONE 29

Kaliningrad

UZ2FWN (UA2s DC,-125-16,ops) 9,884- 145- 28-D

European Russian RSFSR

UA3RAR 703,428- 1374- 132-A
UA3SBW 323,154- 810- 117-A
RW3AU 288,424- 672- 124-A
UA1ANA 120,129- 541- 69-A
UZ6HR 102,238- 456- 74-A
UW3DW 76,070- 385- 74-A
UA3RA 76,370- 324- 70-A
RA3VA 71,196- 345- 68-A
UV6LIX 43,776- 227- 48-A
RW3AN 37,791- 295- 39-A
UA4ANZ 32,912- 146- 68-A
UA3MDV 27,840- 149- 60-A
UA3RAJ 25,948- 377- 26-A
UZ3ZYD 12,816- 156- 24-A
UA3QBX 4,131- 77- 17-A
UA3RNI 3,075- 77- 15-A
UA3PNN 440- 23- 8-A
UA6ADC 490,587- 1143- 129-B
UA4UBC 218,564- 727- 101-B
RW3DW 172,900- 554- 95-B
RA4CC 172,370- 489- 110-B
UA4CO 118,203- 388- 93-B
UW3RR 114,810- 429- 86-B
UA4NC 97,155- 367- 85-B
UA6LF 91,293- 362- 71-B
UA6BPJ 81,900- 436- 63-B
UA3PP 70,505- 393- 59-B
RA3RQT 69,650- 341- 70-B
RA3DR 48,360- 265- 59-B
UW1AE 46,530- 246- 66-B
UW3TY 28,710- 259- 29-B
UA3ZU 26,736- 200- 48-B
RA3ZH 25,056- 728- 54-B
UA3TN 12,742- 73- 46-B
UW6LO 12,012- 149- 28-B
UA6ED 3,856- 83- 16-B
UA6PCH 3,634- 54- 23-B
UA3RMO 1,342- 40- 11-B
UW3AA 691,460- 1420- 140-C
UA3RF 442,335- 1134- 111-C
RA6LM 231,895- 716- 95-C
RA3ZC 203,852- 643- 113-C
UA4YCJ 202,920- 690- 95-C
RW3AX 158,576- 626- 88-C
UA6BPM 147,582- 581- 89-C
UA4NEJ 122,106- 404- 94-C
UA3YAQ 112,094- 457- 82-C
RZ3DZ 105,924- 364- 64-C
UA4AHA 102,258- 477- 78-C
RA3RN 98,800- 280- 95-C
RW3AH 83,810- 465- 58-C
UA6ANZ 82,023- 513- 57-C
UA3JD 58,240- 278- 70-C
UA3DPX 56,256- 304- 64-C
UA4SSS 55,047- 408- 41-C
UA4AO 52,710- 226- 70-C
RA1CT 45,648- 321- 48-C
UV6LDR 42,336- 280- 49-C
UA3IIA 34,068- 286- 34-C
RA6LBP 29,152- 227- 32-C
UA6YHR 25,536- 97- 64-C
UA4NGR 25,524- 245- 36-C
UA3TU 25,456- 86- 86-C
UA4FAT 19,672- 153- 28-C
RA4PO 16,575- 130- 39-C
UV6HFK 7,812- 105- 18-C
UA3TAM 5,520- 98- 20-C
UA3DCX 5,375- 75- 25-C
RA4CD 4,768- 64- 16-C
RA3PP 3,528- 114- 14-C
UA6HSV 588- 46- 7-C
UW4CN 165- 11- 3-C
4J4F (UA4s FAO,FAY,FBG,FDS,FEF, -148-669,-148-667,ops) 1,703,160- 2887- 166-D
UZ6LWZ (UB5ITW,RA6LRT,UA6s I.V,-150-1660,-150-1103,-150-1246, -150-1336,ops) 962,861- 1491- 183-D
UZ6LWA (UA6s LA,LCT,LD,LDX,UW6s LZ,NV,ops) 798,600- 1600- 132-D
UZ4AWB (RA4AK,UA4-156-986,ops) 709,284- 402- 84-D
UZ3AXH (+ops) 408,580- 932- 124-D
R3EKM (RA3EA,UA3s EDQ,-147-338, -147-356,ops) 398,301- 1123- 103-D
UZ1TWB (RA1TE,UA1s UM,-144-386, ops) 369,183- 1056- 109-D
UZ6LXZ (RA6LVA,UA6LRP,UV6LGP, ops) 351,495- 956- 107-D
UZ6LXM (UW6OE,UV6LIP UA6-150-945,ops) 202,658- 562- 107-D
UZ4FWZ (RA4FET,UA4s FEI,FEU,ops) 187,996- 746- 86-D
UZ4LWZ (RA4LAG,UA4s LBQ,LCQ,ops) 176,088- 614- 92-D
UZ3PXJ (RA3PHQ,UA3s PIG,PTN,ops) 167,250- 666- 75-D
UZ4YWY (+ops) 45,145- 577- 77-D
UZ6HXK (UA6s-108-1838,-108-1857, -108-1867,ops) 144,272- 645- 71-D
UZ6EWF (UA6s-109-414,-109-434, UA1-169-33/U6E,ops) 112,916- 633- 68-D
UZ3AWC (+ops) 76,309- 736- 103-D
UZ3YWB (+ops) 62,511- 287- 67-D
UZ3RWZ (RA3s RCG,RRG, UA3-157-665,ops) 59,785- 342- 55-D
UZ6AYN (UA6s AH,-101-1002,ops) 49,808- 374- 44-D
UZ4AXQ (UA4s-156-86,-156-876, -156-878,ops) 45,100- 234- 55-D
UZ4FWH (+ops) 44,590- 436- 35-D
UZ3DWV (RA3DLQ,UA3-142-988,ops) 43,432- 209- 61-D
UZ3TYE 41,528- 275- 54-D
UZ3DYF (+ops) 11,704- 148- 22-D
UZ3TWW (UA3TFY,UW3TX,ops) 9,828- 54- 54-D

Ukraine

RB5IM 1,087,243- 1516- 197-A
RB5IA 412,187- 961- 133-A
UB5NQ 354,850- 1209- 94-A
RB5IIU 195,716- 578- 85-A
RB4IRO 137,531- 565- 83-A
UY5TE 127,840- 560- 80-A
UB5EPV 119,250- 438- 90-A
UB4AR 108,880- 468- 80-A
UB5IAL 91,988- 516- 61-A
UB5IDG 62,558- 292- 62-A
RB5LTZ 57,176- 316- 56-A
UB4HYB 2,758- 81- 14-A
UB5CCP 2,314- 55- 13-A
RB5MT 1,015,208- 1733- 152-B
RB5DX 877,189- 1866- 127-B
RB4MV 178,696- 776- 56-B
RB5VT 135,080- 499- 88-B
UB5TCJ 85,045- 368- 73-B
UB5GBU 47,968- 354- 48-B
UB4JO 48,787- 279- 59-B
UB4JDM 43,804- 315- 47-B
RB5IQ 38,136- 296- 42-B
UT5RY 30,824- 323- 32-B
RB5TK/A 29,250- 227- 45-B
RB4JF 25,172- 152- 62-B
UB5VEF 15,119- 155- 29-B
RB5RA 13,950- 192- 25-B
RB5AGV 10,166- 150- 23-B
UB4JDX 9,486- 241- 18-B
UB5FHU 3,344- 59- 16-B
UB5ZHQ 40- 10- 4-B
UB5ZME 24- 6- 4-B
UB5QKC 453,050- 967- 130-C
UB5CDX 240,820- 657- 108-C
UB5IAN 188,976- 624- 93-C
UB5PAG 180,948- 610- 102-C
UB5LUY 161,862- 424- 106-C
UB5MLP 150,071- 448- 103-C
UB5ITU 140,154- 582- 71-C
UT5UCO 116,805- 359- 95-C
UB4FWC (UB5FBV,op) 115,520- 554- 76-C
UB5BZ 107,185- 391- 85-C
RB5IV 106,568- 432- 88-C
UB5TN 84,906- 299- 89-C
UB5WAB 78,913- 308- 73-C
UB4QXI (UB5QMO,op) 77,376- 374- 62-C
UB5IKN 74,844- 334- 66-C
UB5EEP 73,645- 314- 71-C
UB5EF 68,544- 326- 72-C
UB5IHQ 66,953- 333- 71-C
UB5ZFO 61,992- 307- 54-C
UB5IF 55,685- 442- 37-C
UB5WDD 47,656- 320- 46-C
RB5WR 46,410- 346- 42-C
UB5DW 46,088- 179- 56-C
RB5ZB 44,286- 260- 61-C
UB5DBJ 42,924- 278- 49-C
UB5JS 35,160- 231- 40-C
UB5MMP 30,960- 160- 60-C
UB5AJP 23,436- 181- 42-C
UB3JM 22,410- 230- 30-C
RB5IOV 19,372- 172- 29-C
RB5VB 18,480- 190- 24-C
UB4MPY 17,836- 189- 28-C
RB5HM 14,483- 305- 64-C
UB5UHD 14,471- 131- 29-C
UB5MQS 12,992- 102- 32-C
UB5JNW 12,852- 140- 27-C
RB5VW 9,936- 114- 23-C
UB5VK 9,650- 140- 25-C
UB4LCB 9,234- 131- 27-C
UB5QJN 7,665- 83- 21-C
UB3MA 5,025- 118- 25-C
UB4MTJ 2,067- 37- 13-C
UT5UKE 1,050- 35- 15-C
UB5CMD 504- 38- 8-C
UB3IWA (UB5s IFZ,IML,IOK,IPP,ops) 1,494,920- 2012- 190-D
UB4CYT (RB5s CB,CQ,CW, UB5s -088-532,-088-936,ops) 1,022,968- 2065- 142-D
UT4UXW (UT4UZ,UT5s UGR, -186-152,ops) 900,674- 1920- 146-D
UB4MZL (RB4s MB,ML,UB4MAH, UB5-059-116,ops) 443,160- 1061- 120-D
UB4AWW (UB5s AEM,AFM,ops) 368,792- 1037- 116-D
UB4WZA (UB5s WCX,-068-997, -068-998,ops) 280,875- 854- 32-D
UT4JWB (+ops) 256,410- 868- 90-D
UB4FXX (UB5s FJA,-078-321,-078-721, ops) 194,832- 703- 99-D
UB4IXZ (+ops) 160,188- 589- 84-D
UB4IWI (UB4IRI,UB5s INT, -073-4328,ops) 92,820- 531- 52-D
UB4WZB (UB5s-068-1813,-068-1878, ops) 45,155- 289- 55-D
UB4EZI (+ops) 17,430- 166- 35-D
UB4IWC 585- 23- 9-D

Byelorussia

UC2LAR 197,200- 556- 100-A
UC2OG 46,498- 711- 86-A
UC1AWP 14,498- 249- 22-A
UC2OS 53,527- 647- 90-C
UC2CES 37,656- 223- 52-C
UC2II 5,578- 185- 55-C
UC2AAS 2,940- 52- 15-C
UC2AGT 148- 13- 4-C

Azerbaijan

UD6DFF 59,472- 322- 59-C
UD6DKW 58,744- 295- 56-C
UD7DWZ (+ops) 7,636- 118- 23-D

Georgia

UA3AP/UF5F 94,888- 511- 58-C

Armenia

UG6LQ 287,712- 1068- 72-B

Moldavia

RO4OA 347,806- 1060- 98-C

Lithuania

UP2OU 320,095- 879- 112-A
UP3BA 127,020- 539- 87-A
UP3BH 444,717- 1100- 117-B
UP2ND 58,108- 282- 59-B
UP2BLQ 281,602- 934- 103-C
UP2PAQ 123,587- 502- 83-C
UP3BO 106,260- 298- 115-C
UP2BZ 88,800- 480- 50-C
UP2BKM 11,020- 254- 19-C
UP2FF 6,266- 87- 26-C
UP2BB 3,780- 74- 18-C
UP1BWW (UC2WAO,UP2s BAS,BIJ, BKW,BMW,BO,PX,-038-1052, -038-1162,UP8BA,ops) 1,685,834- 2600- 181-D
UP1BZA (UP2s BIM,-038-1813,ops) 714,015- 1565- 123-D
UP1BZG (UP2s BCO,-283-8439,ops) 619,008- 1392- 124-D

Latvia

UQ1GWB 68,286- 501- 38-B
UQ2GIP 16,575- 118- 39-B
UQ2GLW 9,401- 210- 17-B
UQ2GCV 55,618- 228- 79-C
UQ2GEO 20,265- 157- 35-C
UQ2GHB 6,760- 153- 20-C
UQ2GEC 3,760- 50- 20-C
RQ2GIG 3,226- 123- 12-C
UQ1GWW (RQ2GG,UQ2s GAG,-037-83, -037-116,ops) 1,747,872- 2653- 188-D
UQ8A (UQ2s GID,GKL,GM,ops) 985,908- 2057- 142-D
UQ1GXJ (UQ2s GSG,-037-221, -037-566,ops) 42,952- 268- 52-D

Estonia

UR1RWL 29,000- 465- 40-A
UR2RCU 10,332- 117- 21-A
UR2RJ 4,095- 121- 15-A
UR2RFQ 4,176- 118- 12-B
UR1RXB (UR2RND,op) 86,254- 272- 101-C

ZONE 30

European Russian RSFSR

UA4WEJ	48,837-	342-	47-C
UA4WGR	6,688-	87-	22-C

Asiatic RSFSR

UA9MR	357,840-	712-	126-A
UA9FAR	71,500-	307-	52-A
UA9CBO	65,824-	246-	68-A
UV9CAF	54,340-	266-	44-A
RA9FF	28,868-	241-	28-A
UW9WK	748,650-	1070-	150-B
UA9QA	286,824-	577-	114-B
UA9AKO	254,774-	705-	82-B
UV9FR	30,044-	241-	28-B
UA9ANI	26,220-	211-	30-B
UW9SW	116,100-	354-	75-C
UA9WKO	113,693-	429-	59-C
UA9AMF	104,832-	298-	84-C
UV9WR	64,480-	360-	55-C
UA9FGJ	77,970-	265-	69-C
UA9NN	62,860-	222-	70-C
UA9MEK	873-	23-	9-C
UZ9WWH (RA9s WR,WW,RW9s WA,WW,RV9WA,UA9s WD, WFM,ops)	1,322,908-	1794-	163-D
UZ9FYR (UA9s FAL,FF,FKX,FM,ops)	1,114,210-	1732-	134-D
UZ9CWW (RV9s CBW,CFA,UA9s CDT,CIR,CJK,CPB,UW9s CP, CW,ops)	952,455-	1491-	141-D
UZ9MWA (+ops)	415,502-	948-	103-D
UZ9AWH (UA9s ACA,-165-1256, -165-1841,-165-1843,ops)	357,154-	789-	97-D
UZ9CYP (UA9s CKF,CUA,-154-2185, ops)	352,553-	837-	93-D
UZ9CZM (RA9s CFB,CPQ,UA9COW, ops)	93,380-	359-	58-D

Turkmenistan

RH8AA	9,196-	106-	22-A
RH8AD	19,375-	177-	25-C

Uzbekistan

RI8BT	182,495-	513-	85-A
UI8ZAA	188,496-	522-	88-B
UI9ACP	125,808-	604-	48-C
UI9BWE (RI8BN,UI8s- 053-2007, -053-20 32,ops)	545,100-	1310-	92-D

Tadzhikistan

UJ8JME	11,160-	111-	24-A
UJ8JCM	69,190-	298-	55-B
UJ8JA	324,648-	675-	78-C

Kazakhstan

RL7AC	1,599-	27-	13-A
UL7ACI	76,228-	472-	34-B
RL7AB	900,768-	1515-	132-C
RL7ABK	46,704-	256-	42-C
UL7PHT	2,108-	36-	17-C
RL1P (UL7s PAE,PCZ,PEZ,RL7PKN, RL8s PY,PZ,ops)	2,127,246-	2582-	193-D
UL8LWO (RL8PA, UL7s LEB,LF,FT, -026-756,ops)	581,624-	1094-	116-D
UL8CWW (+ops)	499,485-	1077-	105-D

Kirghizia

UM8MIG	28,110-	266-	30-B

ZONE 31

Asiatic RSFSR

RW9UR	514,320-	998-	120-B
UA9UHL	58,368-	252-	57-C
UA9URF	39,404-	203-	48-C
UZ9YXO (UA9s YIH,YII,YJP,YLU,ops)	455,920-	1000-	105-D
UZ9HYM (+ops)	389,391-	1103-	79-D
UZ9OWD (UA9s-145-168,-145-294, -145-338,UA0-103-554,ops)	311,766-	827-	91-D
UZ9YXI (+ops)	100,510-	802-	38-D

Kazakhstan

RL7FER	72,744-	398-	42-B
RL7JA	61,218-	391-	38-B
UL8GBI	18,202-	113-	38-C
RL7FGI	6,086-	71-	17-C

Kirghizia

UM8MDX	836,740-	1203-	115-B
UM8MZ	42,108-	280-	33-C
UM8MY	8,712-	60-	36-C

ZONE 32

Mongolia

OK1XCJT	26,774-	262-	22-C

Asiatic RSFSR

UA0SAU	843,320-	1397-	145-A
UA0TO	729,603-	1582-	111-A
UA0ABK	402,311-	936-	91-B
UA0SR	323,304-	1112-	76-B
RA0SU	105,700-	363-	70-B
UA0SME	6,749-	97-	17-B
UA0SG	55,873-	261-	59-C
UA0SV	108-	6-	6-C
UZ0OWS (UA0s OA,OCS,OD,OE, -085-144,ops)	783,216-	1727-	108-D
UZ0WWP (RW0WR,UA0s WCL,WN, ops)	138,531-	535-	61-D
UZ0SXF (UA0s SLT,SNR,ops)	132,486-	460-	71-D

ZONE 33

Asiatic RSFSR

RA0JD	30,141-	159-	51-C
UW0UQ	28,859-	277-	21-C
UZ0QWT (+ops)	389,321-	779-	117-D

ZONE 34

Asiatic RSFSR

RA0FA	425,260-	885-	110-B
UA0NL	52,866-	260-	54-B
UW0LT	1,019,008-	1525-	152-C
UA0FZ	40,656-	217-	48-C
UA0IBB	6,900-	89-	20-C
UZ0CWA (RW0CA,UA0s CCD,CG,CJC, UW0s CA,CN,ops)	*475,594-	1152-	98-D

ZONE 35

Asiatic RSFSR

UA0XAK	29,079-	325-	27-B

ZONE 36

Canary Islands

EA8AJI	32,328-	275-	24-B
EA8BIE	125,952-	308-	82-C

ZONE 37

Morocco

CN8FC (WA4UAZ,op)	420,096-	900-	96-C

Portugal

CT1BOP	562,410-	1450-	90-B
CT1BWW	11,088-	87-	33-B
CR2CWT	37,004-	229-	44-C

Spain

EA2CR	9,251-	89-	29-A
EA1GT	139,612-	563-	76-B
EA5CPH	36,252-	190-	53-B
EA5FKQ	32,781-	500-	21-B
EA5JC	26,290-	136-	55-B
EA2AN	23,250-	254-	31-B
EA3FKK	21,476-	262-	28-B
EA5AP	9,990-	72-	37-B
EC3CPT	7,007-	192-	11-B
EA7BYM	4,608-	192-	24-B
EA5EFV	4,031-	42-	29-B
EA3ELM	2,990-	99-	10-B
EA4DMB	2,716-	64-	14-B
EA5AOJ	1,540-	36-	14-B
EA5GFA	8,211-	165-	23-C
ED7CA	7,940-	107-	20-C

Balearic Islands

EA6GP	55,796-	304-	58-A
EA6ZS	728-	31-	8-B

ZONE 39

Jordan

JY9LC	31,520-	172-	40-B

Israel

4X6VJ	107,423-	351-	71-C

Cyprus

5B4MF	1,250,210-	1680-	163-B
C43T (YU1RL,op)	1,649,070-	2356-	146-C

ZONE 41

India

VU2TJW (K3TW,op)	930,088-	1815-	116-A
VU2TTC	60,588-	292-	54-A

ZONE 44

Korea

HL1LW	48,070-	279-	46-A
HL3DE	10,325-	118-	25-C
HL0K (HL1AXK,HL3EAT,HL4CGI,ops)	141,024-	482-	76-D
HL0B (+ops)	134,232-	688-	56-D

Hong Kong

VS6UP	271,400-	754-	92-C

ZONE 45

Japan

JA8RWU	475,092-	960-	108-A
JA1YFG (JE7WBI,op)	226,590-	636-	83-A
JH4UTP	100,018-	303-	86-A
JA0BMS/1	60,966-	275-	54-A
JA1YTD (JH4XKW,op)	47,560-	200-	58-A
JN1AIF	42,594-	157-	62-A
JA6BWH	28,050-	124-	50-A
JA6IP	25,821-	108-	57-A
JA6BIF	24,272-	160-	41-A
JH7BMF	12,960-	86-	36-A
JA8GZ	11,725-	81-	35-A
JA1AAT	2,346-	35-	17-A
JA8HBO	1,808-	29-	16-A
JA1KFX	900-	20-	10-A
JA7DSL	212,135-	611-	77-B
JA0QNJ	140,148-	576-	51-B
JA8NFV	86,037-	363-	51-B
JH1UUT	29,450-	139-	50-B
JA1ASO	22,792-	97-	56-B
JH6DEH	16,470-	125-	30-B
JL3WSL	16,058-	167-	31-B
JA6EFT	13,158-	85-	34-B
JL1MWI	13,048-	108-	28-B
JG1JSY	12,704-	107-	32-B
JA2BEY	12,132-	83-	36-B
JA0AD	9,062-	84-	23-B
JA0AW	6,678-	70-	18-B
JA3SSB	2,774-	44-	19-B
JG7LBN	2,600-	36-	20-B
JH1RMH	2,070-	36-	15-B
JF4UMY	2,034-	31-	18-B
JA3FZI	1,666-	29-	14-B
JF1KWP	1,568-	30-	14-B
JA6QDU	1,428-	22-	14-B
JH6FTJ	1,148-	24-	14-B
JR1GWE	1,134-	19-	14-B
JR3KAH	513-	17-	9-B
JJ2RON	408-	15-	8-B
JH2WHS	238-	12-	7-B
JA0OWR	60-	4-	3-B
JE1TTO	12-	2-	2-B
JA9XTB	5-	1-	1-B
JH7WKQ	822,873-	1017-	177-C
JA7DLE	552,575-	1048-	115-C
JR3BOT	326,076-	822-	87-C
JA9CWJ	289,085-	735-	85-C
JA7YAB (JA1-36363,op)	132,145-	462-	65-C
JK3GAD	90,272-	324-	62-C
JE1AER	73,236-	251-	68-C
JA7FCJ	59,157-	235-	63-C
JH4NMT	50,960-	188-	65-C
JA1WYQ	34,026-	145-	53-C
JA7ASD	23,712-	140-	39-C
JA1GTF	22,140-	117-	45-C
JA9TSI	17,340-	82-	51-C
JA1IFB	16,770-	94-	39-C
JR6IMF	10,792-	134-	19-C
JO1QZI	9,336-	87-	24-C
JE3CYH	7,924-	67-	28-C
JA7MWC	6,669-	57-	27-C
JA1BUN	5,450-	48-	25-C
JF1SQC	4,602-	41-	26-C
JN1MKZ/2	4,599-	65-	21-C
JA8AJE	2,816-	32-	22-C
JR3KEX	1,286-	30-	11-C
JG3EHD	1,040-	22-	10-C
JA9YBA (JA9s OTX,VTA,-1014S,JH9s SSU,VSH,JR8GOU,JR9s CQO,EUZ, JR0BAK,ops)	858,792-	1398-	132-D
JA7YFB (JN1IME,JP1LAT,JQ1NBV, JJ3CNL,JH0ORV,ops)	796,537-	1291-	133-D
JA8YBY (JH8s GFB,FNE,ops)	715,750-	1276-	125-D
JA1YAD (JS1DSC,JH5GHM,JA9UFS, ops)	541,252-	1293-	94-D
JA4YJA (JJ3LJU,JM3ILK,ops)	371,958-	934-	94-D
JA1YXP (JI1UTP,JO1JOZ,JI2DLF,ops)	117,376-	448-	56-D
JE6ZAI (JS1PWV,JF4ETK,ops)	76,555-	347-	61-D
JA2YEF (+JI2LPD)	15,466-	94-	37-D

ZONE 46

Sierra Leone

9L1GG	246-	9-	6-C

ZONE 50

Philippines

4D9RG (DU9RG,op)	610,368-	1312-	96-B
K4YT/DU1	25,239-	123-	47-B
DX9HT (DU6AF,DU9s AA,AU,BI, BK,ops)	204,120-	664-	63-D

ZONE 51

Indonesia

YC9VGJ	119,092-	645-	38-B

ZONE 53

Mayotte

FH5EF	139,536-	400-	72-A

Seychelles

S79D	10,166-	65-	34-A

ZONE 54

Indonesia

YB3ASQ	469,100-	967-	100-B
YC8VFB	103,689-	514-	41-B
YC3OSE	55,800-	322-	36-B
YC8RFF	40,760-	235-	40-B
YC2DGO	37,310-	120-	65-B
YC0USJ	34,100-	228-	31-B
YC2EMV	21,150-	151-	30-B
YC0HSA	15,182-	164-	21-B
YC2BKJ	10,272-	90-	24-B
YC2OK	2,210-	100-	26-B
YC3HCM	197,315-	632-	67-C
YB2FEA	80,388-	316-	59-C
YC5PG	12,864-	110-	24-C
YC2ZES (YD2UPX,op)	1,840-	83-	23-C
YB20AR (YB0s DPO,EMJ,PR,SY, TK,ops)	857,934-	1882-	99-D

Singapore

9V1WU	85,932-	344-	63-B

ZONE 55

Australia

VK8AV	168,508-	356-	103-C
VK4SS	33,805-	117-	65-C
VK4TT	14,520-	123-	24-C

ZONE 58

Australia

VK6AJ	37,221-	141-	57-C

ZONE 59

Australia

VK2APK	313,215-	623-	95-C

ZONE 60

New Zealand

ZL1AIZ	35,746-	128-	61-C

ZONE 61

Hawaiian Islands

WL7E/KH6	13,530-	93-	30-C

ZONE 64

Guam

KH2F	763,392-	1412-	112-B
KH2D	528,717-	922-	119-C

ZONE 90

Minami Torishima

KA2CC	91,740-	425-	44-B

Checklogs

EA3JC, EA3PI, EA4EDU, EA5GEO, GI5TK, GW4BLE, HA3GO, HA9KPZ, HA9TE, HK3JJH, I2BGH, IK8JMS, LA2KD, LA2LV, LA7SI, LA8CE, LA9FFA, LZ1EO, LZ1KAZ, LZ2AG, LZ2KAS, LZ2RS, OH2BKF, OH5FA, OK1US, OK2BBQ, OK3CGT, OZ1DPW, OZ1EUO, OZ1KVB, OZ5PA, PA0TV, PA3BYA, PA3CNI, PA3DCS, PY3CJI, RA1OX, RA2FT, RA3AC, RA3ALA, RA3DIL, RA3DOL, RA3DQP, RA3EF, RA3VR, RA4SAE, RA9UAD, RA9UCP, RB5CL, RB5FF, RB5QNV, RT4UA, RV6AF, RV9UV, RZ3DC, SM0BDS, SM4SET, SM6CDN, SP1CGP, SP2ZT, SP4AS, SP5BNB, SP5ENA, SP6PAX, SP7FOG, SP7NMW, SP9LDI, U0AG, UA0DA, UA0KBC, UA0SLW, UA1ALY, UA1DW, UA2FGO, UA2FU, UA3AB, UA3AUA, UA3DAO, UA3DGA, UA3DTT, UA3DUA, UA3LAR, UA3PB, UA3QAM, UA3ST, UA3VLO, UA4FFB, UA4NCI, UA4QK, UA4YBR, UA4YZ, UA6BJQ, UA8HQH, UA8YW, UA9AKW, UA9CVJ, UB4JZB, UB4LAT, UB4LWA, UB4LWY, UB4QVE, UB4VWN, UB5HA, UB5IMJ, UB5LRS, UB5NCD, UB5QJA, UB5QMD, UB5ZDA, UB5ZFB, UB5ZIZ, UB5ZY, UC1AWZ, UC2AAN, UC2AGO, UF6FFH, UG6GFF, UL7BY, UL8BWW, UL8LYA, UO4OXV, UO5ONV, UP1BXF, UP2BNL, UQ1GXX, UT5UAM/A, UV0BB, UV3DCK, UV3DLP, UV3DN, UV6AY, UW0MF, UW6HS, UW9CZ, UW9JC, UY5GG, UZ6KWH, UZ0OXU, UZ3DZM, UZ3SWL, UZ8HKM, UZ9CWA, UZ9CXA, UZ9FZO, UZ9KWA, W4TMN, WB2AMU, YI1DG, YV1UD, Y22UB, Y23BF, Y23HE/A, Y23HJ, Y24FB, Y24GE, Y25FI, Y25MG, Y26NL, Y26WL, Y31TB/P, Y36XC, Y37XO, Y38ZM, Y43RJ, Y48HL, Y54CO, Y55XH/P, Y69CF, Y72ZL/Y36TG, Y88GST, YC0AQB, YO2AOB, YO2CDX, YO3CFF, YO6FGE, YO8MI, YU3BQ, YU4DNO

ARRL International DX Contest Plaque Program

Listed below are all of the plaques that will be awarded in the 1989 ARRL International DX Contest. Sponsors as of October 17 are shown adjacent to the corresponding category. If you are interested in sponsoring one or more of these awards that have not been sponsored, contact the Contest Branch at ARRL HQ.

The list of sponsored plaques may change because of *QST* lead time, so please call us for a list of what is available before sending payment. We salute all who have helped make the Plaque Program such a success!

W/VE CW—Single Operator

Category	*Donor*
All Band	Frankford Radio Club
1.8 MHz	Billy Lunt, KR1R
3.5 MHz	Dayton Amateur Radio Assn
7 MHz	Northern Arizona DX Assn
14 MHz	Fox Cities Amateur Radio Club—W9ZL
21 MHz	Carl Luetzelschwab, K9LA
28 MHz	W5MYA
Low Power	Dauberville DX Assn
QRP	David Newkirk, AK7M

W/VE CW—Multioperator

Category	*Donor*
Single Transmitter	Northern Illinois DX Assn
Two Transmitter	Kenwood USA Corporation
Unlimited	ETO Inc/ALPHA

W/VE Phone—Single Operator

Category	*Donor*
All Band	Frankford Radio Club
1.8 MHz	Butch Greve, W9EWC, Memorial
3.5 MHz	Lance Johnson Engineering, KØCS
7 MHz	Dave Thompson, K4JRB
14 MHz	Dayton Amateur Radio Assn
21 MHz	Kenwood USA Corporation
28 MHz	Windsor Amateur Radio Club VE3OW
Low Power	Dauberville DX Assn
QRP	Marlis, N4MZJ, Hermitage Wireless Inc

W/VE Phone—Multioperator

Category	*Donor*
Single Transmitter	Kenwood USA Corporation
Two Transmitter	Kenwood USA Corporation
Unlimited	Western New York DX Assn—W2RR

DX CW—Single Operator

Category	*Donor*
World	North Jersey DX Assn
Africa	WB3KTX
Asia	Alamo DX Amigos
Europe	Clarke V. Greene, K1JX
North America	W4KFC Memorial Plaque—PVRC
Oceania	Robert J. Halprin, K1XA
South America	Herbert Hoover Jr, W6ZH, Memorial Award
1.8 MHz	Jim Dionne, K1MEM, and Bill Poellmitz, K1MM
3.5 MHz	Mad River Radio Club
7 MHz	Dr W. R. Staples, W4SME
14 MHz	Bencher, Inc
21 MHz	Southern New England DX Assn
28 MHz	ZP5XDW
QRP	Rick, KZ2E, Hermitage Wireless Inc

DX CW—Multioperator, Single Transmitter

Category	*Donor*
World	John Brosnahan, WØUN
Africa	
Asia	Kenwood USA Corporation
Europe	The Radio Place
North America	Kenwood USA Corporation
Oceania	Gary Stilwell, KI6T, and Glenn Stilwell, WR6O
South America	Kenwood USA Corporation

DX CW—Multioperator, Two Transmitter

Category	*Donor*
World	
Africa	
Asia	Kenwood USA Corporation
Europe	Kenwood USA Corporation
North America	David W. Brandenburg, K5RQ
Oceania	
South America	

DX CW—Multioperator, Unlimited

Category	*Donor*
World	H. Stephen Miller, NØSM
Africa	
Asia	Kenwood USA Corporation
Europe	Texas DX Society
North America	ETO Inc/ALPHA
Oceania	David W. Brandenburg, K5RQ
South America	David W. Brandenburg, K5RQ

DX Phone—Single Operator

Category	*Donor*
World	North Jersey DX Assn
Africa	Kenwood USA Corporation
Asia	Acadiana DX Assn
Europe	Gerald Griffin, MD, W8MEP
North America	Chod Harris, VP2ML
Oceania	Doc Sayre, N7AVK
South America	Kenwood USA Corporation
1.8 MHz	Fred Race, AL7JO, in memory of Charlie, W8TCS
3.5 MHz	Kenwood USA Corporation
7 MHz	Central Arizona DX Assn
14 MHz	Don Wallace, W6AM, Memorial, Central CA DX Club
21 MHz	Ray Molony W2NCL Memorial, Long Island DX Assn
28 MHz	Contest Committee—LIMARC
QRP	Gerald Griffin, MD, W8MEP

DX Phone—Multioperator, Single Transmitter

Category	*Donor*
World	Gloucester County ARC
Africa	Kenwood USA Corporation
Asia	Kenwood USA Corporation
Europe	
North America	Society of Midwest Contesters
Oceania	Society of Midwest Contesters
South America	Kenwood USA Corporation

DX Phone—Multioperator, Two Transmitter

Category	*Donor*
World	Kenwood USA Corporation
Africa	Stanley Cohen, WD8QDQ
Asia	Kenwood USA Corporation
Europe	KB4OMW and WB4CKY, The Middletons
North America	Jan Hubach, OH1ZAA and John Brosnahan, WØUN
Oceania	
South America	Kenwood USA Corporation

DX Phone—Multioperator, Unlimited

Category	*Donor*
World	
Africa	
Asia	Kenwood USA Corporation
Europe	
North America	ETO Inc/ALPHA
Oceania	David W. Brandenburg, K5RQ
South America	

Special Plaques

Single Operator

Category	*Donor*
W/VE S/O Combined Score	*National Contest Journal*
W/VE Low Power, Combined Score	Rochester (NY) DX Assn
World S/O Combined Score	Mike Manato, K3UOC, P46S, 4M4A
Atlantic Division (CW)	K2NY Memorial—Salt City DX Assn
Great Lakes Division (CW)	Livonia Amateur Radio Club, Livonia, MI
Great Lakes Division (Phone)	Livonia Amateur Radio Club, Livonia, MI
Hudson Division (CW)	W2AO Memorial—Order of Boiled Owls
Israel S/O (CW)	Robert B. Weinstock, KN1K
Seventh Call Area (CW)	Willamette Valley DX Club
Seventh Call Area (Phone)	Willamette Valley DX Club
Single Op Under 18 (CW)	Virginia A. Greene, WB1AVA
Single Op Under 18 (Phone)	Virginia A. Greene, WB1AVA
USSR All-Band (CW)	K1KI, WB4TDH, AA6BB, KA6V
USSR All-Band (Phone)	K1KI, W4MOM, AA6BB, KA6V

Multioperator

Category	*Donor*
Caribbean Multi-Single (CW)	The YASME Foundation
Caribbean Multi-Single (Phone)	W5MYA
Multi-Multi Combined World	W2PV Memorial—Schenectady ARA

Contest Corral

Conducted By Billy Lunt, KR1R
Contest Manager

JAN 28-Feb 5

ARRL Novice Roundup, Jan *QST*, p 102.

JAN 31

West Coast Qualifying Run, 10-40 WPM, at 0500Z Feb 1 (9 PM PST Jan 31). 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.

FEBRUARY

4

AGCW-DL Handasten Party (Straight Key Party), sponsored by the AGCW-DL, from 1600Z until 1900Z Feb 4. Frequencies: 3510-3560 kHz. Only straight keys (no bugs). Exchange RST, QSO No., class, name, and age (XYLs use XX) example 579001/A/John/23. Classes: A = 5-W output, B = 50-W output, C = 150-W output, D = SWL. Scoring: class A with class A = 9 points, with B = 7 points, with C = 5 points; class B with A = 5, with B = 4 points, with C = 3 points; C with C = 2 points. Certificates: Send logs by Feb 28 to Friedich Fabri, DF1OY, Wolkerweg 11, D-8000 Munchen 70, Fed Rep of Germany.

4-5

Vermont QSO Party, Jan *QST*, p 105.

New Hampshire QSO Party, Jan *QST*, p 105.

Ten-Ten International Net Winter Phone QSO Party, Jan *QST*, p 105.

5

North American Sprint, CW, Jan *QST*, p 105.

11

W1AW Qualifying Run, 10-40 WPM, at 0300Z Feb 12 (10 PM EST Feb 11). Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 147.555 MHz. See Jan 31 listing for more details.

11-13

YL-OM Contest, phone, Jan *QST*, p 105.

PACC Contest, Jan *QST*, p 105.

12

North American Sprint, phone, Jan *QST*, p 105.

18-19

ARRL International DX Contest, CW, Dec *QST*, p 103.

24

W1AW Qualifying Run, 10-35 WPM at 2100Z Feb 24 (4 PM EST). See Feb 11 listing for more details.

24-26

CQ World Wide 160-Meter Contest, phone, Dec *QST*, p 105.

REF French Contest, phone, Jan *QST*, p 105.

YL-OM Contest, CW, Jan *QST*, p 105.

MARCH

1

West Coast Qualifying Run, 10-35 WPM at 0500Z Mar 2 (9 PM PST, Mar 1). See Jan 31 listing for more details.

4-5

ARRL International DX Contest, phone, Dec *QST*, p 103.

11-12

Iowa QSO Party, sponsored by the Iowa Section, from 1800Z Mar 11 until 0600Z Mar 12. Work stations once per band and mode. No repeater QSOs. Exchange signal report and county for Iowa stations; section or country for others. Suggested frequencies: CW—1.810 3.550 7.050 14.060 21.050 28.050 MHz; phone—3.875 7.225 14.275 21.325 28.600 50.110 144.200 146.520 MHz; Novice—10 kHz from low ends. Count 1 point for each phone contact; 1.5 points for each CW contact; 3 points for each OSCAR contact. Novices and Techs count 5 points for each QSO. Iowa stations multiply total QSO points by total sections and total Iowa counties. Others multiply total QSO points by Iowa counties (max 99) worked. Bonus multiplier for each ARRL Iowa Section Official worked (max 8). Awards. Mail logs by Apr 1 to Bob McCaffrey, KØCY, RR #4, Box 228C, Boone, IA 50036.

12

W1AW Qualifying Run, 10-35 WPM, at 0300Z Mar 13 (10 PM EST Mar 12). See Feb 11 listing for more details.

Classic Sprint, sponsored by the M-QRP-C and the QRP ARCI, 2000Z-2400Z Mar 12. CW and phone. Entry classes: A—0-1 watt output CW (0-2 watts PEP SSB); B—1-5 watts output CW (2-10 watts PEP SSB); C—over 5 watts (10 watts PEP SSB); single band or all band. Work stations once per band. Exchange signal report, state/province/country and power output. Suggested frequencies: CW—1.810 3.560 3.710 7.040 7.110 14.060 21.060 21.110 28.060 28.110 50.060; phone—3.985 7.285 14.285 21.385 28.385 28.885 50.885. Count 5 points per QSO. Bonus points for using classic equipment: add 200 points if transmitter used; add 300 points if receiver used; add 500 points if transceiver is used. Multiply QSO points by states/provinces/countries worked per band plus bonus points for final score. Include description of homebrew equipment, commercial equipment and antennas use. Classic equipment is defined as any equipment whose original design is 15 years or older and no longer in production. For home-brew equipment, the original circuit must be 15 years or older and comparable components in production 15 years or more as much as possible. Awards. Mail entry (SASE for results) before 30 days after the contest to Buck Switzer, N8CQA, M-QRP-C Contest Manager, 654 Georgia, Marysville, MI 48040.

18-20

BARTG Spring RTTY Contest, sponsored by the British Amateur Radio Teleprinter Group, from 0200Z Mar 18 until 0200Z Mar 20. Operate 30 hours maximum. Off-times must be no less than three hours each and must be indicated on log. Single operator, multioperator and SWL categories. Work stations once per band, 80, 40, 20, 15 and 10 meters. Exchange UTC time, signal report and message number starting with 001. Count two points for RTTY QSOs with stations in your country, 10 points for others. Count 200 bonus points for each country worked per band. For final score, add QSO points × (total different DXCC countries + W/VE/VK call areas per band) plus (band countries × 200 × continents). Use a separate log sheet for each band. Mail logs to be received by May 27 to Peter Adams, G6LZB, 464 Whippendell Rd, Watford, Herts, WD1 7PT, England.

Wisconsin QSO Party, sponsored by the West Allis RAC, from 1800Z Mar 19 until 0100Z Mar 20. CW and phone. Work stations once per band and mode. Work mobiles again as they change county. No repeater QSOs. Only one signal on the air at any given time. Exchange signal report and QTH (county for WI stations; state or province for others). Suggested frequencies: CW—3.550 3.725 7.050 7.125 14.050 21.150; phone—3.890 7.290 14.290 28.400. Count 1 point per phone QSO, 2 points per CW QSO. WI stations multiply by total WI counties, states and provinces worked. Others multiply by total WI counties worked (max 72). Add 100 bonus points for using official entry forms. WI mobiles/portables may add 500 points to their score for each county outside of their home county that they make at least 15 QSOs from. Awards. Mail logs by April 15 (include large SASE for results) to WARAC, PO Box 1072, Milwaukee, WI 53201.

28

W1AW Qualifying Run, 10-35 WPM, at 1400Z Mar 28 (9 AM EST). See Feb 11 listing for more details.

25-26

CQ World Wide Prefix Contest, phone

Deadline: The deadline for receipt of items for this column is the 1st of the second month preceding the publication date. For example, your information would have to reach HQ by **Mar 1** to make the **May** issue. Please include name of contest, dates, times (Z) and complete rules. Send to Contest Corral, 225 Main St, Newington, CT 06111.

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.

Strays

CHILDREN'S MAGAZINE PUBLISHES ARTICLE ON ARRL

☐ *Cobblestone*, the history magazine for young people, dedicated its October issue to the "Magic of Radio." Included was a four-page article dedicated to Amateur Radio and the League. The piece begins with a explanation of the public-service role hams play, followed by a brief history of the League. It goes into OSCAR, computers and hams in space. Photographs of HPM, OSCAR 13 and young people operating decorate the pages. It finishes by telling how a young person can become a ham, along with a nice plug for the League. *Cobblestone* has a circulation of 45,000.

Special Events

Conducted By Billy Lunt, KR1R
Contest Manager

Houghton, Michigan: The Michigan Technological University ARC will operate W8YY from **Feb 2-5** to celebrate Michigan Technological University's Winter Carnival. Suggested frequencies: CW—1.805 3.550 7.050 14.050 21.050; phone—1.850 3.875 7.250 14.250 21.375 28.450; packet—145.01. For certificate, send QSL and large SASE to W8YY Amateur Radio Club, Wadsworth Hall, Houghton, MI 49931.

Punxsutawney, Pennsylvania: The PARC will operate K3HWJ **Feb 2** and **Feb 5** starting at 1400Z to celebrate Ground Hog Day. Suggested frequencies are 28.450 and the lower part of the General 40-meter band. On **Feb 5** operation will be in the lower part of the 80, 40 and 20 meter General bands. For certificate, send SASE to John N Burkett, KA3SWZ, RD #6 Box 436, Punxsutawney, PA 15767.

Adamsville, Ohio: To promote Amateur Radio in the school and community, KA8YCX will operate 1400Z-2030Z **Feb 3** from the Adamsville Jr High School. Operation will be in the lower General 40- and 20-meter bands as well as the Novice 10-meter band. For certificate, send QSL and SASE to KA8YCK, 971 Somers St, Zanesville, OH 43701.

Raleigh, North Carolina: The Raleigh ARS club members will operate using their own call signs **Feb 11-12** celebrating the 20th anniversary of the founding of their club. Operation will be in the General bands. For QSL, send no. 10 SASE to RARS, PO Box 17124, Raleigh, NC 27619.

Loveland, Colorado: The Loveland Repeater Assn will operate KAØVFF **Feb 11-12**, 1500Z-0500Z each day and 2300Z **Feb 14** until 0500 **Feb 15** in conjunction with the Loveland Valentines Activities. For certificate, send 9- × 12-in SASE to Michael H Walker, KAØVFF, 3816 Ash Ave, Loveland, CO 80538.

San Benito, Texas: The San Benito ARC will operate N5COW (SSB) and N5HOG (CW/RTTY) on **Feb 18-19**, 1800Z-2400Z each day, from the Cameron Co Fair and Livestock Show. Suggested frequencies: CW—35 kHz from 40- and 20-meter band edges; SSB—3.950 7.280 14.315 21.360 28.425; RTTY—14.085. For certificate, send QSL, contact number and 9- × 12-in SASE to San Benito ARC, PO Box 1382, San Benito, TX 78586-1382.

Rigby, Idaho: The Rigby amateurs will operate W7GRU, W7LQU and WA7IRA **Feb 18-Feb 22** to commemorate Rigby as the birthplace for television, the Farnsworth TV Museum and Philo T Farnsworth's drawing of the image dissector tube on the Rigby HS blackboard on Feb 21, 1922. Operation will be in the lower General phone bands. For QSL, send a no. 10 SASE to Farnsworth TV Museum, Attn Radio Hams, PO Box 493, Rigby, ID 83442.

George, Washington: The Central Washington ARC will operate W7WMO/7 on **Feb 20**, 1800Z-2400Z, from George, Washington to celebrate the Community's Birthday Party. For certificate, send 9- × 12-in SASE via Eugene Bye, W7WMO, 18 J St NE, Ephrata, WA 98823.

Felicity, California: The Amateur Radio Emergency Service of Yuma, AZ will operate WA6PEZ 1500Z **Feb 25** until 0100Z **Feb 26** from the Official Center of the World. Suggested frequencies: SSB—7.238 21.318 28.418. Visitors welcome. Call in on 146.14/74 repeater. For certificate, send QSL and 9- × 12-in SASE to Yuma ARES, c/o US Post Office, Felicity, CA 92283.

Mackinac Island, Michigan: Special-event station, NK8X will operate **Feb 25** starting at 1700Z and continue for 24 hours from the ice bridge between St Ignace and Mackinac Island. Suggested frequencies: 3.965 7.265 14.265 28.365. For certificate, send QSL and SASE to NK8X, 2004 Inverway Ct, Kalamazoo, MI 49009.

Deadline: The deadline for receipt of items for this column is the 1st of the second month preceding the publication date. For example, your information would have to reach HQ by **Mar 1** to make the **May** issue. Please include the name of the sponsoring organization, the call sign of the special-event station, the city location, dates and times (Z), suggested frequencies and QSL information. Requests for donations will not be published.

QSLing Special-Event Stations: To get your QSL or certificate from any of the special-event stations listed here, follow these simple guidelines. (1) After working the station, carefully fill out a QSL card for the QSO. Show the date and time accurately using UTC. (2) Prepare a self-addressed, stamped envelope. If sending for a certificate, use a 9- × 12-in envelope if you want an unfolded certificate, or a no. 10 envelope if folds are okay. Include enough postage for return of your envelope. (3) Mail both your QSL and your SASE to the address listed, or to the address given on the air by the station you QSO. Be patient. Special-event stations will often print their cards and/or certificates after the operation is over so they will know how many to order. QST

Strays

AFCEA LUNCHEON

☐ The Washington Chapter of the Armed Forces Communications and Electronics Association (AFCEA) will hold a reception/luncheon on Thursday, February 9, 1989 to honor industry. On Wednesday, March 8, the group will meet to honor the United States Air Force. Both meetings are at 11:15 AM at the Sheraton-Washington Hotel, Washington, DC. The cost of the luncheon is $22.50. For additional information and reservations, please call Ms Diane Sibley at 202-457-3060.

I would like to get in touch with...

☐ hams who are also members of the US Jaycees. Lee Groce, N4AAD, PO Box 213, Yadkinville, NC 27055.

☐ hams who are spelunkers. Norm Rogers, N9CBW, 4324 West Rockwell, Peoria, IL 61615.

☐ anyone who has technical info on the NEC CQ-P2600 2-meter SSB/CW transceiver. This rig was made about 8 years ago—even a block diagram would be helpful. Please contact Marshall Goldblatt, W4EMB, 11801 SW 70th Ave, Miami, FL 33156, tel 305-666-6997.

☐ anyone who has info, modifications, tests and data sheets for the Collins 51S1 receiver and would like to exchange them with a proud owner. Georges Ringotte, F6DFZ, 8 rue des Muriers, 84310 Morieres, France.

☐ anyone with a manual and/or schematic for a Dentron GLA-1000. Kenneth Williams, WØJKM, 5713 Hawkes Dr, Edina, MN 55436.

