

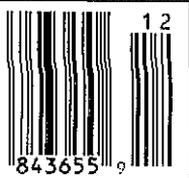
QST

December 1988 \$3.00

devoted entirely to
Amateur Radio



*Season's
Greetings*



THE CHOICE IS SIMPLE

Pick a band. . .pick a power level . . .pick a price! Picking the right brand is even easier. Henry Radio is the power amplifier specialist.

Every one of our 13 models offer superb value, experienced engineering (25 years!) and top quality components.

Since we offer the broadest selection of power amplifiers of any manufacturer, we feel that you should find exactly what you need on the following list:

2K CLASSIC console.....a true workhorse HF linear. Loafs along at full legal power. All amateur bands, 80 through 15 meters. 2K & 3K export models include 10 meters.

2K CLASSIC X console.....we can't think of any way to make this magnificent 2000 watt HF amplifier better. Rugged and dependable. . . the last amplifier you may ever need to buy. 80 through 15 meters.

2KD CLASSICa desk model designed to operate at 2000 watts input effortlessly, using two Eimac 3-500Z glass envelope triodes, Pi-L plate circuit and a rotary silver plated tank coil. 80 through 15 meters. 3.5-30 MHz.

3K CLASSIC Mk II.....uses the Eimac 3CX1200A7 tube. More than 13 db gain. We believe the 3K console to be one of the finest amateur HF linears available. 80 through 15 meters. 3.5-30 MHz.

3K PREMIER console..... all of the time tested reliability of the 3K Classic Mk II plus QSK and the 160 meter band. All amateur bands, 160 through 15 meters. 1.8-30 MHz.

3KD PREMIER desk model....the same RF deck as the console, but in a smaller and lighter configuration. Full legal power plus QSK. All amateur bands, 160 through 15 meters. 1.8-30 MHz.

5K CLASSIC consolea rugged and reliable 5,000 watt HF linear amplifier. Not available for amateur use in the U.S. 3.5-30 MHz.

3002-A desk model....a superb VHF amplifier. Operates CW, FM, SSB, AM or pulse applications. Uses an Eimac 3CX800A7 ceramic triode for smooth dependable power. Frequency range: 144 to 148 MHz. Commercial models in the 100 to 300 MHz range also available.

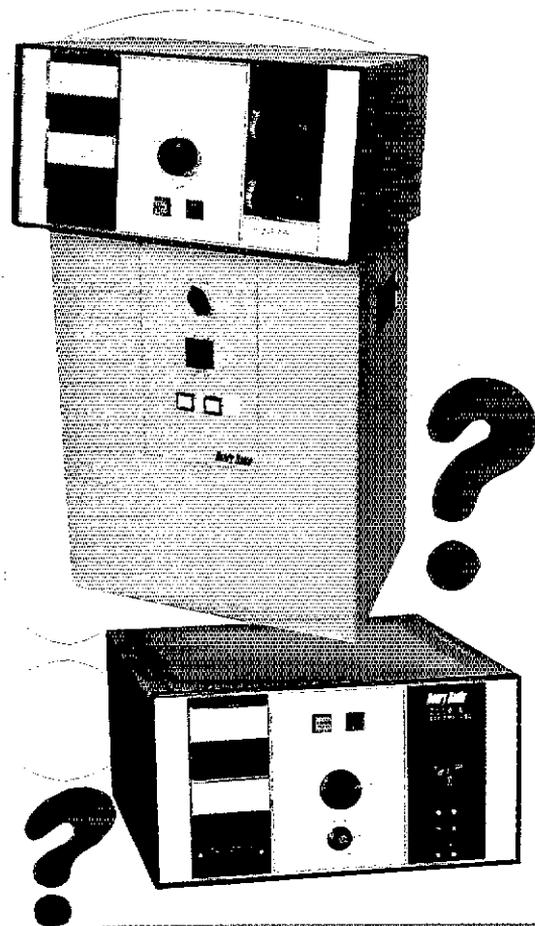
2002-A.....the same as above, but operating in the 220 to 225 MHz frequency range. These VHF units have proven themselves in the field through thousands of hours of use.

2008-A.....offers the same specifications, the same reliability as the 2002-A, but operates in the 50 to 54 MHz. Commercial models in the 30 to 100 MHz range available.

3002-A console....full legal power provided by an Eimac 8877 ceramic triode mated to a heavy duty power supply. Rugged and reliable. Perfect for amateur, commercial, industrial and scientific operations. 144 to 148 MHz. Commercial models in the 100 to 300 MHz range available.

3006-A console....the same rugged construction and the same dependability as the 3002-A, but for operation in the 50 to 54 MHz frequency range. Commercial models in the 30 to 100 MHz range available.

2004-A desk model.....a unique UHF linear amplifier for working 440 MHz frequency range. Designed for dependability. . .built to last.



We realize that these descriptions are much too short. For complete descriptions, specs and prices please call or write.

If you have a requirement for a special purpose amplifier please call Ted Shannon, Meredith Henry or Ted Henry at our Los Angeles office.



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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 QSX 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.**

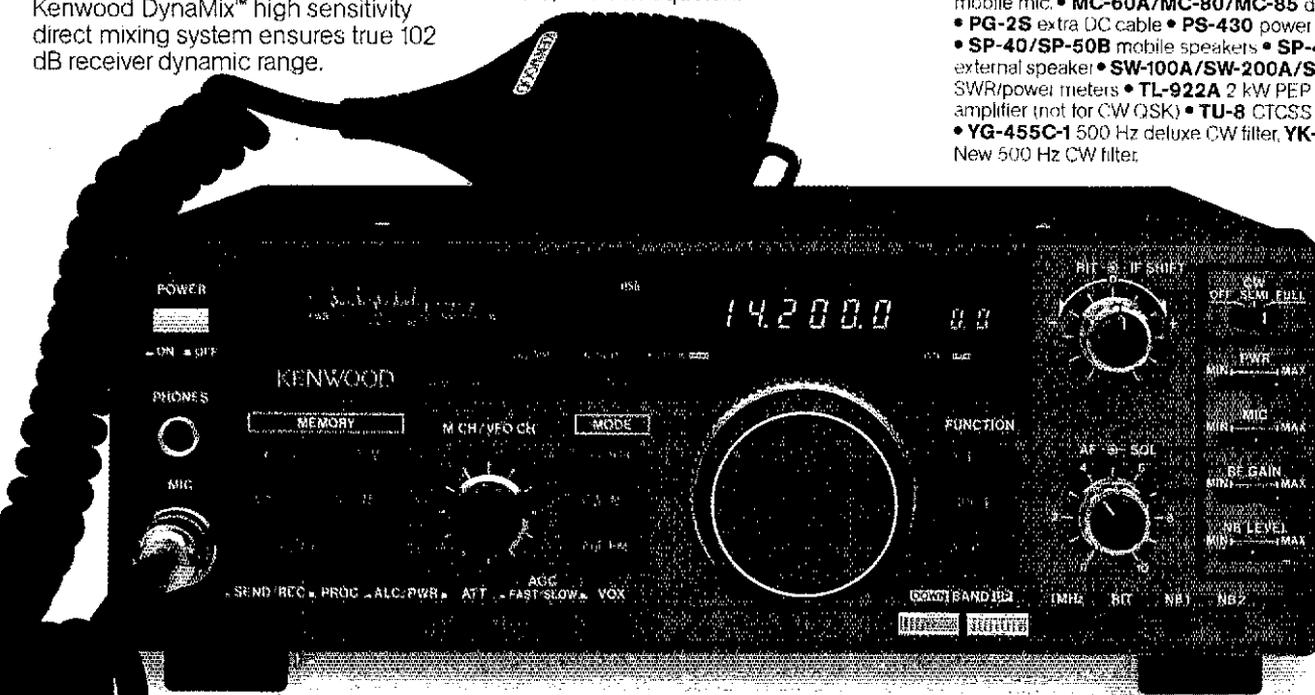
• **AMTOR/PACKET compatible!**

• **Built-in VOX circuit.**

• **MC-43S UP/DOWN mic. included.**

Optional Accessories:

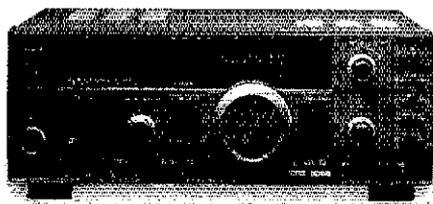
• **AT-130** compact antenna tuner • **AT-250** automatic antenna tuner • **HS-5/HS-6/HS-7** headphones • **IF-232C/IF-10C** computer interface • **MA-5/VP-1** HF mobile antenna (5 bands) • **MB-430** mobile bracket • **MC-43S** extra UP/DOWN hand mic. • **MC-55** (8-pin) goose neck mobile mic. • **MC-60A/MC-80/MC-85**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



TS-680S

All-mode multi-bander

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



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

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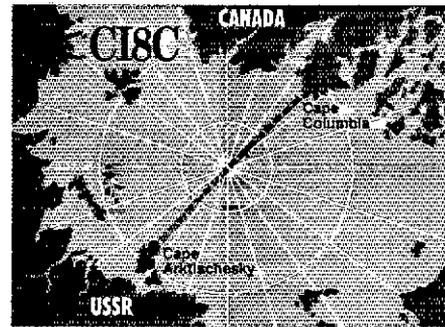
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IC-761 HF Transceiver



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

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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
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- 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.

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All stated specifications are subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions. 761688



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OUR COVER

It's that time of year again, so who better to adorn our cover than 'ol Santa himself? Santa is also known as Kermit Brodersen, 86, of Newington; for more than 30 years, Kermit has visited children's hospitals in the area. The photo was taken at the Newington home of Paula Pingree. You'll find more details on the Electronic Parrot, seen on the gift-wrapped box toward the lower left, beginning on page 14. Happy holidays! (cover credits: Sue Fagan, David Pingree, Greg Kwasowski and Meyers Studio)

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Others May Try to Imitate, But...

Only One Can Be The Best



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

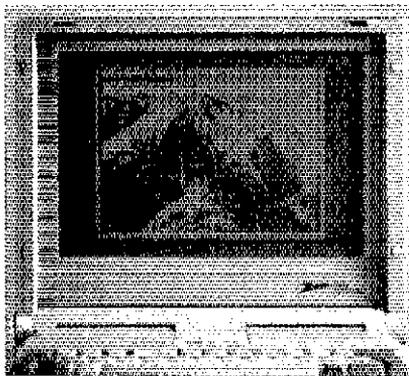
Amateur Net Price \$319.95

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

1 Versatility

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

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

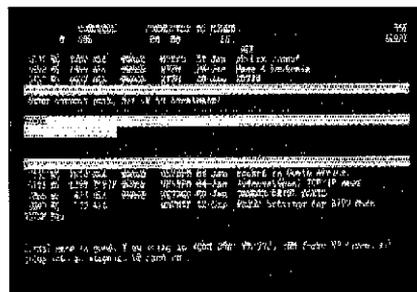


Facsimile Screen Display

2 Software Support

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

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



PC Pakratt Packet TX/RX Display

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.

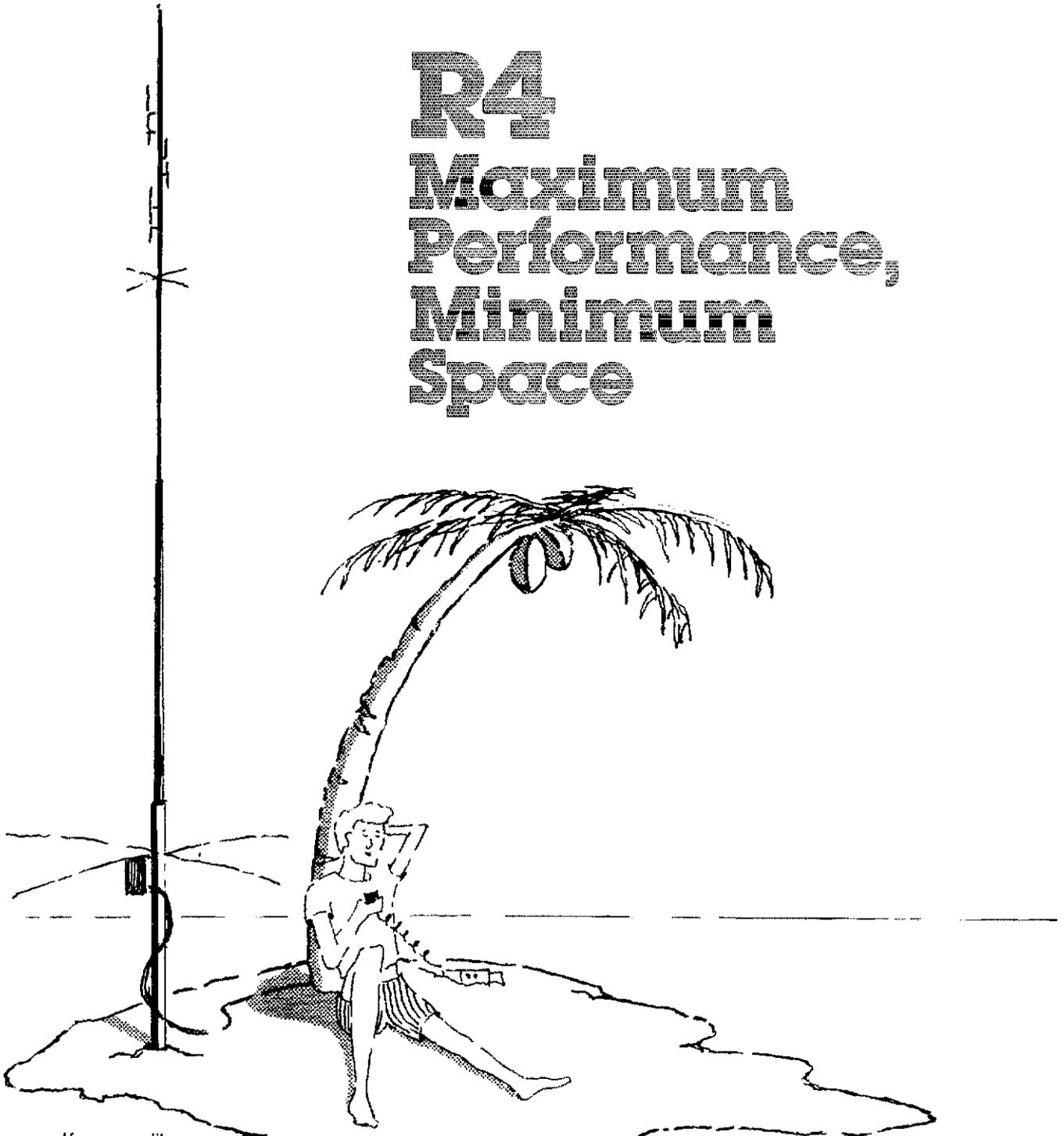
Call an authorized AEA dealer today. You deserve the best you can buy, you deserve the PK-232.

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AEA Brings you the Breakthrough!

R4 Maximum Performance, Minimum Space



If you are like our friend on the island, living with limited space, R4 is for you.

That's right, you can forget about towers and rotators. Put away your spade, wire and insulators because you won't need a ground radial system. Cushcraft engineers have performed a miracle by developing a new half wave vertical for 10, 12, 15 and 20 meters that provides great performance using a simple counterpoise ground of four 48" stainless steel rods.

The new R4 has broadband impedance matching giving full coverage and automatic frequency selection of all four bands. All of this with an 18' high, 8 lb. vertical that will handle 1800 watts of power!

With R4 you get quick assembly, easy installation and top gun performance. Whatever your space, large or small, R4 will make ham radio more fun.

Buy R4 and talk to your friends around the world today!



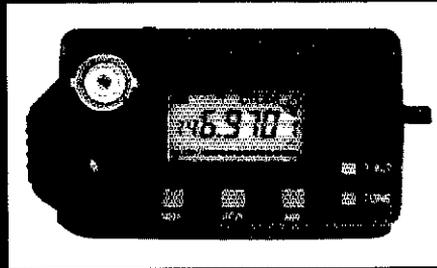
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TH-55AT
1200 MHz
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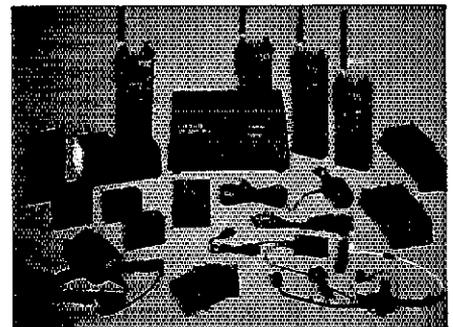
Compact Breakthrough!



TH-25AT/45AT New Pocket Portable Transceivers

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

- Frequency coverage: **TH-25AT:** 141-163 MHz (Rx); 144-148 MHz (Tx). (Modifiable for MARS/CAP, Permits required.)
TH-45AT: 438-450 MHz.
- Automatic Power Control (APC) circuit for reliable RF output and final protection.
- 14 memories; two for **any** "odd split" (5 kHz steps).
- Automatic offset selection (TH-25AT).
- 5 Watts from 12 VDC or PB-8 battery pack.
- Large multi-function LCD display.
- Rotary dial selects memory, frequency, CTCSS and scan direction.
- I-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-3D/31 Speaker mic • TSU-6 CTCSS decode unit • WR-1 Water resistant bag

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P.O. Box 22745, Long Beach, CA 90801-5745

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NOW
Four to
Choose!

Four to Go!

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" H x 5-1/2" W x 7" D.
- Microphone test function on low power.
- High quality, top-mounted speaker.
- Rugged die-cast chassis and heat sink.



Optional Accessories:

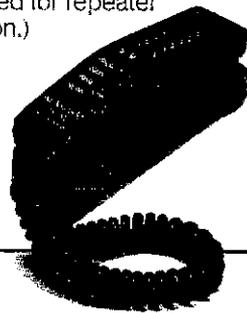
- RC-10 Multi-function handset remote controller
- PG-4G Extra control cable for second transceiver
- PS-50/PS-430 DC power supplies
- TSU-5 Programmable CTCSS decoder
- SW-100A Compact SWR/power/volt meter (1.8-150 MHz)
- SW-100B Compact SWR/power/volt meter (140-450 MHz)
- SW-200A SWR/power meter (1.8-150 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.

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.)



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P.O. Box 22745, Long Beach, CA 90801-5745

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Vice Director: Mrs. Evelyn Gauzens, W4WYR, 2780 NW 3rd St, Miami, FL 33125 (305-642-4139)

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Vice Director: Wayne Overbeck, N6NB, 14021 Howland, Tustin, CA 92680 (714-731-6178)

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Vice Director: Thomas W. Comstock, N5TC, 1700 Dominik, College Station, TX 77840 (409-693-1181)

*Executive Committee Member

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Reports Invited: The ARRL Board of Directors (see list at left) determines the policies of ARRL. The 15 divisions of the League are further arranged into 68 administrative "sections," each headed by an elected Section Manager. Your SM welcomes reports of club and individual activity. ARRL Field Organization appointments are available covering a wide range of Amateur Radio volunteer interests. Whatever your license class, your SM has an appointment available. Check with your SM (below) for further information.

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William Thompson, W2MTA, RD 1—Rock Rd, Newark Village 13811 (607-642-8930)
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North Dakota
South Dakota

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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.

"Citizen, 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.

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"It Seems to Us ..."

435,000 Points of Light

THE AMERICAN RADIO RELAY LEAGUE, INC.
NEWINGTON, CONNECTICUT

September 28, 1988

The Vice President
Room 274
Old Executive Office Building
17th St. & Pennsylvania Ave. N.W.
Washington, D.C. 20501

Dear Mr. Vice President:

We are one of your "thousand points of light." The ARRL is a non-profit association of radio amateurs who, among other activities, volunteer to provide communications in natural disasters for government entities at all levels, the Red Cross, Salvation Army, and other relief organizations. We are a member of National Volunteer Organizations Active in Disaster.

On August 4, the Federal Communications Commission -- whose members were all either appointed or reappointed by President Reagan -- inflicted a grievous blow on our ability to provide this volunteer service. The FCC voted to reallocate an important Amateur Radio frequency band, 220-222 MHz, to commercial interests. In so doing the Commission either chose to ignore, or placed little value on, the fact that this band is being put to use by amateurs for a data communication network that would greatly enhance our disaster communications capabilities. Duplicating the network in another band will place an expensive burden on the backs of volunteers, and is likely to prove impossible in some parts of the country.

There are 435,000 radio amateurs in the United States who are shocked and outraged at this action. It seems that the government is looking increasingly to the volunteer sector to provide services -- which we're ready and willing to do -- while at the same time it is making the job all the more difficult by withdrawing needed resources (in this case, access to the radio spectrum).

You have been most eloquent in support of the efforts of the volunteer sector. Here is an opportunity to turn those words into action. Can you assist in reversing this decision (in FCC General Docket 87-14) in the waning days of the Reagan Administration, or provide the radio amateurs of the United States with some assurance that in a Bush administration, this onerous FCC action will be overturned?

Sincerely,

Perry Williams
Perry Williams, W1UED
Secretary

THE VICE PRESIDENT
WASHINGTON
October 20, 1988

Mr. Perry Williams
Secretary
The American Radio Relay League
225 Main Street
Newington, Connecticut 06111

Dear Mr. Williams:

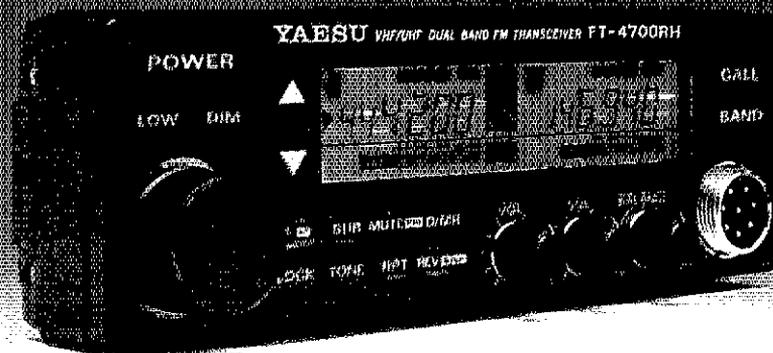
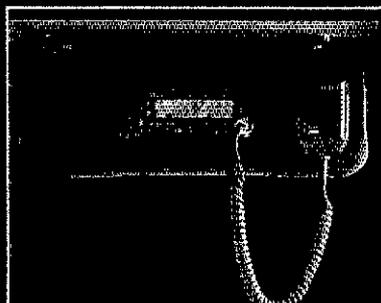
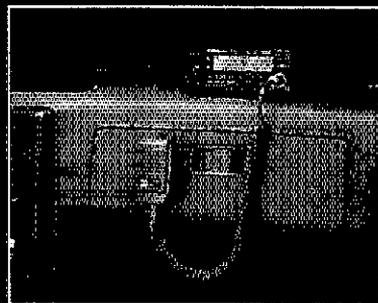
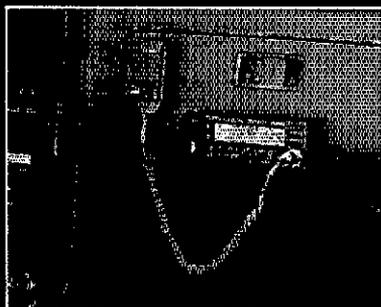
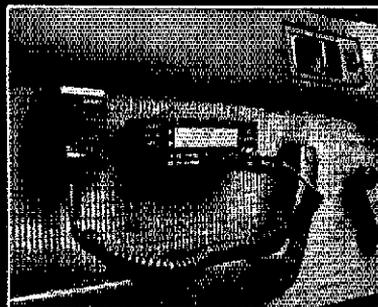
Thank you for taking the time to write and share with me your concerns as an amateur radio operator. Like you, I realize that ham radio operators are more than hobbyists -- many are vital resources in their local communities. Your comments regarding the FCC's regulation of the 220 Mhz band are informative and thought-provoking; I am sharing them with the appropriate members of my staff for further review.

Again, my thanks for writing and best wishes.

Sincerely,

George Bush
George Bush

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



FT-4700RH control head
(1⁵/₁₆" x 5⁷/₈" x 1")

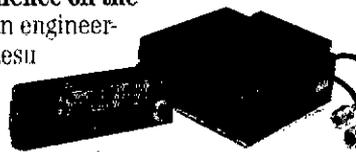
Introducing Yaesu's FT-4700RH dual-band mobile. Choose Yaesu's FT-4700RH, and you open the door to a lot of tight spaces.

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.

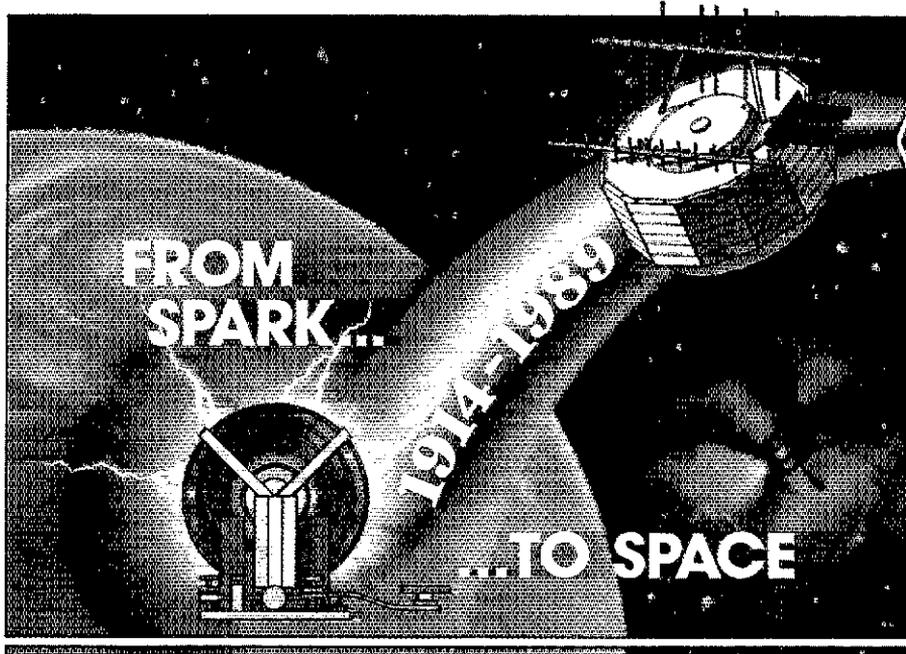
Optional accessories. FTS-8 CTCSS unit. MH-15D8 Autodialer Microphone with 10-telephone number memory. SP-3 or SP-4 External Speakers. And YH-1 Headset/Boom Mic or MF-1A3B Flex-Arm Boom Mic, both with SB-10 PTT Switch Unit.

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

UP FRONT in QST



World Premier: Seen here for the first time is the ARRL 75th anniversary logo. The distinctive graphic was designed by ARRL Graphics Design Supervisor Sue Fagan and executed by Bob Rich Airbrush Studios. You will be seeing more of this attractive logo in various forms throughout 1989.

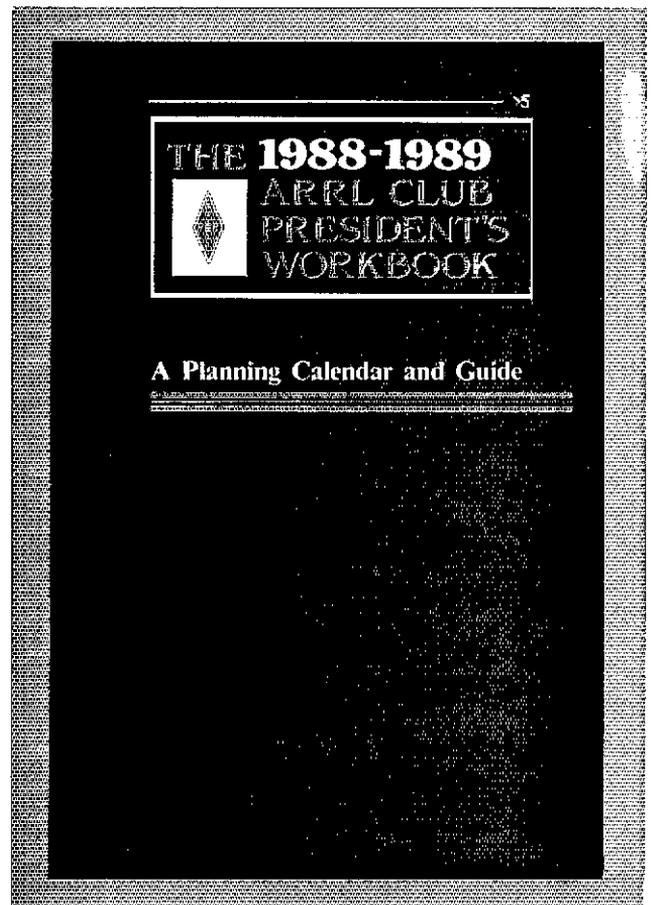
On the Hill

The FCC Authorization Bill, with an Amendment supporting Amateur Radio, passed in both houses of Congress and is now awaiting the President's signature. The ARRL has filed for a petition of reconsideration in Docket 87-14, the FCC Order reallocating 220-222 MHz. For more details, see Happenings on page 66.