☐ anyone with operating and service manuals for a KDK FM transceiver model FM 2016A. Gilles Parrot, VE2OU, 2785 Valcourt St, Ste Foy, PQ, Canada G1W 1W2.

☐ anyone having manuals and schematics for the Hallicrafters S-19R Sky Buddy and the National NC-240D receivers. Luther Pully, W5JIZ, 3910 Cedarbrush Dr, Dallas, TX 75229-2703.

☐ anyone with info on a Pride 100A Bi Linear amplifier 80-10 meters, model #P-100A. Joseph Karr, N9FAU, 3800 Cheyenne Ct, Racine, WI 53404.

☐ anyone with info and/or manual on a Sigma XR-3000D linear amplifier. Jerry Zitterkopf, WS7T, 3120 Ross St, Kingman, AZ 86401, tel 602-753-6138.

Section News

Administered by Steven Ewald, WA4CMS

The ARRL Field Organization Forum

ATLANTIC DIVISION

DELAWARE: SM, Harold K. Low, WA3WIY—ASM: Walt Dabell, KD3GS. Thanks to all who helped with the November Salem nuclear power plant emergency drill. Just another example of some great statewide teamwork. Congratulations to the Osborne family who now have 15 hams in the family. The AWARE club does it right, or they don't do it — What a Christmas party! The Delaware Traffic Net meets Monday thru Friday on 3905 kHz at 6:30 PM local and the Delaware Emergency Phone Net meets on 3905 kHz at 6 PM local on Saturday. We could use a few more check-ins from Kent and New Castle counties. If you have not been checked out on NTS traffic or don't know what NTS is, check in, we will be glad to fill you in. November net rpt: DTN stns 340 tfc 54 in 22 sessions, DEPN stns 44 tfc 14 in 4 sessions, SEN stns 80 tfc 1 in 5 sessions. Traffic: WA3WIY 53, W3QQ 42, WB3DUG 35, K3YBW 32, KA3GRQ 24, K3JL 19, W3FEG 10, KC3FW 8.

EASTERN PENNSYLVANIA: SM, Kay Craigie, KC3LM—ASM: WA3PZO, KA3A, KO3B, K3ZFD. SEC: KB3YS. ACC: KC3QB. OOC: W3IS. SGL: WA3IAO. STM, BM: KB3UD. PIO: W3ZXV. TC: W3FAF. Valentines for all ARRL members in Eastern PA, especially our Field Organization volunteers. Eastern PA is blessed with many hams who deserve the Atlantic Division "Amateur of the Year" award. Let's nominate some of them before the April 22 deadline. For a nomination form, write to Richard A. Goslee K2VCZ, 24 Elaine Drive, Rochester, NY 14623-5306. At press time, our SEC KB3YS was working on new "DEC of the Year" and "EC of the Year" awards to recognize our ARES leadership. Good idea, Bob! Thanks to contacts made by NM3S, "The New World of Amateur Radio" got on the Philly-area public TV station's January sked. Another good publicity item in the Delaware Valley was KC3NE's Philadelphia Inquirer feature story that kept a good balance between showing ham radio as plenty of fun but also as serious community service. Mobile Sixers 1989 officers are WA3NUG, N3AHP, KC3IE, and N3EMQ. Penn Wireless will be led by KA3JOI, KA3CVP, KA3NTZ, K3TX, and N3DRM. It's a sad day when a radio club goes QRT, but Southern Chester Co. ARC's final transmission was a fine gesture. They donated the remaining treasury to the ARRL Foundation's Jesse Bieberman Meritorious Membership Fund. W3KT was a SCCARC member, and this donation in his memory is deeply appreciated. Hamfest season begins next month with the Dover Winterfest on March 5. Eastern PA's Section NTS net sked is as follows:

EPA	3610 kHz	Daily 7 & 10 PM	AA3B, Mgr.
EPAEPTN	3917 kHz	Daily 6 PM	WA3EHD, Mgr.
PTTN	3610 kHz	Daily 6:30 PM	WB3EPU, Mgr.

Many areas do not have a VHF or UHF traffic net or ARES net that handles formal traffic. Why not start one? How about traffic handling on packet radio? Contact the SM or the Section Traffic Manager, KB3UD, for help. We could run a little training seminar if you have a group of interested operators. Had enough home movies and ugly necktie contests? Ready for some solid club meeting programs about antennas, propagation, QRP, microwaves, packet, radon gas and other up-to-date technical subjects? Our Assistant Technical Coordinators are ready. Contact Technical Coordinator W3FAF for the latest list. Traffic (November): N3AZW 689, W3JKX 139, N3CD 130, N3COY 100, KA3DLY 90, W3KAG 88, N3DRM 81, KC3LM 76, KD3AO 73, AA3B 68, W3KOD 62, K3WPI 51, W3IPX 47, N3EFW 40, WB8KPE 40, KU3R 32, W4UQ 32, W3AQN 25, K3TX 25, W3VA 17, WA3CKA 16, W3DP 15, W3BUR 12, KA3RGF 12, W3GJC 11, W3BNR 10, W3HK 3, W3ADE 1. NETS (QNI/QTC): EPA 472/124, EPAEPTN 514/156, PTTN 278/128, MARCTN 176/57, MARCARES 58/5, SCES 55/3, SEPATN 80/27, D5ESN 79/8, D6ARES 76/6. PBBS: @WA3TSW 349, @K3RLI 325, @AG3F 213, @WB3JOE 105, @KB3UD 217.

MARYLAND-DC: SM, Philip Battey, W3FZV—Now is the time to enter your nomination for Section Manager. The second notice appears in this QST and the closing date for nominations is March 10. Voting takes place Apr 3-May 19; only one nominee wins by default. This SM shall step down after his term; there's a lot of talent in this section, so NOMINATE! Clubs are active as usual: OT W3AFV gave a nice talk at the RCARA about early TV. The Antietam Club helped in the Appalachian Trail Hike. CARA held a super-banquet on Dec. 9. Likewise the Carroll Cty ARC on 12/18 and SMARC on Dec. 10. The Nat'l. Capital DX Assn held a DXPO with great speakers. CCARS received an award for their contributions to D.C. SARA came in first and AARC second in the country in the FD three transmitter battery class. FB. Two new BBS are K1LNJ (222.01) and KA3DXX (145.07). WB4APR gave a presentation on ATV at the Md. Mobileers ARC. AB3F of MMARC has a new packet setup and a mailbox on 145.09. KA3OMU, et al, put up his new antenna. NF3A on the Eastern shore has a store-and forward digipeater. Packet traffic into MDC is usually sorted automatically by ZIP code. A large SET was held at Patapsco Valley State Park on Nov. 19. It was very impressive for me who had never before been to a SET exercise. Hams worked with Search and Rescue people, CAP, Red Cross, and Nat'l Guard. KN3U and NO3Z were leaders. WA1QAA coordinates RACES exercises in Howard Co. Tony, WA3YLO, has been busy, as usual, with club, training, and journalistic work. KN3U and W3YVQ recently received Public Service Commendations and W3FA, KC3Y, and KJ3E received Certificates of Merit for their work in the MDC section. Greg Latta, AA8V, is a newcomer to western MD and a recent ATC. AARC has renewed as a Special Service Club. NF3X works on antennas and likes emergency and net work. KA3PQR has passed Adv. Class exam. A schedule of ham exams and training info appears each month in Auto-Call magazine. With the Nets: NET/MGR QND/QTC/QNI: MSN/KC3Y 30/45/348, PON/WB3BFK 28/32/273, MDD/W3FA 60/311/588, (TOP BRASS W3FA/94 W3QQ/87 K3GHH/82 WA3YLO/66 N3EGF/61) (47 different stations QNI during month), MEPN/K2EB no report. HO-CARES/ WA1QAA 2/5/13, MAVEN/W3YVQ 1/0/1. TRAFFIC: W3IWI 539 (BPL), KN1K 255, NC3V 247, K3GHH 229, WA3YLO 159, KJ3E 151, K3RXK 144, N3EGF 137, KC3Y 136, KK3F 129, W3FA 126, NB3P 122, KX3U 80, KA3DXX 51, K3NNI 50, WB3BJM 45, WB3BFK 25, K2EB 23, W3YVQ 23, KD3JK 21, NC3Z 20, W3FZV 17, W3DQI 16, NF3X 14, W3LDD 14, WA3SCW 12, WA3GYW 9, W3ZNW 7, WA1QAA 5, WA2WDT 5, KC3DW 3, PSHR: WA3YLO 115, W3FA 93, N3EGF 86, K3GHH 73, NC3V 71, K3RXK 63, KC3Y 63.

SOUTHERN NEW JERSEY: SM, Richard Baier, WA2HEB—SEC: K2QIJ. STM: WB2UVB. ACC: K2IXE. TC: N2BQT. PIO: KA2RAF. SGL: Vacant. BM: WB2UVB. OOC: WA2HEB. ATC's K2JF, KA2RJA and WB2MNF. VE testing in Bellmawr on Feb. 16. See January, 1989 QST column for details. By the time you read this article, a bill to exempt licensed radio amateurs from the law prohibiting non-emergency personnel from having radios in their vehicles capable of receiving public service frequencies should have been introduced into our state's Assembly. It is VERY IMPORTANT that we present a strong, united front to get this bill signed into law. Therefore, I am asking each and every one of you reading this column to contact your local state representative to urge him, or her, to support this bill. For you folks on packet, look for bulletins addressed to "NJLAW" on your local PBBS for the file designation of this bill. Those of you not on packet should feel free to contact me at my address or phone number listed on page 8 of this QST. This bill affects ALL of us and a lot of background work has gone into getting this statute revised. WE NEED YOUR HELP! Until next month, 73. Traffic: WB2ZJF 226, WA2CUW 50, WA2HEB 14.

WESTERN NEW YORK: SM, William W. Thompson, W2MTA—QSOs with MIR held high interest for some of us this month. NY2I was heard in QSO with Musa U2MIR on 26th...How did you do? N2BKT and K2CKA also made contact on 27th. A charter member of NYS CW Net became a Silent Key Thanksgiving Day. Dan, W2PKY, regularly provided public service through ham radio from Scotia in ENY. NTS, ARES and RACES will miss him. WA2SEF reports that Central Adirondacks is ready for winter now with 93/33 and WB2ZIY-3DIGI both perking FB, good news for Blueline Service Net which Hank reports monthly. PROGRESS REPORT: WNY has 106 stations holding 145 appointments: 35 affiliated clubs have to date filed 1988 ANNUAL Reports: 18 other clubs have not and 7 others have not filed for at least three years. CLUBS are encouraged to "adopt" a local school to interest students in ham radio...perhaps even through a staff instructor, to become an affiliated school club. Let's give them a hand!

NYSEMO	SSB	103/007/04	NYSR	CW	012/004/04
NYS/M*	CW	327/181/30	TIGARDS	FM	049/00504
WDN/M*	FM	400/150/30	WDN/E*	FM	430/206/30
NYP*	SSB	(next month)	NYS/E*	CW	357/295/30
ESS	CW	417/087/30	BLUELINE	FM	260/150/30
NYSPTEN	SSB	502/071/30	VHF THIN	FM	051/000/05
LCARES	FM	041/000/04	BRVSN	FM	279/002/30
NYPON*	SSB	602/374/30	CNYTN*	FM	215/081/31
OCTEN/E*	FM	586/127/30	OCTEN/L*	FM	209/051/30
Q NET	FM	367/002/30	WDN/L*	FM	418/109/30
STAR*	FM	250/031/30	NYS/L*	CW	310/187/30
Pathfinder		249/001/30	*NTS Net.		

Section Packet Node Station (SPNS) Reports: WB2ACV KT 10, ST 17; no other reports. PBBS reports: KA2JXI KT 0, ST 6. CLUB OFFICERS: Drumlins N2CSY N2JC WA2SOK N2IJM. Kodak Park KB2BBH KB2AUD KA2GPJ. Rochester Repeater Prez NF2Z replaces W2SNF who became a Silent Key in October. KB2CHY moves into Prez; Salt City DXA TBA; Syracuse VHF K2OUE W2PJO W2RHQ. WNY DXA WB2CJL Prez. CLUB Newsletters are all enjoyed by the SM and Director W3ABC. Another fine publication for other Clubs to exchange is "Smoke Signal" from the Squaw Island ARC in Canadaigua (contact K2BWK). Public Service Honor Roll: N2ABA N2EIA N2EVG WA2FJJ W2FR NN2H KC2HJ N2IKR W2MTA WB2OWO WB2QIX KA2QOO KA2UBD KD2UV NJ3V K2YAI KA2ZKM KA2ZNZ. BPL Nov. W2MTA. It's good to see increasing inquiries about appointments to Official Observer (OO), Assistant Technical Coordinator (ATC), Official Relay Station (ORS), Official Emergency Station (OES), and other positions. Keep them coming! Your requests are forwarded on to the appropriate Leadership Official (I call them Assistant SMs) for review and appointments, including certificate issuance. If for some reason your request gets lost in the mail, write or call me again. Keep an eye open for Punxatawny Pete! (Survey of readers noted.) Traffic (Nov.): W2MTA 545, NJ3V 441, WB2OWO 423, N2EIA 362, WA2FJJ 320, WB2IJH 245, KC2HJ 216, K2YAI 185, KA2ZKM 184, KA2QOO 175, W2FR 149, KA2UBD 133, WB2QIX 132, N2ABA 124, NN2H 122, WA2JPB 101, KA2ZNZ 100, WB2OEV 66, W2UYE 60, KG2D 52, KE2EA 50, KA2DBD 42, KD2UV 41, AF2K 36, N2EVG 28, KC2JW K2QR 19, WB3CUF 12, N2IKR 4, WA2OEP 2 (Oct.) KG2D 17.

WESTERN PENNSYLVANIA: SM, Otto L. Schuler, K3SMB—SEC: WA3UFN. STM: N3EMD. BM: KC3ET. TC: N3EFN. OOC: KX3V. ACC: AK3J. SGL: KA3OEM. PIO & ASM: N3DOK.

Net	QNI	QTC	Sess	kHz	T/D	Man
WPACW	242	118	30	3585	7:00 P/D	WA3UNX
WPAPTN	528	26	30	3983	6:00 P/D	WA3HLN
KFN	256	117	24	3983	1:30 P/D	KA3OEM
PFN	192	147	30	3958	5:00 P/D	WA3THT
WPA2MTN	252	67	30	28/88	8:00 P/D	KA3BGC
NWPA2MTN	623	55	28	44.53/45.13	9:00 P/D	KC3NY

Welcome the Cathedral Preparatory School ARC in Erie. N3GCN, is president. Radio Association of Erie Officers for 1989 are Pres. KB3A, VP KA3QDM, Secretary N3DYY, Treas. KA3PEJ, Directors N3FAW and WB2ICS. The Butler County ARA officers for 1989 are Pres. KA3ROX, 1VP. W3WXZ, 2VP. N3GAG. Sec. WB3ITS, Treas. WB3HBE, Trustees WA3BVQ, WB3GNP, NG3A, KA3RNF, WB3BFC and W3YNE. Steel City Officers for 1989 are Pres. WA3VXJ, VP. N3DHC, Treas. AK3J, Rec. Sec. KA3OYI Corres. Sec. W3UUH. Two Rivers Board of Directors 88-89 are Pres. KA3KDU, VP. KV3L, Sec. KA3SNH, Treas. WB3ERE. Act. Man. W3SYR, Prop. Trustees NQ3U. NA3U, NF3K. The third annual crop walk of the North Hills area was held in the North Park. The walk was held to raise money for the poor. Walkers were sponsored by many local people and members of the North Hills ARC provided communications: Ops were W3LBV, N3DOS, W3TZW and WA3CHC. Thanks fellows. N3EFN, our TC reports TVI problems cleared up. N3EFN our technical coordinator, is looking for Asst. Technical Coordinators. We need ATCs in various areas around the section. If you can help, get in touch with N3EFN. Nov. Traffic: N3EMD 366, W3OKN 150, WA3UNX 126, N3AES 124, NO3M 123, N3FM 123, KA3OEM 68, K3SMB 60, W3RUL 57, KC3GO 52, WA3DBW 48, WB3DWL 41, KC3YE 39, W3NGO 35, W3KUN 27, N3COR 21, KA3NVZ 18, N3GCN 16, KA3EGE 15, KC3HR 14, KD3AC 12, W3SN 5, K3LTV 4.

CENTRAL DIVISION

ILLINOIS: SM, Dave Carlson, AA9D—SEC: W9UBQ. STM: K9CNP. OOC: W9TT. BM: K9EUI. SGL: K9IDQ. PIO: N9EWA. ACC: WB9SFT. TC: N9RF. DEC: WD9EBQ Illinois Section Sets

NET	FREQ	TIMES (LOCAL ILLINOIS)
ISN	3905	1800 DAILY
ILN	3690	1830 & 220 DAILY
ITN	3705	1900 DAILY
CTN	149.69/09	2100 DAILY
ILARES	3905	1630 1ST & 3RD SUNDAYS
Illinois Independent Nets		
IEN	3940	0900 SUNDAYS
ILPN	3855	1645 M-F; 0830 SUNDAY
NCPN	3915	0700 MONDAY-SATURDAY
NCPN	7270	1215 MONDAY-SATURDAY

Congratulations to the new officers of the Hamfesters Radio Club: President, W9BNR. VP, N9FVR. VP, N9DWI. Sec. N9FPQ. Treas. KC9IC. Trustee, W9LNQ. Also congratulations to the Hamfesters RC on 50 years of affiliation with the ARRL! More congratulations! This time to Joe, KA9PJX, who has received his second good guy report from an Official Observer. Joe was commended for his excellent procedure, clean and crisp audio and good manners. W9DES reports that he addressed the Rotary Club in Jacksonville on the subjects of Amateur Radio and ARES. Vince got the invitation to speak as a result of an article in the local paper about SET. He also reports that Jacksonville ESDA is building an operations center that will include provisions for Amateur Radio. Early in the morning, Thanksgiving day, KA9MUS and a friend saw a burglar on the roof of an apartment house on the U of I campus. KA9MUS contacted the Urbana Police via autopatch, who quickly responded with two squads! Well done! After years of "getting around to it," I am finally on packet radio. I pick up messages regularly from the N9GTM BBS. In a recent test with WD9EBQ, a message sent from his QTH in the southern end of the state took only 10 hours to autoforward to my home BBS. It's faster than mail and cheaper than the phone! Traffic: KA9FEZ 391, W9HLX 179, W9HOT 165, NN9M 160, WA9VLC 160, KA9QXI 116, K9QEW 103, W9LWH 102, W9OBU 80, K9CNP 77, NC9T 66, KA9JNE 27, KA9BBV 15, W9HBI 15, W9KR 14, WA9AXL 8, WA9RUM 8, W9LNQ 6, WD9CIR 4.

INDIANA: SM, Bruce Woodward, W9UMH—SEC: WD9AVQ, STM: NX9I. ACC: K9ZBM. TC: WA9JWL. SGL: WA9VQO. BM: W9OCL. PIO: KA9WXT. OOC: KJ9G. Net Mangers: ITN KA9EIV, QIN KJ9J. ICN KD9ER, VHF W9PMT, IWN KA9ERC. October Net Reports:

NET	FREQ	TIME DAILY UTC	QNI	QTC	QTR	SES
ITN	3910	1330/2130/2300	3258	391	2202	90
QIN	3656	1430/0000/0300	422	147	1026	57
ICN	3705	2315	79	17	397	21
IWN	3910	1310	1281		369	30
IWN VHF BLOOMINGTON			824		222	30
IWN VHF KOKOMO			795		219	30
IWN VHF LIGONIER			746		220	30
HOOSIER VHF NETS (17)			5355	234	4646	262

D9RN for November 287 QTC 60 ses. 56% K9CGS, W9UEM, N9DWU, K9ZLS. CAND 807 QTC in 30 ses. D9RN 100% N9DWU. 9RN Cy 4 QNI 302, QTC 306, QTR 924 in 61 ses. IN 77% W9CEG, N9HZ, KJ9J, NR9K, WA9QCF, WB9UYU, K9WWJ, and W9JUJ. Silent Keys: Paul Stevens, AD9Z, John H. Weiss, WB9DXY, and Mary Galloway, K9WJR OM K9OXA son Mike Galloway. WD9AVQ, Section Emergency Coordinator. EC reports for November: N9ADS, W9BTZ, N9DFU, N9DTG, N9ENC, W9EPT, N9FMO, WA9HVP, W9KGE, WB9LRR, KA9MNR WB9NCE, KA9QME, W9QWI KA9SHM, KA9VNK, KA9WCQ, WD9X, and KA9ZLG. Dick Elliott, KA9WXT, PIO, needs PIAs. Every club should appoint a PIA. Dick will help them get started. GTE through their "Volunteer Incentive Program" and thanks to N9IU, K9MKY, the Noblesville, Indiana EOC with Amateur Radio and other items. Accepting for HCARES were WA4VWV, WA9IIS and WB9LRR Emergency Coordinator. Congratulations to Steve Smith, WA4VWV, for his showing in the June VHF QSO Party. Steve would like to challenge more hams to participate in these contests. Public Service Activity reports were received from N9FOZ, W9QWI and W9EPT. I appreciate all public service activity reports. PACKET BBS REPORTS: WA9UXP 1197, KD9QB 1536, WB9SYK 112, WA9VMW 408. Traffic handling for the month of November 1988: KJ9J 239, NR9K 199, W9UMH 176, N9DWU 82, W9ZGC 74, N9BS 68, W9UEM 64,

(continued on page 108)

WA9QCF 58, K9SBW 47, NX9I 44, WB9QPA 40, KD9QB 36, N9HZ 35, K9FEI 27, W9PPO 25, WD9DWD 24, KA9QME 22, K9ZBM 20, WB9IHR 18, KB9HH 17, N9DOP 17, K9ZLS 17, WA9OHX 15, KD9DU 15, W9CNE 13, K9ZBM 12, W9KHK 8, W9OZJ 8, N9FMO 7, WB9OZZ 6, NV9F 6, WD9CIV 5, K9DIY 5, NZ9S 5, KB9GK 5, KA9RTD 5, WA9QVH 5, AB9A 5, W9HMS 5, N9GKQ 4, W9EI 3, KA9ZLG 2, W9BDP 2, K9EBK 2, W9XD 2, WA9OKK 1, W9KMY 1, K9OUP 1, WB9AJY 1, WA6OIZ 1.

WISCONSIN: SM, Richard R. Regent, K9GDF—STM: K9EP. SEC: W9ZAG. ACC: KA9FOZ. BM: WB9JSW. OOC: NC9G. PIO: K9ZZ. TC: K9GDF. New Section Traffic Manager is K9EP of Beloit, who is well recommended by traffic handlers, packeteers, and Navy Mars. Many thanks for the outstanding work of K9UTQ for handling the STM duties over the past many years. New officers MANCORAD: Pres. WB9ESM; V. Pres. KA9ZXG; Sec. KD9ADY; Treas. N9HNP. Green Fox ARC making use of 19-foot communications trailer and various equipment has new officers: Pres. KB9WC; V. Pres. N9CXX; Treas. N9ALZ; Sec. N9GVY. New officers of Oshkosh ARC: Pres. KD9WQ; V. Pres. KB9AIT; Treas. WB9ZHN; Sec. KD9BC. Milwaukee RAC offers Amateur Radio classes consisting of nine sessions. Classes for the Novice through Extra begin February 22nd at Wauwetosa East High School; forms for registering and information are available from KD9AJ. MRAC Club station W9RH will be on air more often. historical articles pertaining to MRAC should be sent KA9MXM. Ozaukee RC renewed as a Special Service Club. When W9LSR/5 and W9KL/7 both checked into the WIN/E, NCS N9BDL quickly remarked, "It's DX night!" If everything is coming your way, you're in the wrong lane. Traffic: WB9YPY 2025, KC9CJ 943, W9CBE 249, W9YCV 227, WA9WYS 188, K9GDF 188, W9KLN 135, KA9BHL 132, N9BDL 130, W9UCL 118, KA9RII 82, N9BCX 78, KA9KLZ 71, W9CXY 69, AG9G 69, WB9ICH 65, K9AKG 61, W9NGP 51, K9BED 47, K9EP 43, W9ODV 41. K9JPS 39, NS9Q 35, KG9B 33, W9UW 14, W9PVD 6, K9SAO 6, N9BYS 5.

DAKOTA DIVISION

MINNESOTA: SM, George Frederickson, KCØT—It seems to me, that in a way, the new sunspot cycle is a mixed blessing. It is a wonderland for DXers and an exciting experience for newer hams who are enjoying conditions they never dreamed could happen. But when the MUF climbs to 50 MHz plus, it can mean that life can be difficult for the low band (40 and 80 especially) traffic handler. Apparently the culprit is mainly that of high absorption of signals on these lower bands. So, along with aurora, magnetic disturbances, etc life can be challenging! Actually it hasn't been all that bad yet and November was a good Minnesota traffic month as you can see from the summaries below. Congratulations to KØJIY, Dean "OD" Oderkirk of Alexandria, as the November Amateur of the Month. Nice going "OD" and thanks to all for the great work. Marv Mahre, WØMGI passed me some information regarding the St. Paul Radio Club—certainly one of the Premier radio clubs. The club has a new meeting place at the Hamline United Methodist Church adjacent to Hamline University in St. Paul. You are invited to visit any of their meetings which are held the first Friday of each month. For license upgrading information in regard to classes, contact Steve Senty NØIXG at 612-613-3257. As an additional inducement, try checking into the SPARC "Friendly Net" every Wednesday evening at 8 PM local on 28.310 MHz. Len Still, WØBMX, a recent Silent Key was a charter member of the St. Paul Radio Club which he helped organize in 1931. Marv also says that one of the SPARC coffee-drinking groups, after 15 years, still meets every Tuesday evening at 7:30 PM at Denny's located at White Bear Avenue and I-694. Marv invites you to join them and have a cup of coffee with them anytime. Thanks Marv for the input! Thanks Gang, see you next time. 73 es GL. Jim Swisher KAØEPY, STM. MN Emergency Frequency 3860 kHz Bulletins 3860 kHz.

NET	FREQ	TIME	ONI	QTC	SESS	NET MGR.
MSN/1	3685	6:30P	370	68	30	NRØS
MSN/2	3685	10:00P	256	59	30	KDØNH
MSPN/N	3860	12:04P	459	234	30	WBØWNJ
MSPN/3	3860	5:30P	929	216	30	KCØT
MSSN	3710	6:00P	340	37	30**	KAØSBY
MAWN	3860	6:00P	353	206	22	KDØCI
PAW	3925	9:00A	3535	429	118	WDØBAC

**In addition, MSSN handled 69 training messages. Traffic: WBØWNJ 1150, WAØTFC 434, KAØEPY 303, WØGRW 226, KAØARP 136, NØFOO 131, KAØSBY 121, NRØS 113, KDØCI 75, KT9I 73, WDØGUF 65, KØOGI 60, KDØNH 54, WGØS 52, KCØT 50, KØQBE 49, WØKYG 23, NØJP 22, WDØW 22, WFØQ 15, NØIYE 14, W9DM 6, KEØBQ 4. Total Traffic 3,198.

NORTH DAKOTA: SM, Bill Kurtti, WCØM—Devils Lake Hamfest Feb 25. I had the chance to stop in for coffee at the Parkway Cafe with the fellows in Jamestown this month. NØCOU is coming back to Jamestown. Welcome back Jim. We are still looking for operators to put stations into operation for our ND Centennial project. There are 14 historic sites listed on the ND Centennial QSL card; we would like to have every one of them active sometime during the summer of 1989. Contact me for details (nothing formal) Portable or mobile or however you want to do it. Stations in Dickinson, Bismark, Fargo, and Grand were active in the WE THE PEOPLE operation this month making approx 9000 contacts around the world. Congratulations to the following upgrades WAØQBN (about time Paul) KCØFT to Extra, Ewald Christenson from no license to Advanced, KAØZKE KSØBGH to General. Erin Rourke no license to Tech.

NET	FREQ	TIME	SESSION/QTC	MGR
GOOSE RIVER	1990 kHz	9 am su	4/118/5	WØCDO
DATA	3885 kHz	6:30 da	62/661/3	WØGFE
WX NETS	3885 kHz	9 am 12:30 pm 6 pm	62/661/3	WØGFE
STORM NET	3885 kHz	During storms only		WCØM

Traffic: KAØFSM 101.

SOUTH DAKOTA: SM, R. L. Cory, WØYMB—Asst SM: NØABE, WAØFPR. SEC: KAØKPY. STM: KDØYL. The number of contacts made by the six S. Dak. "200" stations was 3487. The breakdown is as follows: Watertown 587, Aberdeen 1300, Mobridge 369, Rapid City 500, S.D. School of Mins & Tech 280, and Huron 451. South Dakota was well represented. Six-meter packet link has been installed between Terry Peak and Pierre. For more info contact WØCQN at Pierre or NUØF at Rapid City. LARK at Watertown has received a certificate of recognition for their contribution to ARRL for W1AW

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renovation. KAØKPY conducted the S.D. SET test. Due to bad band conditions nets on both 80 and 40 were put into operation to pass the tfc. Thanks to all who participated. Traffic: NØDPF 618, KØERM 124, KØAIE 113, KAØUEQ 69, WAØURE 48, WØMZI 45, KAØKPY 39, KDØYI 33, WBØDMI 32, WØYMB 13.

DELTA DIVISION

ARKANSAS: SM, Bob Harmon, W5SEP—There have been lots of activities throughout the state. New officers CAREN club are Al Hughes, WB5OEW President, Rick Brownlee, KA9IVY, VP Wayne Mahnker, WA5LUY, Sec/Treas. James Paul, KC5LL, reports Yellville repeater back on air. Lee, KA5BMK, and members of the Northwest Arkansas Amateur Radio Club was well attended, and Bob LeMaster was named "Ham of the Year." Good turn out at the Razorback Chapter of the QCWA. Guest speaker was Leland Smith, K5LL, President of QCWA. I am planning a statewide campaign for both EC directors and ARES members. Details in next Section Manager's Newsletter. Thanks to each of you that wrote and called with comments on our first statewide Section Manager's Newsletter. The comments were gratifying. Hats off to Larry Ballentine and his wife for editing the CAREN newsletter. WD5FDP, Rick Mobley, will be taking over the editorial reins in January. Hope everyone had a Merry Christmas and a Prosperous New Year. Let's remember to promote ARRL membership in the coming year.

LOUISIANA: SM, John "Wondy" Wondergem, K5KR—ASM: KB5CX. SEC: N5ADF. ACC: K5DPG. SGL: KD5SL. TC: W5RWF. OOC: KE5QK. Packet: NE5S. The Central Louisiana ARC in Alexandria is one of the more active and dedicated groups in the state. Their monthly newsletter "The Brass Key" is a first class printed publication thanks to Dennis—WA5QMM. The newsletter is loaded with all types of timely information and is mailed to club members and all members of the Louisiana Council. Their 1988 officers were recently congratulated for an outstanding job and re-elected for 1989. Attaboys go to Pres: Lou, WG5W. VP: John, N5JMO. Treas: Ed, KB5CX and Sec: Mary, WA5CRU. CENLA will have a 1989 hamfest on 1 July in the Pineville H.S. in Alexandria. Ed, KB5CX, ARRL Assistant Section Manager and member of the La. Council Linking Committee states that statewide linking of 2 meters via 440 or microwave is at a standstill and volunteers are needed if interest still exists. Contact him at P.O. Box 68, Alexandria, LA 71309, if you or your club has interest from a technical standpoint. He feels that it would be a good thing for LA, but needs 6 or 8 people with technical expertise to see what can be done. He is considering a meeting for an hour at the Lafayette Hamfest in March. Regretfully, Jack Swanson, W5PM, died in an auto accident 31 Oct. 88. He was a former ARRL LA Section Manager and top-notch DXer. Traffic: DRN-5 Nov 88. LA represented 98% K5WOD, WA5WBZ, KF5VW, N5CNK, N5LRZ and N5CM. LA traffic 89 msg in 30 sessions, 406 minutes, 289 checkins. 73 de "Wondy" K5KR.

MISSISSIPPI: SM, Jim Davis, KK5Z—ASM: W5TRD. SEC: KA4PKA. SGL: KA5WRX. PIO: WN5M. STM: KB5W. BM: W5EPW. TC: KF5DE. OOC: KK5K. AAC: NC5Y. No repts on upgrades for this month. Much tnx to N5DVR for his unselfish and outstanding asst during challenger power race in Sept. FM NO, LA, to St. Louis, MO. Gud time by all. DRN5 (WB5YDD) SESS 60, QTC 573. MISS REP 95% by KB5W, KT5Z, W5HKW, and NS5M. CAND (W5UPN) SESS 30, QTC 807, MISS REP 100% by NS5M. MTN (KB5W) SESS 30, QNI 171, QTC 84. MAG SEC NET (W5YRX) SESS 30, QNI 510, QTC 17. MISS SLO NET (W5YRX) SESS 19, QNI 7, QTC 4. GULF COAST EMERG NET (KB5W) SESS 5, QNI 82, QTC 3. MISS/LOU EMERG NET (N5EZX) SESS 4, QNI 88. MSBN (KF5DE) SESS 30, QNI 2007, QTC 35. GULF COAST SBN (W5JHS) SESS 30, QNI 979, QTC 12. FM W5EPW (BM MISS ARRL) reg ARRL numbered bulletins 13; propo bulletins, 5. CRRL bulletins 2.

TENNESSEE: SM, Harry Simpson, W4MI—Eastern Assistant SM and PIO W4TYU, Central Assistant SM WA4GLS, Western Assistant SM and ACC: K4CXY. STM: NG4J. SEC: K4UVH. OOC: K4LSP. SGL: N4PQY. TC: W4HHK. The TN Phone Net is on 3980 kHz with early sessions at 6:40 AM Eastern, Regular sessions at 7:45 AM Eastern Monday thru Friday, at 9 AM Eastern on Saturdays, Sundays and Holidays. Evening sessions are Monday thru Saturday at 7:30 PM Eastern. Sincere thanks to WA4HKU for taking over as Net Manager of the Evening sessions. CW Net Sessions are on 3635 kHz at 8 PM Eastern, Monday thru Friday. If you can still copy CW, it would be good to have you join us on that mode. Sometimes we have three operators, sometimes as many as eight, but we are always there, and someday it will be as active as it was 30 years ago. It is with deep regret that I record the passing of four Tennessee hams, WA4YFG William F. Wade of Trenton, WB4CUQ Clarence E. Yockey of McMinnville, WB4HTX Emmette W. Hailey, Jr. and N4LX Foy Coble, both of Nashville. They will be missed by their many friends. Obviously, we must recruit more hams as ORS, OBS, OO, etc., not only for the growth of the order, but also to maintain its strength. The section staff is urged to do everything possible to sign up new appointees to all available positions. Too, Tennessee ARRL members are urged to apply for appointments. If you do not know to whom to apply then simply apply to me, and I will get it into the right hands! Traffic: WA4FMR 139, KA5KDB 58, W4DDK 51, K4WOP 43, W4MI 33, WB4LAL 30, KE4LS 20, W4TYV 20, K4CXY 19, WA4GZZ 12, W4PFP 12, W4EWR 8, W4PSN 8.

GREAT LAKES DIVISION

KENTUCKY: SM, John Thernes, WM4T—Asst SM: KC4WN. SEC: WB4NHO. STM: KA4MTX. PIO: WA4SWF. (November) My thanks to all of you who participated in the SET, especially K4HOE and others for getting the DES station on the air in Frankfort. I will mail out to all affiliated clubs the SET results when they become available. If you would like to be involved in emergency work, see your EC and get signed up with ARES.

NET	QNI	QTC	SESS	MGR
MKPN	1429	119	30*	WD4RWU
KTN	821	78	29	WD4RWU
KYN(E/L)	310	133	60*	K4AVX/KZ8Q
TSTMN	453	40	30	KZ8Q
KNTN	260	70	38	WA4EBN

Traffic (Nov.): WD4RWU 110, K4VHF 106, KI4QH 55, KB4UJA 55, WA4EBN 51, KA4MTX 41, WA4SWF 34, K4AVX 31, N4GNL 29, KC4WN 21, WB4AUN 20, K4HOE 18, KU4A 12, WA4NOG 11, WD4CQF 8, N4PEK 7, WA4HLW 2. PSHR: KI4QH 83, KA4MTX 78, N4GNL 74.

MICHIGAN: SM, George E. Race, WB8BGY (@N8FTY)—ASM: WA1LRL (@WA1LRL). STM: WD8KQC (@NT8R). SEC: N8AYQ (@TVC). SGL: N8CNY. TC: W8YZ. OOC: WA2AJQ. ACC: N8JVA. PIO: N8KBA (ex KA8ZOV). BM: WI8W. Your MI ARRL Staff is now at the 100% level! All major appointments, listed above, are now filled. All of these highly qualified and dedicated amateurs are here to serve your needs, anywhere in the MI Section. Now that they are in place, let's see that they are kept busy by you, the membership. Nov. 29th will be a date remembered by District 3 amateurs in Genesee Co., and many amateurs across MI. At 8:15 PM, Genesee Co. EC, WD8JCN, was notified of a fire at a plastics Mfg. in the city of Flint. Toxic fumes from burning chemicals at the sight were covering a wide area. Dr. Klipa, N8ERF, was instrumental in identifying the burning chemicals for Fire Officials. Officials were prepared to evacuate up to 3000 people from their homes, and about 800 were actually evacuated during the course of the evening. Six Co. AREA groups were on standby, the District 3 emergency VHF net and the Genesee Co. ARES net swung into action, the MEPN packet system was on line, the GLETN operation on 3.932 MHz was called upon to provide emergency coordination between MI Counties. Area amateurs provided communications at the Flint Fire Response Coordination Center, 2 shelter sites, 2 triage sites, 4 hospitals, and 1 staging area. About 24 amateurs were directly involved in emergency communications in the disaster area. Dozens more manned the standby emergency nets around the state and volunteered their services. Citizens near the area, 60 firemen, and 2 amateurs were treated for respiratory problems associated with the toxic burning chemicals. 27 Fire Agencies, 3 Police Departments, and dozens of Red Cross, Salvation Army, and amateurs were involved in the operation. Although we will probably never be able to put together a complete list of all amateurs involved and give proper recognition and credit for all the effort they put forth, the following are recognized for their outstanding contribution to the operation: Jack, WD8JCN, Dennis, N8ERF, Doug, KA8OWR, Shelby, W8WN, Dan, KB8ATR, Don, KA8EUV, Ray, KA8PRV, Dave, N8HKV, Don, WA1ELA, Jay, N8FTY, George, N8JAT, Mike, KA8ASN, Ruth, WD8BSE, Dick, WB8ZIY, Gordon, K8ZIB, Ed, WB8COU, Joe, K8CQF. At 5:13 AM, Nov. 30th, N8HXQ closed the emergency net. Elapsed time—9 hours. The training and dedication of the Genesee County ARES group is among the finest in the state. The coordination of the District 3 ARES/RACES group provided immediate resources from the surrounding area and across the state. My personal thanks to Ruth, WD8BSE, who so skillfully conducted the 3.932 MHz GLETN during the early disaster hours. Also to Dick, WB8ZIY who kept the State Net in operation throughout the late session. All of you who gave your time and support, both in the disaster area and throughout the state, make me very proud to be the MI SM. Your organization, training, and response, are second to none in my book. Great job! Each of you have certainly earned the right to say, "I am a Ham." You can be proud of the job you did in the name of Amateur Radio and all that it stands for, here in Michigan. Please support the following MI area Nets:

NET	FREQ	TIME/DAY	QNI	QSP	SESS	MGR
UPN*	3921	5:00PM DY	1148	72	34	WA8DHB
MACS*	3953	11:00AM M-SA	378	61	29	K8OCP
MITN	3953	7:00PM DY	590	191	29	WD8EIB
QMN*	3663	6:00PM DY	824	189	90	WB8R
SEMTN	145.33	10:15PM DY	413	115	30	N8HSC
MNN*	3722	5:30PM DY	93	5	24	KA8QVH
GLETN	3932	9:00 PM DY	1185	68	30	KA8EIZ
WSSBN	3935	7:00 PM DY	656	31	30	W8NDI

*QMN Fast-6:30 PM DY; QMN Late-10 PM DY; MMN-8:00 PM DY; MACS-1 PM Sun; UPN-12 PM Sun. Traffic: KA8CPS 297, WD8KQC 140, N8FTY/BBS 127, NW8M 101, WB8SYA 82, N8FPN 80, W8RNQ 75, K8GXV 74, WB8YPG 69, W8EOI 65, WB8R 61, KA8BBY 59, N8JAT/BBS 59, NY8W 55, WA8DHB 54, KB8DHV 52, K6HAP 49, WB8YDA 46, N8HSC 45, K3UWO 44, WI8W 40, WB8BGY 39, WD8EIB 37, W8YIQ 33, N8IIC 29, K8UPE 26, N8HTG 25, N8CNY 22, K8OCP 18, WI8K 17, NX8S 14, N8FIZ 13, W8CSO 13, W8WOJ 12, W8VIZ 11, KA8HZO 10, WB8EZ 9, W8CUP 8, WD8MJB 8, KI8Q 8, KA8LAR 8, W8YZ 7, WA8MVH 7, N8EXS 4, N8ITM 4, W8URM 2.

OHIO: SM, John Haungs, WA8STX Phone: (513) 563-7373—ASM: David Kersten, N8AUH. SEC: WD8MPV. STM: KF8J. ACC: KJ3O. BM: W8ZM. tC: KB8MU. OOC: WB8ZCE. SGL: N8CVK. PIO: K8QOE.

NET	QNI	QTC	SESS	TIME (LOCAL)	FREQ	MGR
BN(E)	250	103	30	1845	3.577	WD8C
BN(L)	169	79	30	2200	3.577	K8TVG
BNR	253	87	30	1800	3.605	W8EK
BSSN	215	90	29	1900	3.873	KA8UYN
OSN	282	81	30	1810	3.708	WD8KBW
OSSBN	1869	1013	89	1030 1815 1830	3.9725	KA8CGF
OSSN	172	69	30	0645 M-F	3.577	KD8HB
OSSN	—	—	—	0800 S-SN	3.708	KD8HB
O6MN	9	11	3	2100 WED	50.18	WD8CTX
OHIO SECTION ARES NET				1700 SUN	3.675	WD8MPV
OATN	733	58	30	1845 DAILY	147.735	N8GPU
BRTN	221	87	30	0230 DAILY	146.46	WA8HED

Now the Holidays are over and I hope there were a quantity of new transceivers under the Christmas trees. We have probably heard some of them on the air already. I am sure everyone is hoping for a mild winter without a lot of snow. Maybe we will hear some ski mobile calls from the North. I guess there is always a chance for a blizzard, that would give us some emergency traffic throughout the state. I want to welcome Joseph Phillips, K8QOE, the new Section Public Information Officer, who has very enthusiastically accepted the responsibility. Joe is the Editor of the "Ham Call" column in the Cincinnati Enquirer. Joe is also a teacher in the Princeton School System. Joe will probably be in touch with the PIA's in the Section. More and more traffic is being sent by the Packet mode. There was a SW OH Digital Symposium Jan. 7 at Middletown Miami University Campus hosted by Engineering Tech. Dept. and the OH Packet Council. N8XX, Program Chm. will have report of the event. Congratulations to Scott, KO8O of Lake Co. ARA being selected the first to receive the "Good Ducky Award" for doing good for the club. Congratulations to the new IARC-MASER officers: KC8SS, Pres; N8DPW, VP; N8EBK, Secy; N8CJR, Treas; WD8OJL, KA8UPR and N8GBN, Directors. Mark your calendars for the OHIO ARRL CONVENTION IN CINCINNATI on Feb. 25 and 26. WD8QDQ for info. Hamfest schedules should go to Joanne

Solak, KJ3O Affiliated Club Coordinator for Section listing. Conneaut ARC Hamfest Mar. 12, WD8BAD for info. THE GREATER CINCINNATI ARA donated $1000 to the W1AW Renovation Fund at the Nov. meeting. It is time for everyone to check the expiration date on their FCC license. The next license will be for ten years. Congratulations to the members of the Canton ARC who were presented the Clubs "Community Service" and "Distinguished Service" Awards for the first time. A great group, keep up the good work. Good luck to the new Pres. Joe Vignos, W1FEZ. The OH-KY-IN Radio Soc., K8SCH was busy taking messages at several shopping malls during the weekend Christmas season. With all this traffic the club still had time for the code and theory class and FCC exams and a Packet Radio Forum. No wonder they have a reputation as a "doing club." Larry Solak, WD8MPV reports two new EC Appt. W8OUW, for Licking Co. and W8OK, Montgomery Co. and an OES Appt. WB8MEK. Dave Kersten, N8AUH reports a new ORS Appt. KC8UR. Traffic: AD8I/PBB 540, K8TVG 385, W8DPZ 300, KD8KU 272, W8ZOL 266, K8JDI 260, W8BO 256, KD8HB 203, WD8KFN 180, WA8SSI 170, WD8MIO 154, W8QZK 146, KC8TW/PBB 142, W8SKP 138, KA8CGF 135, WB8JGW 133, N8FWA 121, K8IOW 111, K8DHD 109, W8CXM 97, N8CJS 92, N8XX 91, N8IIP 89, WA8ERQ 88, WD8RIB 83, W8EK 76, KE8CV 75, K8CMR 73, KA8GJV 73, N8GPU 66, N8GEC 66, WD8MEK 66, WD8IKC 64, WA8HED 63, KC8DF 60, N9AUG 60, WD8QXT 59, WA8STX 57, WB8HHZ 54, NE8X 53, K8ALV 50, KB8OZ 49, W8JLW 46, KD8XL 42, NW8E 37, KA8YIT 32, KA8BNQ 31, N8FPH 30, WB8KWC 29, KA8DRR 28, KA8SON 28, KA8RIX 27, KA8HBN 27, KA8SOM 24, N8GOB 24, N8IDA 24, KB8EIW 23, N8CJS 22, WA8EYQ 22, KE8DQ 19, K8WZX 18, N2NS 18, N8FC 17, WD8JAW 17, N8HJB 17, N8CW 15, N8JDH 15, N8AJU 12, K8EF 12, KB8XL 12, K8CKY 12, KC8YV 12, KC8JV 11, K8DXZ 10, W8ZOL 9, WB8GDM 9, KB8DEB 8, WD8PWG 7, WB8JYE 6, W8BDC 6, N8HRW 6, W8RG 6, WB8KWD 6, W8BHL 5, KA8OQF 5, KA8VYT 4, W8LDQ 3, N8GIO 3, WB8VNV 2, WA8NZE 2, W8FPA 2, N8EFB 2, N8IWC 2, N8HBF 2, W8XT 2, WB8OFR 1. Total 6425. October Traffic: KA8HBN 14, WB8VNV 13, W8XT 8.

HUDSON DIVISION

EASTERN NEW YORK SM, Paul S. Vydareny, WB2VUK— ASM & STM: K2ZM. SEC: WA2ZYM. BM: WB2IXR. PIO: KB2TM. OOC: N2DVQ. ATC: WA2VGM. SGL: KB2HQ. ACC: KV2A. ASM & NWSLTR ED: WB2NHC. ASM FOR PACKET: N2FTR. NET REPORTS FOR NOVEMBER (QNI/QSP): AESN 59/4 CDN 634/62 ESS 417/67 HVN 118/26 NYPON 602/374 NYS/E 357/195 NYS/L 310/187 NYS/M 327/181 SDN 265/123. CLUB NEWS: Albany ARA had a presentation on antennas by K2TR and had elections. They also held their first 10 meter warm sprint on Dec. 8th. Catskill ARA learned about Oscar and satellites from WA2FUZ. They also held a Fox Hunt on Dec. 18th. Communications Club of New Rochelle held elections in Dec. Poughkeepsie ARC heard Don, NJ2E, a captain for the American Eagle, talk about aviation and radio. Steve, N1DAY presented a program on Kenya to the Schenectady ARA. They welcome new members K2OL W2BSW WA2BLT N2IPS WB2PIZ WD2IHW N2HQD. The SARA Public Service Award was given to K2RI KA2FEN KA2OHT KA2OHU KA2OPG N2CNZ N2GXH W2ARQ W2KE WB2EAR WB2VJC. The W2SZ ARC had a question and answer session at the Dec. meeting. WARA held their annual dinner. WECA discussed their annual budget. Yonkers ARC discussed an upcoming dinner and made a donation to the W1AW renovation fund. N2FTR has been appointed 2RN packet manager during KB2HM's absence. It is with deep regret that we announce that Dan Murray, W2PKY became a silent key on Thanksgiving. Dan was very active in the Albany area clubs and on the air for many years. He was one of the founders of the NTS as we know it today. He was a real gentleman, a good friend to all and really will be missed. Nov. PSHR: WB2VUK WA2JBO N2HIF K2ZVI KB2EPU WB1BTJ. Nov. Traffic: N2HIF 323, WB2VUK 178, K2ZVI 111, WA2JBO 85, N2FTR 68, WB2EAG 44, WB1BTJ 42, KB2EPU 37, WB2NVR 34, WA2GYY 23, N2FSJ 15, W2CJO 14, K2HNW 8.