Introducing . . . "Amateur Radio: Community Resource, Worldwide Fun" was the theme of a display at Cabrini College's Holy Spirit Library in Radnor, Pennsylvania in February 1988. A showcase devoted to service and another to fun introduced a nontechnical liberal arts college audience and the general public to Amateur Radio, and a pad of ARRL radiogram forms and an instruction poster let visitors get in on the action. Incidentally, the photo was not posed! (photo courtesy KC3LM)

Get Planning: The 1988-89 ARRL Club President's Workbook is a veritable warehouse of suggestions, ideas and sources for your club—to help provide for your most active and interesting year yet. More information on this new book is in the Club Spectrum column on p 92.



Here it is: For details on how you can earn the ARRL Diamond Jubilee Award, see the announcement on page 59 of the October 1988 QST.

Taller Than a . . . Heavier Than a . . .

If all of the copies of QST printed this year were stacked flat, one on top of the other, how tall a pile would you have?

- a) 5000 feet
- b) 12,000 feet
- c) 27,000 feet
- d) 38,000 feet
- e) 52,000 feet

About how much would the pile weigh?

- a) 100 tons
- b) 250 tons
- c) 500 tons
- d) 750 tons
- e) 1000 tons

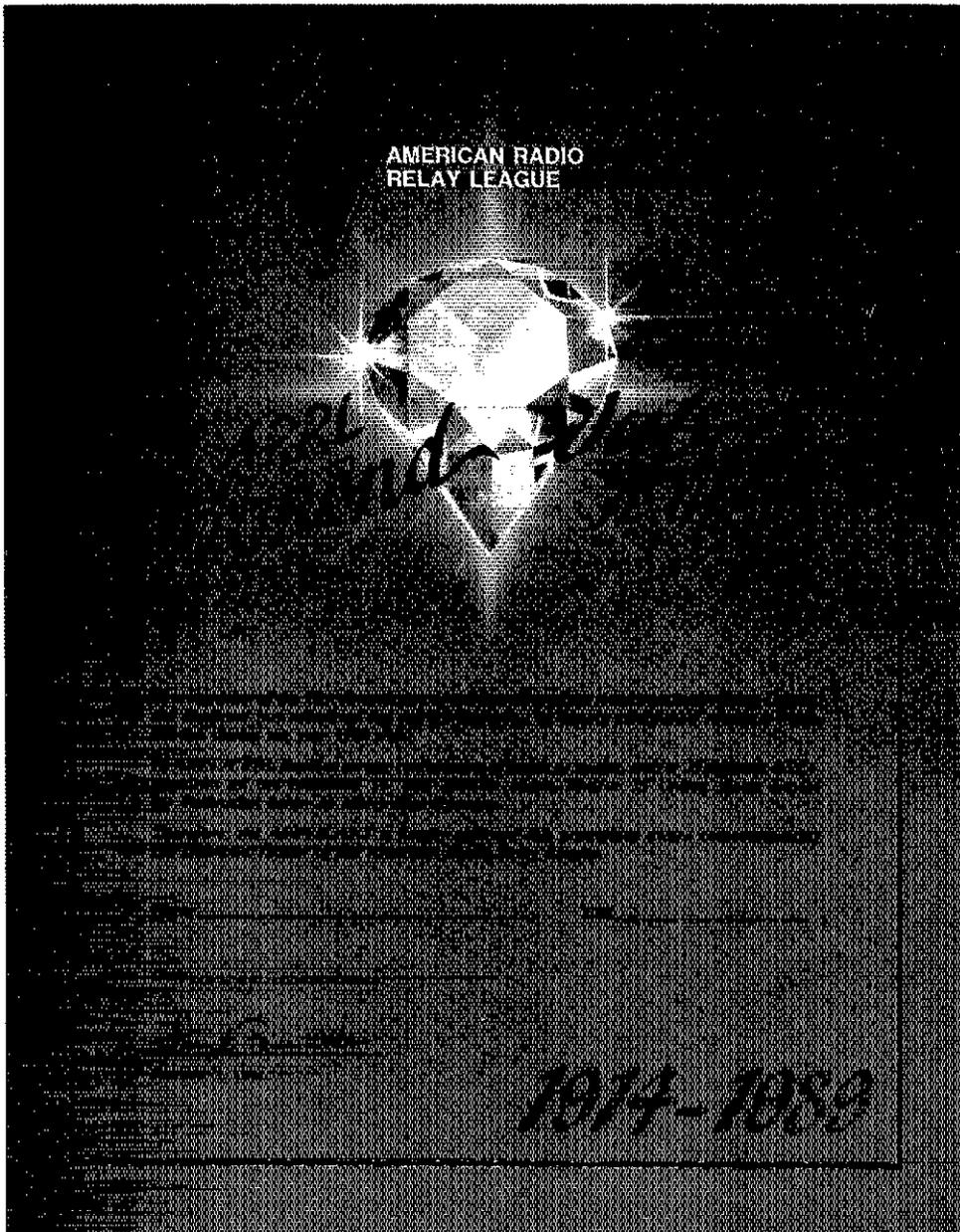
Make your best guess (calculation!) and then check it against the answers on p. 63.

We're in the Search Mode for Novice/ Family Articles

HQ is looking for Novice articles—maybe yours is just what we're looking for! Maybe you would like to tell others about your on-the-air experiences as a Novice. If you have some photos, send them along. Perhaps you have some pointers for Novice Roundup or the ARRL 10-Meter Contest, or hints for Novices on earning operating or contest awards.

Is your family active in Amateur Radio? Then tell us how they became interested and about their ham activities. If you're a YL, tell others how you got started in Amateur Radio and what you have enjoyed about it.

If you have a story, send it to HQ for possible use in QST or another League publication. Send stories or inquiries to ARRL, Attn Editorial Supervisor, 225 Main St, Newington, CT 06111.



Clear out the cobwebs:

After a summer of inactivity on HF, Eric Lindquist, KX4V, of Dublin, Virginia, found some new residents had set up housekeeping on his antenna. Eric figures they'll clear out pretty quickly now that he is active again! (photo courtesy KX4V)

League Lines

Several days after Hurricane Gilbert struck Jamaica, the ARRL received a request from the Jamaica Amateur Radio Association (JARA) for assistance in obtaining antennas and power generators needed for disaster relief communications. Using funds that come into ARRL as undesignated contributions, HQ purchased a tribander, HF vertical, rotator, cables and three emergency generators at a cost of about \$2300. Joel Kandel, KI4T, arranged for the antenna materials to be shipped to Jamaica on a plane provided by Texaco. The generators, which were obtained in Miami with the assistance of Southeastern Division Vice Director Evelyn Gauzens, W4WYR, were sent on a later flight courtesy of Eastern Air Lines. All of the equipment was received by JARA.

Congress recognizes amateurs as a national asset in the 1989 FCC Authorization Bill, S.1048 Section 10.

For further details, see this month's Happenings column.

The ARRL has filed its Petition For Reconsideration in Docket 87-14, the FCC Report and Order which reallocates 220-222 MHz to the Land Mobile Service. The Petition is 25 pages long and contains another 80 pages of exhibits. The strongly worded Petition accuses the FCC of predetermining the outcome of the original proposal and showing a complete ignorance of the spectrum needs of amateurs. For complete details, see this month's Happenings column.

No FCC action yet on PRB-3. HQ continues to receive many inquires from the membership about the status of PRB-3, the FCC notice which inquired if the private sector could establish a program to grant requests for specific amateur call signs.

In July 1987, the ARRL filed comments urging the Commission to retain the assignment of all call signs. If the Commission would not conduct such a program, then the ARRL could do so under certain conditions: (a) only a single entity would administer the program, and (b) there would be no liability to the ARRL or anyone else arising from the denial of a particular call sign.

It has been more than a year since the comment period ended on this Notice, and no word has been received about its fate from the FCC. Watch League Lines, the Happenings column and *The ARRL Letter* for further information when it is released by the FCC.

Ready to upgrade? The testing fee for 1989 will be \$4.75 if you take a Technician or higher class exam through an ARRL/VEC-coordinated Volunteer Examiner Team. Most other Volunteer Examiner Coordinators will also charge the same fee. Remember that there are no fees for Novice testing, license renewal or other license modifications.

Have you QSOed MIR? Operation from the Soviet space station MIR was scheduled to begin on November 14, under the call U1MIR. Initial testing and training contacts are with specific Soviet ground stations. If there are no problems, general amateur FM operations from U1MIR should have begun on November 19, with contacts limited to crew rest and recreation periods on Saturdays and Sundays only. U1MIR will transmit on 145.55 MHz, and will listen on 145.525 and 145.575 MHz. When the current crew returns to Earth in early December, the relief crew is expected to operate with the call sign U2MIR; subsequent relief crews will use the call signs U3MIR, U4MIR, etc, all the way through to U0MIR.

ARRL and Maryland Bank, N.A. have joined together to develop a special ARRL Gold MasterCard® offer. ARRL members will soon be receiving by direct mail information on how to take advantage of this membership offer. For more details, see this month's Happenings column.

Amateur licensing update: The FCC keeps its amateur licensing statistics on a fiscal-year basis, with the fiscal year ending on September 30. Here is a comparison of the fiscal 1987 and 1988 figures:

	1988	1987	%change
Extra	46,152	43,214	6.8
Advanced	98,354	98,147	0.2
General	112,989	114,428	-1.3
Technician	99,603	91,633	8.7
Novice	79,730	82,779	-3.7
Total	436,828	430,201	1.54

ARRL HQ received word at press time that **The New World of Amateur Radio was judged as a Gold Medalist entry** in the Science and Technology category of the 1988 International Film and Television Festival of New York.

HQ has an opening for Deputy Manager, Membership Communications Services. Someone with broad experience as an active radio amateur with management skills and background is sought for this important middle-management position. The successful candidate must have a Bachelor's degree and strong writing/editing skills with a proven ability to complete projects. Starting salary is \$26,156-\$29,302. Send letters of inquiry with a resume to John Lindholm, W1XX, at HQ.

Public Awareness Day: Membership ideas needed! In order to make the general public more aware of the existence, purposes and benefits of Amateur Radio, the ARRL Board of Directors has established "Amateur Radio Public Awareness Day." HQ staff will determine the most opportune time for the day, taking into consideration other operating events. Staff will also develop a set of guidelines and recommendations for setting up and operating an Amateur Radio public display. ARRL HQ needs your ideas! Send them to Rick Palm, K1CE, Field Services Manager at HQ.

The Electronic Parrot

Does SSB contesting take its toll on your throat? Need some help with Field Day operation? Let the Electronic Parrot—a digital voice-recording/playback system you can build—do the talking for you!

By Kevin D. Balmforth, NC6U
621 N Ladera Vista
Fullerton, CA 92631



It was Sunday afternoon during the last SSB ARRL November Sweepstakes contest, and my voice was ready for a long vacation. Hours of shouting the same few phrases into the microphone had left my throat parched and my brain numb. During the traditional contest postmortem, I thought, "What I need is an Electronic Parrot to do the talking for me! After all, CW testers use memory keys to save their fingers—why not build an SSB contest accessory to save my voice?" With that thought in mind, I jotted down my requirements for the Electronic Parrot:

1) It must be able to record and play back a human voice with good fidelity. Robotic-sounding voices are okay for reminding you that "the door is ajar," but they don't cut through contest QRM like a human voice. Also, it's confusing for stations to answer a robot CQ and then be acknowledged in a human voice!

2) It must record and play several variable-length messages. Ability to store any often-repeated phrases would add to operator comfort and concentration, especially toward the end of the contest.

3) It must allow an operator to instantly start or stop any message for efficiency during high-QSO-rate periods. There should be no dead time at the beginning or end of a message during playback.

4) The microphone audio must be cut off during message playback. This allows you to grab a quick bite to eat (literally!) or talk to somebody in the shack while the Parrot is operating.

5) The Parrot must be easy to use. Front-panel controls and status indicators should

be simple and logically arranged to minimize "doggonnits" in the heat of the contest.

6) It must allow the operator to listen to the messages without transmitting them on the air. This requires a built-in playback monitor and speaker.

7) The microphone must be connected directly to the radio when the power to the Parrot is turned off. This allows normal microphone operation without moving cables.

8) An auto-repeat feature, allowing messages to be repeated after an adjustable delay, should be included.

Until recently, articles on voice recording/playback in the ham literature were primarily based on tape loops.^{1,2,3} Such devices have good audio quality and are inexpensive, but can't easily play back and record different messages in an arbitrary order. They are also well known for being unreliable! Solid-state voice-synthesizer chip sets can handle multiple canned messages, but don't sound like your natural voice (unless your name is C3PO). There are some

nice commercial units available,^{4,5,6} but they cost more than I wanted to spend on a station accessory. Thanks to advanced digital IC technology, the Electronic Parrot covers all these requirements, and can be built in a couple of weekends. PC boards and kits of parts are available from A & A Engineering.⁷

Design Overview

The Electronic Parrot meets my design requirements with seven different variable-length messages—a total recording time of up to 67 seconds. These messages can be recorded from a microphone and played back with good fidelity to a radio at the touch of a button. Any message can be automatically repeated after a time delay (adjustable, about 13 seconds maximum). Each message is digitally sampled and stored in memory. As a result, any message can be *instantly* "rewound" and played back, unlike a tape recorder. A built-in monitor allows you to listen to a message before it goes on the air. The heart of the circuit is the Oki Semiconductor MSM6258GSK digital voice-recorder chip and its companion

¹Notes appear on p 21.

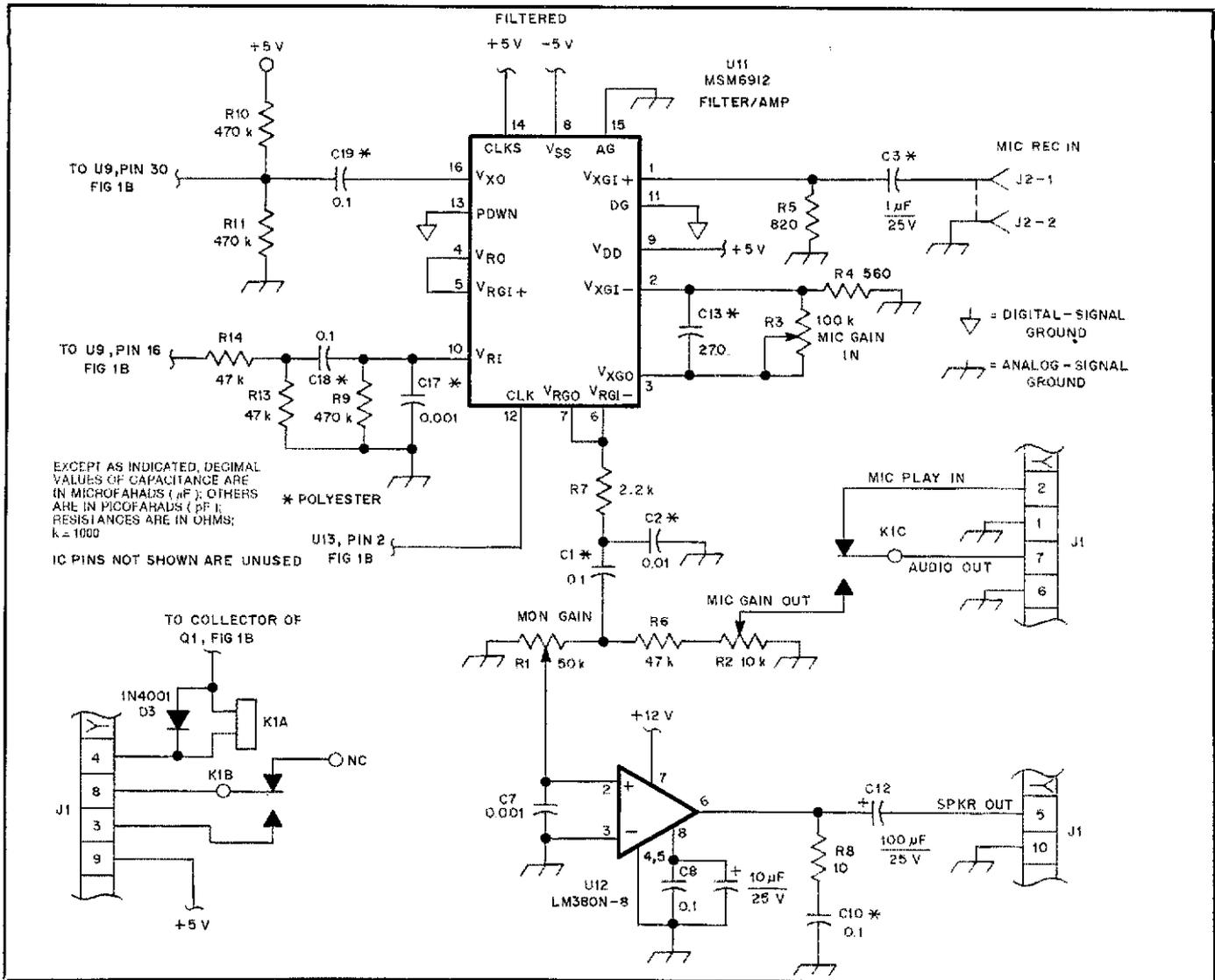


Fig 1A—Schematic diagram of the Electronic Parrot's audio-signal section of the main PC board.

MSM6912 filter chip. To understand the operation of the Electronic Parrot, features of the '6258 and '6912 chips are detailed in the Appendix.

If you'd like to hear the '6258 in action before you tackle this project, Oki has a toll-free number (800-832-6654, ext 462) that you can call, record a message, and hear the system play back your own voice (a Touch Tone[®] phone is required). It is very impressive!

Obtaining Parts

Most of the parts used in the Electronic Parrot, including the 12 V dc power supply, DIP sockets, adapter plugs and toggle switches, can be purchased at discount or surplus electronics stores.⁸ Put some thought into the type of switches and front-panel layout that is best for you. I used inexpensive plastic switches (All Electronics no. PB-8) for my version because they were on hand from another project. Switches with tactile feedback (a click) and a short travel are probably best.

The only parts that you may not be able

to find at a retail store are the '6258, '6912, ICL7660 voltage converter, and the 41256 dynamic random access memory (DRAM) ICs. The Oki parts and technical literature⁹ can be obtained through your local distributor. Consult the manufacturers and distributors directory in the *IC Master Catalog*, or a similar index, for the distributor closest to you. If you can't find a nearby distributor, contact Oki directly.

The Intersil ICL7660 is an 8-pin IC that costs about \$4. The DRAMs used are 150-ns parts (usually called 41256-150), and prices of these parts have been fluctuating wildly in the past few months. I've used Hitachi, Oki and Samsung DRAMs without any trouble. The ICL7660s and the 41256 DRAMs are available through mail-order houses such as Jameco[®] and JDR Microdevices.^{10,11} You can save a lot of money, especially on the DRAMs, by shopping around for the best prices.

Circuit Description

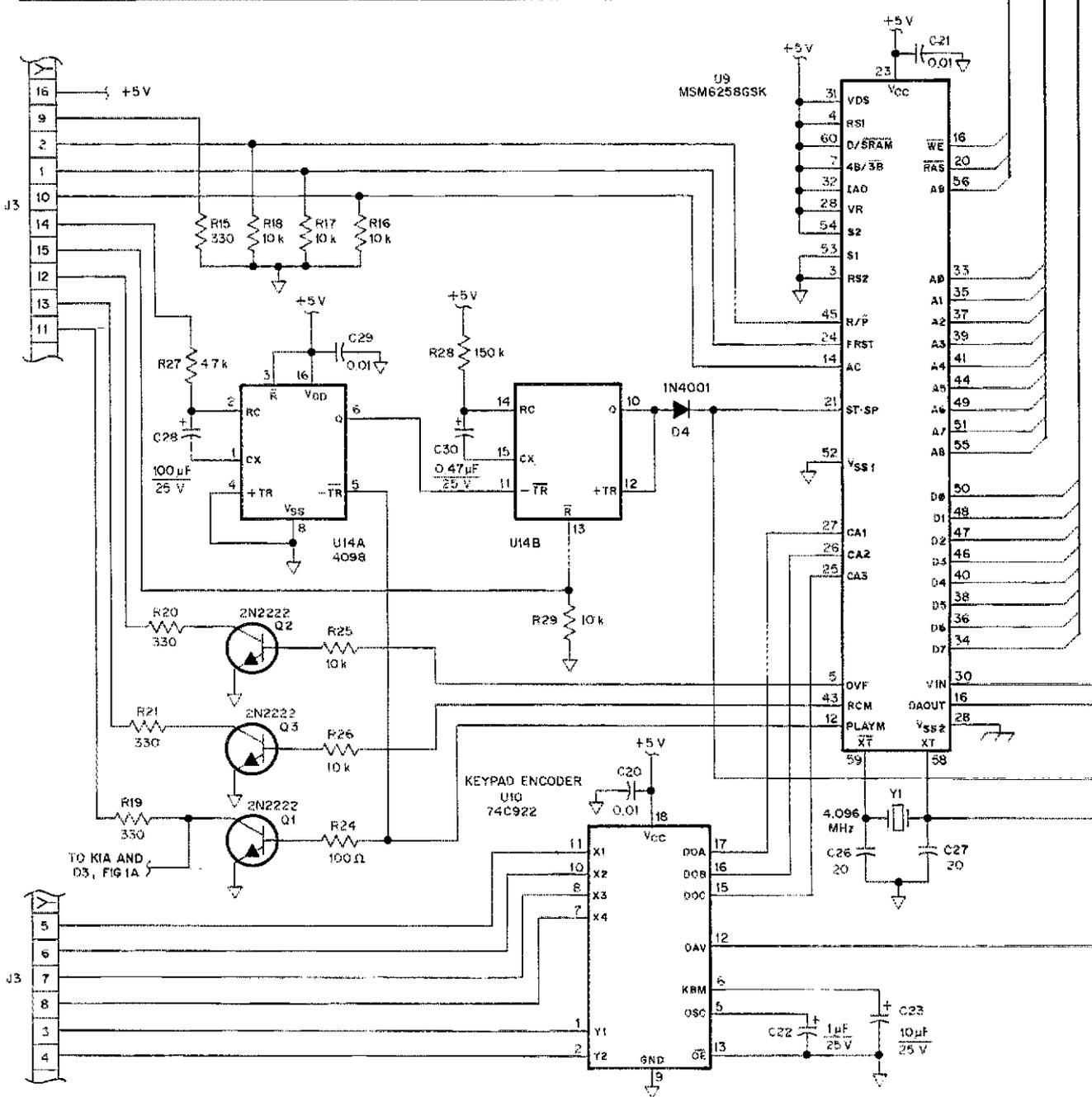
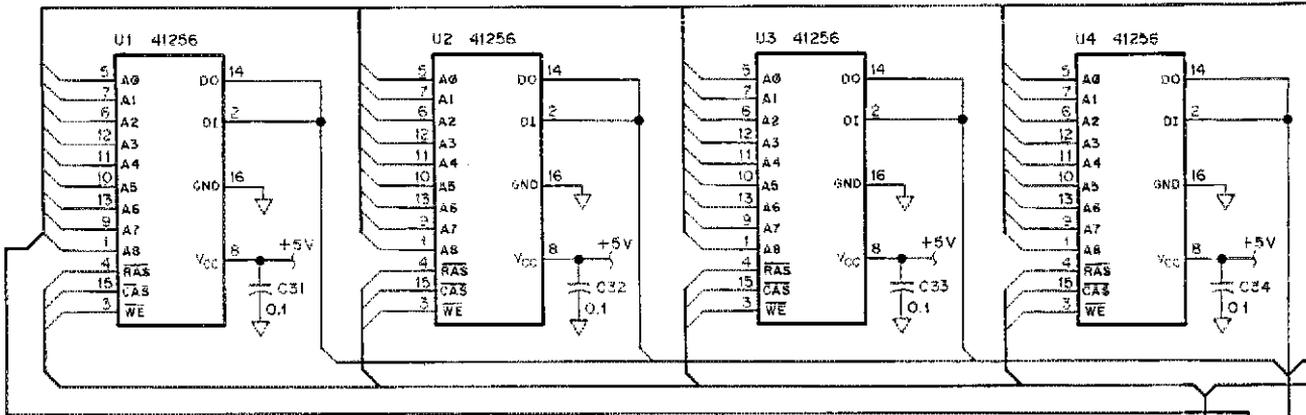
The Electronic Parrot circuit shown in Figs 1 and 2 consists of analog, digital and

power-supply sections. For clarity, the circuit schematic has been broken into four sections: the audio section (Fig 1A), the digital section (Fig 1B), the chassis wiring (Fig 2A) and the power-supply section (Fig 2B). The analog section consists of the Oki MSM6912 filter, an LM380N-8 monitor amplifier, and associated coupling and switching circuitry (shown in Fig 2A).

The Audio Section

See Figs 1A and 2A. Audio input is routed through one pole of the RECORD/PLAY switch (S1A) to the '6912 transmit filter input during recording. In the PLAY mode, input audio is routed through the K1C to MIC OUTPUT connector J7. When activated in the PLAY mode, K1 routes audio output to J7 and grounds the microphone PTT line. During recording, the gain of the '6912 transmit op amp (45 dB maximum) is controlled by R3, MIC GAIN IN. The signal is filtered by the transmit filter, ac coupled and offset by +2.5 V before being sent to the '6258 input VIN.

In the PLAY mode, audio from the '6258



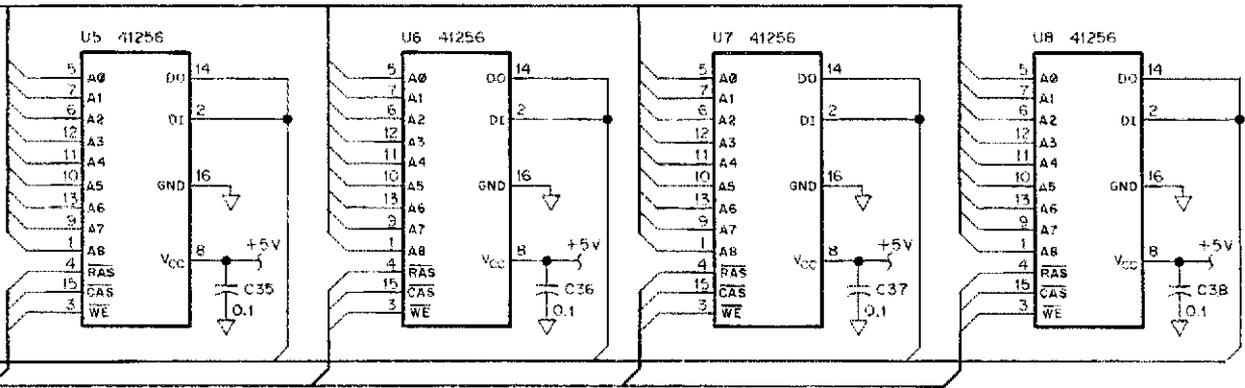


Fig 1B—Schematic diagram of the Electronic Parrot's digital section of the main PC board. The prototype PC boards and lists of parts for the Parrot are available (see note 7).