NEW YORK CITY-LONG ISLAND: SM, Walter M. Wenzel, KA2RGI— ASM:N2GQR. ASM VE: W2NL. ACC: KA2LCC. SEC: WA2UJI. STM: K2MT. OOC: NB2T. TC: WA2YNH. BM: W2JUP. PIO: KA2LCC. The following are traffic nets in and around the section that handle NLI messages:

NET	FREQ	TIME	DAY	MGR	SESS	QNI	QTC	QSP
BAVHF	145.350/R	2000	Dly	K2YQK	30	421	128	128
NCVHF	146.745/R	1930	M-F	N2IMP		N/A		
SCVHF	145.370/R	2000	S-F	KA2JMA	26	209	64	63
NYPON	3913 kHz	1700	DLY	KA2UBD	30	602	406	374
NYS/M	3677 kHz	1000	DLY	KA2UBD	30	327	202	181
NYS/E	3677 kHz	1900	DLY	N2EIA	30	357	319	185
NYS/L	3677 kHz	2200	DLY	KU2N	30	310	218	187
NLT	28450 kHz	2100	WED	N2IMP	—	N/A	—	—
ESS*	3590 kHz	1800	DLY	W2WSS	30	417	—	67
PNS	145.01	24hr	DLY	AI2Q-4		N/A		

*Independent Net, recognized by NTS, all times are local. VOLUNTEER EXAM SESSIONS: Please remember you are required to bring the following to the test session you plan to attend: Your current original license document, a copy of the license, the original of any certificate of successful completion and a copy, $4.75 in cash or check and two forms of positive legal identification in addition to your calculator, No.73 pen, and No. 2 pencil. If you are a physically handicapped person and require a change to the normal testing procedures, please remember to bring down to the session a copy of a physician's certification indicating the nature of the disability so it can be attached to the 610 form. VE LISTINGS: LIMARC-second Saturday of each month at 9:30 AM at Salten Hall, NY Institute of Technology,Old Westbury-contact Joe, W2NL, 516-541-2450; SUFFOLK COUNTY VE TEAM -second Saturday of each month at 9:30 AM at the Suffolk County Community College, Selden-contact George, WA2VNV 616-751-0894; GRUMMAN ARC-second Weds. of each month, until June, at 5 PM at the Bethpage High School, Bethpage-contact Howard W2QUV 516-354-6861; GREAT SOUTH BAY ARC-fourth Sunday each month at 12 Noon at the Babylon Town Hall Annex-contact Walter KA2RGI 516-957-5726; If your group holds regularly scheduled license exam sessions and/or classes let me know at least three months in advance so they can be added to the column before the printing deadline. I want to thank Alan, KA2WIJ for all of the work and dedication he has given in the position of Affiliated Club Coordinator for the section in past few years. Due to work requirements Alan has had to step down as of the first of the year. Jim Heacock, KA2LCC has

agreed to take over the duties as ACC. Jim's address information is 18 Newport Drive, Port Jefferson, NY 11776. Jim will be handling both the ACC and PIO positions until further notice. A reminder to all, we need your expertise in the local ARRL Field Organization as Assistant Technical Coordinators, Official Observers, Assistant Public Information Officers, Official Bulletin Stations and Emergency Stations. If you think you can assist and volunteer for one of these positions or just want to learn more about them please contact me. Clubs, please send me information on your events so I can add them to the column. Keep April 30th clear so you can assist with the March of Dimes Walk-a-thon. There will be increased activity this year within the section and we will need more operators to assist. Contact your local EC or me for more information.

NORTHERN NEW JERSEY: SM, Robert R. Anderson, K2BJG—ASMs: NW2L (NE), N2CXX (SE), N2WM (NW), WB2NQV (SW) N2XJ (Cen) and VE). SEC: N2BMN. STM: K2VX. OO/AAC: KA2BZS. ACC: WB2HBZ. SGL: W2KB. TC: K2BLA. BM: WA2UPK and PIO NW2L. NNJ Ham Radio Info Line 201-680-1585. At the section leadership level, Rich Moseson, NW2L, is appointed as ASM for the north east area. This function is in addition to his duties as PIO. STM John King, KA2F, has resigned. He is to be commended for his outstanding effort in building the NNJ traffic-handlers roster to where it is today with over 75 registered ORS and 9 NM. It is my pleasure to announce the appointment of Dave Welsen, K2VX, as the new NNJ STM effective 01/89. New appointments effective 12/88 are: W2QNL NM NJN/E, W2RRX NM OBTTN and KB2BEA EC Roxbury Twp. PIA K3GNZ for Raritan Bay ARC. Appointment endorsements for the next two-year term starting 02/89 are: ORSs KA2F and W2QNL. A certificate of ARRL club affiliation was presented to the Union College ARC by ASM Carl Felt, N2XJ, at their Scoth Plains campus on Nov. 4th. The NJ Traffic Handlers Confab held at Hightstown on Delaware 3, 1988, was well attended including the Directors from both the Atlantic and Hudson Divisions. The NNJ STM presented three NJ traffic awards: The W2UEZ award to N2FGC, the W2SUE award to WB2FTX and the K2SE award to N2DXP. Congratulations to the following who were newly licensed or upgraded during October sessions conducted by: Northeast NJ Testing Assoc. (8/3), Bergen ARA (5/2), Raritan Bay ARC (8/4) and NNJ VE Board (22/10). Novice (1): D Kaeser. Technician (11): J Appleton, J Phillips, R Torres, N Komagata, KB2GLG, KB2FVL, KB2ELS, KB2FKE, KB2GEG, KB2GKT and KB2GMU. General (3): J Shea, WB2SCK and KA2CZU. Advanced (2): J Hancock and K2OQA. Extra (2): K2DPM and N2HHU. Total applicants (43). Total new or upgrade (19). 44.2%. Traffic nets and statistics for October 1988:

Net	Mgr	Freq	Time	Sess	QSP	QNI
NJM	WB2ZJF	3695	1000 DY	31	140	260
NJPN	W2CC	3950	1800 DY	36	88	328
NJN/E	W2QNL	3695	1900 DY/P	28	98	210
NJN/L	WA2OPY	3695	2200 DY/P	31	68	135
NJSN	KA2INE	3735	1830 DY	31	32	150
OBTTN	KA2F	147.12	2000 DY	26	72	176
NJTTN	N2DXP	223.88	2100 DY	31	48	288
NJVN/E	WB2FTX	146.895	1930 DY/P	31	71	508
NJVN/L	N2FGC	146.49	2230 DY/P	N/A		
NNJ/PL	W2QNL	145.01	24HR			

VIA WA2SNA-1 Packet NTS activity for November, 1988: Total 264. WA2SNA-1 auto forward (175) plus liaison (122) by NZ2T (19), N2HQQ (11), W2QNL (73), WB2FTX (2), WA2EXX (1), and KC2YG (1). SAR/PSHR for October: W2RRX 65/60, W2QNL 323/127, K2VX 128/96, KB2BNW 34/46, W2XD 15/-, N2XJ 251/118, N2DXP 81/60, WB2FTX 81/64, ND2K 5/-, WA2CLP 14/-, WJ2S 36/60.

MIDWEST DIVISION

IOWA: SM, Wade Walstrom, WØEJ—ASM: WBØAVW. SEC: KDØBG. STM: KCØXL. ACC: NUØP. OOC: WAØQMU. BM: KØIR. TC: KØDAS. PIO: WEØM. New officers of the Eastern Iowa DX Association are President: NUØP, Vice President: WB8ZRL, and Secretary/Treasurer: NCØO. New officers of the Collins Amateur Radio Club are President: NYØV, Vice President: WBØUQ, Secretary: Bill Caldwell (as yet unlicensed), Treasurer: WØRFX. New officers of the Burlington Amateur Radio Club are President: KØKOP, Vice President: KAØFWL, Secretary: WBØSGW, and Treasurer: KAØYGX. New officers for the Fort Dodge Amateur Radio Club include President: WBØCAD, Vice President: WDØVLV, Secretary: KØARA, and Treasurer: KØTDO. Davenport Hamfest is scheduled for February 26, 1989. I hope to see you there! Recent upgrades include KAØZPS, KBØCVJ, KBØDKE, KBØHEX, and KBØHEW to Technician, NØIUU and KAØRJQ to Advanced, and KØARA, WBØFNA, WDØAQC to Extra. N9OK and WBØFBP gave our hobby a nice plug by describing ham radio efforts during Hurricane Gilbert on local Quad Cities television stations. WBØSBL, KØAAG, NØBFJ, KAØHMW, NUØG, WDØAMA, WØOJD, KØPVB, KCØZA, and KØHSC all provided communications for the Quad Cities United Way kickoff parade. If you have not voted and returned your SM election ballot yet, DO IT NOW! Traffic: WØSS 168, KØPT 132, WØYLS 117, KAØADF 115, KØGP 95, WBØAVW 45, WBØMCX 42, KCØXL 39, KAØVBA 10, WBØOKA 7.

KANSAS: SM, Robert M. Summers, KØBXF—SEC: NØBLD. STM: WØOYH. Nice to hear that WØTQ is home and hopefully on the mend. Do not forget to check into the Technical net on 3920 kHz Weds after the KSBN. NØHEP and his staff of ATCs await your problems for them to solve. Thanks to NXØR, we now have a Packet Radio Coordinator for Kansas. Along with NØBEV, WAØZBL, KØVAY, WBØAEX to name a few, we have a start towards getting packet really together here in Kansas. For more details keep checking your PBBS. If you are an active Packet Radio operator, drop NXØR a line or two with ref your set-up including your home PBBS you monitor most frequently. Net activity for October is as follows: KSBN QNI 1504 QTC 218. KPN 463/53. KMWN 1026/710. KWN 747/574. CSTN 1980/57. QKS 250/79. QKS-SS 42/9. Still looking for some RTTY activity in Kansas. Are you doing anything in this phase of the hobby? Let your SM hear from you! Interested in QCWA? The Sunflower Chapter meets on CW 1st and 3rd Sat 2PM 3610 kHz. They also meet 2nd and 4th Sat 2PM on 3915 kHz each week. 1988 SET weekend is over. Did you take part in any exercise? If not, perhaps we still need to consider additional simulated disasters to prepare. Traffic (Oct.): WØFIR 260, KØBXF 191, WØFRC 167, NZØM 154, KSØU 108, WØOYH 96, NØBDG 94, KAØRCH 78, WBØZNY 59, WØFDJ 56, NBØZ 38, WØQMT 34, WØMYM 19, WAØYXK 16, WØRBO 9, WØCHJ 7, KXØI 5, NØLL 4.

MISSOURI: SM, Ben Smith, KØPCK: The following were elected to offices of the Kansas City ARC for 1989; KCØWX, Membership secretary; KAØE, Vice president; and NXØY, Director. Amateurs in Southwest Missouri assisted local Red Cross and Barry County Sheriff's Department with communications after a tornado hit that part of the state November 15. Hams that helped were: NØFBW, NØRM, NØFDD, KDØXJ and KDØKQ. Amateurs of the Mexico ARC provided communications for the local Christian Churches when they held their 10-kilometer Crop Walk. Those assisting were: WBØJES, KØELB, NUØH, WBØJAE and KAØNTS. The Kimberling City ARC operated message booths in local shopping centers on two Saturdays. Lots of literature about Amateur Radio was given out to interested people and over three hundred radiograms were sent across the US and other countries. It was a very good promotion for Amateur Radio and the local club. Field appointments for the month were: KØCCK and WBØOPO as OO's. Silent Keys: WØQJU, WBØCEU and WA6YJZ.

NET	SES	QNI	QTC	DAY	TIME	FREQ	MGR
MOSSB	30	778	175	D	6	3.963	KØORB
MEOW	30	634	144	D	5:30	3.963	WDØELL
MON	60	199	105	D	7/9:45	3.585	AIØO
HBN	22	327	22	M-FR	12:05	3.880	KØDSQ
MEN	8	144	21	W	9	146.76	KØPCK
HARC	3	50	18	TH	9	146.94	KABSXY
LOZBC	26	437	12	M-SA	6:30 AM	146.73	NØHVO
PRABN	21	161	7	D	9	145.29	KBØANP
PHD	4	121	7	M	9	146.43	WAØKVH
SLARES	4	274	2	M	8	146.91	KØWEX
JCRC	6	69	2	W	8	147.00	WØORI
ZAEN	6	74	1	—	—	147.24	WDØELL
MEXARES	5	35	1	TH	9	147.255	KBØAGC
ELDON	4	94	0	M	8	146.895	NØHIZ
LOZFM	4	68	0	F	9	146.73	NØHVO
CARL	4	27	0	W	8:30	146.46	WBØWLU

Traffic: WAØYJX 618, NOØG 448, NDØN 216, KØORB 212, WAØHTN 154, AIØO 99, WB8TVV 66, WBØOIZ 58, KØPCK 56, K9OCU 49, WØOUD 45, KDØAJ (Oct 21, Nov 10), WAØKUH 7, KEØAH 3, KØUAA 2.

NEBRASKA: SM, Vern Wirka, WBØGQM—Two new field organization appointments have been made in the Nebraska section. William Moninger, WAØGQH of Omaha is now an Official Observer and Jim Peterson, WBØQGV of Omaha is the new Emergency Coordinator for Douglas County. Thanks for a job well done to the former Douglas County EC, William "Duke" Humphrey, WDØEWH. John Parameter, NØGNP of Scottsbluff became a Silent Key in early December 1988. Our condolences go out to John's family. NØGNP held the field appointment of Net Manager for a Scottsbluff 2 meter net. Congratulations to Lloyd McElhaney, KØDKM of Omaha. Lloyd set a new section record for total station traffic with his report of 680 during October of 1988. In the first three months as a technician, Rich Schmucker, KBØDCD of Brock, reports he has worked all continents, confirmed 36 countries and has 40 states confirmed, all on 10 meters. Congratulations Rich. The Lincoln weekly Saturday breakfast/coffee session is now at the Holiday Inn, 5250 Cornhusker Highway, from 0830 to 1100 local time. The Pioneer Amateur Radio Club of Fremont organized a tour of the Strategic Air Command underground command post at Offutt Air Force Base in November. Traffic: KØDKM 451, WØAP 109, KØMZV 29, WBØTED 14, WØKBS 11, WCØO 10, WBØGQM 10, NOØA 9, WØNIK 1.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Caesar Rondina, N1DCS—ASM: KB1H. STM: K1EIC. OOC: NA1L. ACC: NK1J. PIO: WA1CMF. TC: KC1Q. SGL: K1AH. SEC: N4GAA. Hi, I hope and trust everyone had a safe and healthy holiday season. 1989 is going to be a great year for Amateur Radio. Ten meters is opening nicely, so let's help the Novices to upgrade. Support your local clubs and get involved. Congrats and best wishes to Ann, KA1GWE for her appointment to NM of WESCON. I am sure her experience in traffic will be a great asset to the traffic system. I would also like to thank Debbie, NQ1P, for a job well done, as previous NM of WESCON; she was an outstanding example to the traffic community. A special thanks to Paul, W1HAD, he has served for many years as TC to the CT Section and has helped many operators solve many technical problems. Congrats to Luck, KY1T, to be our new CSTN BBS on 145.010. Oh yea, my BBS is up and running on 145.05, the call is N1DCS-4. Also I have N1DCS-2 (HAVEN2) as a 2-meter node on 145.05, and N1DCS-3(HAVEN3) as a 220 node on 221.110. Check in and say hi. Thanks to W2JUP and N1API for all their help. Congrats to Bill Wawrzeniak, W1KKF, for his Meriden ARC Ham of the Year Award. Also congrats go to Al Alvareztorres, WA1NPX. Al received the Adolph Goodsell Elmer of the Year Award from Meriden ARC. By the way Meriden ARC came in 1st in Field Day using class 1A, under the call W1NRG. Way to go. While visiting the Meriden Club, I had the pleasure of seeing a very interesting presentation by Rich Assarabowski, K1CC, on his trip to Poland. The presentation consisted of an excellent slide presentation and commentary. Rich has graciously allowed me to print his number should any clubs wish to contact him to be a guest speaker. I strongly recommend you all see this one, I enjoyed it immensely. Rich can be reached at 675-0166. We did it again, Conn. Sec. had 100% representation on IRN in November. Great job. Thanks to all the clubs who have shown me a great deal of support and have welcomed me to their meetings. I can see we're on our way. 73 for now . . .

Net	NM	Time	Freq	Sess	QNI	QTC
CN	WB1GXZ	7 & 10 PM Dly	3.640	60	335	251
CPN	NK1J	6 PM M-Sat 10 AM Sun	3.965	30	378	148
NVTN	NM1K	9:30 PM Dly	146.880			
WESCONN	KA1GWE	8:30 PM Dly	147.180	30	397	113
RASCN	KY1F	9:00 PM Dly	146.730	30	214	66
CSTN	KY1T	24 HR BBS	145.010			
CSN	WB1GXZ	7:30 PM M-F	3.720	22	108	46
TMARCN	NM1K			4	85	3
NUTMEG	NM1K			30	670	232

Traffic: N1DMV 487, NM1K 390, W1EFW 360, WB1GXZ 212, KY1T 212, KA1JAN 154, K1EIC 139, KA1GWE 131, KY1F 82, W1WP 79, N1API/R 77, N1FNN 74, KA1FVY 65, KB1ZC 58, N1FQO 46, N1GBP 44, KA1ROL 26, W1YOL 23, NK1J 22, WA1NLD 21, WB4FCC 21, KA1KP 19, N1BOW 18, W1BDN 15, WB2SGI 10, W1QV 6, W1CUH 4.

EASTERN MASSACHUSETTS: SM/SEC: Barry Porter, KB1PA— STM: KW1U. PIO: K1HLZ. BM: KB1AF. OO/AA: AG1F. SGL: K3HI. TC: KA1IU. ACC: open. EMass Hotline: 437-111

Net	Mgr	Freq	Time(EDT)	Dy	Sess	QTC	QNI
EMRI	N1AJJ	365	1900/2200	DY	54	178	179
EMRIP	WA1FCD	3880	1730	DY	30	137	147

EM2MN	KA1MDM	63/23	2000		DY	209	418	
NEEPN	K1BZD	3945	0830		SUN	4	10	32
HHTN	NG1A	04/64	2230		DY	30	155	373
EMRISS	N1CVE	3715	1600/2030		DY	14	37	
CITN	KB1AF	745/045	1930		DY	26	94	345

This season we need to take time to reflect on how lucky we are to be able to be ham radio operators, and remember that we are Federally (not State) licensed. We continue to occupy frequency space based on our hobby's history of being there when it counted and getting the job done. Much of this history and tradition are unknown to our state and local officials. We have been (and will continue to be) under heavy pressure to give up frequency space on the national level. This fact obscures something that is happening locally that I need to mention. Despite PRB-1, our ability to erect towers is under severe threat on a LOCAL level, a level that needs individual and local club involvement. This is due to an explosion of Cellular telephones in this region. In order to be more effective, Cellular phones require many antennas in many locations. Many citizens are bawling at allowing so many ("ugly") antenna structures to be erected in their communities and are demanding action by local zoning boards. Many of these boards are reacting to citizen complaints (read voters) by enacting restrictive legislation relating to towers without taking the local am populations needs into account. While these restrictions can be overridden by court action, his is an expensive way to go and creates a bad feeling by local officials toward or hobby. ONE MORE TIME: We as hams need to GET INVOLVED in the local zoning process to ensure that the local government understands what benefit Amateur Radio can have on a local community. Many clubs are looking for speakers and programs. Why not invite local mayors or selectmen along with local CD officials to a meeting to show them what we can do for them and indicate the fact about PRB-1 and the fact that we are federally licensed. It would be good publicity and "head off at the pass" any future problems with towers. This last month there were 6 tower ordinances opposed (that I know of.) This will only get worse before it gets better unless YOU ACT NOW. While the ARRL and local field organization can help, this is A LOCAL MATTER and requires everyone's involvement LOCALLY. Yes, we have much to be thankful for, and unless YOU stay vigilant, Amateur Radio, as we know it, will be no more. Please get involved!! I would like to give thanks to my field organization, local club officers, members, VE's, and all who have worked so hard to make our hobby the most satisfying in the world. Thank you and keep up the good work! Have you done anything to enhance Ham Radio's reputation this month? Please express your opinion on Amateur Radio issues to your section or division staff. We appreciate your input. Traffic: KW1U 343, WA1FCD 319, WA1TBY KB1AF 270, KA1MDM 216, NG1A 215, W1CE K1GGS 120, N1CVE 118, N1AJJ 86, K1BZD 69, WA1CRE 68, N1FLO 64, K1ABO 60, N1BNG 50, KA1EDY 48, WA1FNM 48, KA1LIH 46, W1TC 42, KA1AMR 39, N1DUB 21, KA1NOI 15, K1LCQ 13. PBBS: K1UGM 385, N1BGG 274, NS1N 22.

MAINE: SM, Bill Mann, W1KX—New Appointment: Asst. Section Mgr. for ME. Emerg. Mgmt. Agency Liaison, N1CBA. Portland AWA is planning a Maine State Convention on Feb. 11 beginning at 10 AM at the Sheraton Tara Hotel. The Poland Hamfest will be held on Mar. 4. An emerg. communications planning meeting was held at SEC KA8UVQ's house on Nov. 27. Packet operators are encouraged to become active in ARES and vice versa. The SEC will continue as contact person to all volunteer agencies served. Our new ASM for MEMA Liaison, N1CBA, will concentrate on emergency communications with the Maine Emergency Management Agency. ASM for Packet, N1AHH, and others are working with the National Weather Service to organize Skywarn on a statewide basis with packet link to NWS. Contact Ron if interested. When flooding occurred in the Costigan area, Pine State ARC members, with EC N1DJD, helped coordinate rescue activities with the Forestry Service and Sheriff's Office. New Augusta ARA officers: Pres. KA1MWG, V.P. WA2CJO, Secy. KA1IPW, Treas. W1SIN, Dir. KA1MLF, Trustee K1NIT. Members of the Pen Bay ARC provided communications for a Knox Co. EMA drill on Oct. 13 in Camden, Rockland and Thomaston. Mid Coast AR Rptr Club held a very successful Christmas Luncheon Party on Dec. 3. VE Exams: Feb. 9, Ellsworth (Hancock Co. Courthouse), 7:00 PM (AK1W); Feb. 25, Bangor (EMVTI), 9:00 AM (K1AG). Five OBSs sent 14 ARRL Bulletins and 2 ME Bulletins during Nov. W1KX now on packet and able to receive any messages via K1RQG PBBS.

Net	Sess	Traffic	QNI	MGR
Aroostook Emerg Net	4	1	80	WA1YNZ
Central Me Emerg Net	9	4	154	N1EUK
Cumberland Co Ares	4	3	52	KA1ODT
Hancock Co Net	4	2	41	WA2ERT
Kennebec Co Ares/RACES	4	0	71	KA1LPW
Me Public Service Net	4	4	42	KA8UVQ
Oxford RACES Net	4	20	59	W1RWG
Pine Tree Net	30	76	273	WA2ERT
Sea Gull Net	26	186	935	K1GUP

Traffic: KA1JOJ 122, W1KX 83, N1BCF 52, WA2ERT 46, W1RWG 40, AK1W 38, KA1REB 35, W1VEH 34, W1JTH 33, N1BJW 26, KA1ODT 23, ND1A 13, W1OTQ 13, W1BMX 11, WA1YNZ 9, N1FPP 4.

NEW HAMPSHIRE: SM, Bill Burden, WB1BRE—PIO: WA2MBQ. SEC: K1ACL. Among the many newsletters and notes I received this month was a unique item—a 30 page "Letter from Antarctica" sent by Al K1OIQ. Al is in Antarctica for a year and wrote about his personal work and ham radio experiences at McMurdo station. Copies are available around N.E. and it is worth reading! Congrats to Tom W1EJ on his QST article on beacon subband relocation. New officers for the Souhegan Valley ARC are: Pres: W1FJH, VP: WB1HBW, Secretary: NE1K, Treasurer: W1UPL. Their Monday night net meets on 147.78 simplex at 8 PM local. The Twin State RC has moved their 10m net to 28.361 at 8:30 PM local on Monday nights. GBRA sponsored a VE session in Nov with 4 out of 5 candidates upgrading at the session and WB1GXM reports that at the CVFMA sponsored VE session, they had 5 upgrades with on e candidate going from no license to General! And I received the first newsletter for the UNH ARC this month. You remember they were getting started in Sept and hoping to get active?!—Well—they provided comm for the Mt Washington bike race, set up a tent at Kingston, and provided emergency comm support for the UNH Homecoming Road Race. In spite of rain and cold, WA1OPL, N1DAS,

WA1THQ, KA1PQE, N5KZE, KA1PQK and KA1IXA staffed the race. They have ski trips and fox hunts on the planning board. Do you know any ham students at UNH? Let them know about the club. Condord Brasspounders WB1ASC and KA1LMR report many DX contacts to the South Pacific and orient and are encouraging more DX activity. The CNHARC heard Meteorologist Bob Konchak speak on weather information souces and WEFAX—very appropriate this time of year! Bill W1WNJ is th enew club training officer with W1JY as assistant. I did receive an interesting letter from Governor-elect Judd Gregg restating his support for the provision attached to the Fed Comm reauthorization bill and indicated his continuing interest in our struggle with the FCC. I would recommend that you take the time to write a note to Gov-elect Gregg and our Senators and Congressmen who supported the recent House and Senate Resolution effort and thank them for their support. It is important that we keep in touch with them as we may need their continued help as time goes on. I am getting good input from the clubs and I need more notes on individual activities from YOU. Just send a few lines so we can share your project or new learning experience with everyone. And good news on the traffic front-our section had 99% on 1RN/3, 100% on 1RN/4, and 100% on 1st Region Net in November! Traffic: GSFM 182, GSPN 154, NHN 70, NHNTN 35. Stations: KB4N 1494, W1PEX 1291, WA1FHB 750, N1CPX 531, W1FYR 295, K1TQY 183, NE1J 117, KA1NXT 109, WA1YZN 63, W1ALE 59, WB1HBB 55, KK1AE 53, KA1GOZ 50, N1ALM 47, KA1ROH 46, KA1OU 35, KI1M 23, KA1HPO s16, W1KWE 13, KC1AF 11, N1BVI 10, KA1JOU, W1TN 9, N1DQA, N1FYD, KA1PFS 7, N1ELO KA1LMR 5, KA1KFX 3, KH6GR 2. BPL: KB4N, W1PEX, WA1FHB, N1CPX. PSHR: N1CPX, KA1NXT, W1PEX, KA1HPO.

VERMONT: SM, Jonathan P. Maguire, N1CQE—ASM (RFI): W1CTM. ASM (Education): WB2MIC. ASM (Packet): K1AUE. STM: KT1Q. TC: W1AIM. PIO: WA1YOY. It's now mid-winter—have you done your antenna work yet? Don't forget the Annual Northern Vermont Winter Hamfest to be held on February 25th at the Milton, VT High School. This event is the premier mid-winter ham event in the North Country, and all are cordially invited. N1ARI reports that VT RFD net is meeting again on Sunday at 1800 local on 3907. Contact Bert for further information. Lots of talk about a no code license...what are your thoughts? CVARC is working on a new repeater, on 146.82 (-600), located in Cabot. Should be on the air by the time you read this. Speaking of repeaters, the WA1WLM 146.85 repeater has a 10-meter FM link. It's lots of fun doing some real DX while sitting by the fireplace using a handheld! If you encounter an emergency situation, call the VT Emergency management office at 800-422-8606, or the State Police. Congratulations to first-place winner NK1A and runner up K1HKI in the recent ARRL international DX Contest (SSB). Also of note, KA1DLK worked the MIR space station—FANTASTIC! On a sad note, I report the passing of W1AEA and WA1OQR. WB2MIC has received the "73 HAM RADIO" 1988 Achievement award in education. Congratulations, Jozef! The section is still in need of volunteers. Don't be bashful, let me know what you can do. The League thrives on volunteers, and we need all we can get. In ATV news, look for a new repeater to be installed, 439.24 in/923.25 out. Check with N1QG for details. Speaking of things that we need, do you have any news that you would like to see reported? Send it to me (mail, phone, packet, smoke signals) by the tenth of each month. PSHR stations for November were: WA2SPL, KT1Q, WA1JVV and N1DHT. Earning BPL were: WA2SPL, KT1Q and WA1VXW. Region net participation was: 1RN/2 95%, 1RN/3 100%, and 1RN/4 98.3%. The cycle 3 100% was the best section in the country! Net reports: CN 26/575/35, CVFMN 4/78/4, TwinSFMEN 5/55/0, GMN 26/470/33, TriSFM 5/82/12, VSSN 10/24/1, VTN 30/147/157, VPN 4/70/5. August Traffic: WA2SPL 1826, KT1Q 572, WA1VXW 506, N1DHT 165, WA1JVV 154, KC1KI 88, W1KRV 20.

WESTERN MASSACHUSETTS: SM, Bill Voedisch, W1UD—OO/RFI: N1CM. PIO/ACC: K1BE. SEC/SGL: WB1HIH. TC: KA1JJM. STM: W1KK. MARA set up a working ham station at the Searstown Mall in Leominster. Traffic was generated and cleared by packet out of the mall. It was cleared the same day via the NTS. An interesting display that looked professionally done. Great job guys! The Mt. Greylock repeater's timer has been changed to one minute. This gives the commuters a chance to get in as well as forcing a break for emergencies. Sounds logical. Squelch Tale also reports that the digi on .05 is doing great also. Congrats to the engineering committee. I think the YLs of WMA should be congratulated. KA1IFC, KA1EXJ, KA1MEW and KA1QFV have consistently handled more than their share of traffic. All have children and all are at the razors edge of technology using packet radio to supplement their traffic handling. Their operating skills are excellent. Congratulations! Many of the college stations have been activated in the section. They are also involved in passing traffic. That's more than encouraging. W1BYH, of MARA, reports that the Fitchburg/Leominster area repeater is using split antennas and has eliminated their problems. KS1B has K9ES's packet station. It should be activated as soon as Larry's computer problem is solved. That BBS has been missed as it was a great outlet for traffic in Central and Southern Worcester County. NCRA's demonstration at the Springfield Science museum was a total success. They even signed up 30 people for their Novice course. It does pay to advertise and all clubs should participate in public events.

WMPN	Daily 6:00 PM 3.937
WMSN	Tuesday & Thursday 7:30 PM 3.713
WMCWN	Daily 7:00 PM 3.562
WMTN	Monday-Friday 1:00 PM 146.31/91

Traffic: KA1IFC 665, KA1EXJ 119, KA1MEW 105, KA1QFV 91, W1KK 87, WA1YYK 81, W1UD 251, KB1TH 60, WB1HIH 60, K1JHC 45, KA1RVN 43, W1SJV 39, NM1U 30, WA1OPN 11, AC1T 10, N3FSM 10, W1GQP 4, NE1C 3.

NORTHWESTERN DIVISION

ALASKA: SM, Dianna Marshall, AL7FG—SEC: KL7AF. DEC Interior: NL7HI. DEC Kodiak: KL7JBV. STM: KL7VY. OBS Kodiak: NL7IY. Congratulations to the Ketchikan club for achieving 501C (3) status with the IRS. Thanks to KL7VK for putting together the interior district emergency plan. I know first-hand that Anchorage winter raffle was a GREAT success (No, it was not rigged), and hats off to ICOM for the support. Jim, NL7HI and Wigi, AL7IF are organizing the YUKON QUEST which will start the 18th of the month. Primary traffic freq 3.890 MHz with secondary 7.090 and 28.390. Packet traffic will be on 145.070 MHz. Let it be known that the Lil, NL7DL, will NOT be organizing the Anchorage flea market next year. Next month think IDITAROD.

IDAHO: SM, Don Clower, KA7T—ASM: K7REX. OOC: WB7CYO. STM: W7GHT. ACC: N7BI. PIO: WG7E. N7IRM and myself went to visit with US Congressman Craig concerning the loss of 220 MHz and to thank him for his support of the Amateur Radio bill that just passed. Mr. Craig seemed to be concerned about our loss of 220 and promised to look into it. It is time for us to be thinking of what we can do to celebrate the Idaho Centennial in 1990. Your ideas and suggestions would be greatly appreciated. 73s, Don.

MONTANA: SM, Ken Kopp, K0PP—If you haven't returned your Section Manager ballot, please do so. FD scores 1A, LP: W7VNE- 1482, NZ7M-1382, WA7GQO-1300. AARC (Anaconda) won own trophy. K200ABV (Great Falls) 3800+ QSO's, W200ED (Bozeman) 2700+ QSO's. Need results of others. GHRC (Bozeman) elected KF7FP/Pres, N7AIK/VP, N7LGB/Sec-Treas. T'phone RFI info in GFAARC (Great Falls) n'ltr—sase to K0PP for copy. AARC (Anaconda) elected N7GHW/Pres, N7DKP/VP (YL's), K0PP Sec/Treas. YRC (Billings) set up in 2 malls for Christmas tfc effort. Their KF7KN is new EC for Yellowstone County. NV7Y, now /DU1 sends 73 to all.

NET	SESS	QNI	QTC	MGR
IMN	30	232	146	KA7EEE
MSN	4	58	2	K0PP
MTN	30	2018	83	KF7R

Traffic: W7TGU 805 (PSHR), KA7YYR 69.

OREGON: SM, Randy Stimson, KZ7T—ASM: KM7R. STM: W7VSE. SEC: W7FBP. PIO: KC7YN. SGL: KA7KSK. ACC: WF7Q. OO: WN7W. STC: N7ENI. It looks like Klamath County had a great Simulated Emergency Test, thanks to Matt, KA7WGW, Ed, KF7KE and Fred, ND7V, the Klamath County Emergency Coordinator. They got the Red Cross involved and a lot of other hams. As Fred said this is a great way to stay tuned up during the winter months and be ready for the forest fires that seem to happen almost every summer. I went to the Central Oregon Radio Club meeting this month in Bend, Oregon. They are almost ready to put a repeater on top of Mt. Batchlor, at 9000 ft, which will cover most of Oregon. The only shadow will be to the Portland area. The Oregon Tualatin Valley ARC has finished their Public Service for the year and there were 33 hams that worked 1218 hours and drove 7814 miles. The Hoodview ARC had 35 hams that worked 350 hours and drove 1080 miles. Great job both clubs. I would like more clubs to send me information about their activities regarding Public Service and Emergency Service or anything that they feel would be of interest. The K7IFG BBS Station had 82 hours 18 minutes in connect time with 70 users and handled 925 messages with 167 NTS traffic. Traffic (P) = Packet. WB7VMS 305P, KA7EEE 299, N7BGW 288, W7VSE 260, WB7VSN 185, WT7A 175, K7IFG 167P, WG7H 161, W7LRB 82, W7LNE 80, WB7EMO 69P, KV7F 61, W7ODG 57, KA7AID 47, KZ7I 47P, KA7SYG 31, N7IXS 38P, W7BDU 11P, Late Oct. WT7A 164, N7APC 23.

WASHINGTON: SM, Brad Wells, KR7L—STM: KD7ME. SEC: KA7INX. TC: W7BUN. OOC: N7DVR. SGL: KD7AC. BM: N7CAK. PIO: N7FKV. ACC/ASM: KC7PH. ASM: KD7G. ASM: KA7CSP. ASM: W7OUF. ASM: K7CLL. Two contests this month, the Novice Roundup and the CW portion of the ARRL DX Contest. The NR is unique in that only Novices and Technicians are eligible for awards. It is their contest. However, they all rely on the rest of us to pitch in and give them needed contacts. Take a little time to introduce these new hams to the world of radiosporting. The ARRL DX Contest should be a good one this year with much improved conditions over last year. It is an opportunity to set new records on all bands and modes. Since the contest format is a world-works-the-US, even the low-power operator has the chance to be on the receiving end of a pile-up. Don't forget this contest has a QRP category and you can smoke the bands with 5 watts. W7BUN is looking for some additional Assistant Technical Coordinators to help him with the Section RFI/TVI workload. The Bellevue FCC office now forwards these complaints to Jerry for solution. We are expected to resolve these problems by ourselves. It is an opportunity to provide a real public service in addition to generating good public relations. If you have some experience in dealing with these problems and would like to be a part of the solution, then contact Jerry Seligman, W7BUN; 12306 80th Ave. East; Puyallup, 98373. The Mount Baker ARC sponsors bunny hunts the last Tuesday of every month on 146.58 MHz. Whatcom County Public Service nets meet every Sunday at 7:30 pm on 147.16 and at 8:00 pm on 3965. The Cubs ARS of Sedro Woolley High School has renewed as a Special Service Club. N6EQZ reports a packet information net on 3885 kHz at 2000 PST every Sunday. KA7EOV has resigned after many years of service as the EC of Lewis County. ARRL membership in the Northwestern Division grew at a rate of 9 percent last year. We were the fastest growing Division in the ARRL. Olympia Mayor Holly Gadbaw proclaimed the week of November 5-11 as Amateur Radio Recognition Week thanks to work by the Olympia ARS. 28 hams participated for 12 hours in the 1988 Mazda Coachman's National Pro Rally in Capitol Forest on November 13. 30 hams provided 400 man-hours of communications support for the Tour de Forest car rally on October 29. 15 hams provided communications for 2300 runners in the Seattle Marathon on November 26. A very special thanks to the following people who continue to give of their time and expertise for the benefit of all Section members: Emergency Coordinators—W7GYZ, WA5ZAY, KB7RS, N7ING, KA7NRA, WA7TWB, KA7NGU, NM7N, WA7BLE, W7AY, W7YLV, WB7SOF, WN7F, KA7BRR, W7LKR, NU7D, KA6ITF, WB7RBJ, KA7VEE, KA7UFE, NO7L, W7DLB, N7BES, N7ELK, KN7D, WB7OXT, K7CLL, KA7MCP, NM7R, N7GDW; Official Observers— WJ7X, W7LKR, NY7T, W7JIE, KE7WG, KA7MCX, N7DVR, AK7H, N7IPJ, N7FKV, KR7L; Official Relay Stations—WA7CBN, W1PRT, W7GB, KD7ME, K7AJT, N7DIP, W7LBK, W7IEU, N7GGJ, W7AP8, KA7TTY, K7GXZ, KR7F, KD7TJ, WB7WOW, W7IGC, N6EQZ, KD7G, K7SUX. WA7YEN. W7LG, KR7L; Official Emergency Stations—KE7LE, KA7AEF, W7UOF, KA7HAM, KN7L, WB7WOW, KD7G, N7GDW; Assistant Technical Coordinators—WA7BPJ, W7GB, K7WA, K7UU, N6CHU, W7GNR; Official Bulletin Stations—KT7H, K8TLQ, W7SFT, N7CAK, KA7CSP, WB7WOW, W7JPH, WA7LQV, W7BUN, W7PGY; District Emergency Coordinators—WA7CBX, KA7AEF, NK7E, N7DXS, N7CWU, KF6NW, KE7WG, KN7L. ARRL Field Appointments provide you with an opportunity to put something of yourself back into amateur radio. Be an

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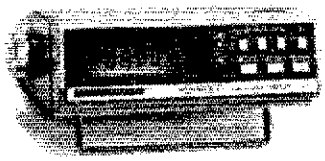

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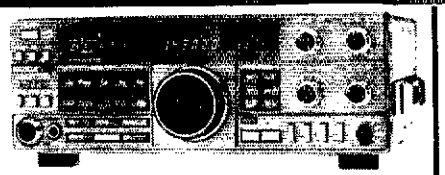

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unsung hero and apply for an appointment by contacting the appropriate Section Staff member. ARES Public Service Hours—Asotin 5; Benton 30; Franklin 15; Garfield 5; King 177; Thurston 104; Skagit 31. Traffic: KR7F 220, N6EQZ 169, W7IGC 156, WA7YEN 124, WB7WOW 123, N7GGJ 109, K7UQH 105, K7GXZ 100, K7SUX 97, WA7CBN 92, W7GB 83, KF7FF 74, KA7TTY 30, KA7PMD 28, W1PRT 23, W7LBK 12, K7CLL 8, KD7G, KD7ME. PSHR: KD7ME, WB7WOW.

PACIFIC DIVISION

EAST BAY: SM, Bob Vallio, W6RGG—ASMs: W6ZF, WB3FCV. SEC: W6LKE. STM: K6APW. OOC: NY6Z. TC: N6AMG. The VVRC Newsletter contained an article by President WX6F on the Miller Canyon Fire, and their participation in providing communications. The following operators were involved: WO6Y, WX6F, WY6C, N6OFZ, KB6QEY, N6QGS, KI6UE, KB6JZE, WD6BUS, K6OLL, WB6RLH, N6NIC, N6QGV, K7VA, KJ6JF, WA6SBA, WA6BWR, N6SWR, AA6GM, K6HIH,WB6PUD, N6PWE, N6QEI, N6SPL, KB6RQH, KA6FDI, WV6F, WX6M, WB6FIS, KA6FUB, WB7TNJ, WZ6T, K6LUQ, N6SEU, KB6KZZ, N6SZQ, WA7EQQ, W7CFQ, WD6EZL, WD6ERQ, N6OGP, K8AUC & WA6IOK. EBARC members N6IIW & WB6DOB report that Bob Highes passed the Novice test at their last meeting, and he is anxiously awaiting the arrival of his license. LARK members N6FQQ, N6SYP, KF6VU, NF6S, WF2H, & KD6DT all were nominated for the club's "Klutz Award." MDARC welcomes new members N6SCR, W6FXI, N6TDJ, N6SIR, KB6HDY, KC6AHE & Paula Whitney. HRC members WB6NER, KG6MH, N6DOC, N6GWL, W6ZTG & KB6HLX provided communications for a Kaiser Hospital communications exercise. The CCCC welcomes new member, KB6TCB. Nov tfc: WB6DOB 344, W6VOM 166, K6APW 75. (Oct.) K6APW 49.

NEVADA: SM, Joe Lambert, W8IXD—ASM: Curly Silva, K7HRW. Hope everybody enjoyed all of the Christmas parties! WADG reports that the N200RH operation was a huge success with 15 operators. They tallied over 6500 QSO's and made DXCC, WAS and WAC. FARS operated NW200O bicentennial station and made about 3900 QSO's and also did WAS and WAC and 84 countries. NK7N reports that the "Best Dam Bike Race" for multiple sclerosis was supported by 14 L.V. area hams. The race included more than 2500 bikes and went from L.V. to Parker Dam to Phoenix. The L.V. hams even put up a temporary repeater to support the difficult path this race covered. SNARS supported the WSRA motorcycle race in October and also the SCCA Yerington Road Rally in October. SNARS is also sponsoring VEC exams on February 18, April 22. Contact K7HRW for info. New Directors for SNARS are N7GXI, K7HRW, WA1WSX, NZ7G, KB7AXQ, N7GTZ and N7ELV. Jay, K7WYC is retiring as editor and secretary of the SNARS newsletter. Thanks, Jay for your excellent efforts over the last few years. Preparations for the 1989 Special Olympics, April 2-8 are well underway. If you can help, contact W7UJB.

PACIFIC: SM, Wayne Jones, NH6GJ—Greetings to all from the land of Aloha! KH6AJ will return for the second year of a two year term as President of the Kauai ARC. Others elected are KH6DLW, VP; NH6AO, Secy; NH6JC, Treas; NH6HF, Activities. The BIARC elected WH6BIR as President, KH6IAA, VP; AH6AB, Secy; NH6MO, Treas; KH6IN, KH6AB, and NH6IZ are Directors. Congratulations to all! The BIARC provided support to the annual Ultraman Triathalon, held over three days, Nov 25, 26, and 27. Approximately 20 amateurs participated. MARC, Guam provided comms support to the 4th Annual Biathlon, WH2AEN, KH2CY, KH2B, and W1YRM doing the honors. On Kauai, heavy rains caused flash flooding and the CD activated an emergency weather net for six hours to keep track of the flooding. KH6JPT, KH6AJ, KH6S, KH6DRT, KH6DLW, KH6JJC, NH6JA, KH6E, KH6F, NH6JB, KH6FGS, and KH6JIB provided the support. Thanks to all! KH6H/R was damaged by lightning on Nov. 4. Thanks to AH6CP, AH6IF, and KH6HHG for getting it back on the air. Aloha from all of us to all of you! Traffic: KL7IVQ 51, KH6S 59, KH6H 44, KH6GMP 9.

SACRAMENTO VALLEY: SM, Bob Watson, W6IEW—The lack of frequent listings of the Section appointees, to save space, does not mean that their efforts on behalf of the section are not noticed or appreciated. So, here they are: Section Traffic Manager Al Biegler, WA6WJZ, who sends the traffic reports to QST every month and is the longest current holder of an appointment. Affiliated Club Coordinator, Tech. Coordinator and Net Manager Jettie Hill, W6RFF. State Government Liaison Jim Pratt, N6IG. Official Observer Coordinator John Canaris, WY6O. Public Information Officers: South, Bob McClard, WA6OWH, and North, Mark Nelson, AA6DX. Ron Murdock, WB5FIX, is our Bulletin Manager, and Marjorie Watson, N6JTJ, is Asst. SM for recruiting staff. Our very effective Section Emergency Coordinator is Dean Coats, N6RA and his District ECs are Walt Cross, KE6EP; Ron Menet, N6AUB; Cass Tressel, KX6Z; Dave Carlson, KE6NS. ECs are N6GLL, WG6N, WA6ITR, KE6LW, N6MSZ, WO6H, KA6HVY, KX6Q, WA6BRV, K7KEH, KI6FT, N6CVF, KI6UH, N6JGC. Keeping us old-timers honest and helping the newcomers are Official Observers: Reva, NT6E; Bill, WA6Q; Walt, KE6EP; Cliff, WA6YA; Ed, KF6EN; Hugh, KI6UQ; Milt, WD6EHF and Ed, WA6ZWE. Keith, K6QIF, is Asst. TC for packet and there are two PIAs, Kristin, KB6RHL, and Harold, W6KZN. Official Relay Stations are W6RFF, N6LAM, N6LUY, W6SRQ, WA6ZUD, WB6CLD, N6CVF and the man who has been the most faithful in reporting, WD6BZQ, who is also an OBS along with WB5FIX. Traffic: N6LUY 383, WA6WJZ 278, WA6ZUD 170, K6SRF 63, W6RFF 39, WD6BZQ 38, W6CFQ 25, N6LAM 10, WB6SRQ 4, KB6WIJ 3.

SAN FRANCISCO: SM, Dick Wilson, K6LRN—Bob Smith, NA6T, has resigned due to personal circumstances. Many thanks to Bob for a job well done. Director Rod Stafford asked me to step in, at least for the balance of Bob's term. As I do not have a listing of appointees and have received no newsletters other than Marin ARC and the ACS, I will take this opportunity to introduce myself. Richard "Dick" Wilson, K6LRN—Extra Class, licensed continuously since 1955. At present my main operating on HF is DXing (243 cfmd mixed, 143 cfmd CW) and contesting. I have gear for 2M and 440 and monitor local repeaters when mobile. I have recently installed some packet gear and feeling my way into that mode. I was Section Communications Manager in the East Bay section in the early 60's. I have been an Assistant Director for many years. I have in the past been active in NTS, operating both as liaison and NCS for PAN, RN6, NCN, and have had TCC schedules, too. My wife, Carolyn, is WB6TKD.

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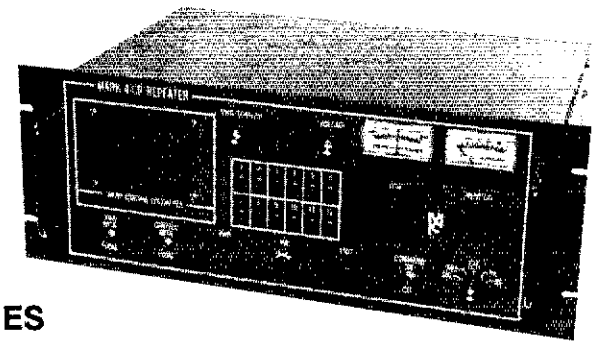

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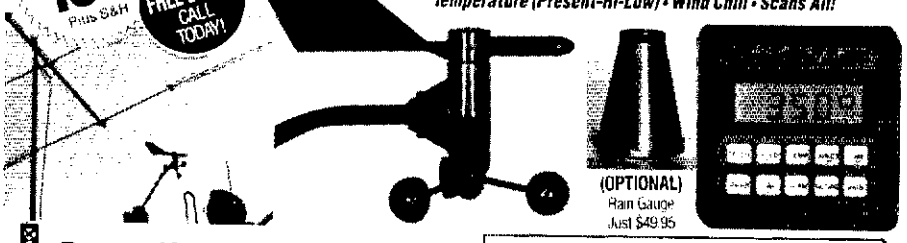

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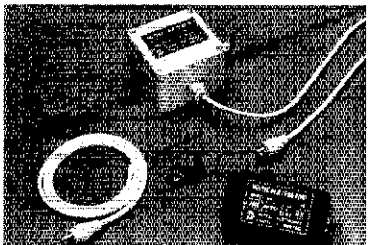

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Please send all correspondence to: Box 4212, San Rafael, CA, 94913. The deadline for items to appear in this space will be the 5th. They will appear in QST two months later. For instance, this is being written in Dec. for Feb's issue. I would prefer items to be ARRL oriented, VE exams/classes, public service, notification of Silent Keys, etc. I will be around to visit the various clubs as time allows.

SAN JOAQUIN VALLEY: SM, Charles McConnel, W6DPD—SEC: WC6U. STM: N6AWH. TC: WA6EXV. ACC: W6DPD. ASST. SMs: W6TRP and K6YK. Congratulations to W8JPU on 50 years as an ARRL member. New Appointment: EC AA6GZ. Appointment renewed: ATC WA6QYR. In the Central California DX Club W6YO is first VP and N6DTB is second VP. WA6IVN and KA6QPB are SILENT KEYS. WA6YAB is Extra. KB6VUF is Advanced. KC6APE is Tech. N7BHW is KJ6MF. I am authorized 18 lines per month for this column. I can print the news I receive. If I don't get any news, then the column runs short. Traffic: WA6YAB 24, K6PMG 10, N6MXG 9.

SANTA CLARA VALLEY: SM, Glenn Thomas, WB6W—SEC: WA6OCV. TC: WA6PWW.STM: N6JLJ. PIO: WB6OML. ASM: N6JQJ. ACC: W6MKM. BM:(vacant) OOC: KA6S. NOVEMBER—First, a reminder. There is a telephone number that has information on Amateur Radio license classes, (408) 971-1424. Well...it only has the info that I put on it, and I can only put on it what I know about. PLEASE, let me know about any classes your group or club is sponsoring so that I may include them on the recording. My phone number is on page 8 of this issue of QST. The Foothills ARS went out on the 10-meter contest to win. Among the participants were N6IIU, K6MA, WA6ZBX, W6AOD, KB6FEC, N6BIS, and N6FW...the San Mateo ARC heard from local ol' timers about what ham radio was like—68 years ago?...the Palo Alto ARA also heard a talk on roughly the same subject from Doc, W6ZRJ, and Al, W6VZT. Also, the PAARA "450 Gang" is a net meeting on Tues/Thurs at 0400Z on 28.450 MHz to assist Novices (& others) with code & theory for upgrades...congrats to John W6ISQ on his induction in the CQ DX Hall of Fame...congrats to KB6GV on his upgrade to Extra...the Perham Foundation has an excellent newsletter starting. They are currently in a fund raising mode to continue operation of the Foothill Electronics Museum. Contact them at the museum if you can help...the AMES ARC has resumed its transmissions of Space Shuttle audio and video during each flight...the EMARC group heard from a representative from Dolby Labs on the latest in hi-fi noise reduction. Neat stuff! Traffic: NR7E 186(0). Phone numbers: Amateur Radio Classes (408) 971-1424; License Exams (408) 984- 8353 (ARRL VEC) or (408) 255-9000 (Sunnyvale VEC).

ROANOKE DIVISION

NORTH CAROLINA: SM, W. Reed Whitten, AB4W—ASM: AB4S. SEC: N4MYB. STM: K4NLK. BM: K4IWW. ACC: WC4T. TC: K4ITL. SGL: KE4ML PIO: AB4FW Tornadoes struck 9 counties in North Carolina beginning at 1:05 AM on Monday, November 28. These tornadoes destroyed 426 homes & 78 businesses, damaged 2057 homes, left 987 homeless, 157 injured & 4 dead. Total loss is now estimated at $75 million. The first touch down occurred in Raleigh, the Wake Co. seat and State Capitol. It is extremely unusual to have tornadoes this late in the year in N.C. and there had been no Skywarn activation to alert the hams to the possibility. This weather also came at a time when most people were asleep. In spite of this, Amateur Radio was involved within minutes. Quite a few amateurs were awakened by the storm and a number had their homes damaged. WB4ROC awakened AB4S via autopatch and Ed activated ARES. This was very different from previous emergencies and exercises because we activated ARES independently and simultaneous with the activation of County and State Em. Mgt., rather than responding to a request for help. We were on the scene and ready to provide communications at the shelters and command posts before they were opened, and were able to help coordinate the selection and opening of shelters. AA4YH, the Wake Co. EC, coordinated the assignment of numerous volunteers from the State EOC and acted as ARES representative for the State Emergency Response Team (SERT). The DEC, KI4ME, assisted by visiting the field locations and gathering information about the status of communications needs. Durham Co. EC, KA4ELD and hams from many neighboring counties joined in the effort. The Red Cross was a major user of amateur communications for several days since their phone lines were jammed. The NTS nets began handling "health & welfare" inquiries when long distance lines into Raleigh became overloaded on Monday & Tuesday nights. On Wednesday ARES was contacted by the Raleigh Police Dept. and asked to assist by providing communications for volunteers helping with control of access to damaged areas. This phase of the operation continued for five days, on a 24-hour basis, until Monday morning. Over 125 Amateurs participated in this emergency. A critique was held at State EOC by ARES on Dec. 9. All the agencies which we assisted have indicated that Amateur Radio played a vital role in this disaster relief effort. Years of preparation by ARES volunteers paid off; you can't just walk up during a disaster and expect to be given a major role. ARES was already a part of the "team" because of participation in exercises and planning sessions with Em. Mgt. officials. Amateur Radio had a chance to help—performed a vital service. GOOD JOB !! [BT] Traffic for November: K4NLK 416, WD4HTE 210, AA4TE 176, KA4EYF 155, K4IWW 126, N9CGD 123, AA4ZV 105, KI4YV 90, WD4MRD 59, KA4OJN-0 50, WB4WII 39, N4LST 37, W4LWZ 36, N4UE 36, N4RRG 34, W4EHF 32, WA9NEW 32, WA4MNR 32, AB4EO 30, WA2EDN 30, N4JRE 27, N4SVZ 24, N4MMM 21, KA4KGZ 16, WD4LSS 13, KC4FBS 12, NT4K 11, AB4W 9, WD4LOO 8, KB4NOZ-1 2, KB4FKF 1 [AR]

SOUTH CAROLINA: SM, Ned Moeller, N4FVU—Vicky Armentano, ARRL Club Admin. Asst. will be mailing the 1989 Affiliated Club (AC) Report Forms. Four of our 18 S.C. ACs did not return their 1988 report forms. I am your AC Coordinator. Club Officers with questions can contact me. My packet address is N4FVU @ WA2GYM. All clubs are encouraged to become affiliated & qualify as a Special Service Club. AC benefits include the $2.00 ARRL membership renewal rebates, the ARRL Forum, & ARRL Insurance. AC Newsletter Editors may subscribe to the ARRL for $10.00. I would like your list of 1989 officers and copies of newsletters. 1989 Club Officers: Anderson; Pres—W4FX, VP—KB4FEM, Sec—W1BNS, Treas—N4NWB, Activity—WD4BUH. Columbia; Pres - WF2G, VP—N4QWL, Sec—KC4CFT, Treas—KC4AKN, Trustee—KC4LB, Editor—AB4ID, Public

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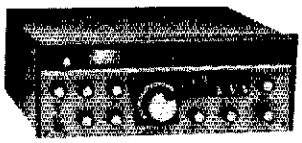

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VIRGINIA: SM, Claude Feigley, W3ATQ—STM: KB4WT. SEC: N4EXQ. ACC: NT4S. OO: W4HU. BM: AB4U. PIO: AA4VP. SGL: W4UMC. TC: WX4C.

VTN	1 PM	3907	KB4NGO
VSBN	6 PM	3947	KI4BR
VSN	6:30 PM	3680	N4KSO
VN	(EARLY) PM	3680	N4GHI
VN	(LATE) 10 PM	3680	WB4KSG
VLN	10:15 PM	3947	W4JLS
SVEN	7:15 PM	146.82	NT4S
STARES	9 PM	146.97	KJ4VT
DEC/EC	9:45 PM (3rd WED)	3910	KA4NWK

Glynn, KB4WT, who has been doing the work of both SM/STM has decided that he prefers to continue to serve as your STM. After consultation with other section appointees W3ATQ has been appointed to assume the post of SM for the remainder of NN4I's term of office which expires April 1, 1990. I am happy to serve in this capacity and I feel confident that I will receive the support of the section's membership. W4HU, Section Official Observer Coordinator, reports his corp of OOs have been very active with 6 stations reporting sending out 14 rule infraction reports. Those reporting were: W4HU, W8IRT, KB4WT, AB4CG, NS3K, and W1ZZI. N4EXQ, Section Emergency Coordinator, reports a total of 1164 stations enrolled as ARES members, 29 active nets with liaison to NTS and 183 net sessions, drills or tests for the month. As the spring approaches there will be many requests for ARES assistance in providing communications in public events. It is urged that all participants in such activities display information indicating that they are Amateur Radio operators, so that Amateur Radio will receive proper recognition. During the past Christmas traffic crunch there was an increasing use of Packet to forward traffic. WB4ZTR, Section Packet Manager, working with Deni, WBØTAX, developed an outline of procedures to be followed in the use of the Virginia Packet Network. This procedure covers in detail how you file and retrieve traffic on the packet system. Copies of these procedures are available from WB4ZTR, WBØTAX, KB4WT or W3ATQ. All Packet ops are urged to monitor their local PBBS daily and pickoff any local traffic listed. This is essential if Packet traffic is to move quickly. Upcoming VE exams; Feb. 25 Vienna Wireless Soc. contact Nancy Draheim, NK4U—Mar. 4 South Peninsula ARC contact Sid Evans, N4IIC—Univ. of Md. ARC contact Scott Rosenfield, NF3I. It was good seeing and talking to many of you at the Richmond Frostfest. Hope to see you at the Vienna Winterfest, Sunday, Feb. 26. November was a good month for traffic 45 stations reporting with a total traffic handled count of 5847.
Traffic: WBØTAX 1050, K4DOR 787, N4GHI 586, AA4AT 343, KB4NGO 324, K4MTX 278, N4EXQ 278, W4JLS 236, WD4FTK 186, W3ATQ 184, WB4PNY 140, KB4WT 130, WB4KSG 105, KJ4VT 87, WD4MIS 80, K4BGZ 75, KØJH 74, KI4BR 66, AA4GL 61, K4JM 49, N6ANQ 43, N4SMB 35, WB4EDB 34, WB4ZTR 34, KI4W 32, W4HDW 24, WA4OHX 24, K4VWK 20, W4HU 20, W4TZC 19, WB4UHC 17, K4MLC 14, WA4TVS 14, N4TJT 13, WA4CCK 10, WB4KIT 10, K4GR 7, N4FNT 5, K4JST 4, N3RC 2, NW4O 2, WA1VRL 2.

WEST VIRGINIA: SM, Kari S. Thompson, K8KT—SEC: K8QEW, STM: N8FXH. ACC: WA8CTO. SGL: K8BS. TC: K8LG. Rept. Coordinator: WB8GDY. Regret to report that WA8CTO has resigned as ACC. Many tnx to Bob for his long term of service, and excellent job. N8IZU is new DEC for zone 12. I am active on packet and can be reached @ WB8CQV. Many tnx to WD8V for helping me collect this month's reports. WVNN is trying to decide which time; 5:15 or 7:30 is better, contact Joe, WG8D.

NET	FREQ	TIME	QNI	QTC	SESS	NM
WVFN	3865	6:00	1115	126	30	WD8DHC
WVN	3567	7:00	227	98	30	KZ8Q
WVMD	7235	11:45	862	69	30	WD8V
WVRN	3640	6:30	280	23	30	K8LG
WVNN	3730	7:30	100	10	32	WG8D
HILLBILLY	14290	NOON SU	165	23	4	W8YP

Traffic: KA8WNO 355, W8YP 279, WD8V 233, K8TPF 157, N8FXH 76, W8FZP 75, KA8ZXP 71, WD8DHC 61, WD8LDY 57, K8QEW 44, K8KT 29, KA8OGF 28, WD8EBH 25, W8JWX 13, NC8G 11.

ROCKY MOUNTAIN DIVISION

COLORADO: SM, Bill Sheffield, KQØJ—ASM: KAØMQA. SEC: WBØTUB. STM: KBØZ. ACC: WBØDUV. OOC: KAØCDN/WØJR. SGL: WBØFQB. TC: WØLJF. PIO: NØDZA. An SET was recently held by District 22, Arapahoe and District 24 Douglas, Elbert Counties. The participation of ARES members totaled 38. The SET was a mock chemical spill. Congrats to the ECs involved K8VQC and W4ETT. The Rocky Mountain Division elections have been held and Marshall Quiat, AGØX has been re-elected to his 2nd term as Division Director. Bill Sheffield, KQØJ has been elected as Vice Director. The ASM will temporarily be assuming the duties of the Section Manager office with the help and advice of KQØJ, until such time as an appointment is made for the position of Section Manager that has been held by KQØJ for the past six years. The annual (ARA) Aurora Repeater Association Swapfest will be held on February 19th at the Jeffco Fairgrounds in Golden. This swapfest is always one of the best attended events of the year. Plan to attend and hope to see you all there. For further info: contact WDØHNP. NETS: CWN QNI 44, WTC 53, QNF 238, 19 SESS. COL: QNI 1189, QTC 68/143, QNF 1065, 30 SESS. HNN: QNI 1939, QTC 113/639. QNI 1624, 30 SESS. NCTN: QNI 93, QTC 51, QNF 183, 20 SESS. SCTN: no totals. Traffic: KØHOA 202, ABØFFV 85, KBØZ 62, KEØWC 40, WØNFW 6.

NEW MEXICO: SM, Joe T. Knight, W5PDY—ASM: K5BIS. SEC: K6YEJ. DEC: WD5HCB. STM: ND5T. NMs: WA5UNO, KA5NNG, W5QNR. TC: W8GY. ACC: KA5BEM. Southwest Net meets daily 3583 @ 0230 UTC, handled 103 msgs with 181 checkins. NM Roadrunner Net meets daily, 3939 @ 0100 UTC, handled 108 msgs with 1304 checkins. NM Breakfast Club meets daily, 3939 @ 6:30 AM, handled 175 msgs with 974 checkins. Yucca 2-mtr Net, 78/18 handled 17 msgs with 440 checkins. Caravan Club 2-mtr Net, 66/06 with 142 checkins. SCAT Net, 66/06 handled 7 msgs with 630 checkins. Info Net 12/72, with 51 checkins. ZIA LINK Sunday Noon Packet Net with 39 checkins. Looking forward to the Christmas Dinner at Rancho de Chimayo for the Northern New Mexico & South Colorado gang on Dec. 11th. Good PR for Ham Radio in the Albuquerque Journal, Sunday, Dec. 4th, with full color pictures and almost a full page devoted to Ham Radio. TFX; W5DAD 66, KB5UL 12.

UTAH: SM/STM, Jim Brown, NA7G—SEC: Rich Fisher, NS7K. The SET was held in November again this year, because of the continuing conflict with the general deer hunt. Salt Lake, Davis, and Cache Counties participated. Tnx to ECs KD7OD, NS7K, and AC7O. WA7BVI reports Weber County ARES held a tabletop exercise with the ARC. The 146.90 repeater in Ogden now is equipped with an autopatch. 73 de NA7G. Traffic: N7IUN 66, WA7KHE 58, WA7MEL 49, N7JLC 30, N7ASY 28, NA7G 25, NS7K 20.

WYOMING: SM, Jim Raisler, N7GVV—ASM: Steve Cochrane, WA7H. SEC: Jim Anderson, W7TVK. STM: Dan Ransom, K7MM.

NET	FREQ	TIME	QNI	QTC	SESS	NM
COWBOY	3923	5:45 PM M-F	850	5	22	KC7AR
PONY E	3923	6:00 AM SU	189	1	4	W7MZW

H. Dean Umpleby, WA7WWE, is sponsoring a new club at the Rawlins High School. Here's wishing you lots of success. Warren Morton, WS7W reports that the Casper ARC has 51 members. Max Carpenter, WA7B reports that Sheridan RAL has 19 members. Dale, WC7S informs us that the '89 Hamfest will be in Cheyenne July 8 and 9 at the Holiday Inn. Circle those calendars now. Max, WB7K reports that the Albany County ARES recently held a meeting with the County's Emergency Management Agency to demonstrate the ARES capabilities. 73 until next month...Traffic: NN7H 271, W7SQT 186.

SOUTHEASTERN DIVISION

ALABAMA: SM, James Spann, WO4W—ASM: W4XI. SEC: KB4GDN. STM: N4RT. PIO: KB4KCH. ACC: AA4BL. OOC: KF4VS. SGL: N4FRQ. BM: KA4ZXL. The Alabama PSC has ruled against the Alabama Repeater Council in its battle to obtain residential rates for lines used on repeaters. The fight isn't over yet—as of this writing the ARC planned on appealing the decision through their attorney, Bill Hooks, WD4BXI. The AENB has a new name! Our section NTS CW net is now "ASN"—the Alabama Section Net. Check it out on 3575 kHz! Members of the Tuscaloosa ARC and the West Alabama ARS did a super job on handling emergency communications before and after the tornado that devastated parts of Tuscaloosa in the pre-dawn hours Nov. 20. Their efforts were a credit to Amateur Radio. Also, similar efforts were put forth by the Muscle Shoals ARC when tornadoes and severe weather ripped through northwest Alabama Nov. 4. Congrats to the Huntsville ARC for celebrating their 40th anniversary recently. I regret to report these Silent Keys: Paula Bartlow, KA4FYM, of Huntsville, and Kenneth Ackermann, W4CWO, of Birmingham. K4UPL of Birmingham worked the CQ WW DX contest with friends in Aruba, a small island 20 miles north of Venezuela. I enjoyed speaking to the Tuscaloosa ARC at their December meeting. SPL: WA4JDH. PSHR: WA4JDH, W4PIM, W4CKS. Traffic: WA4JDH 849, W4PIM 229, W4CKS 188, W4DGH 16, WO4W 7, WA4ZPZ 6.

GEORGIA: SM, Eddy Kosobucki, K4JNL—SEC: NC4E. STM: WB4WQL. Packet: W4QO. ACC: KM4IH. BM: WB4ZOJ. OOC: W4TG. PIO: WB4DEB. SGL: WB4UVW. TC: WD4PAH. Once agn tnx to all the clubs & groups that invited me to their Christmas parties, it's just impossible for me to travel during the mo of Dec. I have appointed Sharon, KM4IH, as the new section "AFFILIATED CLUB COORDINATOR." Anything that comes up involving ur club or group should be sent to her. She is vy actv in many of the clubs in the metro Atlanta area & I know she will do an FB job for us. Following is her address & telephone number: Sharon Foster, KM4IH, 3158 Friar Tuck Way, Atlanta, GA 30342. Telephone: 404-449-3340. PSHR honorees for Nov. are: WB4DVZ, WB4WQL, KJ4NK, W4RWB, KA4HHE, K4ZUY, WD4COL, W4HON & WA4TXT. Harvey, W4TG, the section Official Observer Coordinator informs me that we need OOs in the following Georgia section areas: Clayton-Toccoa, Augusta, Savannah, Waycross-St. Simons, Valdosta, Bainbridge- Thomasville. As we must police our own frequencies, we must have qualified HAMS to do it. If u wud like to help & have been licensed a Tech or above for at least four years, u can write W4TG or yours truly for an application. The Dalton gang has been working to make this year's HAMFEST even better than last year. The date is Feb 25th, same as last year. Being an ARRL Instructor is a great honor. Many people both young & old would like to get into HAM RADIO but need instruction. U could help. If interested, contact Rosalie White, WA1STO, at ARRL HQ & she'll put u on the road. Congrats to Jay Jensen, N4LLX, of Savannah who fulfilled his commitment to the COASTAL AREA REPEATER SOCIETY on the six commitments he made to the club when he took the reigns as its president. Once again, TNX to my vy capable staff for the outstanding job they are doing. U don't know how much it means to me & the Georgia section. 73 & God bless. Traffic: WB4DVZ 127, WB4WQL 89, WD4COL 84, KA4HHE 68, K4ZUY 49, KJ4NK 46, WA4TXT 30, KC4BHX 32, WB4UIH 28, W4RWB 24, N4UZ 13, K4JNL 13, W4HON 7.

NORTHERN FLORIDA: SM, Roy Mackey, N4ADI—ACC: N4ADI. BM: Dave, N4GMU. ASM: Bill KB4LB. AAC: John, AB6I. STM: Rip, AA4HT. SEC: Rudy, WA4PUP. PIO: Petey, WA4POU. TC: Ed, WØRAO. SGL: John, KC4N. At a recent hamfest, I was asked by some club officers why their club hadn't been seen in this column for some time. Fact is, with the limited space each month, it's hard to put everything in that we would like. But here is a try to list all the clubs that are sending their monthly newsletters to me: BARS sends Random Wire by Fred and Patti Sanders; DBARA has the The Groundwave by Carlton Smith; OARC is the Listening Post, Doug Abbott, Editor HAMM-RAMM has their News, Buzz Showalter, Editor; HCARA send their Blurb, Win Knowlton, Ed.; LMARS has Keyed-Up with Charlie Finnigan Editor; NOFARS sends their Balanced Modulator, Billy Williams, Ed.; SSPC has their Oracle, Cameron Magnum Ed; PARC (Palatka) sent their Newsletter, Don Walburn, Editor; Sky High ARC sends Sharc Tales; Spring Hill ARC has Sharc Net, Larry Poulin Ed.; Suncoast ARC's Newsletter edited by Hardy Brown; Sun Country ARS has Jim Shook as editor of their Relay Chatter; TARS sends their Printed Circuit with Helen Straughn as editor; WESVARS has their West Side Story. The Bell Tower Pioneer RC sent a copy of the Communicator's Bulletin which is a 50- page publication that will be of much help to their club members. They are a new Affiliated Club and we wish them well! That about does it. Wish you all a great 1989. 73, Roy, N4ADI. Traffic: WD4IIO 1508, WX4H 566, AA4HT 451, WA4QXT 424, N4UAV 400, KB9LT 388, N4SS 361, KB4LB 327, AA4FQ 258, W7YWF 225, WC4D 219, N4GMU 198, K4CY 124, N4DY 101, WB4GHU 93, WB3AVZ

81, WA4EYU 79, KI4CQ 78, N4JHI 66, N4JAQ 65, NF4O 54, N2AOX 52, WB4FJY 51, W4UEA 42, KA4KAH 39, N4QYS 39, W4DTV 33, W4KIX 31, N4NKI 30, KB4WUK 30, NL7GV 30, WB4TZR 26, N4UF 26, KB4FIY 21, WA4STZ 19, WA4SXW 19, KI4NN 14, W8IM 12, KJ4HS 6, N4OZD 5, W4ILE 4, W4AT 4.WB4JJH 2. October Traffic: WD4IIO 291, NL7GV 39.

SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PFK—SEC: W4SS. STM: K4ZK. TC: KI4T. BM: WD4KBW. PIO: N4PBF. SGL: KC4N. OOC: W4TAH. ACC: K4EUK. WD4KBW reports 126 bulletins received and 246 sent by AA4BN 26, W4DL 67, WA4EIC 139, WT4F 30, K4IEK 32, WD4KBW 39, AA4MI 18 and WA9VND 21. The Suncoast Convention in Tampa was a great hamfest—lots of excellent meetings and lots of people—SMs from GA, VI, NFL and SFL, many from headquarters as well as many section level appointees. Ran into AA4WJ at the ARRL booth—he was sure a happy OM—his daughter, KB4AEV had just been inducted into the National Honor Society. Sarah is 15 years old and was Novice at 8, Technician at 9 and a General at 10. Congrats to you both! Thanks to KD4GR who gave presentations on traffic handling at both the Motorola ARC and the Tamarac ARA meetings during November. KA4FZI reports via the Ft. Myers ARC Modulator that she expects most of the 15 students in her Novice class to have their licenses by the end of the term. She also thanks K4KKP and KC4EGO for their help during the class as well as WV4F and WD4CHP for the equipment donations. Incidentally, on the Florida Phone Traffic Net we have the Bard of Brevard—WA4NBE—now it seems we have a punster monster in the form of the QFN manager, KA4FZI. Check out her QFN column in the December Florida Skip if you're not afraid to tackle it! The Everglades ARC reports that K1FJM/4 in Homestead contacted VP8PTG in the Falkland Islands on 6 meters. The great circle distance is 5300 miles. It appears that it is the first ever 6 meter QSO between the US and the Falklands. The Gator Chapter of the QCWA reports that with their northern members returning to Florida the attendance at the meetings is increasing. The Englewood ARS reports the Novice class at the high school started with seven students, and they still have all seven and hope to have them all licensed by the time you read this. The instructors are K2GQU, K4KF, N4XK, WB1ICM and KC4WJ. The Broward Amateur Radio Digital Society has reorganized with its second meeting held at the Racal-Milgo plant in Sunrise. BARDS was founded in early 1988 and members KB4FO, KB4XE, KB4THK, and AL7IN set in motion a plan to revitalize the organization. The Martin County Common Emitter reports that the Port St. Lucie Police Department issued the Martin County ARS a Certificate of Appreciation "For distinguished Service to the Port St. Lucie Police Department and the citizens of the City of Port St. Lucie" —Congrats to you all! The Motorola ARC indicated that the AL7IN BBS will QRT sometime early in 1989 and that rumor has it that KB4FO will bring up his BBS again to serve the Broward area. Other club bulletins received include The South Brevard ARC Spark, Manasota Repeater Assoc., and the Palmetto ARC's Bug Juice. Sorry to inform you that W4ROA in Sunrise had a heart attack but the good news is he seems to be recovering very nicely. AL7IN who made BPL this month reports that his packet station has handled 10,000 pieces of mail in the last five months. Be sure to remember to listen to or check in to the ARRL Information Net on 3940 kHz at 8 AM each Saturday morning. 73 de WA4PFK. Traffic: W3CUL 2949, W3VR 1140, WA9VND 705, W4NFK 522, AL7IN 508, K4SCL 456, WA4PFK 382, WA4EIC 371, KK4WR 252, AA4BN 221, K4IA 220, N4HAP 214, KA4FZI 206, K4ZK 168, WB4WYG 166, WA4RUE 165, K4EUK 160, WV5Z 143, KB4KXV 129, WD4CHO 119, KD4GR 117, N4MML 109, N4ET 99, KY4U 93, KA4NXF 82, WA4NBE 78, KA4YHS 76, W4DL 73, WD4KBW 64, W3TLV 63, KF4RL 63, K4FQU 62, N4SDS 59, N4ORZ 54, KB4MON 51, N4OIA 45, KI4ZW 39, WB4GCK 36, KA9AKY 35, W4DWN 33, KA4AJR 32, KJ4WJ 31, WA4HDH 30, KB4UIA 30, W1KAM 29, WD4NXK 28, WT4F 27, K4JI 23, W3IJR 20, KA4SIH 19, KA0GYF 15, WD9AEP 15, AA4CH 14, N4RHJ 14, K4GVI 14, N2COI 14, K4KKP 14, KA4AMC 11, N1EGN 11, KB4LPL 11, WA9OYR 9, K9ALX 9, K9EHP 8, KC4GHT 7, WA4PIL 7, KB4UHC 7, KB4TIU 7, W4MFD 7, WA4VWJ 6, N8ABC 5, KA4GDU 5, N4IXO 4, WD4PPA 4, NX5Q 3, W2JTT 3, N4TGV 3, KA2KNZ 3, W4NSY 2, N4SBU 2, WA4LLC 2, WB4NYN 1, N4PSV 1. (Oct.) AA4IF 1.

PUERTO RICO: SM, Jose A. Purcell, Jr., KP4JG—STM: WP4FMH. PIO: NP4XM. TC: KP4ARY. SGL: WP4CSG. NM-PRNN: WP4FMH. NM-PRN: KP4DJ. By the time this message is published there will be a new Section Manager for P.R. On behalf of the above mentioned group I express my sincere thanks to all Hams who gave me the support during my period as SM. Special Thanks to KP4DJ, WP4FMH and NP4XM for keeping the CW Nets on the air at all times. Let's keep supporting the traffic nets. The new question pool for Extra Class Test is in use since November; make sure you have the right study material. Join us daily at 3,710 kHz on CW at the PRN Net at 2300Z. Also every Sunday on 7125 kHz at 1430Z. Practice the code with us. See you there!

VIRGIN ISLANDS: SM. Ron Hall, KP2N—ASM: KV4JC. SEC: NP2B. NM: VP2VI. Enjoyed meeting all SE division SMs at Tampa, FL convention. Brought back lots of ideas to use in VI section. Congrats to NP2B as our new SEC. I know John will do a great job. ARES checkins for St. Croix was 67 in 5 sess. St. Thomas reports 5 sess. QNI 15, QTC 3, St. Croix ARES members furnished H & W comm for 1/2 marathon. Those assisting: KV4JC, WP2AEC, NP2B, NP2C, NP2BR, NP2BJ, KP2Q. WB6RCN and KV4JC assisted in the Conch Shell Regatta. VI stations on for SS were NP2E, NP2B & KV4FZ. For visiting hams VI 2M rpts are: STT, 6.630; 6.810; 6.950-STX, 6.910; 7.110; 7.250. Bring your HTs. US license valid in VI & PR. VIARC FCC Exams sked for 1989; Feb. 11, May 13, Aug 12, Nov 11. Contact KP2O for time & QTH. Anyone interested in section appointment contact SM or ASM. St. Croix ARC 1989 officers: Pres-KV4JC; V. Pres-KP2BI. Secty-NP2C. Treas-NP2CM. Packet growing with addition of PBBS on St. Thomas system.

SOUTHWESTERN DIVISION

ARIZONA: SM, Jim Swafford, W7FF—STM: W7EP. NM: K6LL, K7POF, KI6ZH. The YLRL national president, NN7M was in Tucson during Nov. Mary Lou showed slides of her Nuie Island DXpedition to the Cactus Keys at the home of Phyllis, K7SEC. New officers elected by the Superstition ARC members are: KB7BEI, Pres., KA7BGY, V.P., WB9RBS, Sec., W9YCH, Treas. Their annual hamfest in Apache Junction on Dec. 3-4 was a big success, with approx. 1,500 attendees over

(continued on page 130)

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TECH TALK from ICOM

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A good example of the previous statements are fully tunable memories in ICOM transceivers. Let's hypothetically assume you are DX'ing 20 meters using Memory 1 and spot a 5H3 talking with his QSL Manager on 14.176MHz. You simply press your ICOM transceiver's WRITE button for immediate storage, then switch to Memory 2 and continue tuning 20 meters while the 5H3 converses. After next spotting a long-winded TL8 on 14.195MHz (and again pressing WRITE for Memory 2 storage), you switch to 15 meters and select Memory 3. A VP8 is called but missed on 21.280MHz, so you press WRITE and switch back to Memory 1 and 2 for checking the 5H3 and TL8. As each DX station is contacted, you simply retune that respective memory to another DX station, press WRITE for storage, and continue the process.

If narrow filters are required for good copy, their "call up" is also stored right along with frequencies in related memories. As activities increase on other bands, you likewise call more memories into use. This procedure triples (or quadruples!) your operating time. It's like using three rigs simultaneously, and your DX score rises three times faster!

Independently operating memories that work like multiple VFO's are standard features in all ICOM transceivers, but they are not available in many competitive units. You must continuously use one VFO for shifting frequencies from their fixed-channel storage: a time consuming and cumbersome process most operators usually forget. That's unfortunate. Good DX openings are not long lasting, and contacting the maximum number of needed countries during those periods is the key to top-notch DX'ing.

Several more special features in ICOM transceivers further widen the gap in their DX'ing lead over the competition. Adjusting their Passband Tuning from its center position, for example, continuously narrows its receive bandwidth while accentuating high or low tones for good copy. When combined with various SSB and CW filters, it is the "bees knees" for minimizing rotten QRM.

Noise hampering your DX'ing effort? ICOM transceivers have the answer. First, set their continuously adjustable Noise Blanker for proper operation without buckshotting, then use their IF Notch Filter to further reduce "hash" affecting AGC action. The AF Notch filters in several other transceivers, incidentally, cannot ward off such AGC distractions. It must be accomplished before signal detection to be useful.

Another effective method of reducing unavoidable noises for super DX'ing involves using an on-ground Beverage antenna for receiving and your beam antenna for transmitting. As highlighted in a previous Tech Talk, one wavelength Beverages work well on both lower and upper HF bands. A receiving preamp is suggested for good Beverage performance and guess who is the only manufacturer including that panel-selectable item as a standard feature. Further, a rear panel socket for easy plug-in use of separate transmit and receive antennas is included in ICOM HF tranceivers.

If CW DX'ing is your specialty, ICOM's ultra-smooth QSK, sharp filters and internally mounted iambic keyers put you head and shoulders above the crowd. Limited bandwidth antennas restricting your CW DX'ing? Relax. ICOM's automatic antenna tuners cut SWR's down to nothing with one press of a button. Their wide range also eliminates pampering measures reported by owners of other units. Automatic tuners are factory-installed in ICOM's IC-781 and IC-761, and optional matching accessories are available for the IC-751A and IC-735.

A super accessory for SSB DX'ing is ICOM's optional SM-10 mic. You can set its four band graphic equalizer to accentuate high tones in your voice and really crack tough DX pileups. Adjust the equalizer by tuning in and listening to yourself on a separate transceiver so you know exactly how you sound on the air.

Finally, remember all models of ICOM HF transceivers sport a world-recognized record of highest reliability under the most adverse circumstances. Each HF transceiver is also backed with a full coverage one year warranty.

Top performance and maximum reliability day in and day out. With ICOM, you are fully equipped to experience amateur radio to its full potential...and that is what keeps us enjoying this super hobby!

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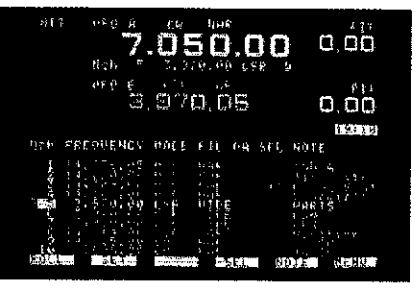
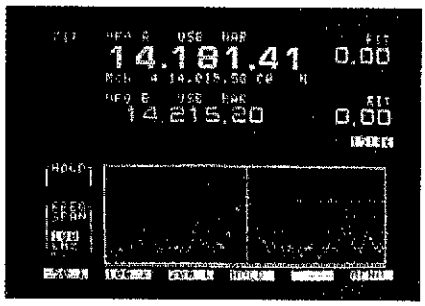
Once in a lifetime, a transceiver is introduced that's so extraordinary and innovative that it opens a totally new era in HF communications. ICOM's pacesetting IC-781 proudly exhibits that hallmark achievement with futuristic designs and features of true legendary proportions. Whether DX'ing, contesting, pioneering new interests or enjoying unquestionable top-of-the-line performance, the IC-781 is indeed today's standard of excellence!

Multi-Function Five Inch CRT. Displays frequencies, modes, memory contents, operating notes, RIT, two menu screens, plus a panoramic view of all signals in a selected range. A portion of the screen also serves as a display for data modes like RTTY, AMTOR, and PACKET.



Unique Spectrum Scope. Continuously indicates all signal activities and DX pileups with your operating frequency in the center. Selectable horizontal frequency spans of 50, 100, and 200KHz for each side of the frequency you're listening to. Vertical range indicates relative signal strengths. A contester's dream!



Dual Width Noise Blanker includes MCF filter plus **level and width controls** to eliminate pulse and woodpecker noise with minimum adjacent-signal interference.

Incomparable Filter Flexibility. Independent selection of wide and narrow SSB filters plus CW filters. Second and third CW IF filters are independently selectable!

Dual Watch. Simultaneously **receives two frequencies in the same band!** Balance control adjusts VFO A/B receive strength levels. You can check additional band activity, even tune in your next contact, while in QSO without missing a single word!

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A Total Communications System! Includes built-in 100% duty AC supply, high speed automatic antenna tuner, iambic keyer, semi-automatic or full QSK CW break-in to 60 wpm, Audio Peaking Filter (APF), RF speech processor, multiscanning, 105dB dynamic range, all-band/all-mode receiver with general coverage, and much more!

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the week-end period. I want to personally thank Bill, KA7SUF and Marge K1YCZ for their help in the ARRL booth set-up. W7YS off travelling again. After visiting KP4, KP2, FM0, PJ9, PJ8, HP and XE-lands in Oct., he's off to Germany in Dec. How does this guy manage to work so much DX when he's never home? W1FJI, our Bulletin Manager receives ARRL bulletins on packet from W7DIB, Yuma, then re-distributes all bulletins on various AZ packets PBBS's, plus originating special AZ bulletins. Good work, Art. He also handles NTS traffic on packet. Welcome to our new OBS, W7DIB. WA7AHF, OBS Tucson still passing ARRL bulletins on Thurs. TRA net on 146.22/82 at 1930 MST. TAPR announces their next annual membership meeting will be in Tucson Feb. 25-26 at the Inn at the Airport. For special room reservations call 1-800-772-3847. Arizona callers use 602-746-0271. They are also planning to have a booth at the 1989 Dayton HamVention. K7KYW our Pima Co. DEC sent in listing of all P.S. events for 1988 participated in by RACES/ARES and TRA members, plus others. Impressive total included 22 separate events using 321 operators expending 2,185 man hours. This is a great part of our hobby; helping other people. (FCC, please note!) Maw Prescott ARC officers: W6UMV, Pres., K7AA, V.P., W7KEE, V.P., KA7NGK. Sec., and WC7R, Treas. and VE exam coordinator. Arizona ARC, Phoenix sent in their annual report. Tnx, KA7UND. K1ZZ reports that SW Div'n membership totals thru Oct. are up by 636, approx. 5% increase over 1987 and we've got two more mos. to go. Don't have AZ-only totals yet, but know we contributed significantly from observing the number of new applications taken this year at the various hamfests. Remember, ARRL is *your only* national organization representing you and your hobby. Support it. ARCA says So. Mtn. Swapmeet will be mid-March with exact date and host club to be announced next month. New Public Information Assistant (PIO) KF7DN of Holbrook sent in monthly report. They had a group tour of the Very Large Array (VLA) radio telescope over in New Mexico with members of the Green's Peak Repeater Gp. Dwayne is also the Navajo ARC club prexy in Holbrook. Your SM currently actively engaged in assembling new tri-band and 6 mtr. beams for installation at home QTH. Understand 6 M will be "hot" in next year or two with rising sun spots. See you on six! Keep those reports coming in. 73, Jim.

NET	NI	TRAFFIC	SESS.	LIAISONS
SOUTHWEST NET	181	103	30	TWN
ARIZONA CACTUS NET (HF)	561	32	30	TWN
ARIZONA CACTUS NET (VHF)	281	55	30	AGN (HF)
ARIZONA TFC & EMERG NET	1027	189	30	TWN

Traffic: W7EP 252, W7KCM 136, W7AMM 115, W1FJI 62, W7OIF 55, W7GAQ 54, KE7EO 46, K7VVC 42, W7KXE 40, WE7G 40, K7JKM 38, K7ARZ 28, K7POF 28, N7ETP 24, (Oct) W1FJI 122.

LOS ANGELES: SM, Phineas J. Icenbice, Jr., W6BF—Regular meetings are now being conducted to manage the HAMCON 89. Rich Sauer, N6CIZ, Pres. of TRW/ARC has requested that two volunteers act as key contacts with HAMCON 89 and TRW/ARC. The TRW/ARC has agreed to support the ARRL HAMCON 89 effort with a special SWAPMEET and supervised parking for the event. Bus service between the SWAPMEET and the Hilton Hotel four miles north will be provided by HAMCON 89. (Rich 213-536-2140) It is not too late to make a major contribution to HAMCON 89 by calling your local Club officials to volunteer your services so that HAMCON 89 will be one of the greatest conventions ever held in Los Angeles.— KD6JL, Bud invited me to a Ham Club breakfast last Thursday at TONDO's in Canoga Park to meet the gang of about 25 and talk about RFI cures. This is a great gang of hams that meet every Thursday at about nine for breakfast. Give KD6JL Bud (818) 348-2736 or KF6QT DR Harry a call (818) 340-5934 for an invitation. This is one of those Ham gab fests that you should try, if you live in or near the San Fernando Valley. (corner of Shoup & Sherman Way)—Do you know how to tell if a political speaker is telling a falsehood? Check to see if his lips are moving.—After reading about 25 Amateur Radio Club Bulletins every month, it seems to me that a yearly calendar of scheduled events is one of the most worthwhile parts of these bulletins, other than the jokes of course.—An operator was convicted of obscene language transmissions in Houston, Texas. The investigation was conducted and coordinated by the FCC Houston Office, in cooperation with the U.S. Attorney's office. This proves that the FCC is alive and well in Houston and we still have obscene language. If you have the time, equipment and desire to help clean up the bands please write to me for an application—ask for the LOCAL INTERFERENCE COMMITTEE QUESTIONAIRE.—Some of the IEEE Life members took off with the idea of promoting Amateur Radio, courtesy of the Life Member Fund of the IEEE Field Services operation. This group has available brochures for the asking on AMATEUR RADIO HANDS-ON HIGH-TECH, geared toward students and reprints of "MORSE DECODED" which gives tips on Morse Code. The address is IEEE Field Services, 445 Hoes Lane, Box 1331, Piscataway, N.J. 0885- 1331. IEEE members who have Ham calls please send them to me or show up on 14,160 kHz at 2100 UTC and make yourself known to the ET Friendly DX Net. 73 and Happy New Year to all. STM News: The activity was low for Thanksgiving day. Don't know what is happening to the traffic nowadays, maybe packet is picking up the overload. I hope Christmas will be better or I don't know what is next. We need radio operators if we are going to continue and that means we have to spend some time on the nets and we have to told the NTS up in the Los Angeles area. Any suggestions will be appreciated. 73. Traffic: K6UYK 514, W6INH 181, W6TH 88, W6NKE 26, W6CL 11.

ORANGE: SM, Joe H. Brown, W6UBQ—ASM: Riv Co W6LKN Bob (714-686-3823). ASM: Org. Co. Ralph WB6JBI (714-776-9272). ASM: San Berdo. Co. Ken WA6ZEF (714-983-1272). *CLUB NEWS* With a new year on the horizon, the time to elect new officers has arrived. Your help will certainly be welcomed. Talk with any Officer or Board Member, de W6ULI(FRC). *Barstow ARC*, New Officers Pres. Chris N6ADY. VP Jose K6EOI. Sec./Treas. Bill KJ6JJ. *SC6MC (Sixpack)* The Out of Boundary Hunt, was much fun, hiders John WA6BFH, Merrils N6PON. Ahead of the pack, Bob WB6YVP and Tony. *Lee Defor ARC*. 1989 Officers, Pres. Donna N6OKS. VP Calvin W6ETB. Treas. Jim KB6YBP. Sec. Toni N6QPX. *Western ARA*. At the helm for 1989. Pres. Glen K6RUB, 1st VP Jeff KB6SRM, Sec. Janet N6TAZ, Treas. Stu KA6RRB. *Buena Park ARC*. 1989 Elected Officers, Pres. Bill KI6KV, VP Russ K6CH, Sec. Margie KA6QWZ, Treas. Chester KB6EHX. *Golden Triangle ARC*, Temecula, CA, a new and growing group, has asked for ARRL affiliation. Good luck and enjoy! *Section (BM)*W6TKV, wants to get clubs more involved in the distribution of new and bulletins (ARRL, FCC, LIC, Westlink, VE testing, ham classes etc) and seeks amateurs interested in becoming part of this news link. GOAL? Let's have more hams aware of what is happening, witness the 220 MHz issue. News can be spread on 2 M Nets, packet, club meetings, Amateur social activities, etc. For info call 714-687-8145. *Public Service* SEC WA6ZEF reports the ARES/RACES county councils concept is moving along. When this program is completed it will present an organized and powerful group of Amateur Ops with a common and effective public service role. Wescom Norco/Corona. New EC N6RNO Ron. Good luck Ron. *ANTS AFFAIRS* SCN1 30 SES, QNI 262, QTC 232. SCNV 30 SES, QNI 283, QTC 174. BPL WF6O. PSHR WF6O, KA6HJK, KA6TND, WB6QBZ, WA6QCA. Packet BBS totals WA6YNT-1 202, N6ADV 77. Traffic: WF6O 676, K6ZCE 149, AD0A 133, WB6QBZ 90, KA6HJK 69, K6DD 69, N6GOT 66, WA6QCA 47, W6CPB 41, KA6TND 35, KA6GND 22, W6SX 15, N6OKS 16, W6NTN 13, W5TZR 6.

SAN DIEGO: SM, Arthur R. Smith, W6INI—TC: N6JZE. SEC: W6INI. STM: N6GW. PIO: N6PKY. The ARRL Field Organization is the lifeblood of the League's operation. To be effective, all leadership positions must be filled by competent volunteers. Needed are Affiliated Club Coordinator, Bulletin Manager, Official Observer Coordinator. Anyone interested please contact W6INI (273-1120) for info. ARES had a late-season CDF callout for Red Flag Patrols. Over 30 operators participated Nov 29 and 30. N6NKJ and N6LKL installed 2-meter and 1-1/4 meter antennas on the El Cajon Red Cross building. Is your club doing its part to bring youths into ham radio? Has it become an "adopt a school" club? Contact school officials now and get a club and licensing class started at a senior or junior high school. Palomar ARC is equipping a trailer as an emergency comm center complete with portable 40' tower. Escondido ARS entered a float in the Escondido Centennial Parade. Is this a first in SD County? NCTN: 29 sessions, 100 msgs, 374 ck-ins. Traffic (Oct.) WV6K 65, KI6ZM 60, N6GW 46, N6RVO 36. (Nov.) KI6ZH 82, KB6PCF 75, N6GW 51, KI6ZM 46, N6RVO 34.

SANTA BARBARA: SM, Thomas I. Geiger, W2KVA—ASMs: N6MA/W8AKF/WB6BYU. ACC: KB5AH. BM: KI6XG. STM: N6WP; OOC: W8AKF. PIO: N6FOU. TC: W6KFV. SEC: WB6IIY. DECs: WB6RVA/KA6KGF/KI6XG/WB6IIY. Our Section Technical Coordinator, W6KFV, has accepted an LIC appointment...perhaps the first such in the country without a concurrent Official Observer appointment. (We DO try to do things differently here!) With John working in the northern part of the section, and Mike, W8AKF in the southern realm, we should have things rolling along pretty soon. If you'd like to help, would like to learn more, or have interest in forming a LOCAL Local Interference Committee (under the umbrella of the Section LIC), please contact W8AKF, W6KFV or me. Remember that what effects one of us ultimately effects us all. (If you have seemingly "insurmountable" RFI problems, we can try to help resolve them, too.) Congratulations to the newly elected officers of the Conejo Valley ARC, installed at their banquet on 12/03/88: Pres.—Tom Richie, N6FBH; V.P.—Brad Ormsby, WA6GLE; Sec/Treas—Marjorie Larson, KB6YQD and Field Day Chairman—Ron Feldstein, KD6ZM. Congratulations also to the new officers of the Ventura County ARC: Pres. Dick George, WA6JOX; V.P. Denney Pistole, WA6FPX; Sec. Mac Shroyer, K6VMN; Treas. Bob Bond, WD6BCN and "KEYER" Editor, Steve Noll, WA6EJO. SPECIAL FELICITATIONS TO THE VENTURA COUNTY ARC (K6MEP) ON COMPLETING THEIR FIFTIETH YEAR AS A ARRL AFFILIATED CLUB! That is an achievement to be proud of. More about Ventura Co. ARC next month, when K6MEP will be the first of the Section's clubs to be profiled in this column. Speaking of achievements, one of our own was involved in another remarkable story of hams getting the message through. Seems that NC8Q in Dayton, OH, had just gotten back on the air, and into packet radio, when an acquaintance asked him to send some emergency traffic to the Philippines. He relayed the traffic via 2-meter packet to N8GTC in Brookville, IN, who forwarded to W8AKF-10 (10 meters) in Newbury Park. Mike happened to be watching, and immediately forwarded to W6CUS-1 (Richmond, CA, Red Cross) via 40-meters. From Richmond the traffic went to DU9EH via 20-meter packet, and was delivered. Elapsed time from origination to delivery....2 hours! A hearty "WELL DONE" to all involved! Incidentally, Mike reminds us that he has all the W1AW Gateway, ARRL, and AMSAT Bulletins available on W8AKF-1 (access direct or via WA6ZSN-3). Those living in the southern part of the Section can reach me by logging on to W8AKF- 1 and "sending" traffic to me (& W2KVA). Mike will auto-forward it WA6VQP-1. Belated congratulations to WA6VNO, whose call somehow got lost from the August upgrade listings. Mel got his Extra at the Santa Barbara VEC session, and is now busily raking in those DXCC counters in the low end of the bands. Congrats also to Lucy Mau, whose new Novice call is WH6CAU and to all those who upgraded in November and December. (Your calls will be listed next month.) That's all we have room for this time. 73 for now.

WEST GULF DIVISION

NORTHERN TEXAS: SM, Phil Clements, K5PC—Asst. SM: K5MXQ. SEC: W5GPO. STM: W5VMP. OOC: WB5JBP. BM: W5QXK. TC: W5LNL. SGL: N1CWP. PIO: K5HGL. With regrets, I have accepted the resignation of Charles Byars, W5GPO, as your Section Emergency Coordinator. Charles has been my "right arm" for the past ten years, in charge of our ARES program, and all emergency operations in our Section. He has taken an almost non-existent program to the number one ARES unit in the entire League. The number of hours he has devoted to the mounds of paperwork and correspondence are incalculable; not to mention his on-the-air organizations and recruiting work. In addition to all of this, Charles has been at the helm of all major communications emergencies that have occurred in the Section, supervising operations and establishing vital communication links to our served agencies. We all owe Charles a great debt of gratitude for the superb job he has done in creating the finest ARES organization in the country! His successors will have his/her work cut out for them! See you at the next disaster, Charlie! 7290 Tfc. Net for Nov. QNI: 3,065 QTC: 362 in 46 ssns. Congrats to Henry, W5YQZ, the new 7290 Net Mgr. Northeast Texas Tfc. and Emer. Net for Nov. QNI: 79 QTC: 27 in 21 ssns. Texas Tfc Net for Nov. QNI: 800 QTC: 120 in 30 ssns. PSHR for Nov. W5YQZ, K5UPN, N5KCL, KF5BL, K5MXQ. Traffic: K5UPN 540, K5MXQ 226, KF5BL 225, W5YQZ 142, W5VMP 137, W9OYL 130, N5KCL 88, WA5EZT 30, WB5CPY 23.