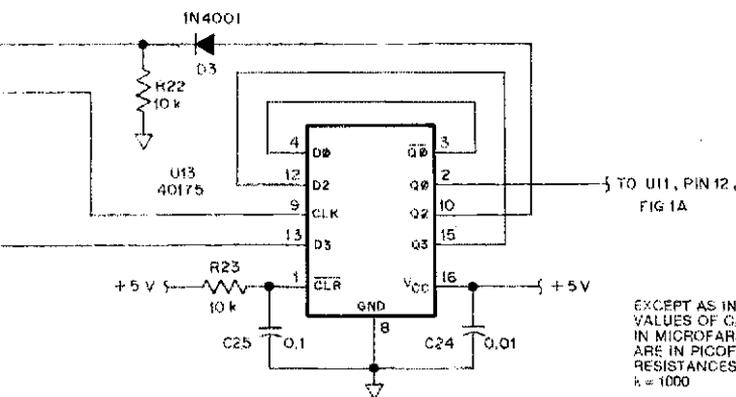
Electronic Parrot parts list

asterisks indicate good-quality polypropylene, polyester or ceramic capacitors.
 C1*, C3*, C8, C10, C14, C15, C18—0.1- μ F disc ceramic.
 C2*, C20, C21—0.01- μ F disc ceramic.
 C4, C9, C11, C16, C23—10- μ F, 25-V electrolytic.
 C5, C6—4700- μ F, 35-V electrolytic.
 C7, C17, C39-C45—0.001- μ F disc ceramic.
 C12, C28—100- μ F, 25-V electrolytic.
 C13—270-pF disc ceramic.
 C14, C15, C18, C19, C25—0.1- μ F polypropylene, polystyrene or ceramic.
 C22—1- μ F, 25-V electrolytic.
 C26, C27—20-pF disc ceramic.
 C30—0.47- μ F, 25-V electrolytic.
 C31-C38—0.1- μ F disc ceramic.
 D4—1N4001 or equiv.
 DS1—DS4—LED.
 H1—10-pin, two-row header, 0.1-in. spacing.
 H2—2-pin header, 0.1-in. spacing.
 H3—16-pin, two-row header, 0.1-in. spacing.
 H4—2-pin header, 0.157-in. spacing.
 H5—miniature phone jack.

J6, J7—Jacks chosen to match your transmitter.
 K1—DPDT PC-mount relay, 5-V coil (Omron Z105-ND or similar).
 L1, L2—1- μ H, 10-mA choke.
 L3-L5—ferrite bead.
 LS1—3-inch-diam speaker.
 P1—10-pin, two-row plug, 0.1-in. spacing.
 P2—2-pin plug, 0.1-in. spacing.
 P3—16-pin two-row plug, 0.1-in. spacing.
 P4—2-pin plug, 0.157-in. spacing.
 Q1-Q3—2N2222 or equiv.
 R1—50-k Ω PC-mount potentiometer.
 R2—10-k Ω PC-mount potentiometer.
 R3—100-k Ω PC-mount potentiometer.
 R4—560 Ω , 1/4 W.
 R5—820 Ω , 1/4 W.
 R6, R14—47 k Ω , 1/4 W.
 R7—2.2 k Ω , 1/4 W.
 R8, R12—10 Ω , 1/4 W.
 R9-R11—470 k Ω , 1/4 W.
 R13—100 Ω , 1/4 W.
 R15, R19-R21—330 Ω , 1/4 W.
 R16, R18-R22, R23, R25, R26, R29—10 k Ω , 1/4 W.
 R24—100 Ω , 1/4 W.

R27—4.7 k Ω , 1/4 W.
 R28—150 k Ω , 1/4 W.
 R30—500-k Ω panel-mount potentiometer.
 S1—3PDT toggle.
 S2, S13—SPDT toggle.
 S3-S11—momentary-contact push button (see text).
 S12—DPDT toggle.
 U1-U8—41256-150 DRAM.
 U9—Oki MSM6258GSK.
 U10—74C922 keypad encoder.
 U11—Oki MSM6912.
 U12—LM380N-8 audio amplifier.
 U13—40175 quad-D flip flop.
 U14—4098 dual monostable multivibrator.
 U15—7805 +5 V regulator.
 U16—ICL7660 +5 to -5 V converter.

TO C19, R10, R11, FIG 1A
 TO R14, FIG 1A



EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μ F); OTHERS ARE IN PICOFARADS (PF). RESISTANCES ARE IN OHMS; k=1000
 UNUSED IC PINS NOT SHOWN
 ▽ DIGITAL-SIGNAL GROUND
 ▸ ANALOG-SIGNAL GROUND

is ac coupled and passed through the '6912 receive filter section. The output of the receive filter is routed through R2, MIC OUTPUT GAIN, to K1C, and also to the LM380N-8 monitor amplifier. The output of the monitor amp passes through one pole of the RECORD/PLAY switch, which disables the speaker during recording, and IN/OUT switch S12, which allows you to disable the internal monitor speaker and place the Parrot on line.

The Digital Section

The digital section (Fig 1B) consists of the Oki MSM6258GSK, a 40175 quad-D flip flop, a 4098 dual monostable multivibrator, a bank of 41256 DRAM and a 74C922 keypad encoder. The REC/PLAY, FRST and AC lines of the '6258 are brought out to switches on the front panel. CA1, CA2, CA3 and ST/SP are driven by the 74C922. The message number keys are wired in a matrix (Fig 2A), and the appropriate row and column lines are connected to the 74C922.

The 74C922 constantly scans the matrix for a key closure. When a key is closed, the other keys are ignored, the closed key is debounced, and its encoded position is latched for CA1, CA2 and CA3 until the next closure. While the key is closed, the 74C922 data available line (DA) goes high. Because this usually precedes the availability of

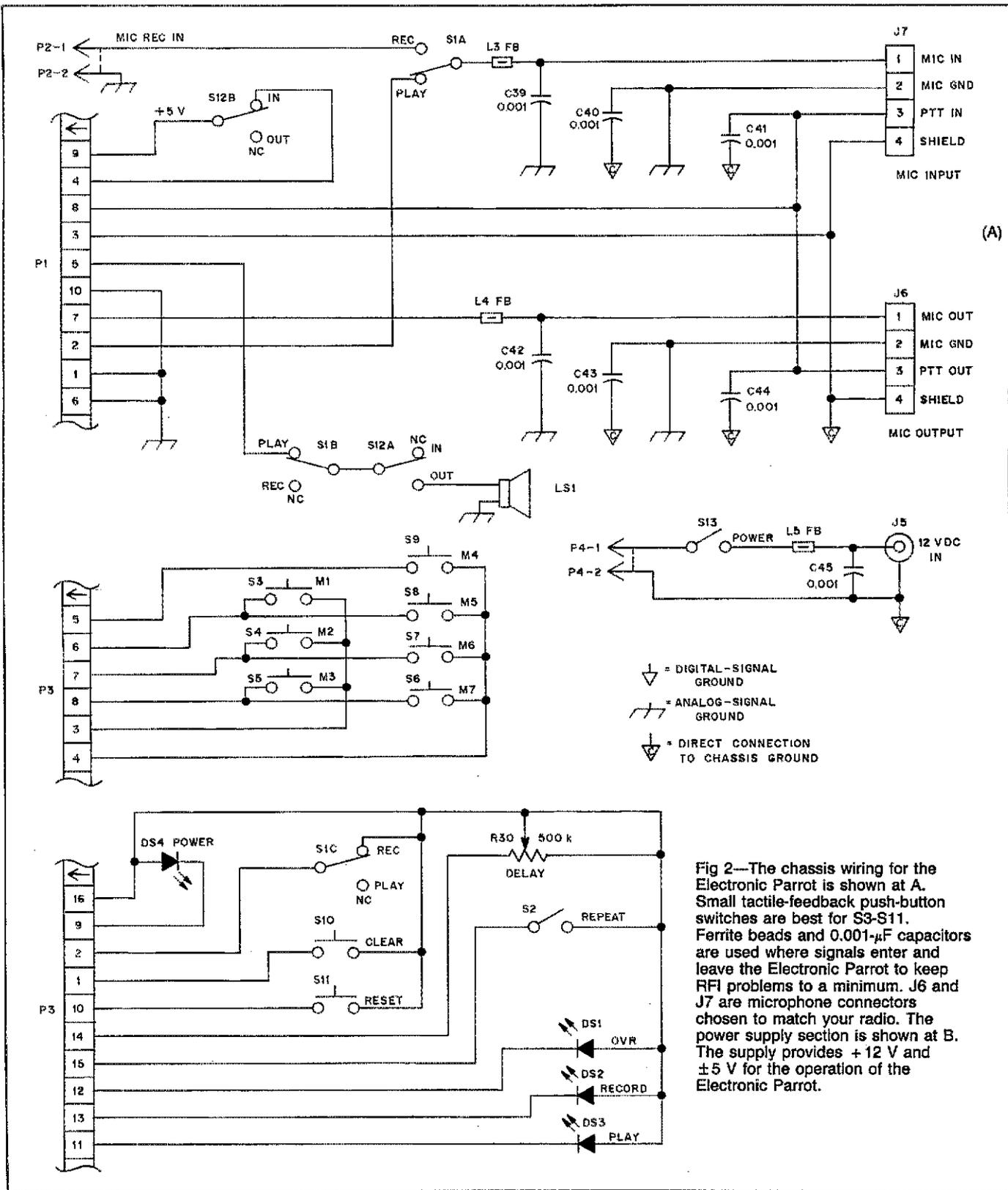


Fig 2—The chassis wiring for the Electronic Parrot is shown at A. Small tactile-feedback push-button switches are best for S3-S11. Ferrite beads and 0.001- μ F capacitors are used where signals enter and leave the Electronic Parrot to keep RFI problems to a minimum. J6 and J7 are microphone connectors chosen to match your radio. The power supply section is shown at B. The supply provides +12 V and ± 5 V for the operation of the Electronic Parrot.

encoded key data, the signal on the DA line is delayed by at least one clock period by two flip flops in the 40175. The key scan rate and debounce period are controlled by C22 and C23, respectively.

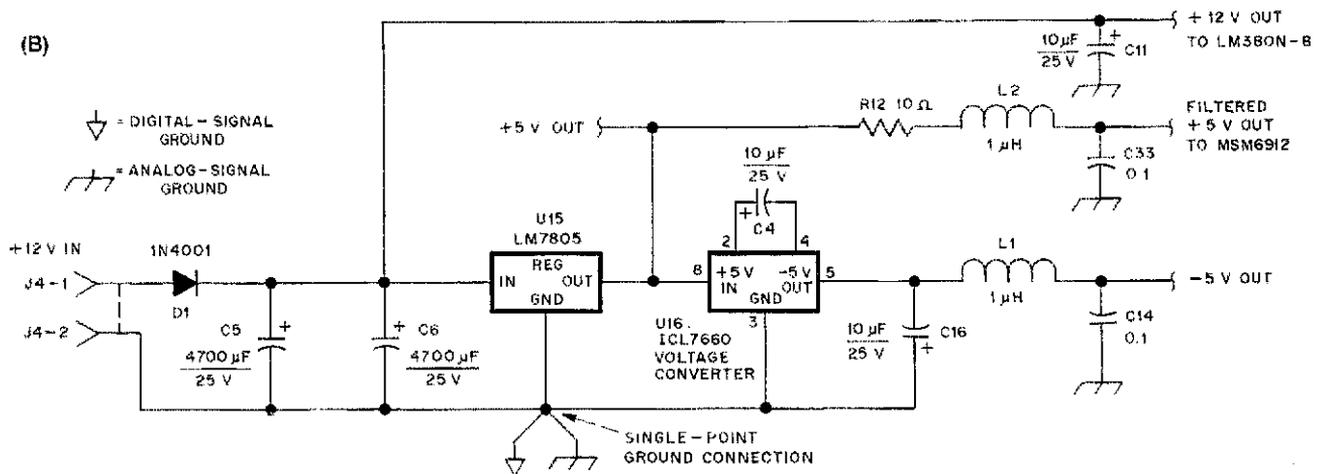
The 4098 is the heart of the automatic-repeat function. When a message ends, the PLAYM pin of the '6258 goes low and causes

the first multivibrator in the 4098 to generate a pulse. The length of this pulse is the repeat delay time, and is determined by R30, R27 and C28. When the first pulse ends, it causes the second multivibrator to generate a shorter, fixed-length pulse governed by R28 and C30. This pulse is logically ORED with the delayed signal on the DA line from the

74C922 via a pair of diodes, and is then fed into the ST/SP input of the '6258. The auto-repeat function is enabled by applying +5 V to the RESET input of the second multivibrator stage.

The RECM, PLAYM and OVR status outputs are used to drive LED indicators mounted on the front panel. PLAYM also drives Q1,

(B)



which actuates K1 during playback mode. S12 is used to keep the radio from being keyed during playback when messages are being monitored off the air. S12 also disables the monitor speaker when the Parrot is on line.

The '6258 uses a 4.096-MHz crystal to generate its primary clock frequency. This frequency is divided in half by the 40175 chip to provide a 2.048-MHz clock for the '6912. Alternatively, a separate 2.048-MHz oscillator can be used to drive the '6912. This may be useful when testing the audio section without the '6258 in the circuit. The

'6258 is strapped to select a 7.8-kHz sampling rate, a 4-bit nibble size and 256-kbyte DRAM, as well as to enable VDS.

The power supply uses a 12 V dc "power cube" to provide operating voltages. The 12 V dc line is filtered and routed to the LM380N-8. A 7805 regulator feeds an Intersil ICL7660 voltage converter to provide ± 5 V dc. The +5 V line also drives an LED power indicator, DS4.

Construction

As shown in Figs 3 and 4, the Electronic Parrot is built on a 6 \times 6-inch double-sided PC board and mounted in an aluminum chassis. Wiring between the main PC board and the panel indicators, switches and connectors is done with ribbon cable for digital signals and supply voltages, shielded cable for audio signals, and heavy insulated wire for ground connections.

You may want to power up the circuit in sections: power supply first, then the audio section, and finally the digital section. Check out everything you can before the '6258 or the DRAM ICs are installed, because they are expensive (at least for the time being).

Good-quality polypropylene, polyester or ceramic capacitors should be used in the audio section to minimize leakage noise. Care must be taken to keep the digital and analog sections well isolated from each other. The key to this is maintaining separate digital and analog signal grounds and joining them *only at a single point*, preferably where the power-supply ground is connected to the chassis.