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MICRO includes ten programmable memories, transmit offset capability from the back panel including odd offsets, an LCD readout on the top panel for easy readability, up to three watts of output (optional), 32 built-in subaudible tones AND wideband receive coverage from 138 to 162.995MHz in 5KHz steps for MARS and CAP operation plus weather broadcasts (IC-μ2AT) or 440 to 449.995MHz (IC-μ4AT).

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OKLAHOMA: SM, Joe Lynch, N6CL—Tulsa Repeater Organization held its first transmitter hunt on the 19th of Nov. The winners were K5WG and KG5IC. Other participants were KA5VFY, WB5OSM, KF5RD, WA6HNO, KG5NP and KA5VIL. WØKIE as the fox gave a real challenge with short transmissions, multiple power levels and antennas. TRO plans to hold regular t-hunts to sharpen df-ing skills. Altus area hams, including WB5KRH and WB5UMH provided emergency communications during and following a combination wind storm/cotton fire. Mike, W5VXU, suffered extensive property damage to his rentals, but no injuries. Your SM, along with the Central Oklahoma DEC, N5FM, and ASM, K5CPZ, visited the Wheatstraw Club at their meeting in El Reno. We met with a wonderfully friendly group of hams and their families. We also met a couple of very special young people, Karey Kuehn, KG5OR, who, at 11, passed her Extra Exam, and her brother, Kris, KG5PD, who, at 13 passed his Extra code exam and by this writing probably has passed his Extra theory. Special tnx to their "Elmers," Ed, WO5B, and Betty, KG6JB, Engbrecht. 73 for now. Joe, N6CL. Traffic: WB5OHK 236, WA5OUV 132, KV5X 118, WB5SRX 108, KF5RD 91, W5RB 71, N5IKN 29, WA5ZOO 27, WA5OGC 22, K5CPZ 21, AA4GI 20, W5VOR 18. (Oct.) AA5GI 16. (Sept.) WB5SRX 117.

SOUTH TEXAS: SM, Art Ross, W5KR—SEC: K5DG. OOC: K5SBU. STM: WR5O. PIO: WA5UZB. ACC: WB5YDD. TC: NZ5U. BM: K5CVD. SGL: K5KJN. ASM: N5TC and all of above. OES KA5QAP, Spring, helped with communication and medical info for Moonlight bicycle ride in Oct. PIA NZ5J, Seguin, rprts N5VAV passed General theory. OBS W5KLV rprts 4 propagation tests, 13 bulletins given 29 readings on 7 nets. SIX SHOOTER, bulletin of Six Meter Intntl Klub (SMIRK), San Antonio, rprts N5HHS is overall winner of 1988 Summer SMIRK party/contest; KH6HI is the international winner; ZS6ANZ is non-member winner. PIA KA5EEQ, Brenham ARC, rprts KB5HIR is new Novice; WB5FRQ, KA5BLB presented Washington County Commissioners with a proposal for establishing an Amateur Radio emergency station; KA5LEI and KA5EEQ showed NEW WORLD OF AMATEUR RADIO to BSA troop, followed by actual 2-meter contacts and demo of HF contacts via HF rcvr; David also sent in copy of article on "Why CW Will Never Die." DRN5 NM WB5YDD rprts 573 msgs in 60 Nov sessions; STX represented 100% by KD5KQ, W5KLV, W5CTZ, NZ5U, KD5CB, WB5HZQ, KE5ZV, WB5EPA, WB5FQU, N5BHQ, WB5YDD. PIA N5FIX, NW ARS (NARS), Houston, rprts officers for 1989 are Pres N5LSP, VP KB5AEL, Secy KD5KR, Treas KB5DTB; thanks to work by EC N5KEU, the NARS ARES group's Amateur Radio Emergency Preparedness booth at the county fair did a great job of showing Ham Radio to the public; KUDOS to all for a job well done. McCulloch County EC N5KAO made a Ham Radio presentation to the Brady Rotary Club; Heart of Texas Ham Operators Group (HOT HOG), Brady, hosted a second Packet Network Operators Meeting, N0CCW, Chairman; WW5M arranged for the meeting site; WD5H rprtd the proceedings in the Brady HERALD. NM K5UPN rprts CAND passed 807 msgs in 30 Nov sessions; RN5 represented 100%; STX stations helping were WB5EPA, WB5FQU, KD5KQ, W5KLV, NX5V, WB5YDD, KE5ZV, W5WXI. PIA KG5HQ, Houston ECHO Society, rprts WQ5Y elected President for unexpired term of WK5M who moved away; ECHO participated in Pregnant Woman's Walk, Moonlight Bicycle Ramble and American Lung Assn's 200-mile bike ride; Helen also rprts KB5GPF and N5DGS went to Advanced; N5NAZ up to General; KB5HNW, KB5HRK, KAØAYG, KB5HFN, KB5HND up to Technician; one unlicensed to General, 4 unlicensed to Technician and 1 unlicensed to Novice in ECHO test sessions. Brazos Valley ARC (Fort Bend & Harris Counties) congratulates KB5GUY for a ten-meter DX QSO with JE2FUP on her 12th birthday, KB5EQF for excellent work on B-VARC bulletin, K5LTW for great club programs, K5BDZ for upgrading to Extra, N5LGS for upgrading to General; real nice going all around; others who upgraded at the same time were KA5AYA, KB5DFR, N5MPN to Advanced, KB5DTQ to Technician and one unlicensed to Novice. OOC K5SBU looking for OO candidates. BM K5CVD needs OBS candidates to "spread the word."

WEST TEXAS: SM, A. Milly Wise, W5OVH—ASM: KA5PTG. ASM: WF5E. ASM: AI5S. ASM: WD5EFJ. ASM: N5DO. SEC: W5MVJ. PIO: KE5ZW. ACC: K5IS. OOC: K5KNC. TC: K5CU. STM: AE5I. The Panhandle ARC of Amarillo advises that the cloud chasers net meets at 8 PM on 146.67 every Monday night. SEC Sandy, W5MVJ, is very proud of the 330 ARES members who have really gotten their SET programs going well. The 1988 Golden Cross Bike-A-Thon Comm. were handled by NCS Judy, KB5AJL, and the hams who manned the checkpoints and rest stops up to 126 miles were KB5AJL, KA5RYF, KG5BL, KB5ARQ, N7IN, KB5FYX, W5ULX, KE5BF, N5MXV, AA5DN, KF5TH, WD5BWH, WD5BCS, KJ5Z, W1LTG, KG5BG, WA5RKQ, KA5YAL, WA5TBB, KA5WWR. Dale, KA5MRR, reports improvement on the Lamesa 2 meter repeater since it has been moved from 147.30 to 146.90. Prairie Dog Chatter of the Childress ARC reports on 11/15/88 beams rattled and peak wind gusts were 85 MPH at the EOC. ACC Jerome reports that at booker the Novice Class jumped into ham radio with a vengenance as all but one of the class has upgraded. Tulia recently installed a new hamtronics reptr on 147.36 + 600. West Texas has now been officially expanded by three counties: Coleman, Callaghan, and Shackleford. San Angelo's ARC bulletin kilo-what, advises the Big Bend ARC participated in the Alpine and Brewster Co. agencies in their SET exercises along with other city's hams. Congrats on the tenth annivsary of the West Texas ARC. New open reptr on a 200-foot tower in Amarillo on 146.92 owned and operated by N5LTZ. 73, A. Milly Wise, W5OVH. Traffic: AE5I 82, W5ERT 19, KE5VH 8, K5KKO 1.

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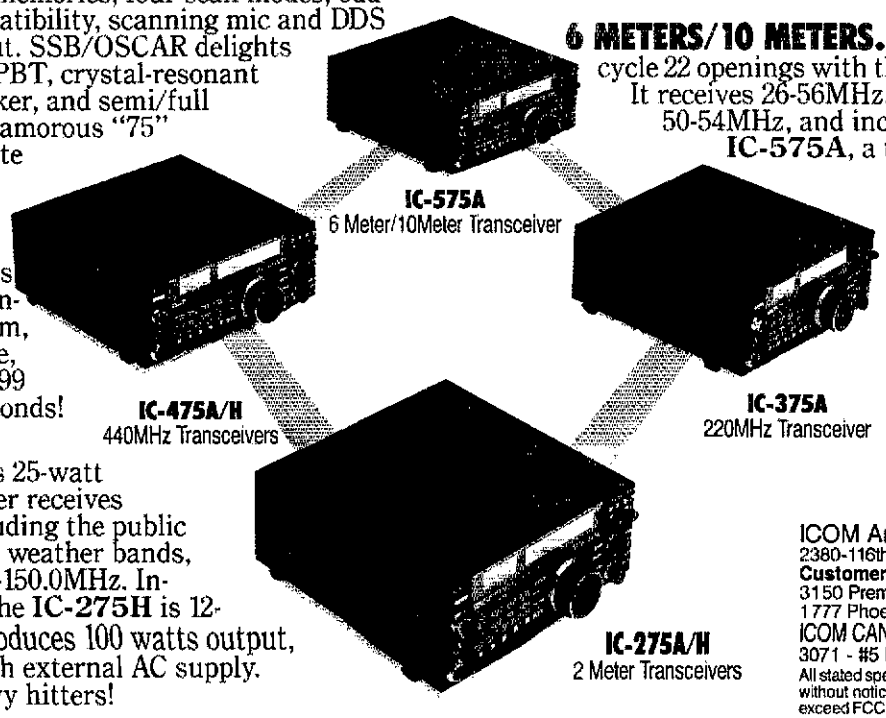

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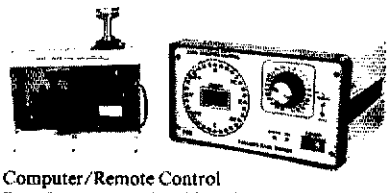

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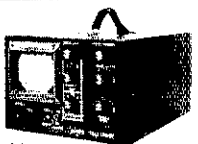

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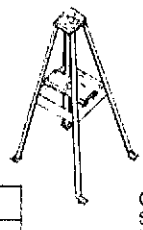
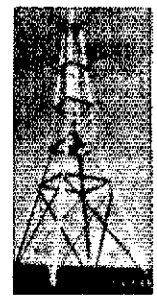
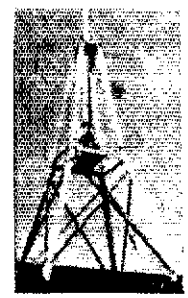


CR-18



CR-30



CR-45

ALINCO ROOF TOWERS

Model No Specifications	EFS-210
Spacing Between Legs At Roof	2'10"
Actual Height	6'6"
Max. Vertical Load	350 Lbs.
Max. Rotational Torque	135 Foot Lb
Max. Mast Length from Roter Plate	5'6"
Roof Mounting Pads	Adjustable For Roof Pitch
Weight	28 Lbs.

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MODEL	HEIGHT	MAXIMUM ANTENNA WIND LOAD IN FT 2	BASE WIDTH	MAX. VERT. LOAD LBS.	TOWER WEIGHT LBS.	PRICE
CR-18	5'10"	21 @ 90 MPH	31-1/3"	440	28	129.00
CR-30	9'10"	27 @ 90 MPH	39"	1,322	39	224.00
CR-45	14'9"	23 @ 90 MPH	39"	881	55	328.00
CK46	Thrust Bearing For CR-18, CR-30, and CR-45 Maximum Acceptable Mast Diameter 2¼"					52.00

*BUYING IS REQUIRED ON ALL ROOF TOWERS. UPS SHIPPABLE

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20G	10' sect.	48.95
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AS25G	access shelf	24.95
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TB-3	thrust bearing	57.95
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SSM-3	spring	16.95
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PD8040	80-40 dipole kit	33.95
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SD80	80 shortened dipole	29.95
SD40	40 shortened dipole	26.95
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GR5V		49.95
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KT34XA	triband 5 el.	
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435-18C	70cm satellite	
435-40CX	70cm satellite	
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2M-13LBA	2 meter	
2M-16LBX	2 meter	

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		per/ft.
Belden 9913	Low Loss	.54
RG213 50 Ω (OHM)		.57 cts
RG8/U	Foam	.30cts
RG 8X	Mini	.22 cts
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CUSHCRAFT ARX2 — CALL!
ALLIANCE HD73 — CALL!

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DXA	160, 80, 40 dipole	49.95
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Coaxseal		2.95
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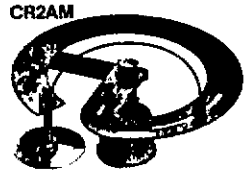

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ARX-2	2mt. vert. ringo ranger	34.95
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	AND MORE!	
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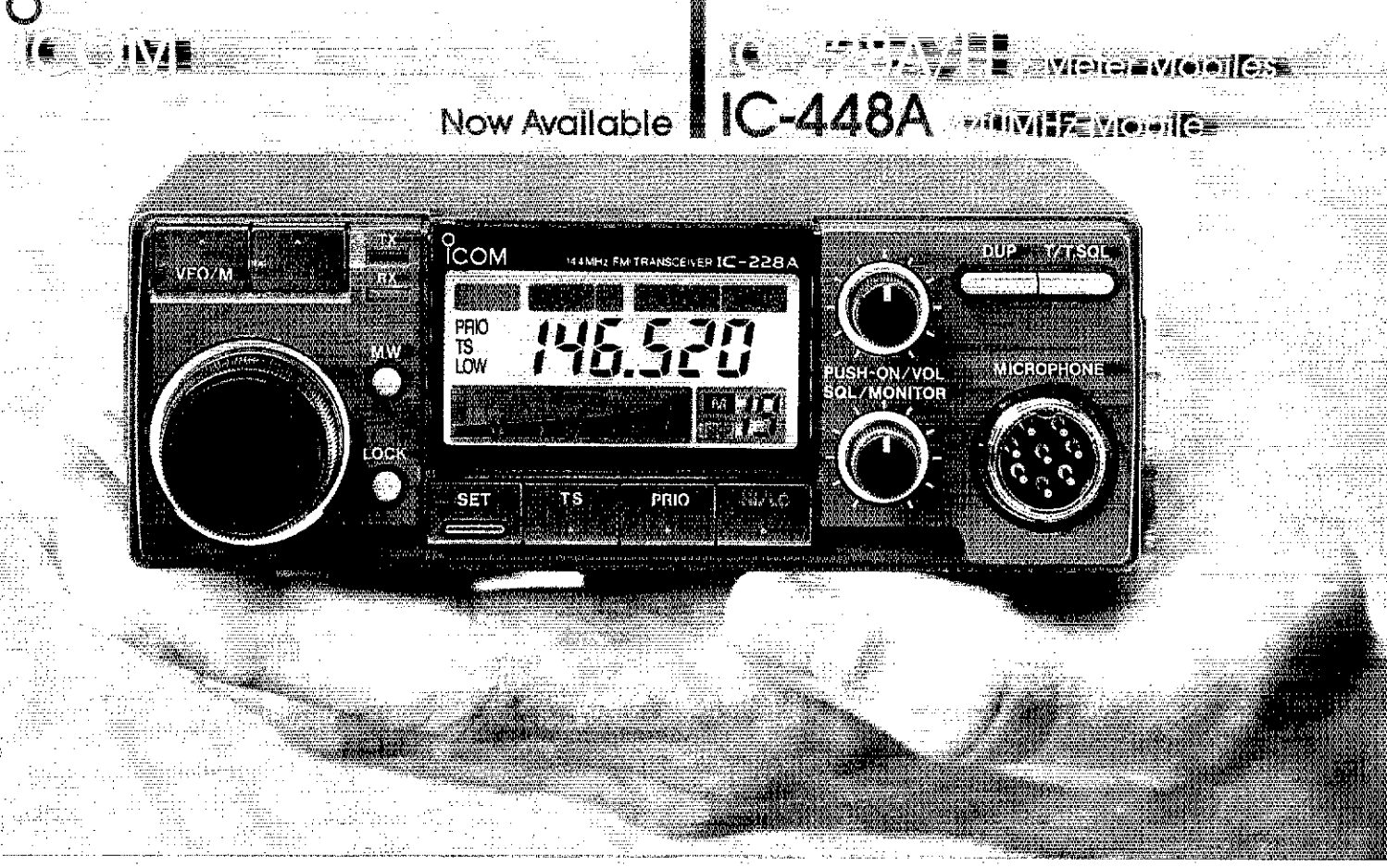

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Programmable tuning steps of 5kHz, 10kHz, 15kHz, 20kHz or 25kHz.

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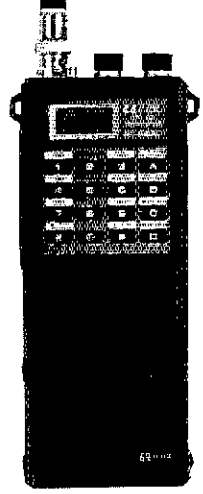

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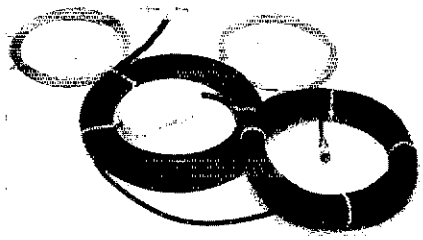

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Single Element 80/40, 2KW PEP	33.95
SWL	33.95

WIRE & CABLE

RG-213 97% Braid, Mil Spec	34¢/ft.
RG-214 Silver Dbl Shield, Mil Spec	1.50/ft.
Equiv. Belden 9913	37¢/ft.
RG-8X Foam, 95% Braid	14¢/ft.
RG-11 96% Braid, Mil Spec	31¢/ft.
8 Cond. Rotor Cable, Std (2-18- 6-22)	16¢/ft.
8 Cond. Rotor Cable, Hvy (2-16 6-18)	32¢/ft.
6 Cond. Rotor Cable	14¢/ft.
300 OHM KW Twin Lead	11¢/ft.
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450 OHM Ladder Line, Bare, 100ft. Rol	16.00
14GA HD Stranded Copper	08¢/ft.

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APR151.3G 2M on Glass	32.99
AP220.3G 220MHZ on Glass	32.99
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All Scanner Antennas in Stock	CALL

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LM 220, 220 MHZ Coil and Whip	22.95
LM450, UHF Coil and Whip	22.95
NMOMM, Mag Mount	17.95
NM02/70 Dual Band Coil and Whip	32.95

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RS7A	48.95	RS35M	148.95
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ICOM's advanced IC-02AT, compact IC-μ2AT Micro, and rugged IC-2AT dominate the 2-meter bands from 139.0-163.0MHz.

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ICOM's deluxe IC-03AT and dependable IC-3AT are the perfect choices for 220.00-224.995MHz.

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ICOM's outstanding IC-04AT, IC-μ4AT Micro, and IC-4AT, have you covered to 440.00-449.995MHz.

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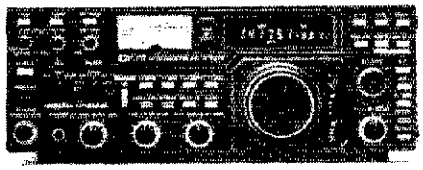
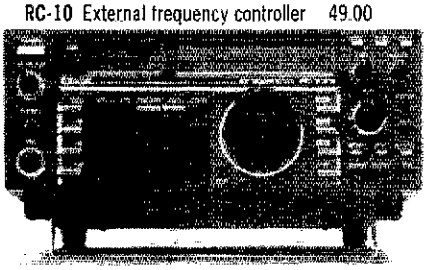
HF Equipment	Regular	SALE
IC-781 Xcvr/Rcvr/ps/tuner/scope	5995.00	Call

IC-761 Xcvr/Rcvr/ps/tuner	2699.00	2369
HM-36 Scanning hand microphone	47.00	
SP-20 Ext. speaker w/audio filter	149.00	139.95
FL-101 250 Hz 1st IF CW filter	73.50	
FL-53A 250 Hz 2nd IF CW filter	115.00	109.95
FL-102 6 kHz AM filter	59.00	
EX-310 Voice synthesizer	59.00	



IC-751A 9-band xcvr/.1-30 MHz rcvr	1699.00	1469
PS-35 Internal power supply	219.00	199.95
FL-32A 500 Hz CW filter (1st IF)	69.00	
FL-63A 250 Hz CW filter (1st IF)	59.00	
FL-52A 500 Hz CW filter (2nd IF)	115.00	109.95
FL-53A 250 Hz CW filter (2nd IF)	115.00	109.95
FL-33 AM filter	49.00	
FL-70 2.8 kHz wide SSB filter	59.00	
RC-10 External frequency controller	49.00	



IC-735 HF transceiver/SW rcvr/mic	1099.00	949.95
PS-55 External power supply	219.00	199.95
AT-150 Automatic antenna tuner	445.00	369.95
FL-32A 500 Hz CW filter	69.00	
EX-243 Electronic keyer unit	64.50	
UT-30 Tone encoder	18.50	

Other Accessories	Regular	SALE
IC-2KL 160-15m solid state amp w/ps	1999.00	1699
PS-15 20A external power supply	175.00	159.95
PS-30 Systems p/s w/cord, 6-pin plug	349.00	319.95
MB Mobile mount, 735/751A/761A	25.99	
SP-3 External speaker	65.00	
SP-7 Small external speaker	51.99	
CR-64 High stab. ref. xtal for 751A	79.00	
PP-1 Speaker/patch	179.00	164.95
SM-6 Desk microphone	47.95	
SM-8 Desk mic - two cables, Scan	89.00	
SM-10 Compressor/graph EQ, 8 pin mic	149.00	139.95
AT-100 100W 8-band auto. antenna tuner	445.00	389.95
AT-500 500W 9-band auto. antenna tuner	589.00	519.95
AH-2 8-band tuner w/mount & whip	659.00	589.95
AH-2A Antenna tuner system, only	519.00	449.95
GC-5 World clock	91.95	79.95

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VHF/UHF base multi-modes	Regular	SALE
IC-275A 25W 2m FM/SSB/CW w/ps	1299.00	1069
IC-275H 100W 2m FM/SSB/CW	1399.00	1129
IC-375A 25W 220 FM/SSB/CW (c/o)	1399.00	899.95
IC-475A 25W 440 FM/SSB/CW w/ps	1399.00	1099
IC-475H 75W 440 FM/SSB/CW	1599.00	1289
IC-575A 25W 6/10m xcvr w/ps	1399.00	1129
IC-575H 100W 6/10m xcvr	1699.00	1499
IC-471H 75W 430-450MHz base (c/o)	1399.00	989.95
PS-35 Internal power supply	219.00	199.95
AG-35 Mast mounted preamp	99.95	
AG-35 (Purchased with IC-471H)	99.95	9.95
SM-6 Desk microphone	47.95	
EX-310 Voice synthesizer	59.00	
TS-32 CommSpec encode/decoder	59.95	
UT-15 Encoder/decoder interface	34.00	
UT-15S UT-15S w/TS-32 installed	96.00	

VHF/UHF/1.2 GHz Mobiles	Regular	SALE
IC-37A 25w 220 FM/TTP mic (c/o)	499.00	349.95
IC-47A 25w 440 FM/TTP mic (c/o)	549.00	399.95
PS-45 Compact 8A power supply	145.00	134.95
UT-16/EX-388 Voice synthesizer	34.99	
SP-10 Slim-line external speaker	35.99	
IC-28A 25W 2m FM, TTP mic	469.00	409.95
IC-28H 45W 2m FM, TTP mic	499.00	439.95
IC-38A 25W 220 FM, TTP mic	489.00	349.95
IC-48A 25W 440-450 FM, regular mic	459.00	369.95
IC-48A 25W 440-450 FM, TTP mic	509.00	449.95
HM-14 Extra TTP microphone	59.00	
UT-28 Digital code squelch	39.50	
UT-29 Tone squelch decoder	46.00	
HM-16 Speaker/microphone	34.00	
IC-228A 25W 2m FM/TTP scan mic	509.00	449.95
IC-228H 45W 2m FM/TTP scan mic	539.00	479.95
UT-40 Pocket beep function	45.00	
IC-900A Transceiver controller	639.00	569.95

★ Package Special . . .
IC-900A Transceiver controller with UX-29H 2m/45W and UX-39A 220/25W band units.
$969.95

UX-19A 10m 10W band unit	299.00	269.95
UX-29A 2m 25W band unit	299.00	269.95
UX-29H 2m 45W band unit	349.00	319.95
UX-39A 220MHz 25W band unit	349.00	289.95
UX-49A 440MHz 25W band unit	349.00	319.95
UX-59A 6m 10W unit	349.00	319.95
UX-129A 1.2GHz 10W band unit	549.00	499.95
IC-1200A 10W 1.2GHz FM Mobile	699.00	549.95
IC-3200A 25W 2m/440 FM/TTP (c/o)	695.00	499.95
UT-23 Voice synthesizer	34.99	
IC-3210A 25w 2m/440 FM/TTP	739.00	649.95
AH-32 2m/440 Dual Band antenna	39.00	
AHB-32 Trunk-lip mount	35.00	
Larsen PO-K Roof mount	20.00	
Larsen PO-TLM Trunk-lip mount	22.00	
Larsen PO-MM Magnetic mount	22.00	
RP-1210 1.2GHz 10W 99 ch FM xcvr	1529.00	1349
RP-2210 220MHz 25W repeater	1649.00	1469
RP-3010 440MHz 10W FM repeater	1299.00	1149

Due to the size of the ICOM product line, some accessory items are not listed. If you have a question, please call. All prices shown are subject to change without notice.

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Hand-helds	Regular	SALE
IC-2A 2-meters	289.00	259.95
IC-2AT with TTP	319.00	279.95
IC-3AT 220/TTP (c/o)	349.00	269.95
IC-4AT 440 MHz, TTP	349.00	299.95
IC-02AT/High Power	409.00	349.95
IC-03AT for 220 MHz	449.00	289.95
IC-04AT for 440 MHz	449.00	389.95
IC-u2AT for 2m w/TTP	329.00	289.95
IC-u4AT 440 MHz, TTP	369.00	299.95
IC-2GAT for 2m, TTP	429.00	379.95
IC-4GAT 440MHz, TTP	449.00	399.95
IC-32AT 2m/440MHz	629.00	559.95

IC-u2A for 2m w/o TTP
Reg. $299 - **Closeout $249.95**

IC-12AT 1W 1.2GHz FM HT/batt/cgr/TTP	473.00	369.95
IC-12GAT Dlx 1/7W 1.2GHz FM HT/TTP	529.00	469.95

Aircraft band handhelds	Regular	SALE
A-2 5W PEP synth. aircraft HT	525.00	479.95
A-20 Synth. aircraft HT w/VOR	625.00	569.95

Accessories for all except micros	Regular
BP-7 425mah/13.2V Nicad Pak - use BC-35	79.00
BP-8 800mah/8.4V Nicad Pak - use BC-35	79.00
BC-35 Drop in desk charger for all batteries	79.00
BC-16U Wall charger for BP7/BP8	21.25
LC-11 Vinyl case for Dlx using BP-3	20.50
LC-14 Vinyl case for Dlx using BP-7/8	20.50
LC-02AT Leather case for Dlx models w/BP-7/8	54.50

Accessories for IC and IC-O series	Regular
BP-2 425mah/7.2V Nicad Pak - use BC35	49.00
BP-3 Extra Std. 250 mah/8.4V Nicad Pak	39.50
BP-4 Alkaline battery case	16.00
BP-5 425mah/10.8V Nicad Pak - use BC35	65.00
CA-5 5/8-wave telescoping 2m antenna	19.95
CP-1 Cig. lighter plug/cord for BP3 or Dlx	13.65
CP-10 Battery separation cable w/clip	22.50
DC-1 DC operation pak for standard models	24.50
MB-16D Mobile mtg. bkt for all HTs	26.99
LC-2AT Leather case for standard models	54.50
RB-1 Vinyl waterproof radio bag	35.95
HM-9 Speaker microphone	47.00
HS-10 Boom microphone/headset	24.50
HS-10SA Vox unit for HS-10 & Deluxe only	24.50
HS-10SB PTT unit for HS-10	24.50
SS-32SMP Commspec 32-tone encoder	27.95

For other HT Accessories not listed please CALL

Receivers	Regular	SALE
R-71A 100kHz to 30MHz receiver	$999.00	869.95
RC-11 Infrared remote controller	70 99	
FL-32A 500 Hz CW filter	69.00	
FL-63A 250 Hz CW filter (1st IF)	59.00	
FL-44A SSB filter (2nd IF)	178.00	159.95
EX-257 FM unit	49.00	
EX-310 Voice synthesizer	59.00	
CR-64 High stability oscillator xtal	79.00	
SP-3 External speaker	65.00	
CK-70 (EX-299) 12V DC option	12.99	
MB-12 Mobile mount	25.99	
R-7000 25MHz to 2GHz scan rcvr	1199.00	1049
RC-12 Infrared remote controller	70.99	
EX-310 Voice synthesizer	59.00	
TV-R7000 ATV unit	139.00	129.95
AH-7000 Radiating antenna	99.00	(16)

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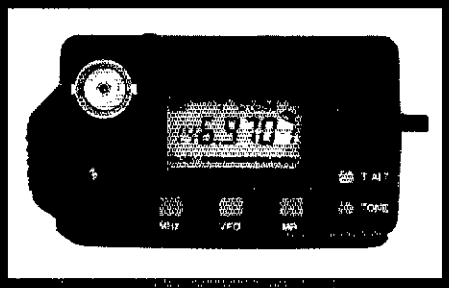

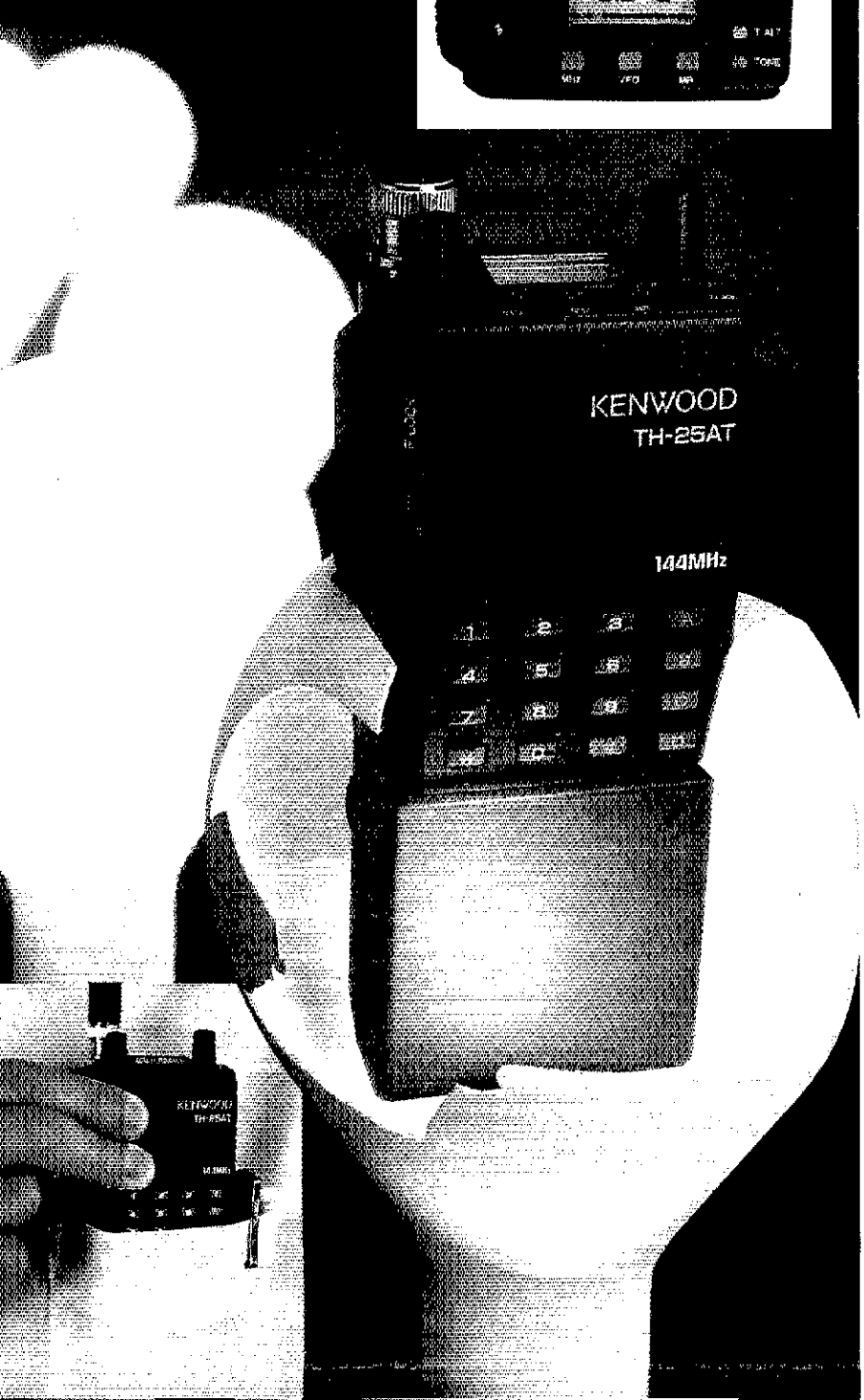

TH-25AT/45AT

New Pocket Portable Transceivers

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

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

Optional accessories:

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

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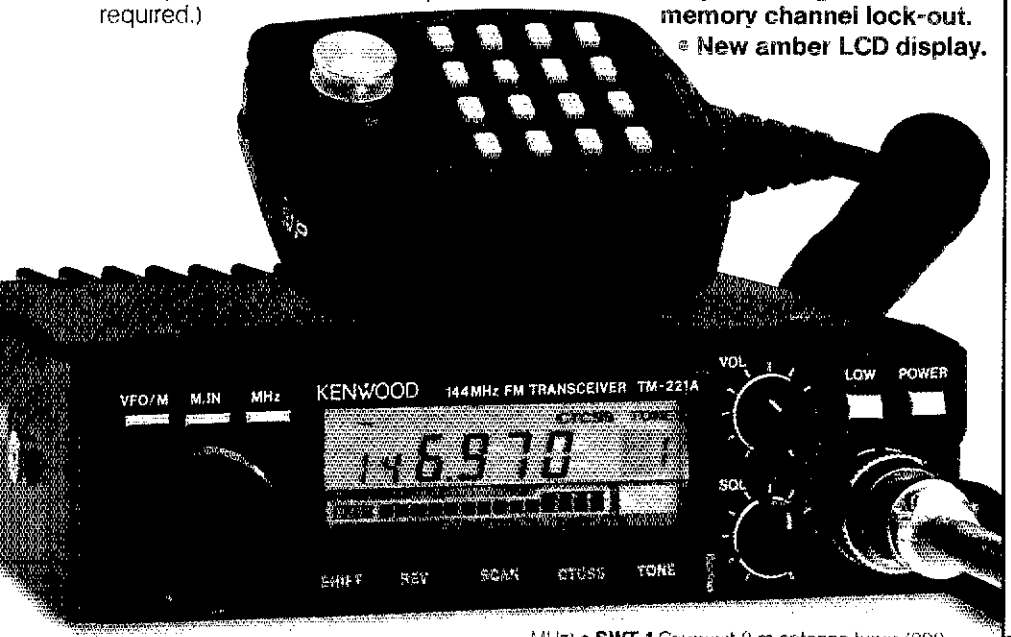
TM-221A/321A/421A/521A

144/220/450/1300 MHz

The Hottest Selling Compact FM Mobile Transceivers

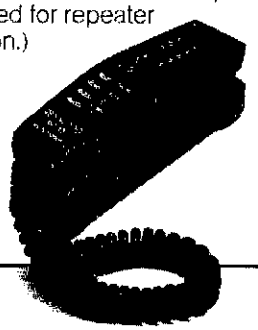
The all-new TM-221A, TM-321A, TM-421A and TM-521A FM transceivers represent the "New Generation" in Amateur radio equipment. The superior Kenwood GaAs FET front end receiver; reliable and clean RF amplifier circuits, and new features all add up to an outstanding value for mobile FM stations! The optional RC-10 handset/control unit is an exciting new accessory that will increase your mobile operating enjoyment!

- **TM-221A receives from 138-173.995 MHz.** ***This includes the weather channels!*** Transmit range is 144-148 MHz. Modifiable for MARS and CAP operation. (MARS or CAP permit required.)
- **TM-321A covers 220-224.995 MHz, TM-421A covers 438-449.995 MHz, and the TM-521A covers 1240-1300 MHz.** (Specifications guaranteed for Amateur band use only.)
- **Built-in front panel selection of 38 CTCSS tones.** TSU-5 programmable decoder optional.
- **Simplified front panel controls**—makes operating a snap!
- **16 key DTMF hand mic., mic. hook, mounting bracket, and DC power cable included.**
- **Selectable frequency steps** for quick and easy QSY.
- **TM-221A provides 45 W. TM-321A 25 W, TM-421A 35 W, and TM-521A 10 W.** All models have adjustable low power.
- **Packet radio compatible!**
- **Programmable band scanning with memory scanning and memory channel lock-out.**
- **New amber LCD display.**
- **Kenwood non-volatile operating system.** All functions remain intact even when lithium battery back-up fails. (Lithium cell memory back-up, est. life 5 yrs.)
- **14 full-function memory** channels store frequency, repeater offset, sub-tone frequencies, and repeater reverse information. **Repeater offset on 2 m is automatically selected.** There are **two channels** for "odd split" operation.
- **Super compact:** approx. 1-1/2"Hx5-1/2"Wx7"D.
- **Microphone test function on low power.**
- **High quality, top-mounted speaker.**
- **Rugged die-cast chassis and heat sink.**



RC-10 Remote Controller

For TM-221A/321A/421A/521A. Optional telephone-style handset remote controller RC-10 is specially designed for mobile convenience and safety. All front panel controls (except DC power and RF output selection) are controllable from the RC-10. One RC-10 can be attached to **a combination of two transceivers** with the optional PG-4G cable. When two transceivers are connected to the RC-10, **cross band, full duplex repeater** operation is possible. (A control operator is needed for repeater operation.)



Optional Accessories:

• **RC-10** Multi-function handset remote controller • **PG-4G** Extra control cable for second transceiver • **PS-50/PS-430** DC power supplies • **TSU-5** Programmable CTCSS decoder • **SW-100A** Compact SWR/power/volt meter (1.8-150 MHz) • **SW-100B** Compact SWR/power/volt meter (140-450 MHz) • **SW-200A** SWR/power meter (1.8-150 MHz) • **SW-200B** SWR/power meter (140-450 MHz) • **SWT-1** Compact 2 m antenna tuner (200 W PEP) • **SWT-2** Compact 70 cm antenna tuner (200 W PEP) • **SWC-4** 1200 MHz Directional coupler. • **SP-40** Compact mobile speaker • **SP-50B** Mobile speaker • **PG-2N** Extra DC cable • **PG-3B** DC line noise filter • **MC-60A, MC-80, MC-85** Base station mics. • **MC-55** (8-pin) Mobile mic. with gooseneck and time-out timer • **MA-4000** 2 m/70 cm dual band antenna with duplexer (mount not supplied) • **MB-201** Extra mobile mount

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

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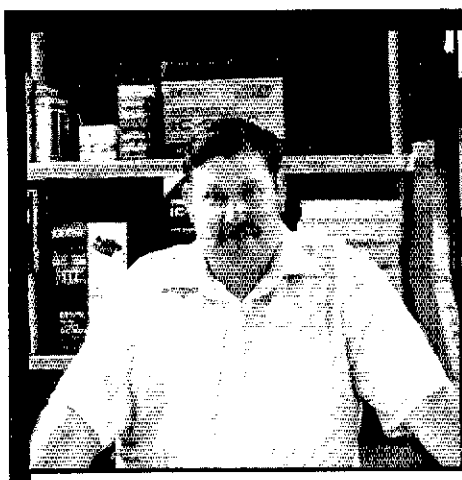

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  General coverage receiver tunes from 100 kHz—30 MHz. Easily modified for HF MARS operation.
- **Direct keyboard entry of frequency**
- **All modes built-in**
  USB, LSB, CW, AM, FM, and AFSK. Mode selection is verified in Morse Code.
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  Covers 80-10 meters.
- **VS-1 voice synthesizer (optional)**
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  Kenwood DynaMix™ high sensitivity direct mixing system ensures true 102 dB receiver dynamic range. (500 Hz bandwidth on 20 m)
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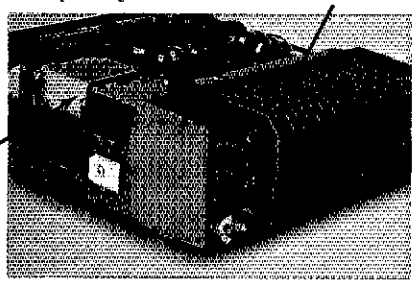
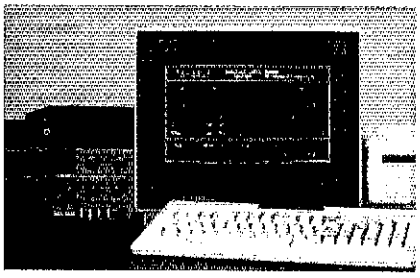
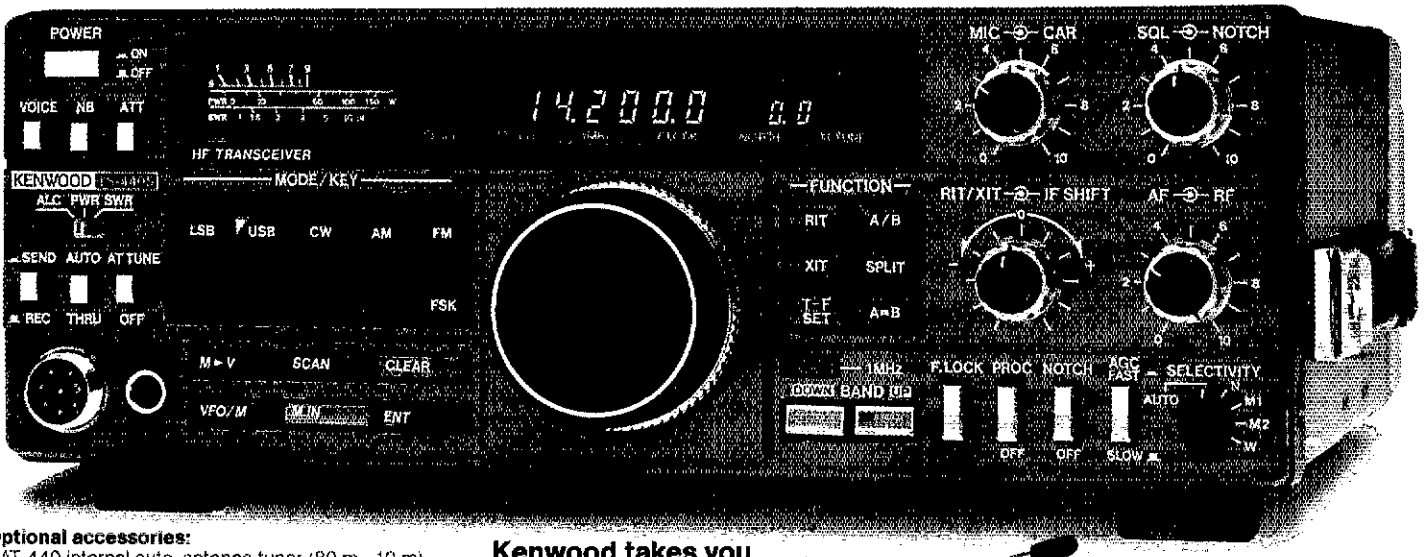
  Super efficient cooling permits continuous key-down for periods exceeding one hour. RF input power is rated at 200 W PEP on SSB, 200 W DC on CW, AFSK, FM, and 110 W DC AM. (The PS-50 power supply is needed for continuous duty.)





- **Adjustable dial torque**
- **100 memory channels**
  Frequency and mode may be stored in 10 groups of 10 channels each. Split frequencies may be stored in 10 channels for repeater operation.
- **TU-8 CTCSS unit (optional)**
- **Superb interference reduction**
  IF shift, tuneable notch filter, noise blanker, all-mode squelch, RF attenuator, RIT/XIT, and optional filters fight QRM.
- **MC-43S UP/DOWN mic. included**
- **Computer interface port**
- **5 IF filter functions**
- **Dual SSB IF filtering**
  A built-in SSB filter is standard. When an optional SSB filter (YK-88S or YK-88SN) is installed, **dual** filtering is provided.
- **VOX, full or semi break-in CW**
- **AMTOR compatible**



Optional accessories:
AT-440 internal auto. antenna tuner (80 m—10 m)
AT-250 external auto. tuner (160 m—10 m)
AT-130 compact mobile antenna tuner (160 m—
0 m) • IF-232C/IC-10 level translator and modem
kit • PS-50 heavy duty power supply • PS-430/
S-30 DC power supply • SP-430 external
peaker • MB-430 mobile mounting bracket
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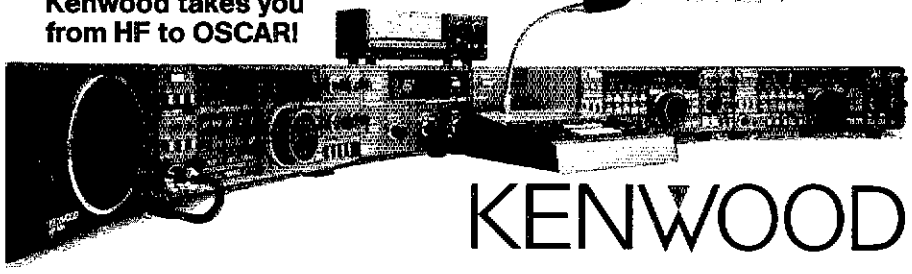

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Complete service manuals are available for all Kenwood transceivers and most accessories. Specifications and prices are subject to change without notice or obligation.

The PARAGON, Performance Plus...

The Paragon

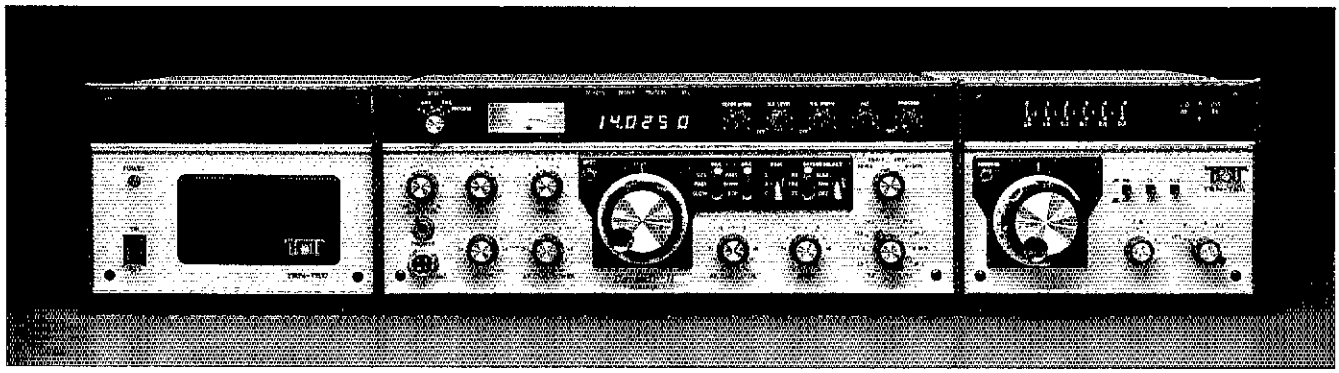
All mode versatility and a transmitted signal you will be proud of. A receiver that has set new standards for sensitivity and quietness. Receives from 100 kHz to 29.999.99 MHz. Transmits on all bands from 1.8 MHz to 29.999.99 MHz with 100 watts output. SSB, CW, real FSK and optional FM. Standard equipment includes speech processor, noise blanker, dual VFOs, TX split, RX split and QSK with a changeover time of 30 ms or less. Five I-F filter positions with the 6 kHz AM filter and 2.4 kHz SSB filter, standard. Optional 1.8 kHz, 500 Hz and 250 Hz filters are selectable independent of mode. Two selectable tuning rates. Passband tuning, notch filter, audio bandpass filter, tone control, squelch and more!

Sixty-two programmable memories that store frequency, mode, filter selected, channel number and a 7 character alpha-numeric "tag" for entering channel I.D. Scan rate is selectable and as each memory is scanned all of the stored information is displayed (what a light show!). Alternately, the memories can be tuned with the main tuning knob.

Frequency selection is with the main tuning knob, direct keypad entry or up/down buttons that will shift in 100 kHz or one MHz increments or to the next ham band. DISPlay button selects 24 hour clock or date or tag. VOICE button causes a voice frequency announcement with optional synthesized voice board installed.

Rear panel controls are provided to adjust the VOX, cw monitor level and tone, and SSB sidetone monitor level. Switching is provided to control conventional linear amplifiers and of course, high speed switching for QSK linears, such as the Titan or the Hercules II. Other rear panel inputs and outputs for transverters, FSK (170 Hz shift), fixed level audio out, audio in, external speaker, aux dc jack and provision for the optional RS-232 control interface. An absolute delight for the all mode operator.

The Paragon is the result of a three year engineering effort. We are proud of the Paragon and we think it has set new standards of excellence in synthesized rigs. Check it out yourself. We think that you will share our pride in the Paragon.



The Classic CORSAIR II...

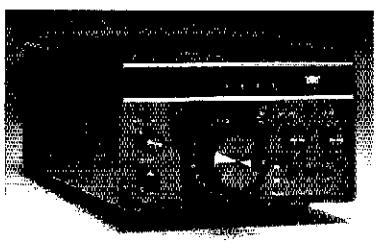
Unique in all the world, the CORSAIR II is the only ham transceiver available that uses a crystal mixed, permeability tuned oscillator. The ability of this scheme to reject strong adjacent signals and to dig out weak signals under the most adverse conditions is legendary. The 95 dB of dynamic range is all useable!

Frequency tuning is also unique. The main tuning is 18 kHz per turn. Dual range offset tuning can control transmit, receive or transceive. Selectivity is enhanced with a 16 pole crystal ladder filter and pass band tuning. The 50+ dB notch filter virtually eliminates carrier type interference. An eight pole audio filter is standard and the I-F filters are selectable independent of mode for superior operation on the digital modes.

The transmitter is well known for outstanding audio quality on SSB and QSK CW performance is simply beyond comparison. All ham bands are covered, 160 through 10 meters with WWV at 10 MHz. The front panel is a thoughtful and spacious arrangement with only the controls that you need.

If your number one priority is outstanding performance on the ham bands, and simplicity is still a virtue, you may be the kind of purist who deserves the classic CORSAIR II.

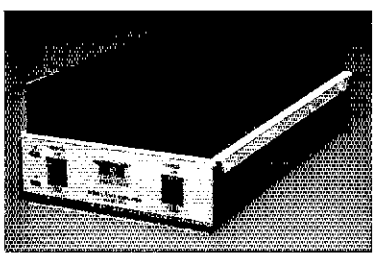
Add Satellite Communications To Your HF Station



Model 2510B

The Model 2510B, mode B, satellite station is a 70 cm, 10 watt SSB and CW transmitter with a super-sensitive, low noise, 2 meter to 29 MHz receive converter. The receive conversion idea takes advantage of the excellent selectivity and sensitivity that you already have in your HF station. Frequency tuning is with the PTO in the 2510B and the transmitter automatically tracks the receive frequency for "transceive" operation. "Split" operation is also provided. Two bands are included for full coverage of Oscar 10 and Oscar 13.

The Model 2410 is an all mode, broadband, 100 watt, 70 cm amplifier that adds 10 dB of gain to your up-link signal. Tx/Stby control can be hard-wired or automatic when the drive signal is present. Primary power is 12 to 14 Vdc at 20 amps.



Model 2410

TITAN: A Gallon And A Half Out! (5.68 Liters)

Titan

The TITAN has it all! 1500 watts output with ease, all legal bands 160 through 15 meters including MARS frequencies (10 meters after owner mod), lightning fast QSK for full break-in CW or the digital modes and a two speed blower for quiet operation on SSB. This awesome performance from a 17 lb desk top amplifier is made possible by a pair of Eimac® 3CX800A7 ceramic triodes and an external 45 lb power supply that is an absolute "horse."

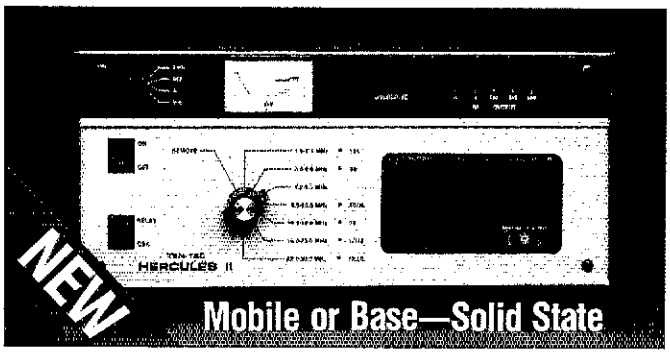
The heart of the power supply is our own tape wound, four core Hypersil® transformer that weighs in at an impressive 41 lbs. The transformer is conservatively rated at 2.5 kva CCS. (9.5 kva IVS.) The power supply is housed in a separate utility enclosure and is nearly noiseless even at full power.

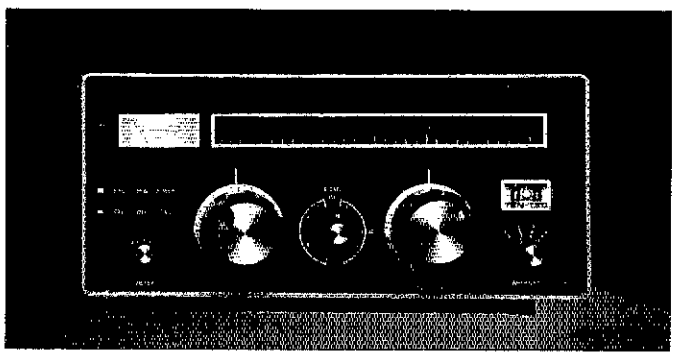
Front panel features include a ten element LED bargraph that displays peak power, a multi-meter selectable to read plate voltage, forward or reverse power and grid current. A matching meter is dedicated to display plate current. The TUNE and LOAD controls use 3:1 vernier drives which, in combination with a great RF deck design, make the TITAN a real "pussy cat" to operate.

The low drive requirement of the TITAN (65 watts for 1500 watts output, typical) makes life much nicer for your exciter too. This is especially comforting when operating keydown modes such as RTTY. Two product review articles have been published, see QST April 1986, CQ February 1986.

If you are ready to choose your dream amplifier the TITAN has everything but the highest price. Check it out!

THE TITAN IS BACKED BY A THREE YEAR LIMITED WARRANTY.





Hercules II No Tune HF Amplifier

The HERCULES II, Model 420, is an amplifier design that offers a combination of unique features that can only be achieved using modern solid state technology. Instant on, 12 - 14 Vdc operation, no-tune broadband final and compact size. General coverage operation from 1.8 to 22 MHz (to 29.999 MHz with authorized modification). Add to that lightning fast QSK cw, remote control, superb linearity and a low drive requirement. Outstanding!

The HERCULES II will interface nicely with virtually all transceivers. The front panel includes an analog multi-meter for collector current, voltage, forward power and SWR. A 10 element LED bar-graph display indicates peak output power. Band selection is made from the front panel switch or remotely controlled through a rear panel connector. Accessories are available for mobile remote control and automatic band tracking when using a Paragon. A front panel speaker is built-in.

The Model 9420 115/220 Vac power supply is in a separate utility enclosure and connects to the RF deck using a 6 foot power cable. It provides 80 amps to the amplifier plus 20 amps at 13.8 Vdc to power a 100 watt output exciter.

KW Antenna Tuner

The Model 229B adds a lot of versatility to your HF station antenna system. With this tuner you can load virtually any unbalanced (coax or single wire) antenna. With the accessory balun, antennas with balanced feeders can be used. Maximum legal power may be used from 1.6 to 30 MHz. The modified "L" network will tame an SWR of at least 10:1, any phase angle, without "false load" problems. Lighted multi-meter shows power in two ranges plus reflected power. A great way to operate all bands with something less than a world-class antenna farm.

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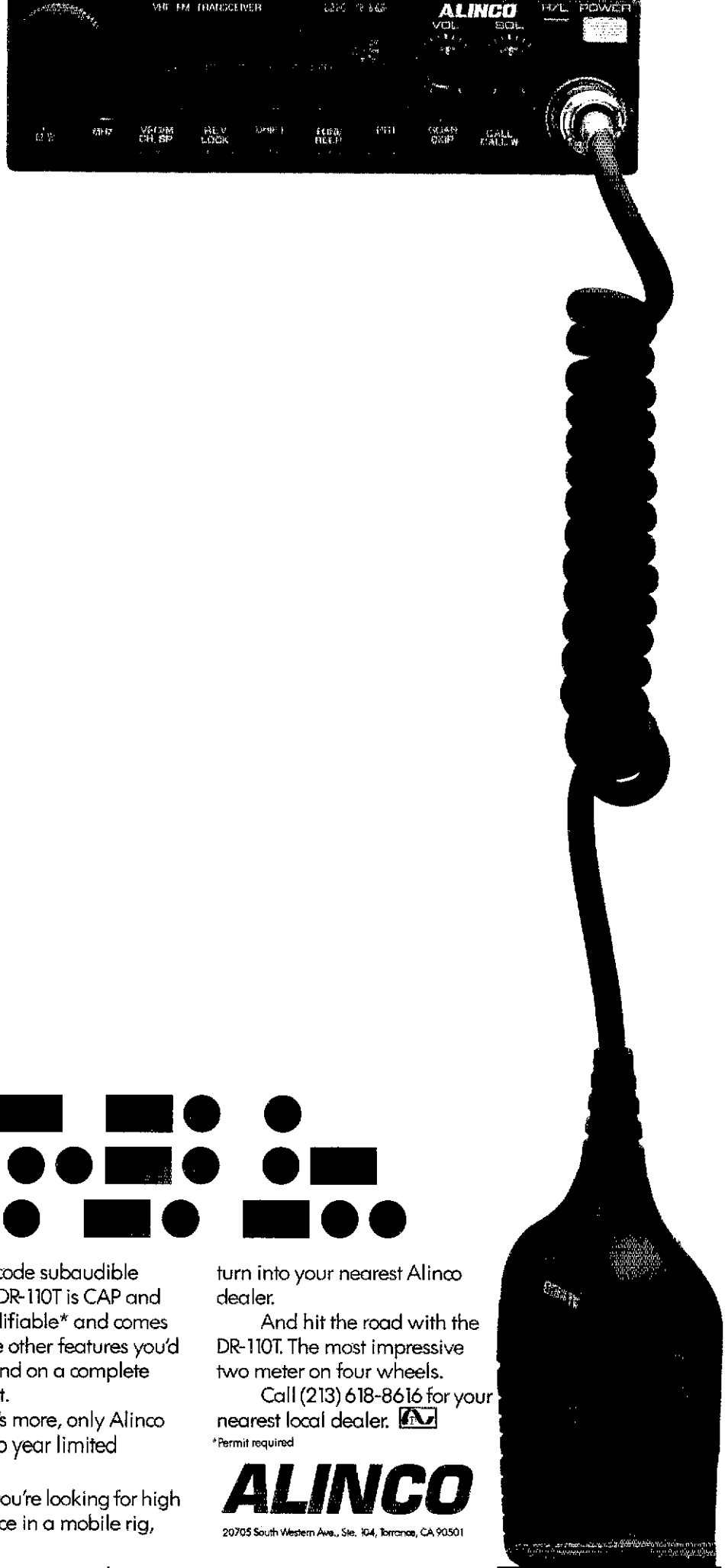

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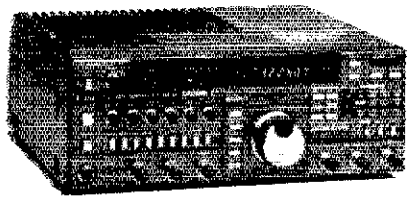

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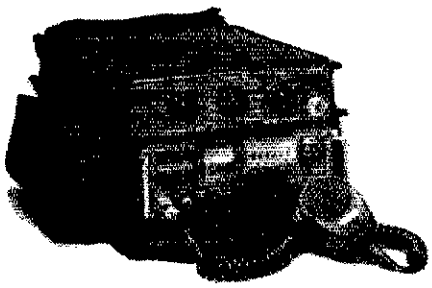
6M/767 6m module	199.95
430/767 430-440 module	249.95
440/767 440-450 module	249.95



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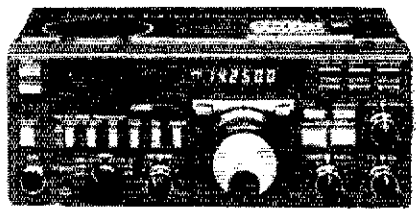

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2M/FTV 2m module only	189.00
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Misc. accessories	LIST
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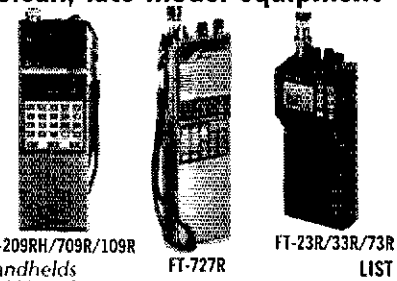

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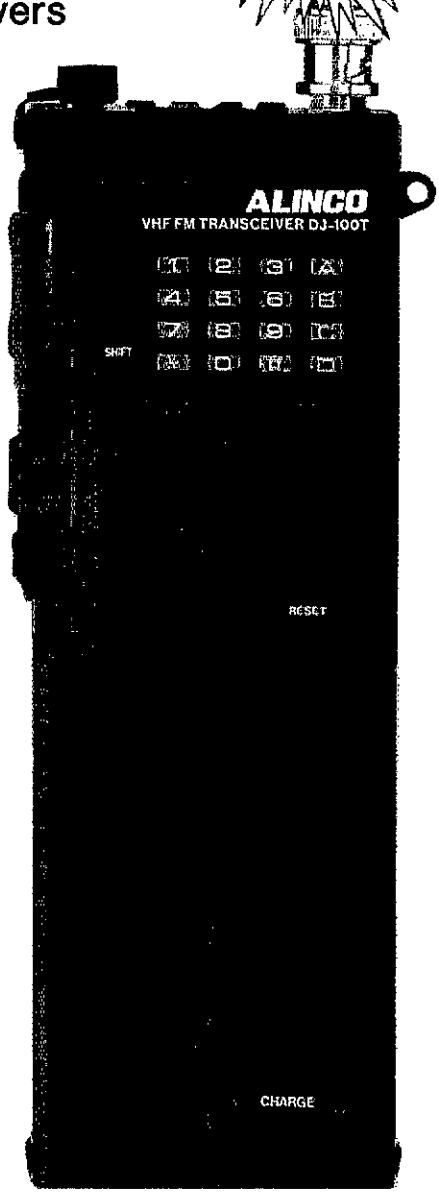

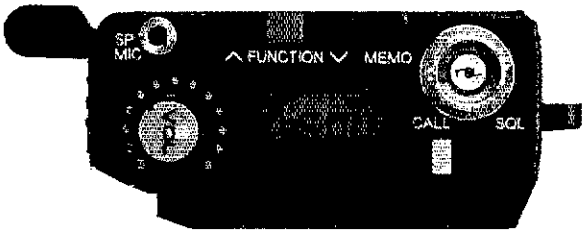

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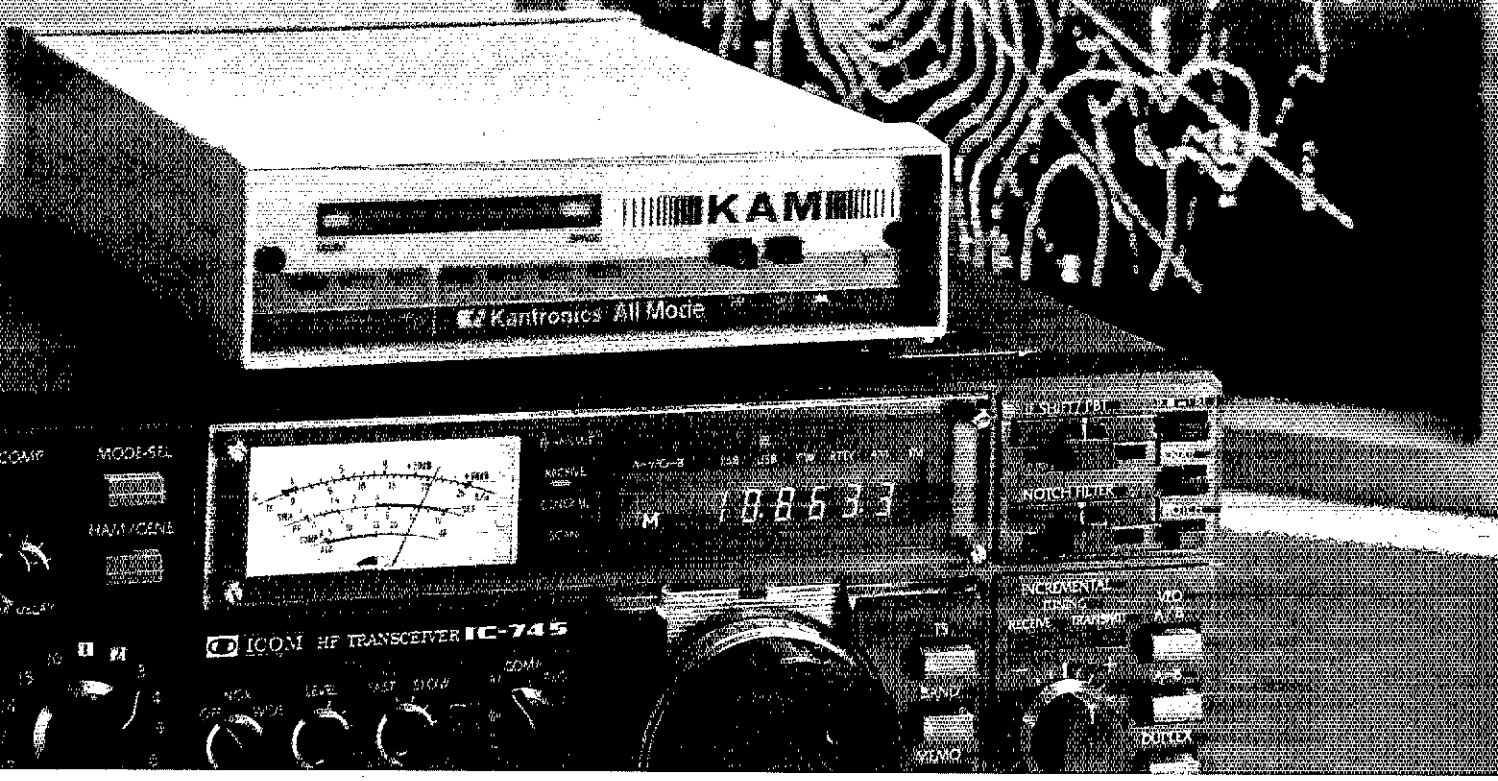

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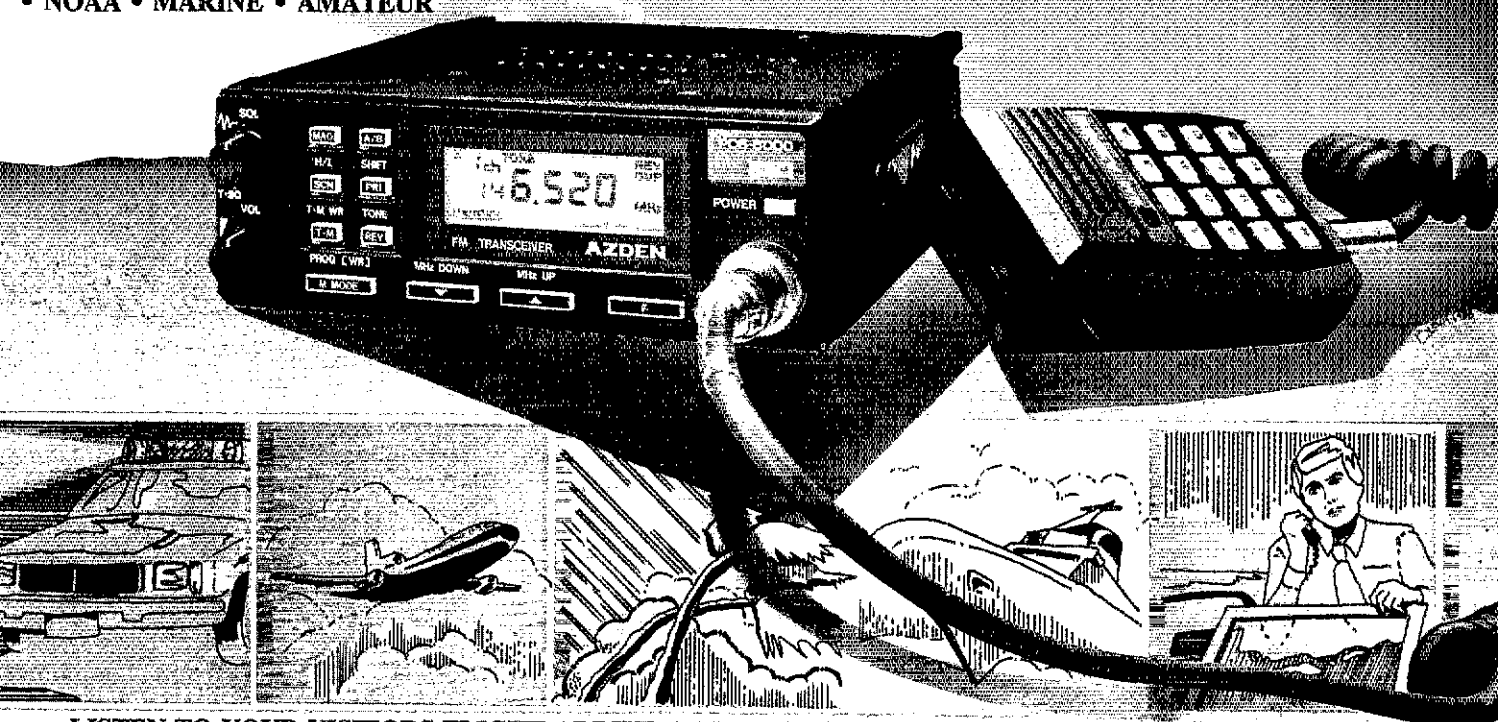

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the 75th anniversary of ARRL with a new Handbook!

1989 marks the 75th anniversary of the founding of the League. There's no better way of celebrating this momentous occasion, than with the new *1989 ARRL Handbook for the Radio Amateur*!

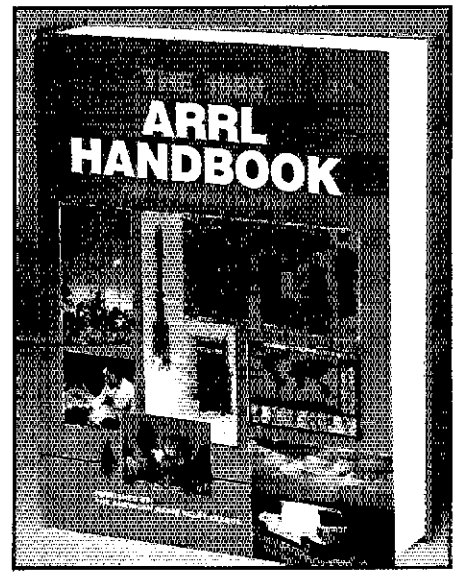
The 1200-page sixty-fifth edition contains over 2100 tables, figures and charts. The new *Handbook* is better than ever with revised information on phase noise measurement, direct frequency synthesis and spread spectrum communication techniques. The section on repeaters has been updated including a new CW identifier circuit. You'll find new spectrum analyzer and oscilloscope material, as well as several new projects in the test equipment chapter.

As always, we've added a host of new construction projects to this new edition. Just some of the new projects include: A 500-MHz frequency counter, 160 through 10 meter legal limit amplifier, simple CMOS keyer project, digital audio memory keyer and a L/Q meter for measuring coil inductance.

But that's not all. You'll find many other popular construction projects that can be built in a weekend such as power supplies and VHF/UHF preamps. For the more ambitious builder there are projects like the 1.8 MHz QSK transverter (there are VHF/UHF transverter projects too) and there are many amplifier designs to suit your needs from HF through microwaves.

The Handbook has always been famous as a reference for component data and you will find an entire chapter devoted to everything from transmitting tube and transistor specifications to aluminum tubing sizes. Satellite enthusiasts will find that the digital TR sequencer will add operating convenience to your station. Of course, you'll find the most up-to-date information on digital techniques, and the video communications chapter is packed with information not only on SSTV, ATV and FAX but Weather FAX as well. QRP enthusiasts will find the famous "Cubic incher" transmitter; not much bigger are the QRP SWR indicator and QRP Transmatch. There is also a VXO-controlled 6-watt CW transmitter for your favorite band between 80 and 15 meters. There are a number of useful station accesories that you can build like DTMF encoders and decoders, PIN-diode TR switch, digital PEP wattmeter and SWR calculator, Transmatches and dummy loads.

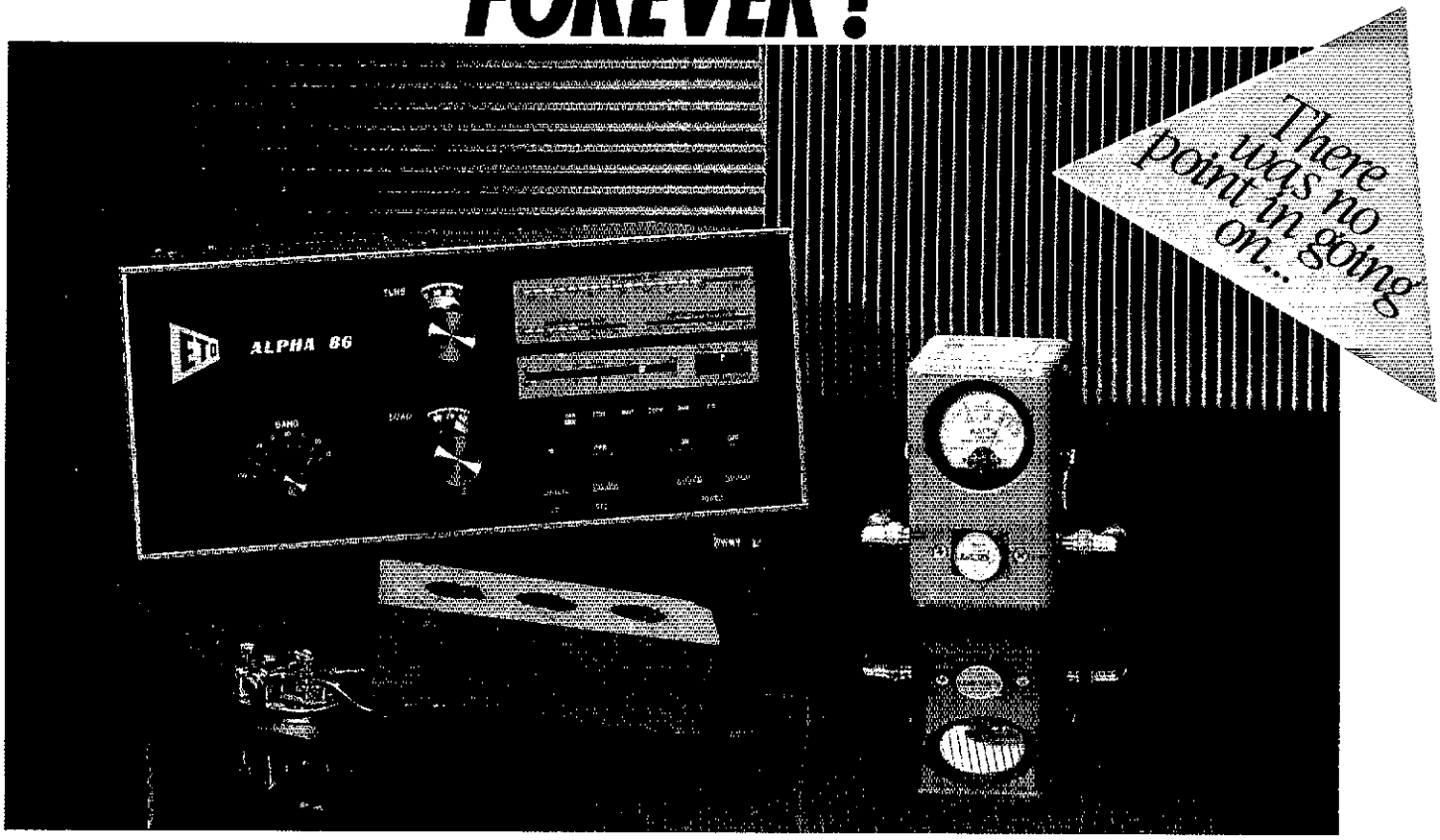
For $21, *The ARRL 1989 Handbook for the Radio Amateur,* remains an exceptional value for a hardcover technical publication. The price outside the US is $23. For postage and handling, add $2.50 (or $3.50 for insured mail or UPS—please specify)



Here is a description of what is covered in the Handbook:
The first 5 chapters serve as an introduction and cover: basics of Amateur Radio, electrical fundamentals, radio design technique and language, and solid state fundamentals. Vacuum tube principles as they pertain primariliy to high power amplifier design are also presented in these introductory chapters. There are 12 chapters devoted primarily to these radio principles: power supplies, audio and video, digital basics, modulation and demodulation RF transmitters, receivers, transceivers, repeaters, power amplifiers, transmission lines and antenna fundamentals. Another 4 chapters cover voice, digital, image and special modulation techniques. The RF spectrum, propagation and space communications are covered in 2 chapters. The construction and maintenance section has 12 chapters of useful projects ranging from power supplies and antennas through digital equipment. You'll find up-to-date component data that the Handbook is famous for. The final 5 chapters cover how to obtain your license, station design and operation, interference, monitoring and direction finding. An abbreviations list, huge index and etching patterns make up the balance of the book.

The American Radio Relay League, Inc., 225 Main St., Newington, CT 06111 USA

WOULD THIS *ALPHA 86* HAVE RUN 1.5 KW RF OUTPUT *FOREVER?*



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The *ALPHA 86's* that powered P4ØV to ***all-time world records on both phone and CW*** in the 1988 CQ WW DX Contest were shipped to Aruba fresh off the production line. They were unpacked and used by 20 different operators to make more than 35,000 contacts in 96 hours without a single failure.

P4ØV was a giant field day, with the crew rushing to install a dozen different transmitting antennas in only a few days. The *ALPHA's* endured numerous mismatches, transmission line shorts, and inadvertent T/R hot-switching without damage. Typical.

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PLAN YOUR SPRING ANTENNA WORK NOW!

THE ARRL ANTENNA BOOK Written by members of the ARRL Technical Department staff and sixteen well-known outside authors, all of whom have done much to contribute to the state-of-the-art in antenna and transmission line theory and practice. The recently published 15th Edition presents the best and most highly regarded information on antenna fundamentals, propagation, transmission lines, Yagis and quads, as well as all of the popular wire antenna designs. You'll find antennas for limited space, portable, mobile, VHF, UHF, microwave and space communications. Contains over 700 pages and 987 figures. **Chapter lineup:** Safety First, Antenna Fundamentals, The Effects of Earth, Selecting Your Antenna System, Loop Antennas, Multielement Arrays, Broadband Antennas, Log Periodic Arrays, Yagi Arrays, Quad Arrays, Long Wire and Traveling Wave Antennas, Direction Finding Antennas, Portable Antennas, Mobile and Maritime Antennas, Repeater Antennas Systems, VHF and UHF Antenna Systems, Antennas for Space Communications, Spacecraft Antennas, Antenna Materials and Accessories, Antenna Supports, Radio Wave Propagation, Transmission Lines, Coupling the Transmitter to the Line, Antenna and Transmission Line Measurements, Smith Chart Calculations, Topical Bibliography on Antennas, Glossary and Abbreviations. Edited by Gerald L. Hall, K1TD, *QST* Associate Technical Editor. Copyright 1988, #2065 $18*.

*For postage and handling add $2.50 ($3.50 for insured parcel post or UPS, please specify)

YAGI ANTENNA DESIGN is based on the series in *Ham Radio* Magazine by the late Dr. James L. Lawson, W2PV. Jim designed and built a highly competitive and successful Amateur Radio contest station. 210 pages cover the following subjects: Performance Calculations, Simple Yagis, Performance Optimization, Loop Antennas, Ground Effects, Stacking, Practical Designs, Designs for 7 through 28 MHz. Hardcover, Copyright 1986. #0410 $15*.

NOVICE ANTENNA NOTEBOOK At last, an antenna book written for the beginner! Don't let the lack of an antenna keep you from getting on the air. With this book you can choose which wire, vertical or beam antenna suits your needs, and you'll be ready for all of the fun of seeing that the antenna you put up really works! Contains pictorial drawings that show dimensions for Novice and Technician band use. Written by W1FB in his usual plain language style that makes him so popular as a *QST* author. Copyright 1988, #2073 $8*.

ANTENNA COMPENDIUM We don't have room for all of the good antenna articles that are submitted to *QST*, so we have packed this volume with new material on verticals, quads, loops, Yagis, reduced-size antennas, baluns, Smith Charts, antenna polarization and other interesting subjects. 176 pages. Copyright 1985. #0194 $8*.

LOW BAND DXING John Devoldere, ON4UN completely explores the 160, 80, and 40-meter bands. A large portion of this book is devoted to propagation characteristics and design and building of efficient antennas for these bands. 210 pages. Copyright 1987. #047X $10*.

HF ANTENNAS FOR ALL LOCATIONS was written by L.A. Moxon, G6XN for the RSGB. Contains 264 pages of practical antenna information. This book is concerned primarily with small wire arrays, but you'll find descriptions of some aluminum antennas as well. Copyright 1982. #R576 $15*.

TRANSMISSION LINE TRANSFORMERS At last there is a source of practical design data covering the use of these devices for both commercial and amateur applications. Written by Dr. Jerry Sevick, W2FMI, this book covers types of windings, core materials, fractional-ratio windings, efficiencies, multiwinding and series transformers, baluns, limitations at high impedance levels and test equipment. Hardcover, 128 pages. Copyright 1987. #0471 $10*.

W1FB'S ANTENNA NOTEBOOK Not everyone has a great deal of real estate to put up a forest of aluminum. Doug DeMaw tells how to get the best performance out of unobtrusive wire antennas and verticals and how to build tuners and SWR bridges. 122 pages. Copyright 1987. #0488 $8* For shipping and handling add $2.50 ($3.50 for insured parcel post or UPS)—please specify.

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Huge pileups, big city QRN, no spare parts, and a long way to anywhere. You probably couldn't find a better test of the new SB-1400 All-Mode Transceiver than Heath's expedition to Taipei in the Republic of China.

When working DX, you need sensitivity to dig for the weak ones, but still need dynamic range so the guy down the block doesn't clobber you in the middle of a QSO. Sure, the SB-1400 worked the S9 + 30 signals, but out of the pile-ups it also worked a number of stateside stations running 5 watts or less! And that's not bad for a short path distance of 7600 miles!

SB-1400 A proven transceiver.

The technology that worked the world can work for you, too, in your own ham shack. The SB-1400 is a fully assembled all-band, all-mode (FM optional), continuous duty, 100-watt transceiver. It incorporates an impressive general coverage receiver with dual VFOs for split operation and 20 memories to store your favorite frequencies. The unit includes standard SSB filter plus a narrowband 500 Hz CW filter and wideband AM filter. It also features clarifier (RIT), front panel AGC, noise blanker, all mode squelch, 20 dB attenuator, computer interface, and a clean, "operator preferred" front panel layout.

The transmitter's PA is cooled by a quiet, thermostatically controlled internal fan and is enclosed in its own diecast aluminum heat-sink chamber, which allows for full power operation in CW, SSB, FM and RTTY, AMTOR, SSTV, and Packet.

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You can also prepare for your next exam (Novice, Technician, General, Advanced or Extra class) with Heath study courses.

Finally, as a Heath-equipped ham, you can get answers to your technical questions from our tech consultants, who are licensed ham operators, on the Heath Tech Assistance line.

For more information on the SB-1400 or Heath's complete line of amateur radio equipment, call for a FREE catalog: **1-800-44-HEATH (1-800-444-3284)**

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SOLID STATE DESIGN

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 second printing, the occasional errors and omissions which inevitable 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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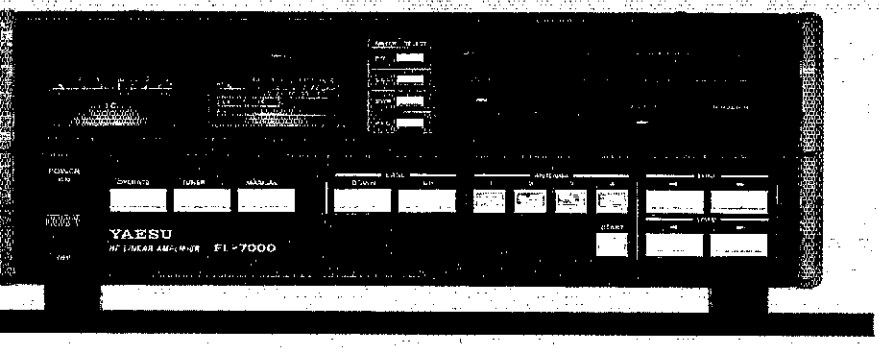

AND THE BRAWN.

rated dissipation 290 watts each) operated at 24 volts for excellent intermodulation rejection in transmitter.

Enhanced C.A.T. system for external control of transceiver from personal computer. (Software for Apple IIe/MAC, Commodore C-64, and IBM-PC is available through your Yaesu dealer.) There's also data communication with the FL-7000 linear amplifier for hands-free amplifier operation.

The muscle to get you out: The FL-7000. This solid-state amplifier covers 160 to 15 meters, and includes a built-in power supply, automatic tuner and lots of powerful operating features.

There's fast turnaround time for break-in (QSK) CW, HF packet radio, and AMTOR. Only 70 watts excitation for full output, and 1200 watts PEP input power. Fully protected push-pull parallel wideband "no-tune" amplifier circuit powered by 47V, 25A DC power supply. Yaesu's exclusive "DVC" (Direct Vertical Cooling Heatsink System) with bottom-mounted fan. Automatic antenna matching sensor turns off amplifier and rematches tuner circuitry if SWR rises above 2:1. Hands-free automatic band change when used with FT-767GX, FT-757GX or FT-980. Lithium battery backup remembers antenna selection and tuner settings. Dual 2-speed fans with independent thermal sensors. Connection to up to four antennas, including automatic selection via optional unit. Eight front panel LED status indicators. And more.

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TUNE IN THE WORLD WITH HAM RADIO

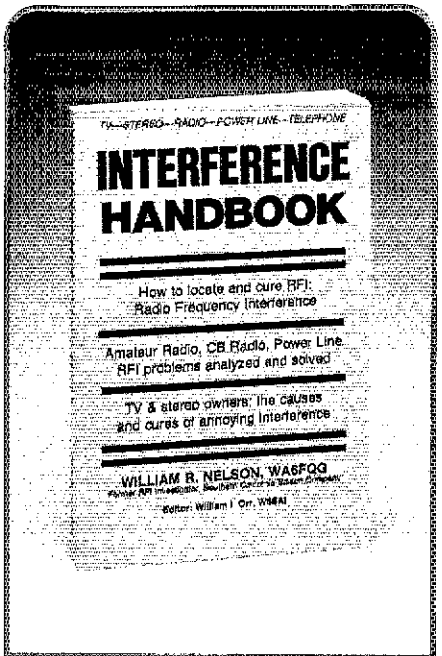
YOUR ROAD TO HAM RADIO EXCITEMENT

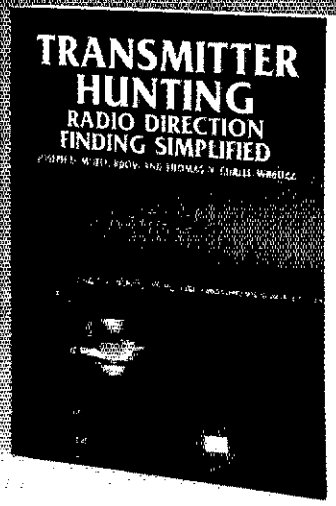
Tune in the World with Ham Radio has put the fun back into learning what Amateur Radio is all about. Enhanced Novice class privileges have brought the fun back into operating. Now beginners with their Novice licenses no longer have to spend all of their time on the air using only Morse code. Novices can now use voice communications on 10-meters and use VHF and UHF repeaters. The new privileges include the use of digital communications so that home computers can be linked through packet radio networks.

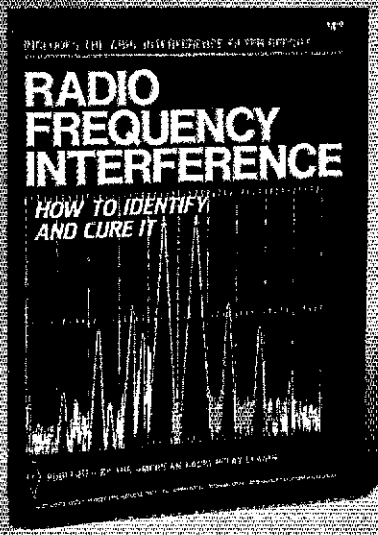
Imagine being able to personally communicate with an astronaut as the Space Shuttle circles the globe. Perhaps you would like to become a friend over the airwaves with someone on a remote island in the South Pacific or on an ice-flow in the Arctic. There are hams everywhere!

The FCC requires that Novices know something about their new privileges and that's where the expanded *Tune in the World with Ham Radio* text comes in. You'll find what you need to know explained in clear, concise bite-sized chunks of information. You'll find all 300 possible questions on the Novice exam with their distractors and answer key. Besides improving the text, we've added almost three times the code practice material to the package in the form of two C-90 tape cassettes. One tape teaches the code, the other provides practice. They are recorded in stereo so you can switch off the voice portion for even more practice. These new tapes make learning the code a snap!

The *Tune in the World with Ham Radio* package including the text and both tapes is available for $15. The text alone is $12 and the set of tapes is $10. Add $3.50 for shipping and handling.







3 STRIKES AGAINST INTERFERENCE

INTERFERENCE HANDBOOK by William R. Nelson, WA6FQG, Edited by Bill Orr, W6SAI. WA6FQG is a former RFI investigator for Southern California Edison Company. This 250-page book is written from an RFI sleuth's perspective and is a diary of his experiences in solving interference problems. His experiences run the gamut from the common (arcing thermostats) to the bizarre (loose metal sheathing in a temporary building next to a 250kV transmission line and a certain brand of 25-watt light bulb) Besides all sorts of power line interference causes and solutions this book covers electrostatic discharge (rain or snow static,) grounds and grounding, vehicle noise suppression, RFI from nonlinear devices, how the power company locates RFI, how to RFI proof your transmitter, how some receivers suffer from self-inflicted RFI and solutions to RFI in various electronic devices. Radio Publications, Second Edition, 1988, $12 plus postage and handling*.

TRANSMITTER HUNTING by Joseph D. Moell, KØOV and Thomas N. Curlee, WB6UZZ. You'll find out how direction finding (DFing) can be both fun and practical. Combine the techiques taught in this 323-page book with those used by search and rescue teams and you can lean how DFing can even save lives! Explore the challenge of hidden transmitter hunts (fox hunting) and locating causes of both accidental and malicious interference to Amateur Radio communications. Find out about the history of RDF, how to get started, directional antennas, doppler DF units, all about S-Meters, commercial and military direction finding systems, direction finding from fixed sites, VHF mobile hunting techniques, T-hunting from orbit, hunting below 50MHz, how to be the "Fox" and triangulation using two BASIC programs. Copyright 1987 by Tab Books. $18 plus postage and handling*.

RADIO FREQUENCY INTERFERENCE What causes RFI? What are your responsibilities under FCC regulations to solve RFI problems? Are all RFI problems difficult, expensive and time consuming to cure? You'll find the answers to these commonly asked questions about RFI in this 82-page ARRL publication. Tells you how to understand why RFI occurs and to learn how to eliminate it. Chapters include: RFI: Problem of Opportunity, Survival in an RF-filled World, Interference from Transmitters, Interference from Electrical Devices and Power Lines, Cable Television: Friend or Foe?, How to Identify and Resolve Radio-TV Interference Problems, Consumer Products RFI Assistance List, Interference Filter Test Report. Copyright 1987. $4.00 plus postage and handling*.

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THE AMERICAN RADIO RELAY LEAGUE, INC.
225 MAIN STREET
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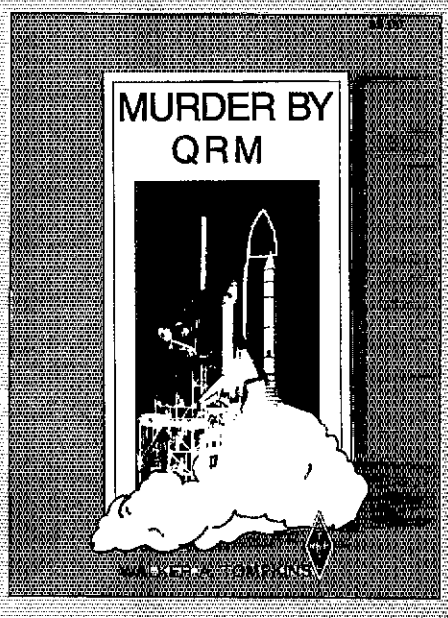
"A terrorist agent, representing an unknown foreign power or an internal subversive group, is bent on crippling or destroying America's space program by operating an illicit radio station from somewhere inside our Lost Padres National Forest wilderness area. A terrorist who has somehow gained access to our secret digital codes, launching schedules and classified radio frequencies required to cause our birds to self-destruct, during or after launch." And so begins a new adventure for Tommy Rockford, K6ATX.

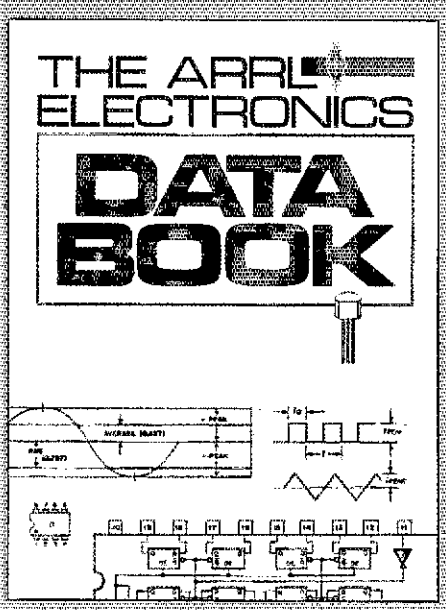
Murder by QRM is packed with action. Join K6ATX on an ill-fated search using motorized hang-gliders and then as he backpacks through the wilderness in search of the hidden transmitter site. With the launch of the space shuttle *Conquistador* only hours away will Tommy be able to ferret out the culprits before the fatal destruct signal is sent?

This is the sixth and final ham radio adventure by Walker Tompkins (the real K6ATX) who became a silent key just before the book was published. 194 pages, $5.00*

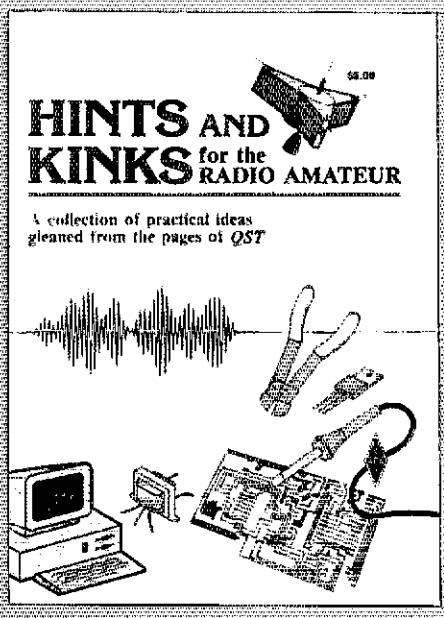
*For postage and handling add $2.50 ($3.50 for insured parcel post or UPS—please specify)



The ARRL Data Book is back by popular demand! Doug DeMaw, W1FB has completely revised and expanded the material in this handy reference for the RF design engineer, technician, radio amateur, and experimenter. This *one* source has all of those regularly used tables, charts, and those hard-to-remember formulas. You'll also find hundreds of popular circuit diagrams of oscillators, mixers, amplifiers, other active devices and their operating



parameters. This book can be used alone or to complement **The ARRL Handbook** and belongs in every technical library. Here's a brief summary and chapter lineup: **Symbols, Conversion Factors and Tables; Components and Materials** includes color codes, standard values, toroid selection charts; **Inductors and Transformers; Time and Frequency Measurement; Networks and Filters** covers attenuators and matching network design information; **Digital Basics** is 88 pages of logic, TTL Circuits, specific device descriptions, linear ICs, op-amp applications, and regulators; **Antennas and Transmission Lines; Catalog of Circuit Building Blocks** including audio amps, RF and IF small-signal amplifiers, mixers, FM detectors, oscillators, dc switches and amps, and frequency doublers; **Workshop and Lab Practices**. 234 pages, $12.00*



"Gimmicks and Gadgets, Tricks of the Trade." Since 1933, those words have been used describe **Hints and Kinks for the Radio Amateur**, but it has been almost seven years since the last edition appeared. Well, H&K fans, the long wait is over. The 12th in the series of the most popular *QST* "Hints and Kinks" contributions is now available, and hams like yourself share their innovations and wizardry. Like its predecessors, this edition has been said to be almost like having a radio club meeting on your bookshelf!