Route low-level analog signals through shielded cables. Currents in the cable shields will be reduced if one end of each shield is tied to analog ground and the other end is left floating. Be sure that the external chassis ground to the radio is as short as possible to avoid introducing 60-Hz hum into the microphone audio. When building the Parrot, you may want to bring the message and REPEAT lines out to a remote keypad or foot switch for easy operation. Bypassing the microphone shields, PTT lines, the 12-V

line to J5 and the remote message and repeat lines (if used) with 0.001- μ F disc capacitors and ferrite beads at each connector provides RFI protection. I have no RFI problems with the Electronic Parrot on any HF band while running 1 kW output.

The MSM6258GSK is a surface-mount device (SMD—see Fig 5), and is difficult to use without some forethought. It does not use a common package, and cannot be mounted using commercially available adapters at this writing. My initial attempts at making an adapter used four DIP component headers mounted on a 2.5 \times 2.5-inch piece of perf board. The adapter board plugs into four corresponding DIP sockets on the main board, allowing the '6258 to be easily removed. I glued the '6258 in the middle of the adapter board and soldered no. 30 wire (under a microscope!) between each lead and a pin on the component carrier. After two hours of eye-straining work per part, I realized I had to find a better approach!

I developed an etched PC board for the '6258 that works quite well mechanically and electrically (see Figs 6 and 7). These boards are available from A & A Engineering (see note 7). Four DIP adapter plugs (two Augat 616-AGIF and two 614-AGIF) are soldered to the pads on the board. Each pad connects to a trace that fans in toward the center of the board,

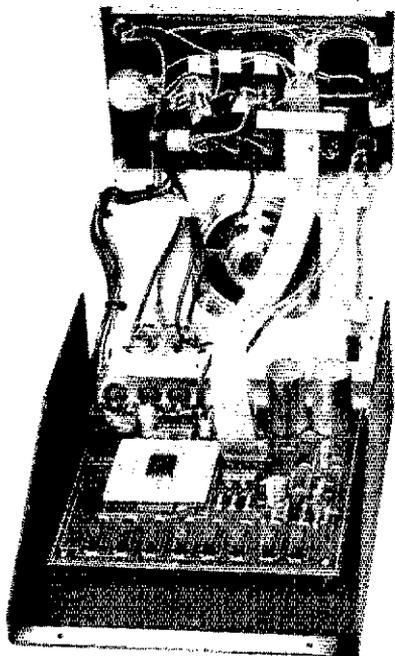


Fig 3—Inside view of the Electronic Parrot. On the main PC board, the power-supply section is visible in the upper right, the memory ICs are in the foreground, the MSM6258GSK is mounted on the daughterboard toward the left center, and the connectors and level controls are near the upper left.

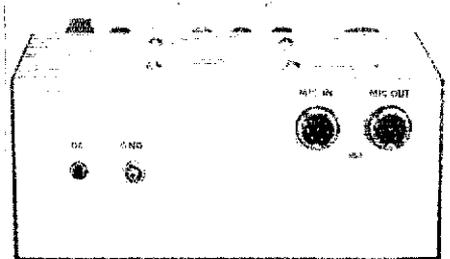


Fig 4—Rear-panel view of the Electronic Parrot. Choose the MIC IN, MIC OUT and DC connectors to suit your installation.

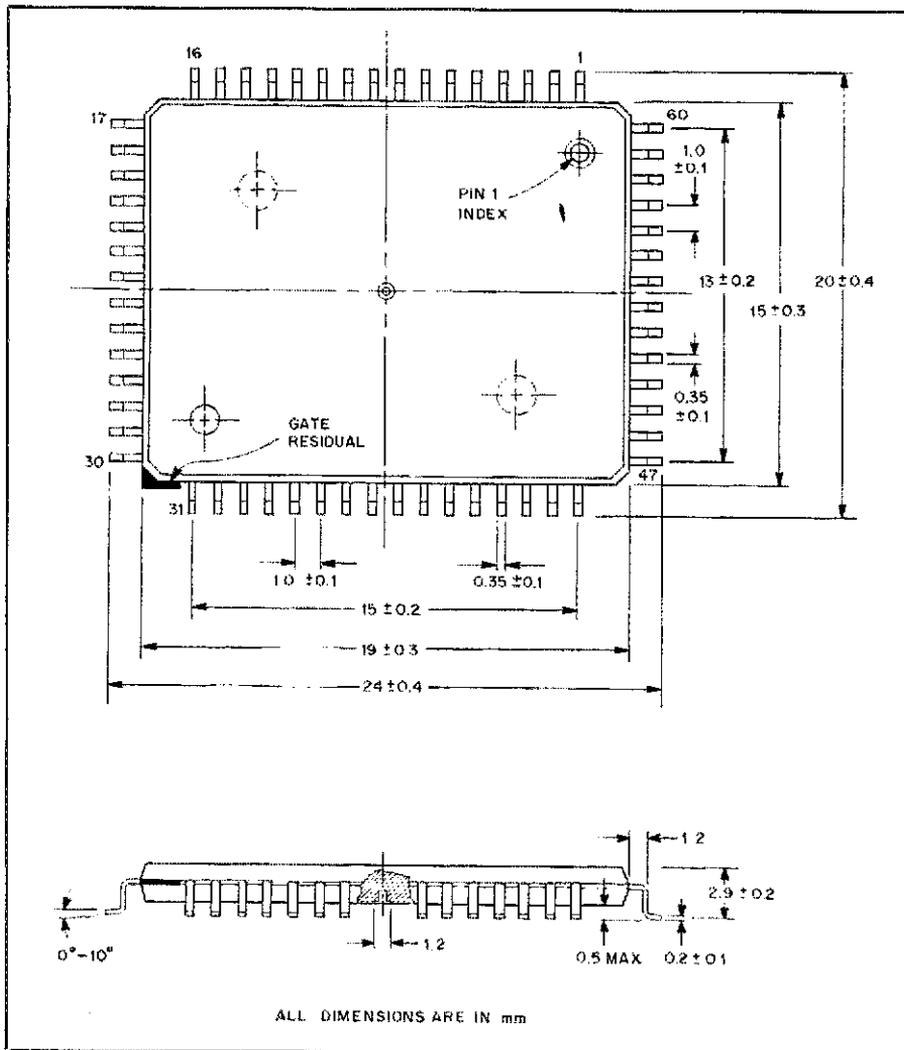


Fig 5—The MSM6258GSK is packaged in an uncommon plastic leaded chip carrier (PLCC). The leads are bent down and outward at right angles to allow surface mounting of the IC.

forming a pattern identical to the lead layout of the '6258.

To mount the '6258, quickly and carefully wipe a tinned, fine-point soldering iron over the bottom of each lead, and do the same for each trace on the adapter board. Position the '6258 on the board so that the leads are aligned evenly over the traces, hold the IC in that position, and sweat each lead to its trace by quickly applying the iron to the top of each lead. A magnifying glass is helpful during this process.

Check for solder bridges between traces. Very gently wiggle each lead close to the solder connection with a pair of tweezers. If there is any movement at all, resweat the joint. If at all possible, do not apply solder directly to the joint, because solder bridges develop easily between leads that are only 1 mm apart! After checking all of the joints, spray the soldered areas with a rosin remover. Whenever you handle the '6258 (or any of the other ICs), be sure to wear a grounded static-discharge wrist strap to

minimize the possibility of electrostatic damage.

Operation

The Electronic Parrot is very easy to use. To set it up, connect your microphone to the microphone input plug and connect a cable from the microphone output jack to the microphone connector on your radio. Plug the +12 V supply into J5, and you are ready to go.

To record, flip the RECORD/PLAY switch to RECORD and then push the switch for the message you want to load. The RECORD LED will flash, indicating that the Parrot is ready to begin recording. Talk so that the OVR LED barely flashes on voice peaks. If it flashes a lot, tweak the MIC GAIN IN control until the OVR LED barely flashes during normal speech. When you are finished recording, press the message switch again. The OVR LED should light, indicating that your message is recorded in memory.

You may record over that message by pressing the same message button; however, the unit will record for the original length of time and cannot be stopped until it is finished. To change the length of an existing message, press the CLEAR button and go through the record sequence again. Any existing message that is even partially overwritten cannot be played back. It is not a good idea to use the CLEAR button unless you are rerecording the most recently entered message.

To play back a message, flip the RECORD/PLAY switch to PLAY and press the desired message button. Adjust the MIC GAIN OUT (R2) and the MONITOR GAIN (R1) controls for the appropriate levels. The message will play back and terminate automatically, unless you stop it by pushing the message button. The Parrot may be switched on or off line, allowing messages to be monitored without transmitting them on the air. The RESET button is used to clear memory and reset the unit to the power-up condition.

To use the auto-repeat function, press the desired message button and turn on the REPEAT switch before the message terminates. The message will be repeated with a delay period controlled by R30. To revert to the normal mode, turn the REPEAT switch off. If this is done while a message is playing, the message finishes playing back in the normal way and does not repeat. If the REPEAT function is turned off during the inter-message delay, the message does not repeat.

Summary

The first night I used the Electronic

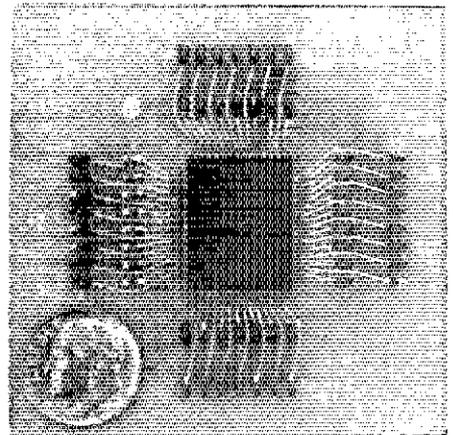


Fig 6—The brains of the Electronic Parrot: the Oki Semiconductor MSM6258GSK mounted on a daughterboard, with a dime shown for size comparison. The easiest way to mount the '6258 is by using the PC board (pattern shown in Fig 7—also see note 7). Four Augat DIP pin plugs are mounted on the opposite side of the board. They plug into four DIP sockets mounted on the main PC board. The daughterboard concept allows the Electronic Parrot to be tested in sections, with the '6258 removed until all other circuit functions are checked.

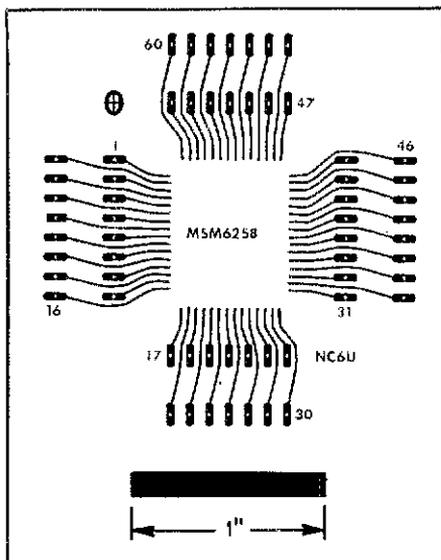


Fig 7—Full-size etching pattern for the '6258 adapter PC board. The pattern is shown full size from the foil side of the board. Black areas represent unetched copper foil. See Fig 6 and the text for details.

Parrot on the air, I was listening to a couple of my friends in San Diego on 2-meter FM. I loaded a few messages into the Parrot and proceeded, without their knowledge, to carry on a short QSO with them by only pushing buttons! The last message I sent was "Hi guys, I have a surprise for you—is this live or is this Memorex®?" Needless to say, they were amazed at the audio quality, especially after my side of the conversation was replayed!

If increased storage time in a small package is desired, you may want to consider using single in-line memory modules (SIMMs) such as those used in the newer personal computers. Each module contains 8 or 9 DRAM ICs wired together to appear electrically as a single memory device. The modules are mounted perpendicular to the main board in special sockets that reduce the component footprint.

I hope that this article stimulates interest in using digital audio technology and surface-mount devices in Amateur Radio applications. The technology used in the Electronic Parrot has applications other than contesting, such as repeater voice mailboxes and voice packet communication. As for contesting, the Electronic Parrot is only a small part of the equation for a winning score. A machine can certainly do most of the talking for a contester, but it will be a long time before a machine can equal the efficiency of a skilled ear. Perhaps there is something to be learned from that!

Notes

- ¹A. Keck and C. Senatore, "A Cheap and Easy Endless Tape Loop," *CQ*, May 1986, pp 26-28.
- ²C. Margelli, "Getting Ready For Field Day, Part III," *Western Amateur Radio Association club bulletin*, date unknown.
- ³A. D. Brede, "The Electronic Voice Saver," *QST*, Jun 1980, pp 18-20.

The Electronic Parrot in Action

The Electronic Parrot received substantial use in the 1987 CQWW SSB contest at W6TMD, and proved to be a great accessory, both in handling pileups and in soliciting (read: pleading for) contacts. On 15 meters, the Electronic Parrot was used to work about 350 Japanese stations in 2½ hours. Four messages (a short CQ, a long CQ, a QRZ message and the contest exchange) were initially loaded. As a result, only the call sign of each station worked was actually spoken by the operator during the run!

On 40 meters, where split-frequency operation is often used to work DX on SSB, most stateside operators calling CQ specify a listening frequency. This is quite a mouthful, especially when repeated several hundred (thousand?) times through the course of the night. Using the Electronic Parrot, each of the seven messages was loaded with a CQ message specifying a different listening frequency. For example, message 1 said "CQ contest, CQ contest, listening 7035, Whiskey Six Tango Mike Delta listening 7035." Message 2 said "CQ contest, CQ contest, listening 7038, Whiskey Six Tango Mike Delta listening 7038." This way, whenever the listening frequency was jammed with QRM, operation could be quickly shifted to a new frequency. Over 400 stations were worked in this manner, without the usual "40-meter throat" the next morning!—Kevin Balmforth, NC6U

Kevin Balmforth was first licensed in 1969 as WN7MPS. In 1970 he became WA7MPS, and in 1981 he upgraded to Extra and received NC6U. Kevin received BSEE and MSEE degrees from Brigham Young University in 1979 and 1982, respectively. He began working for Hughes Aircraft Company in 1980, and received an EEE degree from The University of Southern California through the Hughes Engineer Fellowship program. Kevin has worked on development of a high-speed VLSI signal-processing computer for acoustic, radar and electro-optical applications. He is currently involved in sonar signal processing.

Kevin is a former president of the Hughes Fullerton Employees Association Amateur Radio Club, K6QEJ, and is currently the club's bulletin editor and Field Day chairman (look out, class 3A FD entrants!). Kevin is also a member of the Southern California Contest Club. His interests include contesting, computers, piano, Field Day, basketball and the LA Lakers. He has been married for nine years, and has "a very understanding wife and three great kids."