Here's just a sample: **In and Around the Station:** A Universal Equipment Stand, Safe Power Wiring Practices, Stop the Fire, Not Your Gear. **Transmitting and Receiving:** A Two-Transistor Transmitter for 30 Meters, Improvements for the HW-8, FT101ZD, TS830S, SB200, and SB220. **CW Hints:** Magnetic Switch for CW Tune Up, The Sneaky Knee Key for Mobile CW. **Computers and Digital Modes:** A Message-Waiting Indicator for TNCs, Tips for the VIC 20, TRS80 and Apple II. **Antennas and Feedlines:** Inexpensive 30 and 12-Meter Arrays, Retuning Traps for the WARC Bands, Baluns, Tower and Rotator tips. **Shop Secrets:** Tips on soldering and making PC Boards and more! **Tips on Testing:** Simple Logic Probe, plus 11 pages of test equipment and tips. **Portable and Mobile:** Power supplies, antennas, mobile installation tips. **VHF and UHF:** Antennas, amplifiers, CTCSS Tone Generator and more. **Power Supplies:** Power Supplies from Old Battery Chargers, High-Voltage Supply for Mobile Amplifiers. **Taming Interference:** Telephone RFI, TVI, CATVI cures. **Miscellanea:** COR and Timer Circuit, World-Time-Finder Slide Rule, AFSK System for FAX and more. 160 pages, $5.00*

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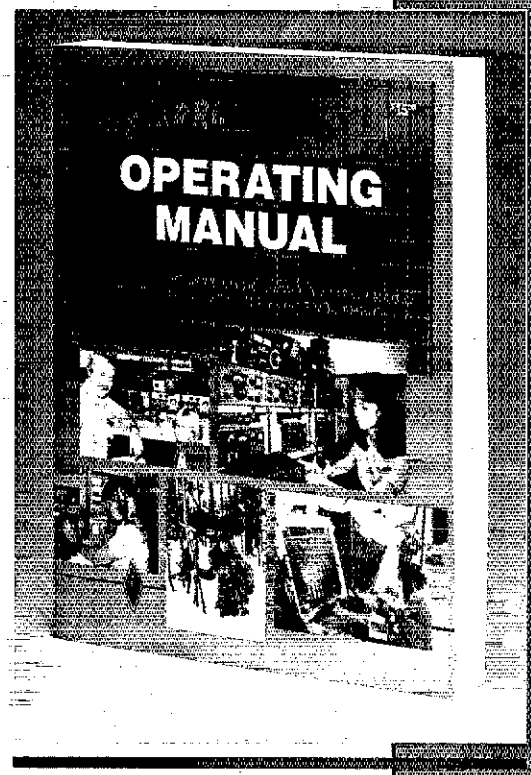
OPERATING EXCELLENCE

No one has ever called Amateur Radio boring. There's so much to do in this multi-faceted hobby and it is all described in the big 688-page *ARRL Operating Manual*! The book proved so popular that we had to go back on press for a second printing in less than a year.

Why is this League publication a smash hit? We gathered together the efforts of talented writers who are experts in each of their Amateur Radio specialties: Basic Operating by Bill Jennings, K1WJ and Carol Smith, AJ2I; FM and Repeaters plus the chapter on Packet Radio by *QST* columnist Stan Horzepa, WA1LOU; DXing by Bob Locher, W9KNI, Overseas DXing/DXpeditions by Carl Henson, WB4ZNH; Traffic Handling by Maria Evans, KT5Y; Emergency Communications by Richard Regent, K9GDF; Image Communications by Bruce Brown, WA9GVK; VHF/UHF Operating by Michael Owen, W9IP; Satellites by Dick Jansson, WD4FAB and Contests by Clarke Greene, K1JX.



The chapters on Shortwave Listening, The Amateur Radio Spectrum, Antenna Orientation, and RTTY Communications were written by HQ staffers: AK7M, W4RI, K1TD and WA3VIL. Bob Halprin, K1XA was the editor of the *Operating Manual* and was responsible for the popular Operating Awards chapter where more than seven dozen awards are described and illustrated in full color.

If you really want to be "in" on what is happening in Amateur Radio operating today, you need a copy of the third edition of the *ARRL Operating Manual.* Available at your dealer or directly from ARRL for $15. For postage and handling add $2.50 ($3.50 for insured mail or UPS—please specify.)

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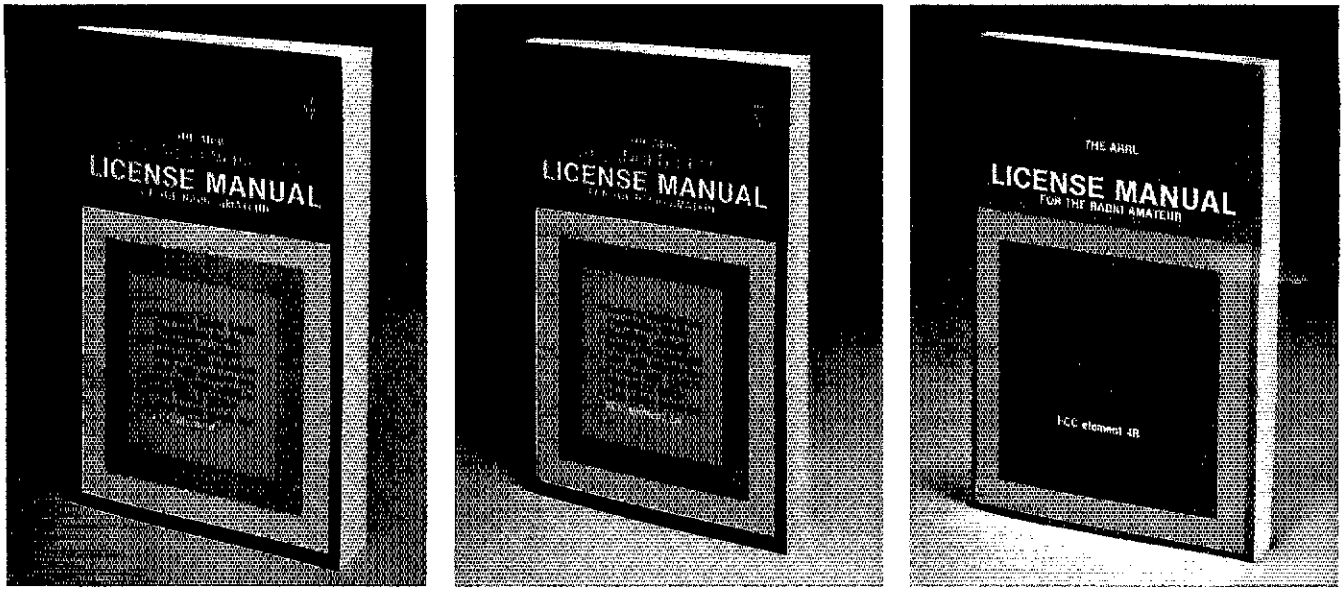
by a host of world-class operators



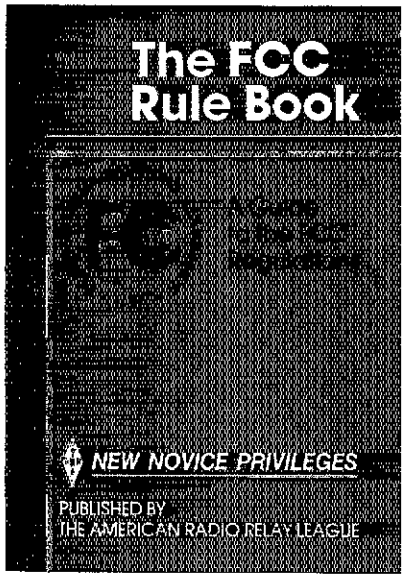
The popular **ARRL License Manual Series.** *The ARRL Technician/General Class License Manual* separates the study material for the Element 3A (Technician) and Element 3B (General) exams for easy study. The material covering the Technician Class is good for exams given through Oct. 31, 1989; the General Class material is good through Oct. 31, 1990. *The Advanced Class License Manual* is good through Oct. 31, 1990 and *The Extra Class License Manual* shown is good for exams given Nov. 1, 1988 thru Oct. 31, 1991.

GO FOR IT!

There's no time like the present to begin studying for your next Amateur Radio Exam. If you are not licensed, our popular beginner's package, **Tune in the World with Ham Radio** is just the ticket for the prospective Novice. The text covers the basic regulations and theory you need for the written exam and the cassettes which are included in the package make learning the code a snap! Our **License Manual Series** shown above and the **FCC Rule Book** cover what you need to know to pass the higher class exams.

The FCC Rule Book, not only has the complete FCC regulations, but explains their important interpretations of the rules as well — especially the gray areas of repeater operation, business and third party traffic.

Besides the cassettes in **Tune in the World,** we now have four sets of tapes that give practice from 5 to 22 WPM. We also have **Morse University** and **Morse Tutor** software mentioned below.



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Morse University TM Tune-in book and cartridge for C-64 computer ... **#0259 $40**
Morse Tutor from GGTE, Code practice diskette for the IBM PC ..... **#2081 $20**

Code Practice Cassettes Each set of two C-90 tapes gives 3 hours of instruction.
Set 1: 5 to 10 WPM ..... **#2227 $10**
Set 2: 10 to 15 WPM ..... **#2235 $10**
Set 3: 15 to 22 WPM ..... **#2243 $10**
Set 4: 13 to 14 WPM ..... **#2251 $10**

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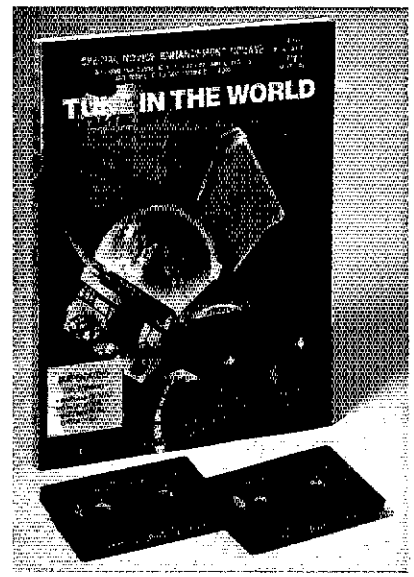

ARRL BOOKSHELF

Prices are subject to change without notice. Shipping and handling: add $2.50 for book rate. For $3.50, shipments to US addresses can be made by insured parcel post or UPS. Please specify. The minimum charge order is $7.50. Payment must be in US funds.

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THE 1989 ARRL HANDBOOK

This is the most comprehensive edition since the *Handbook* was first published in 1926. It is updated yearly to present the cutting edge of rf communication techniques while presenting hundreds of projects the average Amateur Radio operator can build. The 66th edition is packed with information on digital communication modes as well as new power supplies and amplifiers. Ready-to-use etching patterns are provided for many projects. This *Handbook* belongs in every ham shack. 1216 pages.

Hardcover only #1662 $21 US, $23 elsewhere

ANTENNA BOOKS

THE ARRL ANTENNA BOOK represents the best and most highly regarded information on antenna fundamentals, transmission lines, design and construction of wire antennas as well as yagis and quads for HF. You'll find chapters on VHF/UHF antennas, test equipment and propagation. The new 15th edition has over 700 pages of practical antenna information. **©1988,** Softcover ..... **#2065 $18**

Novice Antenna Notebook is written for the beginner or experienced amateur who wants practical information on basic antenna designs and construction. **©1988.** Softcover ..... **#2073 $ 8**

W1FB's Antenna Notebook Practical wire and vertical antenna designs ..... **#0488 $ 8**

TRANSMISSION LINE TRANSFORMERS, cover baluns, use of ferrites, and other aspects of antenna transmission line design and operation. 128 pages ..... **©1987 #0471 $10**

ANTENNA COMPENDIUM Packed with new material on quads, yagis and other interesting topics. **©1985 178 pages #0194 $10 US, $11 elsewhere**

HF ANTENNAS FOR ALL LOCATIONS G6XN's look at antennas with practical construction data. **©1982 264 pages #R576 $15**

YAGI ANTENNA DESIGN by Dr. James L. Lawson, W2PV. Over 210 pages of practical theory and design information. **©1986 #0410 $15**

PASSING POWER! - THESE PUBLICATIONS WILL HELP YOU THROUGH THE EXAMS

Beginning with **Tune in the World with Ham Radio** for the Novice and progressing through the critically acclaimed **ARRL License Manual Series** for the Technician through Extra Class; you will find passing each exam element a snap! There are accurate text explanations of the material covered along with FCC question pools and answer keys. The latest edition of **The FCC Rule Book** is invaluable as a study guide for the regulatory material found on the exams and as a handy reference. *Every* amateur needs an up-to-date copy. **Morse Code the Essential Language** has tips on learning the code, high speed operation and history. If you have a Commodore 64™ or C 128 computer, **Morse University*** provides hours of fun and competition in improving your code proficiency.

First Steps in Radio from **QST** presents electronic principles for the beginner.

Morse Code: The Essential Language covers sending, receiving, high speed operation and history ©1986 ..... **#0356 $ 5**

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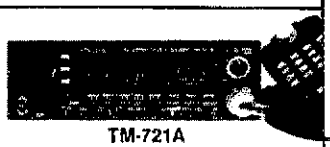

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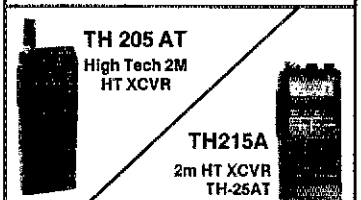

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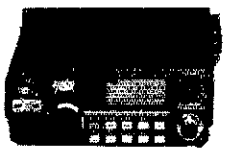

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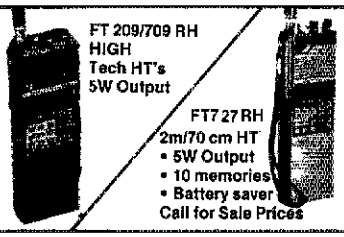

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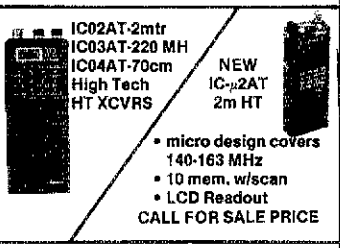

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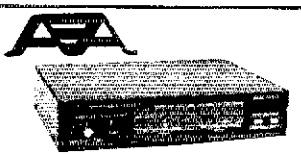

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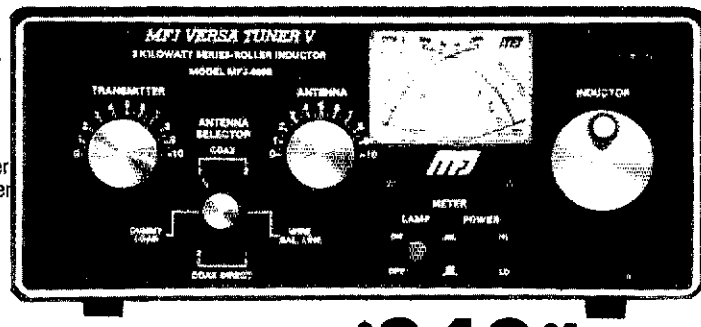

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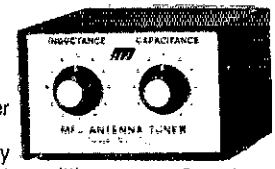

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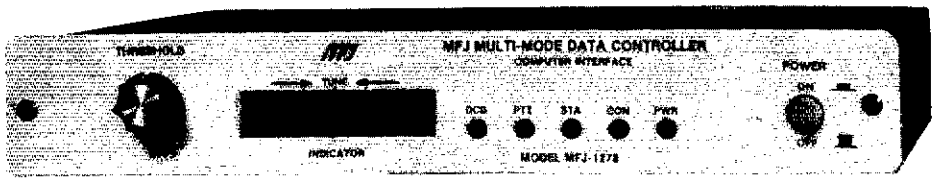

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Amateur radio's most versatile multi-mode data controller -- the MFJ-1278 -- lets you join the fun on Packet, AMTOR, RTTY, ASCII, CW, Weather FAX, SSTV, Navtex and gives you a full featured Contest Memory Keyer mode . . . you get 9 modes . . . for an affordable $249.95.

Plus you get MFJ's new **Easy Mail**tm so you and your ham buddies can leave messages for each other 24 hours a day.

You'll find it **the most user friendly of all multi-modes.** It's menu driven for ease of use **and** command driven for speed.

A high resolution 20 LED tuning indicator lets you *tune in signals **fast** in any mode.* All you have to do is to center a single LED and *you're precisely tuned in to within 10 Hz* -- and it shows you which way to tune!

Plus you get 32K RAM, KISS for TCP/IP, high performance HF/VHF/CW modems, software selectable dual radio ports, AC power supply and more.

All you need to join the fun is an MFJ-1278, your rig and any computer with a serial port and terminal program.

You can use the MFJ Starter Pack to get on the air instantly. It includes computer interfacing cable, terminal software and friendly instructions . . . everything you need to get on the air fast. Order MFJ-1282 (disk)/MFJ-1283 (tape) for the C-64/128 and VIC-20; MFJ-1287 for Macintosh; MFJ-1284 for the IBM or compatible, $19.95 each.

Packet

MFJ's new generation packet mode gives you genuine TAPR software and hardware plus many MFJ enhancements like Easy Mailtm.

A new Kiss interface makes the MFJ-1278 TCP/IP compatible.

Extensive tests published in **Packet Radio Magazine** ("HF Modem Performance Comparisons")prove the TAPR designed modem in the MFJ-1278 gives better copy with proper DCD operation under all tested conditions than the other modems tested.

New AMTOR mode!

Now the MFJ-1278 has a new AMTOR and Navtex mode, making it the only controller to feature **nine** digital modes.

MFJ-1278 transmits and receives AMTOR and includes all AMTOR modes: ARQ (Mode A), FEC and MODE S (Mode B).

Baudot RTTY

You can copy all shifts and all standard speeds including 170, 425 and 800 Hz shifts and speeds from 45 to 300 baud. *You can copy not only amateur RTTY but also press, weather and other exciting traffic.*

You can transmit both narrow and wide shifts. The wide shift is a standard 850 Hz shift with mark/space tones of 2125/2975 Hz. This lets you operate MARS and standard VHF FM RTTY.

ASCII

You can transmit and receive 7 bit ASCII using the same shifts and speeds as in the RTTY mode.

CW

You get a Super Morse Keyboard mode that lets you send and receive CW effortlessly, including all prosigns -- it's tailor-made for traffic handlers.

A huge type ahead buffer lets you send smooth CW even if you "hunt and peck".

You could store entire QSOs in the message memories, if you wanted to! You can link and repeat any messages for automatic CQs and beaconing. Memories also work in RTTY and ASCII modes.

A tone Modulated CW mode turns your VHF FM rig into a CW transceiver for a new fun mode. It's perfect for transmitting code practice over VHF FM.

An AFSK CW mode lets you ID in CW.

You also get a random code generator that'll help you copy CW faster.

Weather FAX

You'll be fascinated as you watch WEFAX signals blossom into full fledged weather maps on your Epson or IBM graphics compatible printer.

Automatic sync and stop lets you set it and leave it for no hassle printing.

You can save FAX pictures and WEFAX maps to disk if your terminal program lets you save ASCII files to disk.

Pictures and maps can be saved to disk or *printed to screen in real time or from disk if you have an IBM or Macintosh* with the MFJ Starter Pack.

You can transmit FAX pictures right off disk and have fun exchanging and collecting them.

Slow Scan TV

The MFJ-1278 introduces you to the exciting world of slow scan TV.

You can print slow scan TV pictures on any IBM or Epson graphics compatible printer. If you have an IBM or Macintosh you can print to screen and save to disk with the MFJ Starter Pack.

You can transmit slow scan pictures right off disk. If your terminal program lets you save ASCII files you can save pictures from over-the-air QSOs.

You can transmit and receive 8.5, 12, 17, 24, and 36 second black and white format SSTV pictures using two levels.

Contest Memory Keyer

***Nothing** beats the quick response of a memory keyer during a heated contest.*

You'll score valuable contest points by completing QSOs so fast you'll leave your competition behind. And you can snag rare DX by slipping in so quickly you'll catch everyone by surprise.

Message memories let you store contest call, name, QTH, rig info -- everything you used to repeat over and over.

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More Features

Turn on your MFJ-1278 and it sets itself to match your computer baud rate. Select your operating mode and the correct modem is automatically selected.

Plus . . . printing in all modes, threshold control for varying band conditions, tune-up command, lithium battery backup, RS-232 and TTL level serial ports, watch dog timer, FSK and AFSK outputs, output level control, speaker jack, key paddle jack, test and calibration software, Z-80 at 4.9 MHz, 32K EPROM, and socketed ICs. FCC approved. 9x1½x9½ in. 12 VDC or 110 VAC.

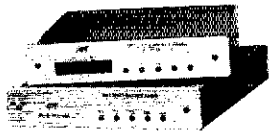
Get yours today and join the fun crowd!

New Firmware Update

A new KISS/AMTOR/Navtex Firmware update is available to MFJ-1278 owners.

MFJ's powerful update is the most reasonably priced multi-mode upgrade by any manufacturer. Contact your dealer or MFJ for yours today!

MFJ Packet Radio



MFJ-1274 **$139.95**

MFJ-1270B **$119.95**

MFJ-1270B super clone of TAPR's TNC-2 give you more features than *any* other packet controller -- for $119.95.

You can double your fun by operating both VHF *and* HF packet because you get **high performance** switchable VHF/HF modems.

You get MFJ's new **Easy Mail**tm with soft-partitioned memory so you and your friends can leave messages for each other 24 hours a day.

In MFJ's new WeFAX mode you can print full fledged weather maps to screen or printer and save to disk using an IBM compatible or Macintosh computer with an MFJ Starter Pack.

A new **KISS** interface lets you run **TCP/IP.** They also come **NET ROM** compatible -- ***no modification needed!***

You also get 32K RAM, a full one-year unconditional guarantee and you can use 12 VDC or the included 110 VAC power supply.

For dependable HF packet tuning, the **MFJ-1274** gives you a high resolution tuning indicator that's accurate to within 10 Hz -- and it's only $20.00 more.

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3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied. Submitted ads should be typed or clearly printed on an 8-1/2″ × 11″ sheet of paper.

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(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A last name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permitted in *QST* advertising.

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The League reserves the right to decline or discontinue advertising for any reason.

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PROFESSIONAL CW operators, retired or active, commercial, military, gov't., police etc. invited to join Society of Wireless Pioneers—W7GAQ/6, 146 Coleen Street, Livermore, CA 94550.

IMRA—International Mission Radio Association helps missionaries by supplying equipment and running a net for them daily except Sunday, 14.280 MHz, 1:00-3:00 PM Eastern Time. Rev. Thomas Sable, S.J., University of Scranton, Scranton, PA 18510.

THE Veteran Wireless Operators Association, a non-profit organization of communications people founded in 1925, invites your inquiries and application for membership. Write VWOA, Ed F. Pleuler, Jr., Secretary, 46 Murdock Street, Fords, NJ 08863.

FCC EXAMS. Novice-Extra Class, Walk-in's only. Sunnyvale VEC ARC, POB 60142, Sunnyvale, CA 94088-0142, 408-255-9000, 24/hr. Gordon, W6NLG, President. Flea Market, March-Sept, Foothill College, Los Altos Hills, CA.

MARCO: Medical Amateur Radio Council, operates daily and Sunday nets. Medically-oriented amateurs (physicians, dentists, veterinarians, nurses, therapists, etc.) invited to join. For information, write MARCO, Box 73's, Acme, PA 15610.

JOIN The Old Old Timers Club, an international non-profit organization. If you operated a radio station, commercial, amateur or Armed Forces 40 or more years ago, and have an Amateur license at present you are eligible. Join the real pioneers of ham radio. Write O.O.T.C., 20933 Brant Avenue, Long Beach, CA 90810.

LIMARC ARRL Hamfest Sunday, February 5, 1989. Indoors at the Electricians Hall, 41 Pinelawn Road, Melville, Long Island. Doors open 9 to 3. Admission $4 to all regardless of age. $3 after 11:30 AM. Sellers 4′ × 8′ tables are $12 or bring your own at $1.50 a foot, 6 foot minimum, helpers pay admission. Tables in advance only, check payable to LIMARC. L.I.E. Route 495 to Exit 49 North ¼ mile right turn onto Pinelawn Road. Talkin 146.85. Tables/info Mark Nadel, NK2T, 516-796-2366, 22 Springtime Lane East, Levittown, NY 11756 or Hank Wener, WB2ALW, 201-694-1811.

LITTLE Big Horn Nets Sundays: 14.057-2200Z, 21.150-2230Z. Native American Indians and Others Welcome. Info WA2DAC.

FLEMINGTON Hamfest 89. Sponsored by the Cherryville Repeater Association, Saturday, April 15, at 8:00 AM, in the Hunterdon Central High School Field House. Admission: $4 advance, $5 door. Children under 12 and XYLs free. Refreshments available from 6:30 AM. Advance tickets: Dave Hickson, KD2RC, 125 South Main Street, Lambertville, NJ 08530. Tables: Marty Grozinski, NS2K, 6 Kirkbridge Road, Flemington, NJ 08822. Information: 201-788-4080 before 11 PM EST. VE Testing begins at 10 AM, send FCC form 610, photocopy of current license, and a check for $4.75 (payable ARRL/VEC) to: Cherryville Repeater Association, VE Test Team, Box 308, Quakertown, NJ 08868. Talk-in: 146.52, 147.975/375, 145.615/015, 222.52/224.12 and 449.85/444.85 MHz.

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April 28, 29, 30, 1989

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ecial Awards
ominations are requested for "Radio Amateur of e Year," "Special Achievement" and "Technical hievement" awards. Contact: Hamvention Awards airman, Box 964, Dayton, OH 45401.

cense Exams
ovice thru Extra exams scheduled Saturday and nday by appointment only. Send FCC form 610 ug. 1985 or later) - with requested elements own at top of form, copy of present license and eck for prevailing ARRL rates (payable to RRL/VEC) to: Exam Registration, 8830 Windbluff int, Dayton, OH 45458

1989 Deadlines
Award Nominations: March 15
Lodging: April 7
License Exams: March 26
Advance Registration and banquet:
USA - April 4 Canada - March 31
Flea Market Space:
Spaces will be allocated by the Hamvention committee from all orders recieved prior to February 1. Express Mail *NOT* be necessary! Notification of space assignment will be mailed by March 15, 1989.

Information
General Information: (513) 433-7720
or, Box 2205, Dayton, OH 45401
Lodging Information: (513) 223-2612
(No Reservations By Phone)

Lodging
Please write to **Lodging, Dayton Hamvention, Chamber Plaza, 5th & Main Streets, Dayton, OH 45402** or refer to our 1988 Hamvention program for lodging information which includes a listing of hotel/motels located in the surrounding areas of Dayton. Reservations for the surrounding area will then become the responsibility of the individual.

HAMVENTION is sponsored by the Dayton Amateur Radio Association Inc.

dvance Registration Form

yton Hamvention 1989
servation Deadline – USA-April 4, Canada-March 31
ea Market Reservation Deadline: February 1

close check or money order for amount indicated d send a self addressed stamped envelope.

ease Type or Print your Name and Address clearly.

	How Many		
Admission (valid all 3 days)	_____	@ $10.00*	$_____
Grand Banquet	_____	@ $20.00**	$_____
Women's Luncheon (Saturday)	_____	@ $7.00	$_____
(Sunday)	_____	@ $7.00	$_____
Flea Market (Max. 3 spaces)	_____	$25/1 space $50/2 adjacent $150/3 adjacent	
Admission ticket must be ordered with flea market tickets		**Total**	$_____

* $12.00 at door ** $22.00 at door, if available

Name _____

Address _____

City _____ State _____ Zip _____

Make checks payable to - **Dayton HAMVENTION**

Mail to - **Dayton Hamvention**
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Dayton, OH 45401

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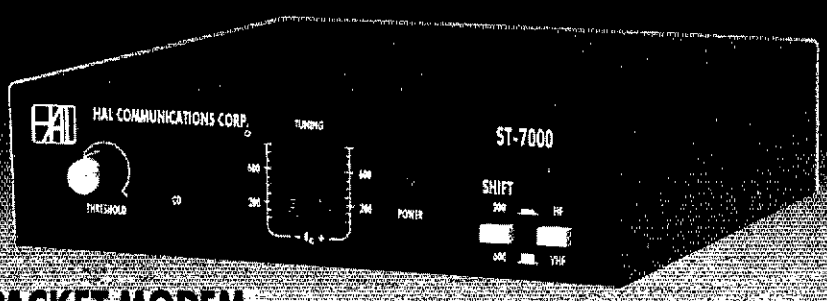

ST-7000 HF PACKET MODEM

The verdict is in and the opinion of HF Packet operators is clear . . . the HAL ST-7000 is a winner!

The HF Packet communications world is not forgiving. Selective fading, noise, and interference coupled with poor tuning indicators and simplistic phone line modems contribute to the poor performance of packet controllers on HF.

The ST-7000 makes HF Packet Work

The ST-7000 is designed specifically to greatly improve the 300 baud HF Packet performance of all packet and multi-mode controllers. Techniques developed for our government and military ST-8000 (MD-1232/G) HF modem are applied to the special problems of HF Packet radio. It's simple . . . just connect the ST-7000 to your existing packet or multi-mode controller . . . and you're ready to send data, **not** repeats.

The "standard" 200 Hz shift mode of the ST-7000 has a 6-pole input bandpass filter, an optimized detector circuit, plus a 40 db AGC system. These design features make 200 Hz HF Packet work!

The ST-7000 also includes a 600 HZ shift mode for even better performance than is offered by the 200 HZ "standard" shift mode.

Other features of the ST-7000 include:

- A new tuning indicator design assures quick and accurate tuning of HF Packet signals
- CD (carrier detect) and threshold level circuits designed specifically for 300 baud HF Packet
- A sine-wave synthesized transmit tone generator assures minimum phase distortion and splatter
- Easily interfaces with all packet and multi-mode controllers via RS-232C, TTL, or TNC VHF audio tones

Best of all, the ST-7000 is manufactured and tested entirely in the United States by HAL Communications, a company you've known and trusted for years.

The ST-7000 is available directly from the factory at a price of $299.00, which includes a 12VDC, 0.25A power supply.

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2-117	2m	10-170	315
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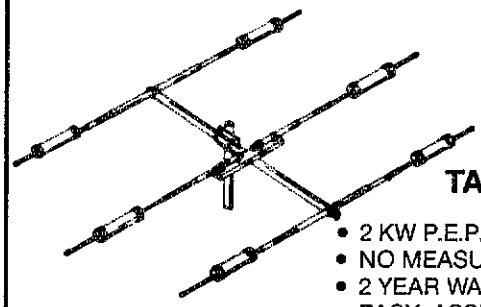

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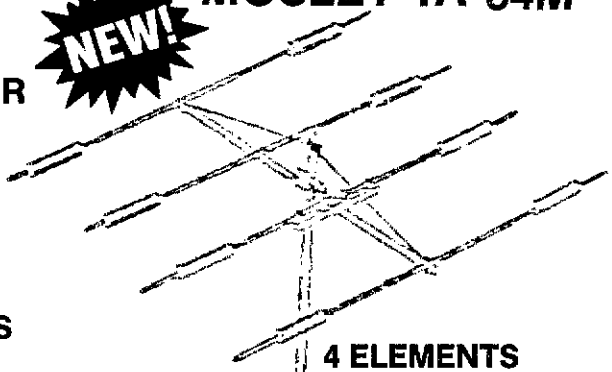
NEW!

MOSLEY TA-34M



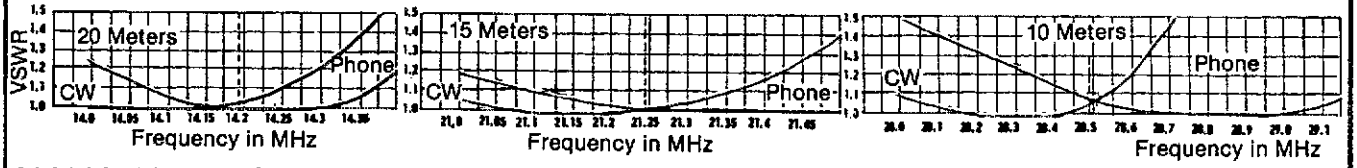
4 ELEMENTS ALL ACTIVE ON 10/15/20

Specifications:

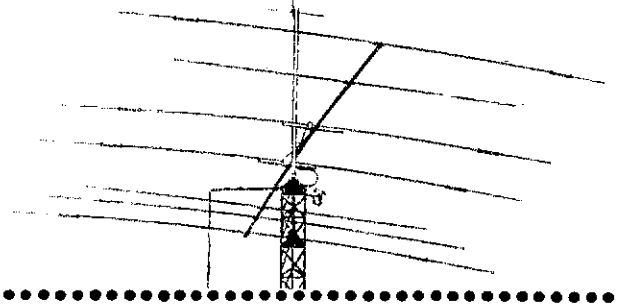
Boom:	21'
Turning Radius:	17'9"
Wt:	58 lbs.
Sq. Ft.:	6.9
Windload:	164 lbs.
Power:	2.5 KW P.E.P.

SWR/Frequency Curves

Model TA-33



MOSLEY PRO-57/67



PRO 57-67 FEATURES

- Covers 10/12/15/17/20 Meters
- PRO-67 has 2 Elements on 40 Meters
- Monobander Performance!
- Dual Driven Elements Add Gain
- 7 Elements on a 24 Foot Boom
- 2.5 KW DC-CW, 5 KW PEP-SSB
- Broadbanded — VSWR 1.5:1 or Better!
- Easy Assembly, NO MEASURING!!!!
- Very Rugged Construction
- All Stainless Hardware Standard
- 2 Year Warranty

YOU MAY NOW ALSO PURCHASE MOSLEY ANTENNAS DIRECT FROM THE FACTORY. FOR A *FREE* CATALOG ON OUR COMPLETE LINE OF ANTENNAS OR TO ORDER, PLEASE CALL OR WRITE.

TA-33-JRM	10/15/20 3 Element, 500W CW, 300W RTTY	$269.95
TA-33M	10/15/20 3 Element, 2 KW PEP, 14 Ft. Boom	$342.95
TA-34M	10/15/20 4 Element, 1½ Inch Boom w/Strut	$464.95
TA-33-34	3 Element to 4 Element Conversion Kit	$195.95
TA-34-XL	10/15/20 4 Element, 2 Inch Boom , No Strut	$579.95
TA-40-KR	40 Meter Dipole Kit for TA-33/34	$149.95
TA-12-KR	12 Meter Kit for TA-34, 1 Kit Per Element	$ 51.95
CL-33-M	10/15/20 3 Element, 18 Ft. Boom, Classic Feed	$449.95
PRO-57	10/12/15/17/20 7 Element, 24 Ft. Boom	$669.95
PRO-67	10/12/15/17/20/40 7 Element, 2 Element on 40	$829.95
RV-4C	10/15/20/40 Vertical, 22 Ft. Self Supporting	$174.95
RV-8C	75/80 Meter Kit for RV-4C	$116.95
TD-3	10/15/20 or 40 Trap Dipole, Full Power	$139.95
TD-2	40/80 Trap Dipole, Full Power	$139.95
MA-3	10/15/20 Mobile, Automatic Band Switching	$119.95
MB-40	40 Meter Coil for MA-3	$ 71.95
MB-80	80 Meter Coil for MA-3	$ 94.95

(Includes Shipping Continental U.S.A.)

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For Technical Info...

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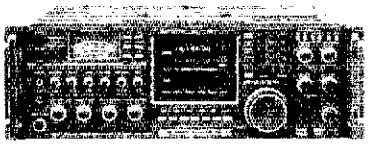
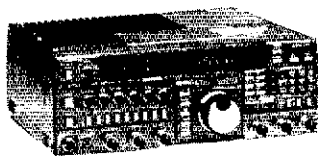


IC-781

HF Equipment	List	Juns
IC-781 New Deluxe HF Rig	$5995.00	Call $
IC-761 Loaded With Extras	2699.00	Call $
IC-735 Gen. Cvg Xcvr	1099.00	Call $
IC-751A Gen. Cvg. Xcvr	1699.00	Call $
IC-575A 10m/6m Xcvr	1399.00	Call $
Receivers		
IC-R7000 25-1300+ MHz Rcvr	1199.00	Call $
IC-R71A 100 kHz-30 MHz Rcvr	999.00	Call $
VHF		
IC-228A New 25w Mobile	509.00	Call $
IC-228H New 45w Mobile	539.00	Call $
IC-275A All Mode Base w/PS	1299.00	Call $
IC-275H All Mode Base 100w	1399.00	Call $
IC-28A FM Mobile 25w	469.00	Call $
IC-28H FM Mobile 45w	499.00	Call $
IC-2GAT, New 7w HT	429.95	Call $
IC-02AT FM HT, HP	409.00	Call $
IC-900 Six Band Mobile	639.00	Call $
UHF		
IC-475A All Mode 25w	1399.00	Call $
IC-475H All Mode 75w	1599.00	Call $
IC-48A FM Mobile 25w	509.00	Call $
IC-4GAT, New 6w HT	449.95	Call $
IC-4A1 FM HT	349.00	Call $
IC-04AT FM HT	449.00	Call $
IC-448A, 25w Mobile	TBA	Call $
IC-3200A FM 2m/70cm 25w	649.00	Call $
IC-32AT Dual Band Handheld	629.95	Call $
IC-3210 Dual Band Mobile	TBA	Call $
220 MHZ		
IC-375A All-Mode, 25w, Base Sta.	1399.00	Call $
IC-38A 25w FM Xcvr	489.00	Call $
IC-37A FM Mobile 25w	499.00	Call $
IC-3AT FM HT	349.00	Call $
IC-03AT Deluxe HT	449.00	Call $
1.2 GHz		
IC-1271A All Mode 10w	1269.00	Call $
IC-1200 FM, 10w Mobile	699.00	Call $
IC-12AT Deluxe 1w HT	473.00	Call $

TS-940S

HF Equipment	List	Juns
TS-940S/AT Gen. Cvg Xcvr	$2499.95	Call $
TS-440S/AT Gen. Cvg Xcvr	1449.95	Call $
TS-140S Compact, Gen. Cvg Xcvr	949.95	Call $
TS-680S HF Plus 6m Xcvr	1149.95	Call $
TL-922A HF Amp	1649.95	Call $
Receivers		
R-5000 100 kHz-30 MHz	1049.95	Call $
R-2000 150 kHz-30 MHz	799.95	Call $
RZ-1 Compact Scanning Recv.	599.95	Call $
VHF		
TS-711A All Mode Base 25w	1059.95	Call $
TR-751A All Mode Mobile 25w	669.95	Call $
TM-221A Compact FM 45w	459.95	Call $
TM-2530A FM Mobile 25w	499.95	Call $
TM-2550A FM Mobile 45w	519.95	Call $
TM-2570A FM Mobile 70w	623.95	Call $
TH-215A, 2m HT Has It All	399.95	Call $
TH-25AT 5w Pocket HT NEW	369.95	Call $
TM-721A 2m/70cm, FM, Mobile	729.95	Call $
TM-621 2m/220, FM, Mobile	699.95	Call $
UHF		
TS-811A All Mode Base 25w	1,265.95	Call $
TR-851A 25w SSB/FM	771.95	Call $
TM-421A Compact FM 35w	469.95	Call $
TH-415A 2.5w 440 HT	419.95	Call $
TH-45AT 5w Pocket HT NEW	389.95	Call $
TW-4100A, 2m/70cm FM	599.95	Call $
TH-55 AT 1.2 GHz HT	524.95	Call $
TR-50 1w 1.2GHz FM	629.95	Call $
220 MHZ		
TM-3530A FM 220 MHz 25w	519.95	Call $
TH-31BT FM, 220 MHz HT	299.95	Call $
TM-321A Compact 25w Mobile	469.95	Call $
TH-315A Full Featured 2.5w HT	419.95	Call $



FT-767GX

HF Equipment	List	Juns
FT-747 GX New Economical Performer	$689.95	Call $
FT-757 GX II Gen. Cvg Xcvr	1129.95	Call $
FT-767 4 Band New	1929.00	Call $
FL-7000 15m-160m Solid State Amp	1995.00	Call $
Receivers		
FRG-8800 150 kHz - 30 MHz	759.95	Call $
FRG-9600 60-905 MHz	699.95	Call $
VHF		
FT-411 New 2m "Loaded" HT	TBA	Call $
FT-212RH New 2m, 45w mobile	459.95	Call $
FT-211 RH 2m, 45w, FM	459.95	Call $
FT-290R All Mode Portable	599.95	Call $
FT-23 R/TT Mini HT	344.95	Call $
UHF		
FT-712RH, 70cm, 35w mobile	499.95	Call $
FT-711RH FM Mobile 35w	449.95	Call $
FT-73 R/TT Mini HT	349.95	Call $
FT-709RH FM HT 4w	389.95	Call $
FT-790R MKII FM/SSB, 25w	799.95	Call $
FT-2311R 10w, 1.2 GHz, FM	559.95	Call $
VHF/UHF Full Duplex		
FT-736R, New All Mode, 2m/70cm	1749.95	Call $
FEX-736-50 6m, 10w Module	259.95	Call $
FEX-736-220 220 MHz, 25w Module	279.95	Call $
FEX-736-1.2 1.2 GHz, 10w Module	539.95	Call $
FT-690R MKII, 6m, All Mode, port.	569.95	Call $
Dual Bander		
FT-727R 2m/70 cm HT	439.95	Call $
FT-4700RH, 2m/440 Mobile	TBA	Call $
220 MHZ		
FT-33R, mini HT	389.95	Call $
FT-109 RH New HT	399.95	Call $
FT-312 RM, Mobile	TBA	Call $
FT-311 RM Mobile	499.95	Call $
Repeaters		
FTR-2410 2m Repeaters	1269.95	Call $
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IC-04AT now **$369.95**	FT-311RM only **$239.95**	TM-321A	PRICES
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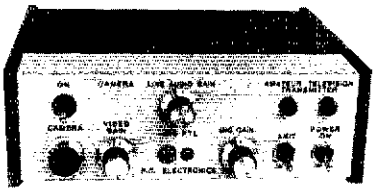

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TX23-1 one watt ATV transmitter crystaled for 1289.25 MHz runs on 12-14 Vdc @ .5A. PTL T/R switching. 7x7x2.5". Transmitters sold only to licensed amateurs for legal purposes verified in latest Callbook or copy of license sent with order.

You as well as all classes of licensed amateurs can now easily transmit live action color and sound video just like broadcast TV with our TX23-1 transmitter. Use any home TV camera by plugging in the composite video and audio into the front panel 10 pin VHS connector or use the rear panel phono jacks. **Call (818) 447-4565** or write for our complete ATV catalog for downconverters, linear amps, antennas, and accessories on the 70, 33, & 23cm bands.

NEW ARRL CODE PRACTICE CASSETTES

Improve your code proficiency the easy way! Here are the four sets of code-practice cassettes that you've been waiting for. We applied the technology used in improving the *Tune in the World with Ham Radio* tapes (See **QST** for August, 1987 page 137) when we produced these all new cassettes to be used by those who already know Morse code and want to improve their ability to copy.

Each set provides almost 3 hours of practice and consists of two 90-minute (C-90) cassettes. On each tape, you will find sample QSO's and code groups. There are also complete sentences in which you will find it difficult to anticipate the words. Here's a sample, "Yesterday, amateur yardsticks played jazz with kazoos."

On sets 1, 2, and 3, at speeds below 17 WPM, the individual Morse Code characters themselves are recorded at the rate of 18 words per minute, but the spacing between characters is made longer to slow the overall code speed. At speeds of 18 words per minute and faster, the characters are recorded using the standard code time for that speed. On each tape, the code speed gradually increases. On set 4, which gives practice at 13, 13½ and 14 WPM for the General Class code exam, standard timing and spacing is used.

Set 1: 5 to 10 WPM in these steps: 5, 5.8, 6.7, 7.5, 8, 8.7, 9.3, and 10 WPM. Order number 2227

Set 2: 10 to 15 WPM in steps: 10, 10.8, 11.7, 12.5, 13.3, 14.2, and 15 WPM. Order number 2235

Set 3: 15 to 22 WPM in one word per minute steps, Order number 2243

Set 4: 13 to 14 WPM in steps 13, 13.5 and 14 WPM. Order number 2251

Each set is **$10** plus postage and handling charges of $2.50 ($3.50 for insured parcel post or UPS — please specify carrier.)

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COMPUTER Code Course. Apple II +/c/e/GS, C-64/128. 37 modes, graphics, 1-100 WPM, menus, proportional spacing, variable frequency, more ($29.95). With wordprocessor ($39.95). Manual ($10). Check/MO. Laresco, P.O.B. 2018-QS, Calumet City, IL 60409, 1-312-891-3279.

APARTMENT Dwellers/Portable Antenna System. For HF. SASE for information. Burk Electronics, 35 North Kensington, La Grange, IL 60525, 312-482-9310.

WANTED: Six Meter FM Equipment. Interested in Genave GTX-600, Regency HR-6, etc. Also GE, Motorola, RCA portables, mobiles or bases that are low band high split that could be converted for six meters. Reasonable. WA3RSP, 469 Jayson Avenue, Pittsburgh, PA 15228.

BIRDS on your antenna? Try our Decoy Owl, $19.95. They really work! Ham Radio Outlet, 1-800-854-6046.

WANTED: Six Meter SSB Equipment. Interested in Drake, Swan, Heath, etc. Also interested in RF amplifiers. Reasonable. WA3RSP, 469 Jayson Avenue, Pittsburgh, PA 15228.

FOR SALE: ComTek ACB-4 Array Switch. For your 2 or 4 element phased vertical arrays on 160M, 80M, or 40M. Complete. Contains remote switchbox with hybrid power dividers and relays, and console control box. Handles 5 KW. Complete directions. Works with 1/4 wave verticals or 1/2 waves. Now you can get gain and directivity at the throw of a switch. Compete with the big boys. Only $195 US + $18 S & H. (Foreign, add 10%.) ComTek, P.O. Box 202, Hopkinton, MA 01748.

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CIPHERING Equipment (M-209, M-94, others) Wanted. Books, Manuals, anything related to secret writing. WB2EZK, 17 Alfred Road, Merrick, NY 11566, 516-378-0263.

WANTED: ICOM IC-30A, 440 MHz Xtal. Rig. $100 if good condition. Dave, K5JOI, 6714 Gaston Avenue, Dallas, TX 75214-4028, 214-826-0535.

LIMITED Space Dipoles ... Tri-Bander 160/80/40 ... $75; Dualband 160/80, 160/40, 80/40 ... $59.50; 80/20 ... $49.50; 40/10 ... $47.50. All coax fed, low VSWR, no tuning required, maximum power. G5RV ... $35; G5RV junior ... $32. UPS prepaid. SASE. Tom Evans, W1JC, 113 Stratton Brook, Simsbury, CT 06070.

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EXCELLENT HRO-60 with A, B, C, D, G, AC Coils. Speaker, $200. K7LQI.

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AUSTIN, Texas QTH of N5CQ: 4 bedroom, 2 bath home, 2000 square feet, with 2 fireplaces on large, fenced, fully landscaped lot with oak trees and established rose, vegetable, and herb gardens. Round Rock school district, convenient to major employers. One bedroom is set up as a hamshack with dedicated 110, 220, and phone circuits. Good elevation with 80 foot professionally installed Rohn 45G with A4, 2M beam, discone, dipoles. $115,000. Call 512-250-9032.

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CHEAP PACKET for the C64/C128. Digicom 64 TNC emulator software with documentation and schematics for AM7910 based HF-VHF interface, $6 ppd. Complete kit $49.95. Assembled $79.95. Both include free disk. Add $2.50 shipping. See my *73 Magazine article* (August 1988) for details. SASE for info. Barry Kutner, W2UP, 614-B Palmer Lane, Yardley, PA 19067.

ADOPTION. I have listened in the night and have heard, low against the ground the cry of lonely, orphaned, and forgotten Telegraph Keys and Bugs. Times past, they were loved, and used, daily, nay hourly, but now languish, almost unknown in many a dusty box or drawer. If you happen to find any of these unfortunates, please give them our address or telephone number and we would be overjoyed to pay the adoption fee and give them regular attention, care and use. Thank you. Reno Telegraph Key Orphan Home, W7SK Headmaster, c/o Box 7415, Reno, NV 89510-7415, 702-356-0615 collect.

COMPUTERIZE with the "Amateur Radio Operating System". This MS/DOS based software features auto-logging, QSL management, award summaries, contesting, and more! Base System $39.95, demo disk $10 (credited). SASE brings details. WA4PYF, Fundamental Services, 1546 Peaceful Lane, Clearwater, FL 34616.

WANTED Ham Equipment for Boy Scouts. Troop 125 is starting a training program in communications, emergency communications, and international brotherhood through amateur radio. Your property donation or financial support will be acknowledged with a receipt for your tax deductible contribution. Contact Mike, WB2FCP, via callbook or 718-984-8177 evenings. Thank you.

ATLAS RADIOS Wanted—working or not. RF Parts Co., 619-744-0720, 800-854-1927.

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WANTED: Heath 5010 Keyer. KA5RKC.

WANTED: SB220/1 or equiv., TH6, TH6 to TH7 Kit, T2X Rotator, Heath CW Keybd., Heath Iambic Keyer, Bencher Iambic Key. W2UGM, 66 Columbus Avenue, Closter, NJ 07624, 201-767-0123.

SWAN 750, nice, $125. K4NBN, "No Bad News".

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NEW—811A's $16.95 each. Add $3.75 for shipping and handling. 6164B's, $11.95 each. Wanted; we pay cash or trade for all types of transmitting or special purpose tubes, Eimac, RCA, ITT, Westinghouse, etc. M & S Communications Engineering, 160 S. Auburn Street, Suite 200, Grass Valley, CA 95945, 916-272-5500.

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1989 CALLBOOKS. North American $26. International $29. Both $52. Personal check. Insured UPS paid. Immediate shipment. Avatar/W9JVF, 1408 W. Edgewood, Indianapolis, IN 46217.

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WANT: R-1004 Receiver, part of AN/GRC-109. Miles Anderson, K2CBY, RFD 2, Cornell Road, Sag Harbor, NY 11963, 516-725-3431 evenings.

COLLINS KWM-380, all updates, speech processor, noise blanker, keypad, 140 Hz, 360 Hz, 1.7 KHz filters, WARC. Superb condition, spotless, in perfect calibration, $2695. Also some extra KWM-380 accessories available. W3ALZ, 301-384-2969.

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DX-100, HQ-110, More, Excellent. WA2RAI, 718-459-3377.

SUPER VR85 replaces the popular VR85 satellite tracking program for the Commodore 64. Features include high resolution color map and satellite sprite, tracking data display, footprint sprite, ground trace, mutual acquisition table, transponder mode display, room for twenty satellite Keplerian element sets, Autotrak compatibility, extensive instructions, and strong user support. Send SASE for details. Super VR85: $35 ppd. (CA residents add 6% sales tax.) RLD Research, McCloud, CA 96057. W6AMW owner.

MIL-SPEC Communications: New and used equipment sales and repair, Collins our specialty. Box 461, Wakefield, RI 02880, 401-783-7106.

WANTED: ICOM-IC22U Xceiver and Sideband Engineer 70CM (420-450 MHz) Xceiver, Yaesu FT-680R Xceiver. QSL w/condition/price. Bob, KI4MB, 6608 N. 18th Street, Arlington, VA 22205, 703-533-0650.

ARE You the owner of an unmodified FT-902DM in excellent condition? If so I'd like to buy it. N8AFX, 1015 Miner, Ann Arbor, MI 48103.

SPY RADIOS Wanted! Radios beginning with prefix "SS" (example SST-1), "RS", "RT", or "RR" (examples RS-8, RT-1, RR-49, etc.). I buy spy radios, surveillance receivers etc. Keith Melton, 318-747-9616 (days).

KITS & ASSEMBLIES for frequency synthesizer, spectrum analyzers, wefax, C-64 packet radio, talking frequency display, keyers, QRP, battery chargers, power supplies, DTMF select call, HF counter, memory voicer and more. For catalog send SASE (45 cents) to A & A Engineering, 2521 W. La Palma, #K, Anaheim, CA 92801.

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WANTED: new or like-new 5CX1500A or 5CX1500B Tubes. Marvin Hoffman, c/o KV8V, P.O. Box 7, Beloit, KA 67420.

ALDA-103 Solid State, Tri-Band HF Transceiver (80, 40, 20 meters-new finals), with manual, mic. and external speaker, $350. WB5PUB, 512-837-7770.

WANT Rcvr. R-1004/GRC-109. Also Rcvr. RR-2/RS-1 and RR-6. Gary Cain, 1775 Grand #302, St. Paul, MN 55105.

WANTED—Delco Transceivers Models 1600, 3200, 5300! Also RS-65 or other type "Spy Radios." Keith Melton, 318-747-9616.

LEARN CODE using IBM PC or compatible (256kB Ram). Easy to follow menu-driven program on DS/DD floppy fully prepares you to copy 5 WPM for Novice license to 50 WPM. Features adjustable intr/interchange timing with 1-50 WPM sending rate, keyboard-selected and randomly generated characters including FCC-required punctuation/signals. $11 including shipping. Logicon, P.O. Box 426, Lexington Park, MD 20653.

WANTED: IC-701 for cash. With/without power supply. Sam Horowitz, 1830 SW 81st Avenue, Apt. 4417, North Lauderdale, FL 33068, 305-722-2540.

R-390A Receiver Parts: Info SASE. CPRC-26 Military Manpack Radio, 6 Meter FM with Antenna, Crystal, Handset: $22.50, $42.50/pair. CPRC-26 Radio only: $9.50. Add $4.50/piece shipping, $9 maximum. Baytronics, Box 591, Sandusky, OH 44870.

BEAM Headings, DX and WAS, from your QTH $7. Wagner, WD8SBB, 855 North Willowglen, Tipp City, OH 45371.

WANTED: Heathkit Mohawk Receiver. Also Wanted: Your old 500 watt class B modulator. Ron Rausch, K5HZ, 16135 West Melody Drive, New Berlin, WI 53151, 414-784-6346.

WANTED: Panasonic RFB-600, Grundig "Satellite", Magnavox D2999 or any good General Coverage Multi-Band Receiver. Wade, 657 14th Avenue, Prospect Park, PA 19076.

FOR SALE: Dovetron MPC-1000 CR Multipath Diversity RTTY Terminal Unit, SSD 100 Solid State Cross Display, Up/Down Conversion, Loop, TTL, RS232 Output, Excellent Condx., Manual, $500 + UPS. Ed White, W1NPL, 413-592-0756.

COMPLETE RTTY Outfit, perfect for beginner. TI-99/4A computer Hamsoft plug-in cartridge, AEA computer interface CP-1, GE cassette tape recorder, 12" Zenith ZVM-123 monitor, all cables including parallel printer cable, and manuals. Original cost over $550, $325 plus shipping. Jules, W2JGR, 516-593-8050.

COLLINS KWM-380 Power Transformer $75. Eimac 8169/4CX3000A $775, 3CX1200A7 $395, 3CX3000A7 $675, SK-300 $350, SK-840 $200, SK-2210/ SK-2216 $100. Jennings UCS-300-7.5 KV $135. (All new.) A. Emerald, 8956 Swallow, Ftn. Vly., CA 92708, 714-962-5940.

DRAKE MN-2000 Matching Network, mint, $120 or best offer. KX8W, 1-517-799-4577.

FOR SALE: Info Tech M-610 Scope. Two TH21A-PB-21H best offer. Bob, 7603 Fostoria Street, Downey, CA 90241, 213-928-1665.

MINT Condition: Panasonic RF4800 all band receiver 530 KC thru 31 MC plus 88-108 FM plus SSB-12V DC and 110V AC with freq. counter rack size, 28 lbs.. $420-sell $200 or best offer. FOB Ft. Pierce. F. Pursell, 377 Anchor Way, Ft. Pierce, FL 34946, phone 407-465-6841.

SALE: Drake R4, T4X, PS, Speaker, excellent working condition, $300 plus shipping. Kurt Bittmann, WB2YVY, 147 McGaw Avenue, Centereach, NY 11720, 516-585-9775.

PK-64A/HFM-TNC Controller $150. MFJ-941C Antenna Tuner $50. Write Jeff, WW6U or call 707-839-0796.

SIGNAL Generators: Wavetek Model 3010, Precision, Digitally Synthsized Signal Generator 1-1000 MHz, CW/AM/FM, excellent condition with manual, price: $1500 or best offer. H-P Model 616A, UHF Signal Generator 1800-4000 MHz, CW/FM, plus good condition with manual, price: $500 or best offer. Call or Write: Doug Sargent, 4 Greenview Drive, Portland, CT 06480, 203-342-1402.

WANTED: Kantronics CW Interface for TI-99/4A. Laughner, Greengate Apt. D-10, Greensburg, PA 15601.

NEED GEAR. None here & 2 year 902 w/xverter unrepaired. 44 year ham running scared. Green superlean. Know what I mean jelly beam? Charity, parity-I don't care-ity. Are you that rarity? 73, W3KFZ at least.

FOR SALE: Drake TR7 with RV7 Remote VFO and PS7 Power Supply; Yaesu 620B six meter transceiver with Pre-Amp; Collins 75A4 Receiver. All mint. Best offer. W2IDZ, 201-462-8191.

KENWOOD TS711A 2M All Mode. Used very little, $700. KB1EJ, 203-651-8407.

SELL: Heathkit HW-101 Transceiver, includes digital readout and phonepatch. Excellent condition. Larry Taylor, WB1CIV, 207-284-7672.

WIRE, COAX, ROPE, Connectors—Why pay full price? Silver/TeflonPL-259, $13.50/10; Factory Fresh RG-213 $30/100', RG-8X $14/100', International 9086 $40/100'. Ladder Line $10/100', #14 (7x22) Wire: HD Copper $7/100', Copperclad $8/100': 3/16' Black Double Dacron(r) Line $10/100'; MilSpec 3/16', UV, Fire, Abrasion Resistant, Green #700 Braided Dacron(r) Line, $9.95/200'. The best HF wire antennas and baluns at unbeatable prices. 24 hour service. 10% ($3 minimum) shipping. MC/Visa. Mention ad, receive 40 page catalog free. Radio Works, Box 6159, Portsmouth, VA 23703, 804-484-0140.

FOR SALE: Kenwood TS-520S, w/CW Filter, VFO-520S, DG-5 Digital Display. Excellent condition. Will ship. Call KD2KR, 914-783-5132.

KENWOOD TS520S, perfect, $400. Shure 444 Microphone, $30. Autek QF-1 Audio Filter, $35. Kenwood MC-48 Microphone, $35. Ameco PT-2 Preamp, $35. Heathkit Power Supply, 3 Amps, $15. Call Ken, KA2CMJ, 201-791-3758.

WEATHER Facsimile Recorder Wanted. HF and Satellite Capabilities Desirable. Herb Strobel, WB2HIQ, 84 Chichester Avenue, Center Moniches, NY 11934.

FOR SALE: Collins 75-A4/KWS-1. Excellent condition, high serials, best offer, three filters, New York City. Sam Horowitz, 1830 SW 81st Avenue, Apt. 4417, North Lauderdale, FL 33068, 305-722-2540.

YAESU 767 all band, all mode, mint condition. Also has 2M, 440 and 6M modules, $1500. K2HHQ, 201-477-3686.

SUPERFAST Morse Code Supereasy. Subliminal cassette. $10. Learn Morse Code In 1 Hour. Amazing new supereasy technique. $10. Both $17. Moneyback guarantee. Free catalog: SASE. Bahr, 2535-G2 Marietta, Palmbay, FL 32905.

CERTIFIED Vocational Electronics Instructor will provide program tailored to individual requirements. R. Gray, WA1DVU, Box 924, Belchertown, MA 01007, 413-323-7374.

YAESU 902 For Sale. Bought new in 1982. Hardly used. Asking $600. Please call Peter Monroe at 718-965-0031 (Brooklyn, NY).

CUSHCRAFT R3, Make Offer. KD7SE, 671 Morton, Ashland, OR 97520, 503-488-0919.

KENWOOD TS-830S with VFO-230, $750; Drake TR4CW/RIT station fixed and mobile, $550; Drake R4C/T4XC station, $550; Want Drake R-7A. KG6KB, 120 Cedar Lane, Santa Barbara, CA 93108, 805-962-8957.

FOR SALE: Kenwood TS-940S. Like new in original box incl. all filters + AT + SP940 + MC-85. Callillan. 203-353-8318 after 7 PM.

WANTED: Rohn crankup-tilt over tower (old model) sections 2 and 3; or complete standard or heavy duty series to 54 or 71 feet. K2KA, 609-429-6032.

WANTED: All interested hams to form a net to discuss legends and stories about Collins radio equipment. Write KØDEW, 272 Donnalee, Lebanon, MO 65536.

WANTED: High performance general coverage receiver such as R71, R2000, etc. Write Al Ahrens, P.O. Box 1912, Mariposa, CA 95338 or call 209-966-5389.

SELL: Robot 1200C & color modified 800 keyboard. Best offer over $1000. W2WHK, 210 Utica Street, Tonawanda, NY 14150, 716-692-5451.

WANTED: Hallicrafters SR-2000. K4IRK, Rt. 1, Box 414, Arcadia, FL 33821.

DRAKE TR3 Transceiver, Power Supply, Speaker, $260. A1 condition. WB2LTS, 516-643-7008.

SALE: Heathkit Ultrapro Keyboard and Microcraft Codestar. Code Copier. Copies Morse, Baudot, ASCII Codes 3 to 70 WPM. Power Supplies and Manuals Included. Mint Condition, $200. Ernie, KC4EP, Box 3255, Nalcrest, FL 33856, tel. 813-696-2554.

YAESU FT270RH 45W 2M $275. Kenwood TH31BT, DC-DC, Battery, 1/4 Whip $200. Original cartons. Jeff, KB3DX, 202-966-6614 home.

FOR SALE: Kenwood 520 VFO in original carton with manuals, $125. W1MWQ, 203-377-0074 Connecticut.

FOR SALE: MFJ Wattmeter $20. MFJ Noise Bridge $25. Vibroplex Bug $15. WD4OHD, 704-568-9026.

SELL and Ship UPS Yaesu FT-102, $525. KG6NL, 714-652-0450.

WANTED: Solid State HF Transceiver like TS430, IC735, etc. W7HOO, 2187 Angle, Klamath Falls, OR 97601, 503-882-5824.

FOR SALE: Swan 500C with 117XC PS mint $250. Heathkit HW12 with PS + 12V PS mint $150. WBØVGX, 612-364-5224.

WANTED: B&K Precision model 1405 3 inch scope in good condition. Sell one DGM MKB keyboard. Sell one Instructograph with 19 tapes. Price both negotiable. Dan Morehead, WD9GXV, 2115 W. Lawrence, Springfield, IL 62704, 217-546-5357.

WRITTEN Exams Supereasy. Memory aids from psychologist/engineer cut studytime 50%. Novice, Tech, Gen: $7 each. Advanced, Extra: $12 each. Moneyback guarantee. Bahr, 2535-G2 Marietta, Palmbay, FL 32905.

TANDY TX-1000, CM11 picture tube, smart watch 3-1/2" and 5¼" drive, $1000. K2HHQ, 201-477-3686.

SELL: Alpha 78 no tune amplifier with 10M. Very low hours. Will ship. $2000. Bob, N2HKM, 201-208-1320.

GROUND Radial Wire For Verticals Or Slopers: Improves performance, new #16 bare solid copper. Lowest cost, 1000 foot spool, $38 includes shipping. Davis RF, P.O. Box 230-Q, Carlisle, MA 01741, 508-369-1738.

ROSS'$$$$ New February Specials: Kenwood TM-221A $389.90, TS-440S/WAT $1229.90, TM-721A $624.90, TW-4100A $489.90, TM-721A $619.90, TH-215A $329.90, Robot 450C $664.99, 800H $329.99, 1200C $1139.90, Alliance HD-73 $109.50, AEA PK-232 $287.50, BT-1 $79.90, MP-20 $89.99, ICOM IC-27A $334.99, IC-28H/WHM-14 $426.99, IC-3200A $497.99, IC-735 $939.90, IC-781 $5539.90, Yaesu FT-109RH $276.99, FT-727R $339.90, FT-411RH $349.90, MFJ-989B $279.90, 949-C $119.90. All LTO (limited time offer). Looking for something not listed?? Call or Write. Over 8780 ham-related items in stock for immediate shipment. MENTION AD. Prices cash, FOB Preston. We close at 2:00 PM Mondays & all day Saturday. Ross Distributing Company, 78 South State, P.O. Box 234Q, Preston, ID 83263, 208-852-0830.

SELL: Knight 106-6M-AM Trans. and Clegg 22ER-2M-AM with Manuals. U ship. K3YKM, 215-687-1687.

CRYSTALS—Build something these long winter nights. Hands on electronics for fun and satisfaction, you can fix it too. It's easier with crystals. QRP, low power AM phone, etc. See October or January *QST* classified for prices, frequencies, circuits etc. "Crystals Since 1933", WØLPS. Two stamp long SASE for listings-circuits. C-W Crystals, Marshfield, MO 65706.

SELL: HQ129X, DX-100, SB400, Dumont 304. $50 each. Brad Marple, W1RUH, 55 Hilldale Road, Ashland, MA 01721, 508-881-1961 evenings.

SELL: AM-6155 for 2M, 7/8" hardline with connectors, 2800Vdc @ .5 amp PS, 6' fiberglass .4f/d dish. Jeff, 502-729-4454.

FOR SALE: Johnson Viking Ranger. Also Hammarlund HQ100. Best offer. Earl, N4UDO, 703-425-7142.

WANTED: Ham Equipment and Other Property. The Radio Club Of Junior High School 22 NYC Inc. is a nonprofit organization, granted 501(c)(3) status by the IRS, incorporated with the goal of using the theme of Ham Radio to further and enhance the education of young people. Your property donation or financial support would be greatly appreciated and acknowledged with a receipt for your tax deductible contributon. We sponsor the classroom net on 7.238 at 1200 UTC daily and encourage your QSL for our weekly award. Please write us at: P.O. Box 1052, New York, NY 10002 or call our round the clock hotline: 516-674-4072. Thank you!

COMPLETE Station Sale: Kenwood TS-940S/AT, SP-940 Speaker/Filters, low hours, mint condition. Drake L4B, T4XC, R4C, MS4, AC-4, 1000-LP low pass filter. Hygain 205BA, 155BA, 105BA w/baluns tailtwister, ham II rotators. Telex ProCom 250 microphone/headset. Astatic D-104 w/chrome base. Universal 80' heavy duty aluminum tower. Heath memory keyer, VTVM, dummy load. Vomax SBP-3 RF speech processor. CREI 255 scope and electronics/communications course. Eico 710 grid dip meter. AEA CP-1 RTTY patch. *QST* 1971-present. 3-1000Z tube socket, xfmrs., misc. KW parts. All gear excellent, w/manuals, cables, etc. Best offers. K3LWM, 128 Southwood Drive, Uniontown, PA 15401, 412-439-0496.

HAM ADS: Free Advertising, wide distribution, 200 ads per issue. Only pay if benefit derived. SASE sample. Communications Exchange Sheet, P.O. Box 754-Q, Concord, MA 01742.

ALPHA 76 $695. Alpha 76A $1095. K1BW, 508-797-4190.

DRAKE C-Line, mint, no mods, all original, high SN 500 Hz filter, 160M, WWV, WARC, $600. Daiwa RF-440 speech proc., $50. Ten-Tec Century 22 w/cal $250. HK-5A Keyer $35. Keith, AA5AC, 505-821-1498.

COMMODORE/Amiga Chips, Parts, Diagnostics. Oldest Commodore service center in the country. Low prices, (eg. C64-$49.95 plus UPS). Heavy duty C64 power supply-$27.95 plus UPS. We ship worldwide. Kasara Microsystems Inc., 24 West Street, Spring Valley, NY 10977, 1-800-248-2983 or 914-362-3131, Telex 229608.

YAESU FT-757 GX CAT system low band 10-160 meters, tech & operating manuals included used very little mint cond. $795. Kenwood TS-700A all mode 2 mt. good condition $325. Commodore printer 803 mint $75. Commodore 128 computer, manual inc. $165 perfect condition. Write or call—call after 6 PM eastern time. WA2ERD, P. Laspina, 33 Gloria Ann Smith Drive, Bricktown, NJ 08723, tel. 201-920-0270

5 ACRE Contest/DX QTH For Sale in Boynton Beach, FL. Lovely 4 br./3 ba. 3600 sq. ft. home plus separate 1200 sq. ft. hobby home/guest house. Includes 2 40 ft. towers, ultralight air strip, operating nursery business, $380,000. Call Mark Wilkinson, N4NJ, 1-800-325-7232.

COMMUNICATIONS Batteries NiCd Packs/Inserts/Rebuilding. Clone Packs w/case/plugs: Yaesu FNB2/Wilson BP4 $22.95, Santec 142/1200 (3 pin) $23.95, ICOM BP5 $46.95, Commercial Packs: call. Battery Repair Inserts: ICOM BP2/CM2 $18.95, BP3/CM3 $16.95, BP5/CM5 $24.95, BP7/BP8 $29.95, Kenwood PB21 $13.95, PB24 $21.95, PB25/25H/26 $25.95, Azden 300 $21.95, Std. C118 $25.95, Santec KTBP $16.95, Tempo S1/270 $23.95, S1, 2, 4, 5, /450 $23.95, S15 $24.95, Yaesu FNB9 $15.95, FNB4/4A $33.95, Ten-Tec 2591 $24.95, Eagle Pitcher "Porta-Pac" 12V/5AHr, with Charger $39.95. Rebuilding: add $4 to insert cost for factory installation or send pack for quote. 2MTR 5/8Wv Telescopic/BNC $18.95, HT Ducks/BNC $8.95, Mobile & Base Antennas. SASE-Catalog. PA add 6%. Add $3 shipping/order. Visa-MC add $2/order. Phone: 814-623-7000. Cunard Associates, Dept. A, RD 6, Box 104, Bedford, PA 15522.

ROSS'$$$$ Used February Specials: Kenwood TR-3600A/TU-35B $279.90, TH-415A $269.90, VFO-820 $159.90, PS-30 $134.90, Collins KWM-2 $499.90, 30L-1 $795, 312B-4 $259.90, ICOM IC-471H $799.90, IC-3PA $39.90, PS-20 $158.90, IC-215 $99.90, Ten-Tec Triton IV $339.90, 262G $85, 252MO $99.90, Robot 70 $99.90, 80 $90.90, 400 $299.90. Looking for something not listed?? Call or Write. We have over 225 used items in stock. MENTION AD. Prices cash, FOB Preston. We close at 2:00 PM Mondays & all day Saturday. Ross Distributing Company, 78 South State, P.O. Box 234Q, Preston, ID 83263, 208-852-0830.

ANTENNA Parts Catalog, Lowest Costs: dipole/quad/ground radial wire, insulators, center feeds, open wire feed line, coax, relays, (#14 multistrand dipole/quad wire, non-stretch, very flexible, $34 per 275' (minimum), $.12/ft. thereafter, includes shipping). Closeout: #12 copperweld 18,000 feet, $795, cheap. Catalog: $2. Davis RF, P.O. Box 230-Q, Carlisle, MA 01741, 508-369-1738.

ALPHA 78 purchased new July 1988 from Alpha Company, Colorado. Will ship for $2300 prepaid. John Savonis, W1DBS, 410 Blake Road, New Britain, CT 06053, 203-223-3072.

ELECTRONIC Weather Station. Superb bargain while they last. The one you've wanted, as featured in Aug. '85 Popular Science, provides more than 20 functions, including barometric pressure. Complete system currently retails for $389. Distributor close out price (less Rain Gauge), only $169. Includes full service and original warranty. Satisfaction guaranteed. Visa, MasterCard accepted. Hurry, call now for details and immediate delivery. Peet Bros., 201-531-4615.

HAM MUG beautifully hand-crafted pottery mug with your name and call imprinted into the clay. Earthtone colors and 16 oz. capacity will make it a welcome addition to your radio station. $14.95 plus $2 postage and handling. Satisfaction guaranteed. Pottery By JC, 650 Cascade, Shelton, WA 98584.

CUSTOM Call Letters for your vehicle, computer. Cut vinyl lettering, $8/set or magnetic sheeting for $14. Call Pete, KC1IT, at Caron Signs, 207-223-4779.

CLEANING Out Shack: selling as one package Drake TR7 Transceiver with PS-7 Power Supply; 500, 1800, 2400, 6000 Hz Filters, Noise Blanker, tunes zero to 30 MHz, two fans, mike and WARC bands, MN2700 Tuner, immaculate condition. Rich, WB2IDV, Bloomfield, NJ 07003, 201-893-1293 evenings.

SELL Collins 32V3, $275; 75A3, $225; 75A4, $300; KWS-1, $550. Will pack and ship at extra charge. Bill Kirk, 619-279-0411.

WANTED: ICOM IC-22A or IC-27A/H 2 Meter Transceiver. Only unmodified and fully functional units considered. Write or call: P.O.B. 716, Kirkland, WA 98083.

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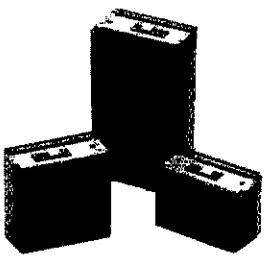

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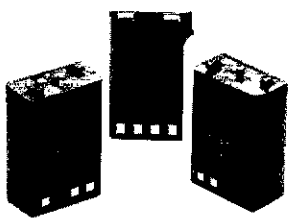

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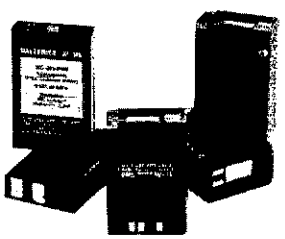

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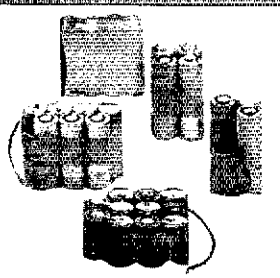

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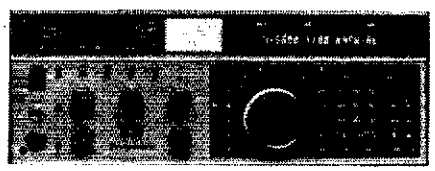

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585 9-band xcvr w/1-30 MHz rcvr	2245.00	1899
961 Deluxe 22A ps w/speaker	239.00	219.95
256 FM transceive module	65.00	
257 Voice synthesizer	89.00	
258 RS-232 interface	65.00	
282 250 Hz 6-pole CW filter	69.00	
285 500 Hz 6-pole CW filter	69.00	
288 1.8 KHz 8-pole SSB filter	69.00	
700C Electret hand microphone	37.00	
705 Electret desk microphone	69.00	
1140 18/24.3A DC circuit breaker	18.00	

TITAN	List	SALE
425 1.5kw linear (SN below 1000)	2685.00	2289
425 1.5kw linear (SN 1000 & up)	2795.00	2389

CORSAIR II	List	SALE
561 9-band digital transceiver	1445.00	1249
961 Deluxe 22A ps w/speaker	239.00	219.95
263G Remote VFO	269.00	249.95
282 250 Hz 6-pole CW filter	69.00	
285 500 Hz 6-pole CW filter	69.00	
288 1.8 KHz 8-pole SSB filter	69.00	
603 KR-1B Dual keyer paddle	69.00	
700C Electret hand microphone	37.00	
705 Electret desk microphone	69.00	
1140 18/24.3A DC circuit breaker	18.00	

ACCESSORIES	List	SALE
2510B SSB/CW Mode B satellite conv	695.00	629.95
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229B 1.8-30 MHz 2KW PEP tuner	349.00	319.95
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KENWOOD TS-711A/VS-1 with ARR-SP144VDG & KLM 2M16LBX $750; Kenwood TR-751A/MU-1/TU-7/VS-1 with AS-APR151.3 $525; Kenwood T8-811A with ARR-SP432VDG & CC-424B $775. All like new, complete, service manuals. Send SASE for 4 page list clean VHF ham, audio, microwave gear & parts. WA6JRA, 714-637-3989.

IB-PC Software For PK-232I New CompRtty II/PK is the complete communications program for the PK-232/HK-232. Uses host mode of PK-232 for complete control. Text entry via built-in screen editor! Adjustable split screen display, including optional Triple Split-in Packet mode. Instant mode/speed change. Hardcopy, diskcopy, break-in buffer, select calling, text file transfer, customizable full screen logging, 24 programmable 1000 character messages, mailbox facility. Ideal for MARS and traffic handling. Requires 256k PC compatible. $65. Non-PK-232 version still available. Send call letters (including MARS) with order. David A. Rice, KC2HO, 144 N. Putt Corners Road, New Paltz, NY 12561.

HAMMARLUND HQ-100 $100. Realistic Pro-32A Scanner, 30-512 MHz, 200 Channel $200. Center 12" Green Monitor with Suntek Mono/Hercules Board for IBM PC or Compatible $100. Fred VanPata, 11 Sperry Street, Milford, CT 06460. 203-877-3038.

MFJ-1278 Multi-Mode Data Controller, 9 Modes, new $185. MFJ-1282 Connectors and Program $10. Call KB4FQ, 919-844-3895.

HEATHKIT Wanted: SB-644 remote VFO for the SB-104A transceiver. Contact: G. Hawrysko, K2AWA, P.O. Box 568, Boro Hall, Jamaica, NY 11424.

MacINTOSH Ham Software. MacTrak (R) tracks satellites, sun, moon. Graphic or tabular outputs. Compatible with Mirage Tracking Interface for rotor control, $59.95. DX Helper [illegible] provides DX info including distance, bearing, sunrise, sunset, propagation MUF, great circle display, more. $34.95. SASE for info from R. Stegemeyer, P.O. Box 1590, Port Orchard, WA 98366.

RADIO Shack Model 100 laptop computer, portable disk drive II, lucid chip, TSDos, manuals, books, magazines, case, $300. Collins R388/51J4 general coverage receiver, mechanical filters, manual, excellent condition, $175. WA7ZYQ, 208-245-2070.

T-4XC, AC-4 $240; MS-4 $20; HO-13 $50; Transformer 17V-0-17V, 100A $95. Wanted: TS-130/660, R-7000. Paul Husby, 1462 Midway Parkway, St. Paul, MN 55108, 612-642-1569.

'Q' PRODUCTS: 8877 QRO VHF Amplifiers. 50 MHz, 144 MHz, 220 MHz. HV power supplies, coaxial antenna relays. Introductory price on 50 MHz kit. SASE for brochure. 'Q' Products, Larry Price, N7BNJ, 10412 38th Street E, Puyallup, WA 98372, 206-841-7465 evenings.

WANTED: Hallicrafter VFO's. HT6, S53, HT30. Collins Transmitters, Receivers. Grebe. Deforest Crystal Receiver. K4UJZ, 608 W. Thompson Lane, Murfreesboro, TN 37129.

WANTED: two Collins 351R-1 relay rack panel adapters for mounting s/line equipment in relay rack. M.M. Zemek, W5IK, P.O. Box 289, Little Elm, TX 75068, phone 1-800-433-8984 weekdays.

IC-730, $425. PS-15, $100. AT-100, $250. LDA, $20. Drake 7000E Terminal, Monitor, $225. FOB K1LEC, 802-986-8121.

MICROWAVE Signal Generators, all checked, working: HP-626A, HP-628A, HP-8690A $150/ea. FXR L772A 1-2 GHz $75. GR-1218A 1-2 GHz, GR-1021A VHF/Gen. $100/ea. GR-1601A VHF Bridge $125. Also Meters: HP-410C w/out probe $100. HP-412A $35. GR-1611A Cap/Br $100. Tektronix plug-ins: Type-82 $75. Also 1A1, M, 1S1, 81. Tek manuals: 475A, 422, 575, 547, 2215, $25/ea. Heath EU-205 2-pen Chart Recorder $75. Military VLF Receiver SRR-11 14-600 KHz $75. H-V Transformers, 4400V/CT, 235MA; 3500V/CT 275MA $75/ea. Giant Powerstat 220V/28A, 0-280V, 7.8KVA $145. SASE list. Joseph Cohen, 200 Woodside, Winthrop, MA 02152, 617-846-6312.

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WANTED: Drake RV75, P75, & R7 by German Ham Call. W8MOK, 313-485-1557.

C64-128 SOFTWARE: 1000's of programs for ham, education, utilities, games. $3.50 to $5 per disk. SASE for catalog. Manna Software, 15426 Yukon Avenue, Lawndale, CA 90260.

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WANTED: Vacuum Variable Capacitor with 2000 to 3000 PF maximum capacitance. Joe Sposato, KA1BWO, 32 Kimball Road, RFD 3, Lisbon, CT 06351, 203-376-0134 after 5 PM EST.

MURCH UT2000A Transmatch $110. Nye-Viking Phone Patch, new $35. Nye-Viking Phone Patch, used $17. B&W Apt. Antenna, new $30. All items complete with manuals. UPS prepaid. W9FUP/4, 305-972-8766.

SMALL Solar Panels, Chargers, World Timers. Send SASE. B.E.A.M. Solar And Electronics, N2ZY, 6205-11th Avenue, Brooklyn, NY 11219.

WANTED: Heath HW-7, HW-8, love to have kit. Also Heath DX-60B, HR-10, Speakers, Realistic DX-150A or B. Call Steve Giancola collect 602-985-7049.

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WANTED—SB-101 any condition for parts. Send condition and price. Andy McAloose, P.O. Box 136, Kelayres, PA 18231, 717-929-3093.

FOB SELL: Swan 600R, 600T and Phone Patch, $395; Swan 500CX, 117XC, 444 Mike, $375; Globe Chief, $65; Globe King 500A, $375; Collins KW-1 Prototype, $1500; 5 KW HB Amplifier, 160, 80, 40, 20, $1500; 100 Foot Pneumatic Mast Mounted on Trailer, $1500; 12.5 KW Katolite Generator Mounted on Trailer, $3000; Telrex 335, 40 Meter Beam, $800; Telrex 536 Beam, $375; 70 Foot Aeromotor Self Support Tower, $800; 40 Foot Self Support Tower, $200; Telrex 10-15-20 Christmas Tree, with Rotor on 50 Foot Crank-Up, $750, you take down. Want Telrex 2 Inch Mast, Rotor Cable. K8CCV, 216-427-2303 6-9 PM EST weeknights.

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ICOM micro2AT, DC/DC, service manual, $250; Regency TS-2 scanner, 800 MHz with cellular, service manual, $250. Pete Sperandio, N2BGD, 283 Tilford Place, Somerdale, NJ 08083-2646, 609-784-1070.

ICOM 451A mint condition $300. Yaesu FT-708A handie talkie with accessories $200. Bob, WA6KYM, 714-968-8858.

WANTED: service manual for a Hallicrafter SX-26 receiver. Hallicrafter HT33A or HT33B linear amp. Will pickup within 300 mile radius of Port Huron, Michigan. WD8DWR, 3635 Orvall Drive, Port Huron, MI 48060, phone 313-385-9479.

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WANTED—Bencher XZ-2 Audio Filter and Drake R-4B Receiver. W2VT, 92 Warwick Turnpike, Warwick, NY 10990.

45G Rotating Base $1400, Rotating Rings $800 each. WA8CZS, 614-452-7971.

WANTED: Military Manuals, TM-30/420, Japanese Military, TME11 Technical Data German and Japan, any information on US Signal Corps Basic Components History, Collins 312B SM-3, good conditions. Tajima care Toshiba, 701 Westchester Avenue, White Plains, NY 10604.

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COLLINS New Tube Sets—75S3ABC-$60, 75A4-$80,KWM2-$85, 32S3-$50 without finals, add $30 for 614B's, $3 shipping. WE2I, 716-334-1103, 65 Aleta, Rochester, NY 14623

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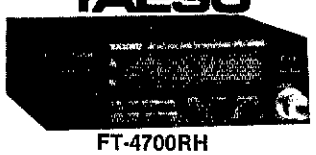

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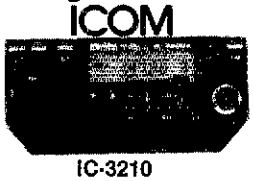

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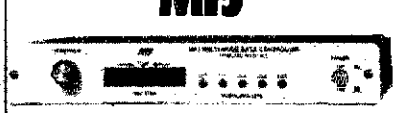

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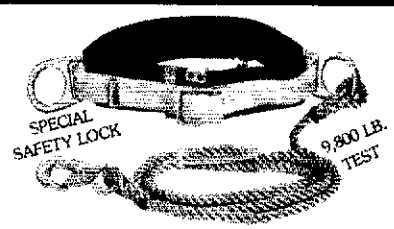

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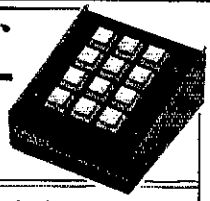

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23BS 3-el 2 mtr Beam.....
25BS 5-el 2 mtr Beam.....
28BS 8-el 2 mtr Beam.....
214BS 14-el 2-mtr Beam.....
2BDQ 80/40 mtr Trap Dipole.....
5BDQ 80-10 mtr Trap Dipole.....
BN86 80-10 mtr KW Balun W/Coax Seal...

HUSTLER

6BTV 80-10 mtr Vert $149 5BTV 80-10 mtr Vert $129
4BTV 40-10 mtr Vert $99 G7-144 2-mtr Base $129
G6-144B 2-mtr Base $89

Mobile Resonators	10m	15m	20m	40m	75m
400W Standard	$16	$17	$19	$22	$26
2KW Super	$20	$22	$25	$29	$39

Bumper Mounts - Springs - Folding Masts In Stock!

BUTTERNUT ELECTRONICS CO

HF6VX 80-10m Vertical $149 Delivered
- Full Legal Power
- Highest Q Tuning Circuits

HF2V 80-40m Vertical $139 Delivered
- Full Legal Power
- Automatic Band Switching

Accessories:
RMK II Roof Mtg. Kit.....$55
STR II Stub-Tuned Radials.....$35
TBR160 160m Coil Kit.....$55
30m Add-on Kit.....$35
17/12m Add-on Kit.....$35

HF6V HF2V

FREE UPS on ACCESSORIES when purchased with antenna

HF5B "Butterfly" 20-10m Compact Beam $229.95

- Unique Design Reduces Size
- No Lossy Traps
- Turns w/TV Rotor
- Boom Length 6 Feet
- Element Length 12.5 Feet

FREE UPS Shipping in Continental USA

MIRAGE/KLM

KT34A 4-el Broad Band Triband Beam.....$399.95
KT34XA 6-el Broad Band Triband Beam.....$589.95

ROTORS

Alliance HD73 (10.7 sq ft rating).....$119.95
Alliance U110 (3 sq ft rating).....$49
Telex CD 45II (8.5 sq ft rating).....$Call
Telex HAM 4 (15 sq ft rating).....$Call
Telex Tailtwister (20 sq ft rating).....$Call
Telex HDR300 Heavy Duty (25 sq ft rating)..$Call

ROTOR CABLE

Standard 8 cord cables $.22/ft.
(vinyl jacket 2-#18 & 6-#22 ga)
Heavy Duty 8 Cond cable $.39/ft
(vinyl jacket 2-#16 & 6-#18 ga)

ROHN GUYED TOWER SECTIONS

10 FT. STACKED SECTIONS

20G.....$49.50 45G.....$139.50
25G.....$59.50 55G.....$179.50

ALL ACCESSORIES IN STOCK—CALL

ROHN FOLDOVER TOWERS

Model	Height	Ant. Load*	Price
FK2548	48 ft.	15.4 sq. ft.	$1129
FK2558	58 ft.	13.3 sq. ft.	1199
FK2568	68 ft.	11.7 sq. ft.	1239
FK4544	44 ft.	34.8 sq. ft.	1489
FK4554	54 ft.	29.1 sq. ft.	1599
FK4564	64 ft.	28.4 sq. ft.	1699

25G Double Guy Kit.....$279.
45G Double Guy Kit.....$299.

*Above antenna loads for 70 mph winds w/guys at hinge and apex. All foldover towers shipped freight prepaid in 48 states. Prices 10% higher west of Rockies.

TOWER/GUY HARDWARE

3/16 EHS Guywire (3990 lb rating).....$.15/ft
1/4 EHS Guywire (6650 lb rating).....$.18/ft
5/16 EHS Guywire (11,200 lb rating).....$ 29/ft
5/32 7 × 7 Aircraft Cable (2700 lb rating).....$.15/ft
3/16 CCM Cable Clamp (3/16" or 5/32").....$ 45
1/4 CCM Cable Clamp (1/4" Cable).....$.55
1/4 TH Thimble (fits all sizes).....$.45
3/8EE (3/8" Eye & Eye Turnbuckle).....$6.95
3/8EJ (3/8" Eye & Jaw Turnbuckle).....$7.95
1/2 × 9EE (1/2" × 9" Eye to Eye Turnbuckle).....$9.95
1/2 × 9EJ (1/2 × 9" Eye & Jaw Turnbuckle).....$10.95
1/2 × 12EE (1/2" 12" Eye & Eye Turnbuckle).....$12.95
1/2 × 12EJ (1/2" × 12" Eye & Jaw Turnbuckle).....$13.95
5/8 × 12EJ (5/8" × 12" Eye & Jaw Turnbuckle).....$16.95
3/16" Preformed Guy Grip.....$2.49
1/4" Preformed Guy Grip.....$2.99
6" Diam - 4 ft Long Earth Screw Anchor.....$17.95
500 D Guy Insulator (5/32" or 3/16" Cable).....$1.69
502 Guy Insulator (1/4" Cable).....$2.99
5/8" Diam - 8 ft Copper Clad Ground Rod.....$12.95

PHILLYSTRAN GUY CABLE

HPTG2100 Guy Cable (2100 lb rating).....$.32/ft
HPTG4000 Guy Cable (4000 lb rating).....$.52/ft
HPTG8700 Guy Cable (8700 lb rating).....$.72/ft
9901LD Cable End (for 2100/4000 cable).....$9.95
9902LD Cable End (for 6700 cable).....$11.95
Socketfast Potting Compound (does 6-8 ends).....$16.95

GALVANIZED STEEL MASTS

Heavy Duty Steel Masts 2 in OD - Galvanized Finish

Length	5 FT	10 FT	15 FT	20 FT
.12 in Wall	$29	$49	$69	$89
.18 in Wall	$49	$89	$129	$149
.25 in Wall	$69	$129	$189	$249

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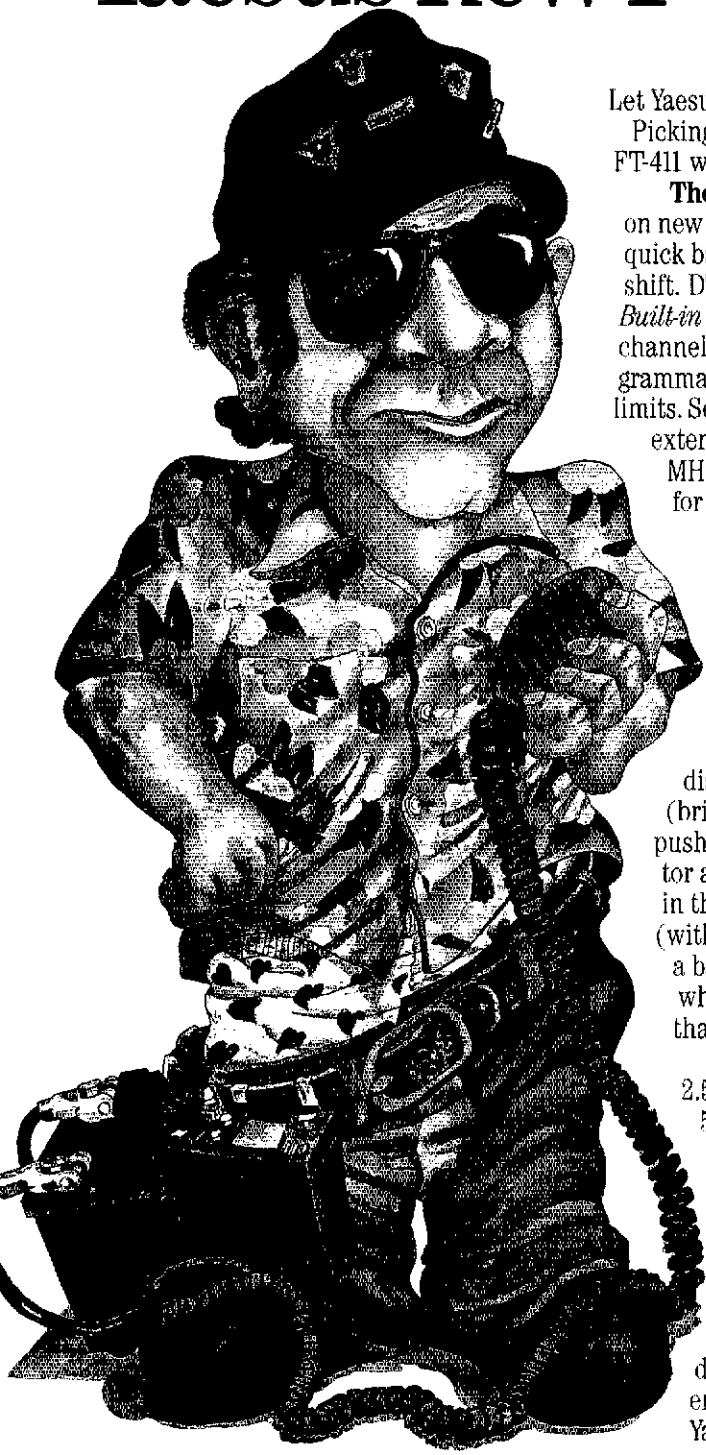
(Prices & Availability Subject To Change Without Notice)

(Antenna/tower product prices do not include shipping unless noted otherwise)

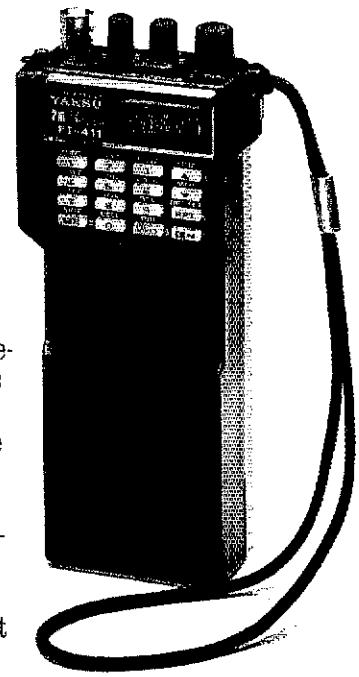
You'll be hard-pressed to beat the performance of Yaesu's new FT-411 handheld.



Let Yaesu's "next generation" handheld lighten your load!

Picking up where our popular FT-209R Series left off, the 2-meter FT-411 will amaze with its astounding array of features!

The brains of a base station. "Sophisticated operation" takes on new meaning in the FT-411. You get 49 memories, plus dual VFOs for quick band-hopping. Keyboard frequency entry. Automatic repeater shift. DTMF autodialer with ten memories of up to 15 digits each. *Built-in CTCSS encode/decode.* Selectable channel steps: 5/10/12.5/20/25 kHz. Programmable band scan with upper/lower limits. Selectable memory scan. And extended receive coverage of 140-174 MHz (MARS/CAP permit required for transmit on 140-150 MHz).



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

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

High power capability. The FT-411 comes equipped with the 2.5-watt, 600-mAh FNB-10 battery pack. Try our optional FNB-12 5-watt, 500mAh pack or tiny FNB-9 2.5-watt, 200-mAh pack. Or get 6 watts output by applying 13.8-volts DC from an external power supply.

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

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

YAESU

Yaesu USA 17210 Edwards Road, Cerritos, CA 90701 (213) 404-2700. Repair Service: (213) 404-4884. Parts: (213) 404-4847. Prices and specifications subject to change without notice. Specifications guaranteed only within amateur bands.

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All-mode tri-bander!

Warp Drive!

TS-790A

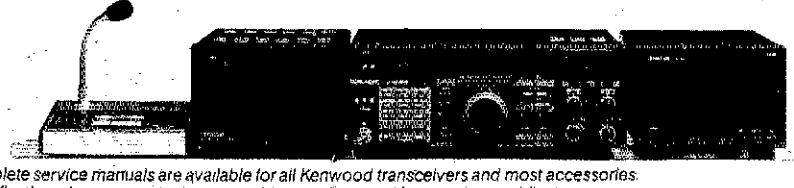
Satellite Transceiver

The new Kenwood TS-790A VHF/UHF all-mode tri-band transceiver is designed for the VHF/UHF and satellite "power user." The new TS-790A is an all-mode 144/450/1200 MHz transceiver with many special enhancements such as Doppler shift compensation. Other features include dual receive, automatic mode selection, automatic repeater offset selection for FM repeater use, VFO or quick step channel tuning, direct keyboard frequency entry, 59 memory channels (10 channels for separate receive and transmit frequency storage), multiple scanning and multiple scan stop modes. The Automatic Lock Tuning (ALT) on 1200 MHz eliminates frequency drift. Power output is 45 watts on 144 MHz, 40 watts on 450 MHz, and 10 watts on 1200 MHz. (The 1200 MHz section is an optional module.)

- **High stability VFO.** The dual digital VFOs feature rock-stable TCXO (temperature compensated crystal oscillator) circuitry, with frequency stability of ±3 ppm.
- **Operates on 13.8 VDC.** Perfect for mountain-top DXpeditions!
- **The mode switches confirm USB, LSB, CW, or FM selection with Morse Code.**
- **Dual Watch allows reception of two bands at the same time.**
- **Automatic mode and automatic repeater offset selection.**
- **Direct keyboard frequency entry.**
- **59 multi-function memory channels.** Store frequency, mode, tone information, offset, and quick step function. Ten memory channels for "odd split."
- **CTCSS encoder built-in.** Optional TSU-5 enables sub-tone decode.
- **Memory scroll function.** This feature allows you to check memory contents without changing the VFO frequency.
- **Multiple scanning functions.** Memory channel lock-out is also provided.
- **ALT—Automatic Lock Tuning—on 1200 MHz eliminates drift!**
- **500 Hz CW filter built-in.**
- **Packet radio terminal.**
- **Interference reduction controls:** 10 dB RF attenuator on 2m, noise blanker, IF shift, selectable AGC, all mode squelch.
- **Other useful controls:** RF power output control, speech processor, dual muting, frequency lock switch, RIT.
- **Voice synthesizer option.**
- **Computer control option.**

Optional Accessories:

• **PS-31** Power supply • **SP-31** External speaker • **UT-10** 1200 MHz module • **VS-2** Voice synthesizer unit • **TSU-5** Programmable CTCSS decoder • **IF-232C** Computer interface • **MC-60A/MC-80/MC-85** Desk mics • **HS-5/HS-6** Headphones • **MC-43S** Hand mic • **PG-2S** Extra DC cable



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P.O. Box 22745, Long Beach, CA 90801-5745

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