APPENDIX

The Oki MSM6258GSK and MSM6912 ICs The MSM6258GSK

The MSM6258GSK is a stand-alone IC designed for digital-voice-recorder applications ranging from telephone-answering machines to pinball games. As shown in Fig 5 of the main text, it is packaged in a small (25.3 × 25.3 × 5 mm) plastic leaded chip carrier (PLCC) with a total of 60 leads bent to allow the part to be surface mounted. The leads are spaced 1 mm apart; 14 leads are on each of two opposite sides, and 16 leads are on the other two sides. The '6258 requires +5 V dc at 4 mA (nominal) to operate, making it suitable for battery powered applications.

Description

The functional block diagram of the '6258 is illustrated in Fig A. The key feature of the '6258 is its capability to be configured for a variety of memory components, sample rates, and sample sizes. It will handle 16, 64 and 256-kbyte static RAMs (SRAMs), as well as 64- and 256-kbyte and 1-Mbyte dynamic RAMs (DRAMs). DRAM provides higher memory density and costs less per part than SRAM, but consumes more power and requires refreshing. The audio sampling rate can be set to 3.9, 5.2 or 7.8 kHz, assuming a 4.096-MHz crystal is used for the master clock. The higher sampling rates provide better speech quality, but consume more memory than the lower rates. Sample size can be set to either 3- or 4-bit nibbles; 4-bit nibbles provide better speech quality, but may require more memory than 3-bit nibbles. The designer selects memory type, sampling rate and sample size by strapping the appropriate pins to +5 V dc or ground. In the maximum-memory configuration of 2 Mbytes of DRAM at the 3.8-kHz sample rate, the '6258 will handle over 17 minutes of speech!

The '6258 contains built-in control circuitry that manages the messages in memory, accepts control signals and drives status indicators. Seven variable-length messages are handled by the '6258. Each message is stored in memory in the order it is recorded, just like a standard tape recorder. The following control signals and status indicators are used in the operation of the '6258:

vi—Audio input to the '6258 during recording. The audio signal must be filtered to eliminate components at frequencies higher than ½ the selected sampling rate, and must be between 0 and +5 V dc, centered at +2.5 V dc, to avoid clipping.

⁴Digital Voice Recorder, Advanced Computer Controls, Inc, 2356 Walsh Ave, Santa Clara, CA 95051.

⁵Digital Voice Keyer (DVK-100), Nel-Tech Labs, Inc, 28 Devonshire Ln, Londonderry, NH 03053.

⁶R. Nelson, "The RePlay Digital Voice Message System," *QST*, Jun 1988, pp 31-37.

⁷A & A Engineering, 2521 W La Palma Ave, Unit K, Anaheim, CA 92801, tel 714-952-2114. For the main PC board and daughterboard alone, order no. 175-PCB and enclose \$27.95 plus \$2.50 per set of boards for shipping and handling. For a kit of parts including the main PC board, daughterboard ('6258 adapter PC board) and all board-mounted parts except the 41256 DRAM ICs, order no. 176-KIT. Enclose \$139.95 plus \$3.50 shipping per kit. For a set of assembled and tested PC boards (less 41256 ICs), order no. 175-ASY and enclose \$179.95 plus \$3.50 for shipping and handling. A set of eight 41256 RAM ICs is available from A & A Engineering for \$100. A & A Engineering accepts Mastercard and Visa. The ARRL and QST in no way warrant this offer.

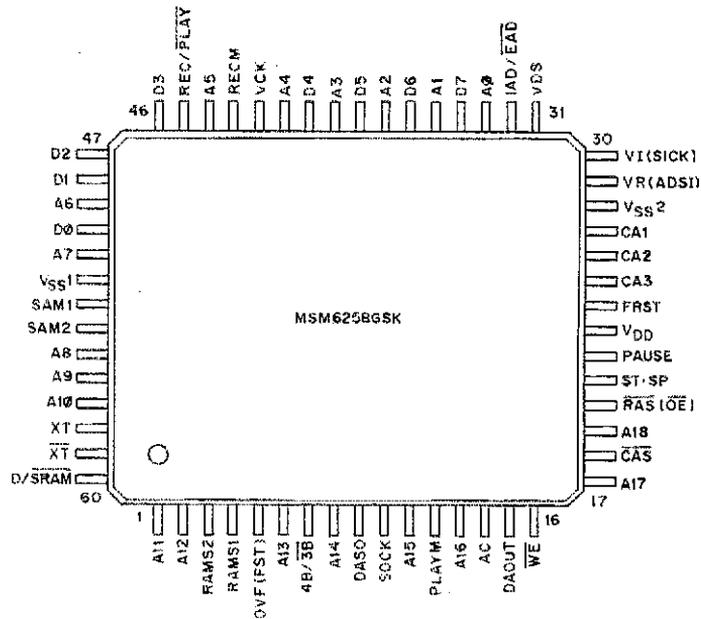
⁸All Electronics Corp, PO Box 567, Van Nuys, CA 91408, tel 800-826-5432 or 800-258-6666 (inside CA).

⁹Oki Voice Synthesis LSI Data Book, Aug 1987, Oki Semiconductor, 650 N Mary Ave, Sunnyvale, CA 94086, tel 415-720-1900.

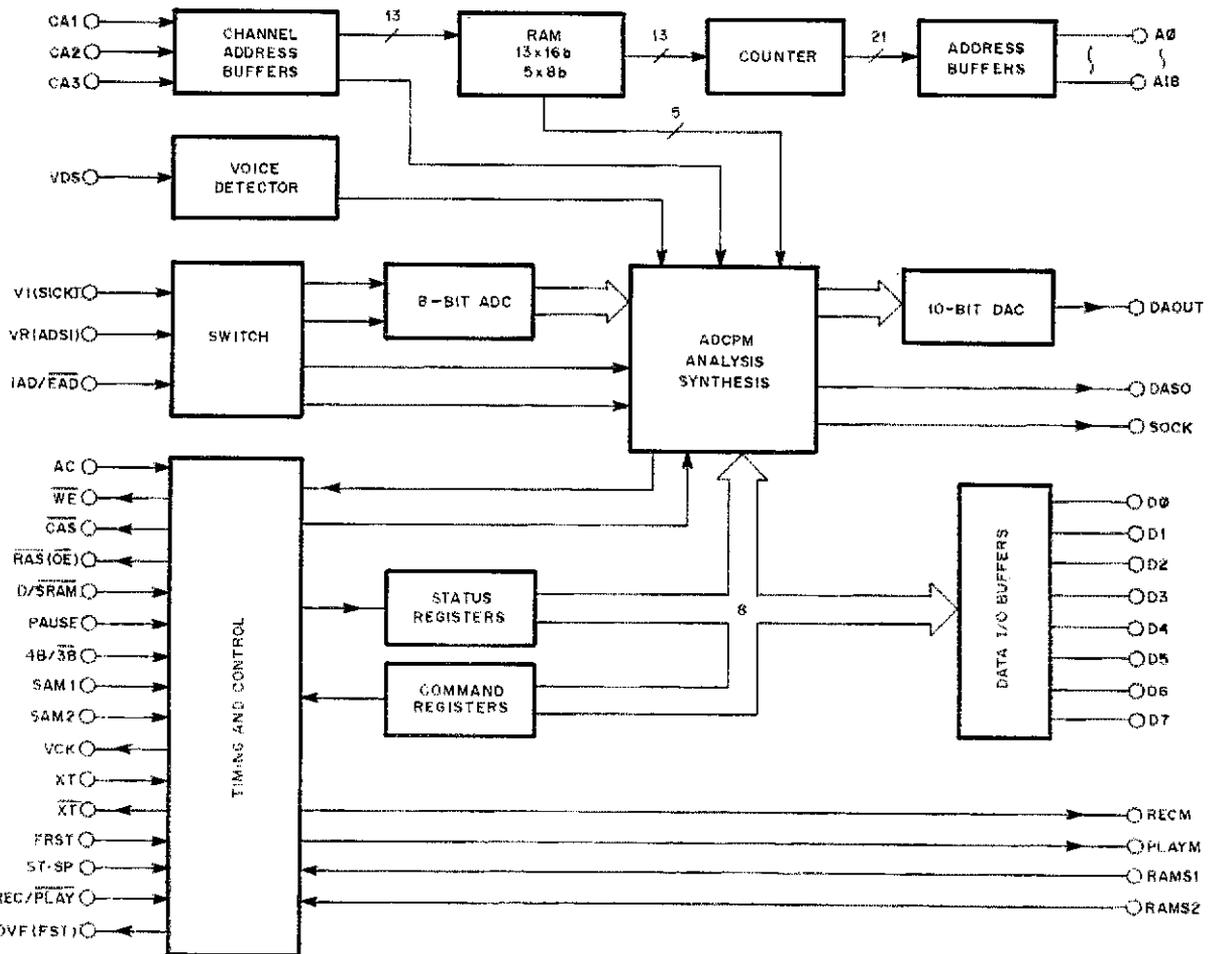
¹⁰Jameco Electronics, 1355 Shoreway Rd, Belmont, CA 94002, tel 415-592-8097.

¹¹JDR Microdevices, 110 Knowles Dr, Los Gatos, CA 95030, tel 800-538-5000.

Fig A—Pin assignments for the Oki MSM6258GSK are shown at A. A functional block diagram of the '6258 is shown at B.



(A)



(B)

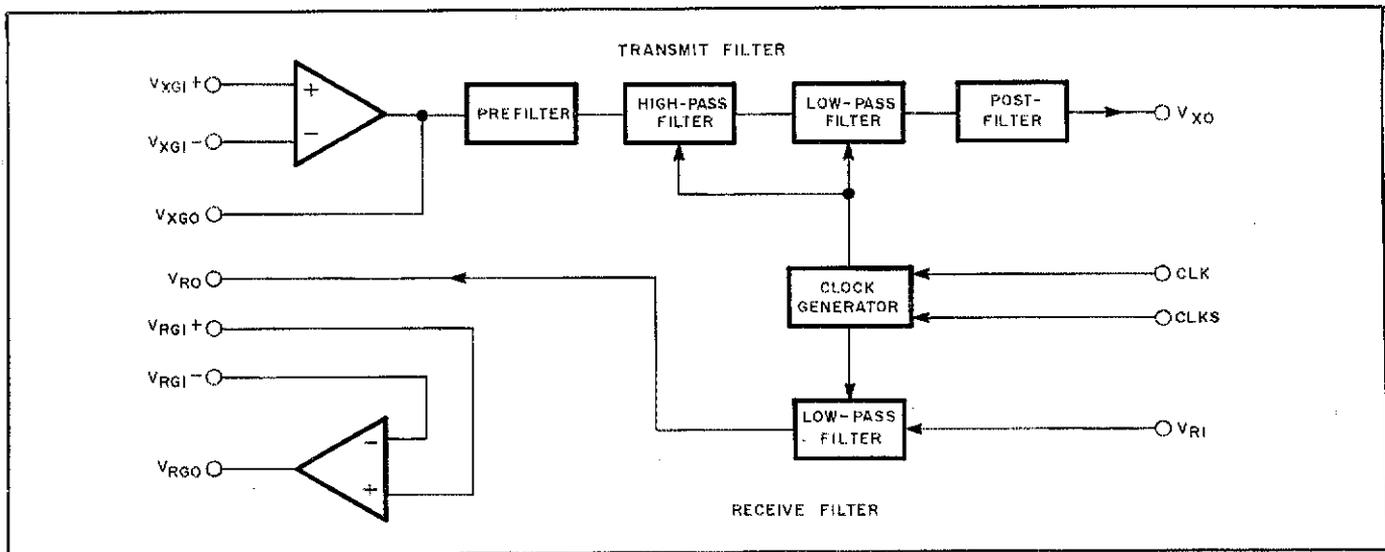


Fig B—The Oki MSM6912 is a full-duplex telecommunications filter that uses switched-capacitor filter technology. The TRANSMIT FILTER is used to amplify and filter the microphone input signal, and the RECEIVE FILTER filters the '6258's audio output. The amplifier stage shown in the lower left-hand corner of the diagram is not used.

DAOUT: Audio output from the '6258 during playback. It should be ac coupled to a filter that removes components above $\frac{1}{2}$ the selected sampling rate. In record mode, the input audio from VI is passed through this output.

CA1, CA2, CA3: These select the message number from 1 (binary 001) to 7 (binary 111). (Message 0 [binary 000] is reserved.)

REC/PLAY: This input selects record mode (when asserted high) or playback mode (when asserted low).

ST/SP: This input, when pulsed high, initiates or terminates the mode selected by REC/PLAY.

VDS: This input enables or disables the automatic-voice-detect feature during recording. When asserted low, and when the ST/SP pulse starts the record mode, recording begins when audio input is detected at VI. This is useful for conserving memory and eliminating dead space at the beginning of a message. When asserted high, recording begins immediately after the ST/SP pulse initiates record mode.

PAUSE: This input, when pulsed high, pauses the '6258 during recording or playback. A subsequent pulse continues recording or playback. (The PAUSE function is not used in this application.)

FRST: This input, when pulsed high, clears the message-full flag associated with the selected message number and thereby erases that message in memory.

AC: This input, when pulsed high, erases all messages and places the '6258 in the standby mode.

RECM: If VDS is enabled, this output pulses at a 3-Hz rate while waiting for the onset of audio input in the record mode. During actual recording, it is asserted low.

PLAYM: This output is asserted low when the '6258 is playing back a message.

OVF: This output serves two purposes. In standby mode, it is the "message full" flag and is asserted low if a message exists in memory for the selected message number. During recording or playback, it is an overflow indicator and is asserted low if the audio signal peaks outside the voltage-input limits of the internal A/D or D/A converters.

Operation

While power is applied, the '6258 is always in one of three modes: standby, record, or playback.

The device is in standby mode whenever it is powered up or when it is not recording or playing back a message. In record mode, the '6258 digitizes the audio-input signal with an 8-bit A/D converter at a selectable sampling rate and analyzes the data using a technique known as adaptive pulse-coded modulation (ADPCM). ADPCM encoding puts the 8-bit word into a 3- or 4-bit nibble, reducing the memory requirements. The sequence of nibbles is then written to memory.

In playback mode, the nibbles are read from memory and passed through an ADPCM synthesis function that expands it into a 10-bit word. The sequence of words is then passed through a 10-bit D/A converter at the selected sampling rate to become a "reconstituted" analog audio signal. Both the analog input and output of the '6258 must be low-pass filtered to remove frequency components above $\frac{1}{2}$ the sampling rate. If this is not done, these signal components will be aliased into the passband and degrade the signal.

To record a message, the message number (1-7) is selected via CA1-CA3, and the record mode is selected via REC/PLAY, and a pulse is applied to ST/SP. If VDS is not enabled, recording is initiated with the ST/SP pulse and the output RECM is asserted low. If VDS is enabled, the recording begins when an audio input signal is detected. During the waiting period, RECM pulses at a 3-Hz rate. When the onset of the audio input occurs, RECM is asserted low. Audio applied to the voice input lead (VI) is then recorded in memory as described above until another pulse is applied to ST/SP.

After a message is recorded, an internal message-full flag associated with that message number is set, and OVF is asserted low, indicating the message is present in memory. While that flag is set, the message may be rerecorded, but the '6258 will force the new message to be the same length as the old message. This allows a message to be replaced without disturbing a subsequent message. A pulse on FRST allows the message full flag to be cleared, allowing any length message to be rerecorded. However, if the new message records over any part of a subsequent message, the subsequent message will not be reproducible.

To play back a message, the desired message number is selected via CA1-CA3, playback mode is selected via REC/PLAY, and a pulse is applied to ST/SP. The reproduced analog message will

appear at DAOUT and automatically terminate when it is finished, or when ST/SP is pulsed, whichever occurs first. During playback, the PLAYM output is asserted low.

The MSM6912

The MSM6912 is a two-channel filter that uses switched-capacitor filter (SCF) technology in a 16-pin plastic DIP. As illustrated in Fig B, the '6912 contains independent transmit and receive filter sections. The transmit section consists of a configurable op amp, prefilter, high-pass filter, low-pass filter, and post filter. External gain adjustment of the transmit section is provided by the transmit op amp. The transmit high- and low-pass filters are SCFs that remove components of the input signal below 300 Hz and above 3400 Hz, and the prefilter and post filter provide rejection against the SCF clock frequency. The receive section consists of a low-pass filter and a configurable op amp. The low-pass filter is an SCF that rejects input signals above 3400 Hz, and the receive op amp is used to provide external gain adjustment of the receive filter section. The '6912 requires ± 5 V dc, each at 5 mA (nominal), and an external 128- or 2048-kHz TTL-level clock. The external clock frequency is selected by strapping the CLKS input to +5 V or ground.

Strays

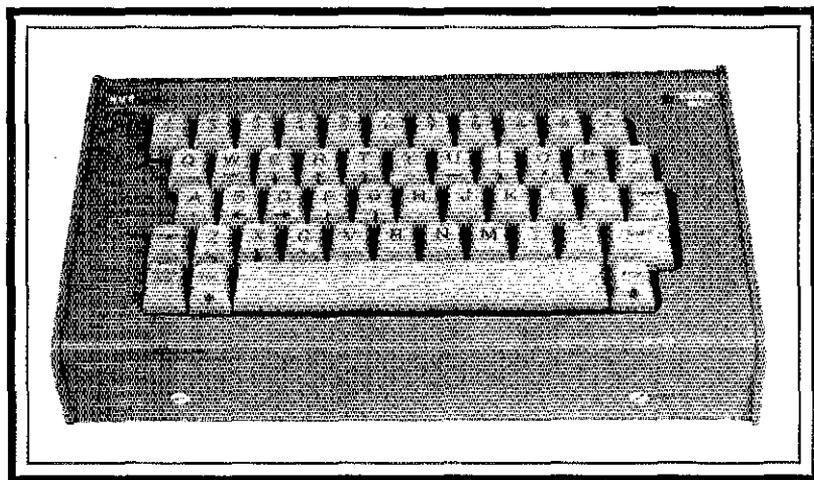


QST Congratulates ...

the following radio amateurs on 50 years as ARRL members:

- Jack Berman, W2BGW, of West Roxbury, Massachusetts
- Gordon R. Blanchard, W2VGM, of Oneonta, New York
- Charles A. Burt, W9JAU, of Streator, Illinois
- Wells E. Burton, N4EE, of Summerville, South Carolina
- Milt E. Chaffee, W1EFW, of Southington, Connecticut
- Ralph Saroyan, W6JPU, of Fresno, California

The CW6805—An Inexpensive Morse Keyboard



Here's a project you *can't* pass up! Easy to build, inexpensive and compact, this keyboard offers a multitude of features—and lots of fun!

By Edward Oscarson, WA1TWX
70 Behrens Rd
New Hartford, CT 06057

As a ham, sooner or later you're bound to have to scratch the itch the ham bug leaves when it bites: the itch to *build something!* Well, here's a project that should bring soothing relief to that itch and provide you with loads of fun both during and after the building stage. Chances are, once you've accumulated the parts, you can assemble this Morse keyboard during a lazy weekend and be on the air enjoying the smooth CW it generates.

What does the CW6805 have to offer? Here's a list:

- Low-cost, readily obtainable keyboard subassemblies
- PC boards and parts kits are available
- Seven programmable 256-character messages
- Messages can be chained
- 64-character type-ahead buffer in CONTEST mode (with seven 256-character messages)
- 256-character type-ahead buffer in RAGCHEW mode (messages not available)
- Speed programmable from 5 to 99 WPM
- Programmable letter/word spacing
- Programmable dot/dash ratio
- CQ and PARIS test messages are resident in EPROM
- Programmable, self-incrementing QSO counter

An impressive list of features, isn't it?

Some History

The CW6805 Morse keyboard is the result of a long chain of keyboard projects I've built over many years. My first CW

keyboard was a simple 10-chip design that accepted ASCII-encoded input. A pair of first-in/first-out (FIFO) buffers provided a 64-character type-ahead capability. The Morse code translation was done by a discrete logic sequencer and a 1702 EPROM.

With the advent of readily available and inexpensive microprocessors, the FIFO buffer and ASCII-to-Morse translation could be performed by software. This approach still required an ASCII-encoded keyboard subassembly and had a relatively high parts count. The use of the microprocessor also created another problem that did not exist in the earlier units: radiated noise caused by the address and data line switching.

The CW6805 Is Born

The CW6805 uses the Motorola MC68705P3 single-chip microprocessor. (See the sidebar, "The Motorola MC68705P3 Microprocessor.") This IC was chosen because of its low cost, availability and the ability of the IC to program itself from an external memory device without the need to use expensive programming hardware. Using this microprocessor vastly reduces the noise radiated by the keyer by keeping all high-speed switching on the chip. The accompanying software is also written to minimize the number of I/O lines that are switched when the keyboard is not transmitting.

Basic Circuit Description

A schematic diagram of the CW6805 is shown in Fig 1. The parts count is small—only five ICs are used: a Motorola

MC68705 microprocessor (U1), a 2 k × 8 RAM (U2), a counter (U3), an optoisolator (U4) and a voltage regulator (U5). If you're interested in a detailed account of the CW6805's circuit operation, refer to the sidebar, "The Motorola MC68705P3 Microprocessor," and to the Appendix, "Program Operation."

Keyboard Subassembly Types

The CW6805 will accommodate the surplus TI-99 computer keyboard or an ASCII-encoded keyboard. If the TI-99 keyboard is used, jumper W1 is connected between points E1 and E2. When using an ASCII-encoded keyboard, connect W1 between points E1 and E3. The ASCII keyboard output is connected to U1 pins 20-27 (inputs A0-A7) via pins 1-7, 10 and 11 of J1, with the least-significant bit (LSB) on J1-1, the most-significant bit (MSB) on J1-11.

Buffer Full LED

DS1 lights when the type-ahead buffer is full. Any information keyed after the BUFFER FULL LED lights is lost. Under normal operation, chances are you'll never fill the type-ahead buffer unless you are typing quickly and have the keyboard output set to a low speed.

Output Keying

The key-line output is coupled to the transmitter using a 4N33 optocoupler. This device consists of an LED and a high-gain phototransistor in a sealed package. There is no electrical connection between the input and output; on the contrary, there is

The MC68705P3 Microprocessor

The MC68705P3 microprocessor is a member of a family of single-chip processors produced by Motorola. These processors are gaining in popularity because of their simplicity, low power consumption, and built-in features. Some members of the family have A/D converters or phase-locked loop subsystems on board. All have RAM, EPROM, a timer, I/O lines and interrupt handlers.

At the low end of this microprocessor line is the MC68705P3. It contains 1804 bytes of EPROM, 112 bytes of RAM, 20 I/O lines and an 8-bit timer with a prescaler, internal and external vectored interrupts, and a clock generator. The CPU is similar in structure to those of the MC6800 series, but with a reduced register and instruction set.

The chip's on-board programming software allows you to copy data from an external, preprogrammed EPROM into the MC68705 using a counter to address the EPROM, and one of the MC68705's data ports to handle the data. The programming voltages are switched by external transistors under control of the MC68705. This programming process takes about two minutes. The data is also verified, and an external LED can be illuminated to indicate that the data was programmed correctly. The programming software is automatically run whenever +12 V is applied to the timer input pin. The external circuitry required for programming this microprocessor is minimal, and is presented in the Motorola data sheet. An assembler for the MC68705 is available for use with the Radio Shack® TRS-80® Color Computer running the FLEX operating system, as well as the IBM® PC under MS/PC DOS.

The operating characteristics of the IC are mostly pre-defined, but some are selectable via a mask-option register located in EPROM. This allows you to configure the IC in any of the modes available in a mask-programmed device. The mask-option register controls the interrupt, timer prescaler, and clock options of the IC.

The clock generator in the MC68705 can be programmed to run—with varying degrees of frequency stability—using crystal control, a single resistor, or just a piece of wire. Once programmed, only the selected option will work reliably. Originally, the clock option I selected for the keyer was that using the resistor. The PARIS test message was built in as an aid in setting the clock. The accuracy of the oscillator using this option provides a Morse speed accuracy of about 10% to 25% over the temperature range of the IC. Since the normal operating temperature is known, (25°C) the keyer software speed control could be set to match the resistor selected. In the

end, however, I reprogrammed the mask-option register for crystal-controlled operation to obtain better clock stability. The internal CW timing constants have been set for use with an inexpensive, readily available 4-MHz crystal.

Also in the mask-option register is the interrupt control bit. The external interrupt input on pin 2 can be set for edge- or level-triggered operation. The edge-triggered (falling edge) mode is selected for this design. This allows the interrupt to be used as an input if necessary, provided that a dummy interrupt routine is provided. An edge-triggered interrupt creates one interrupt per transition from a high to low level. The level triggered will produce interrupts as long as the line is low and interrupts are enabled. The MC68705 has a branch instruction that tests the state of the interrupt input line.

The edge-triggered interrupt is used when the chip is connected to an ASCII-encoded keyboard. The high-to-low transition of the interrupt signals the presence of ASCII data. Since the interrupt line is high at power-up with the ASCII keyboard connected, the software can self-configure the keyboard for use with ASCII or TI-99 keyboard subassemblies. The INT line (pin 2) must be low for TI-99 keyboard operation. When using an ASCII keyboard, the data is connected to port A with the least-significant bit (LSB) of the ASCII data on port A, bit 0. Only 7-bit ASCII data is required. Port A, bit 7, can be left unconnected.

The timer control options include the setting of the divider in the 8-bit timer prescaler, and an option that selects either the internal clock or an external input as the source for the timer. In this design, the prescaler is set to divide by eight, and the internal oscillator is used as the timer input. The external timer input must be tied to V_{CC} when the internal clock source is selected. The timer interrupt is used as the scheduler for the software and to time the CW transmission.

The MC68705 has three programmable input ports: two 8-bit, one 4-bit. The ports can function as inputs or outputs, and are programmable on the fly. Port A is always set to the input mode in this design. This port has internal pull-up resistors for CMOS compatibility. Port B has six bits that are used as outputs to drive the key matrix, and at a different time, inputs for RAM data. Bit 6 is used to indicate when the type-ahead buffer is full; bit 7 is the CW output. Bits 8 and 7 can directly drive LEDs. Port C is used for the RAM and counter control lines. It is not active unless the expanded mode functions are being used.—Ed Oscarson, WA1TWX

sufficient isolation between input and output for a potential difference of up to 1500 V. The use of the optocoupler helps to reduce any RF emission from the keyer (which should be minimal anyway) and also prevents any RF from the transmitter from getting into the keyer through the key lines. The output interface is further simplified because the optoisolator's output can be connected to switch positive or negative key lines just by swapping the output leads.

The breakdown voltage of the 4N33 optoisolator is specified typically at 70. The current-handling capability of the output is dependent on the drive to the LED, which is set to about 1.8 mA for an output saturation current of about 10 mA. If greater output current is needed, the series-limiting resistor to the LED can be reduced in value. The LED current should not exceed the 8 mA rating of the MC68705.

For switching higher key-line voltages, use a high-voltage coupler such as the Fairchild H11D1 (rated for 300 V) in place of the 4N33.

Power Supply

The keyboard requires +5 V at 100 mA. You can build a power supply into the keyboard cabinet or use an external source of dc power. A 7805 (5-V) regulator is included on the keyer PC board. This regulator will easily handle 9- to 12-V dc inputs and provide the keyboard with the proper voltage. The 9-V dc wall transformer/power supplies available from Radio Shack® and other sources are an inexpensive source of power for the keyboard. Note: Some of the wall transformers do not have internal filter capacitors. If you suspect the wall transformer you use *does not* include filter capacitors (and you

usually can only tell that by opening them up or scoping the voltage waveform under load), a 500- μ F (minimum) capacitor should be used to provide filtering on the input line to the 7805. The 5-V power supply to the MC68705 should be decoupled with a 0.1- μ F capacitor.

Construction

Because of the small number of parts required—and the ability to use a simple unencoded keyboard (the TI-99) or an ASCII-encoded keyboard—this project is a snap to build! Several of these keyboards have been hard-wired, wire-wrapped and built on PC boards. A single-sided PC board and parts kit are available.¹ A PC-board pattern and parts overlay are shown

¹Notes appear on p 28.

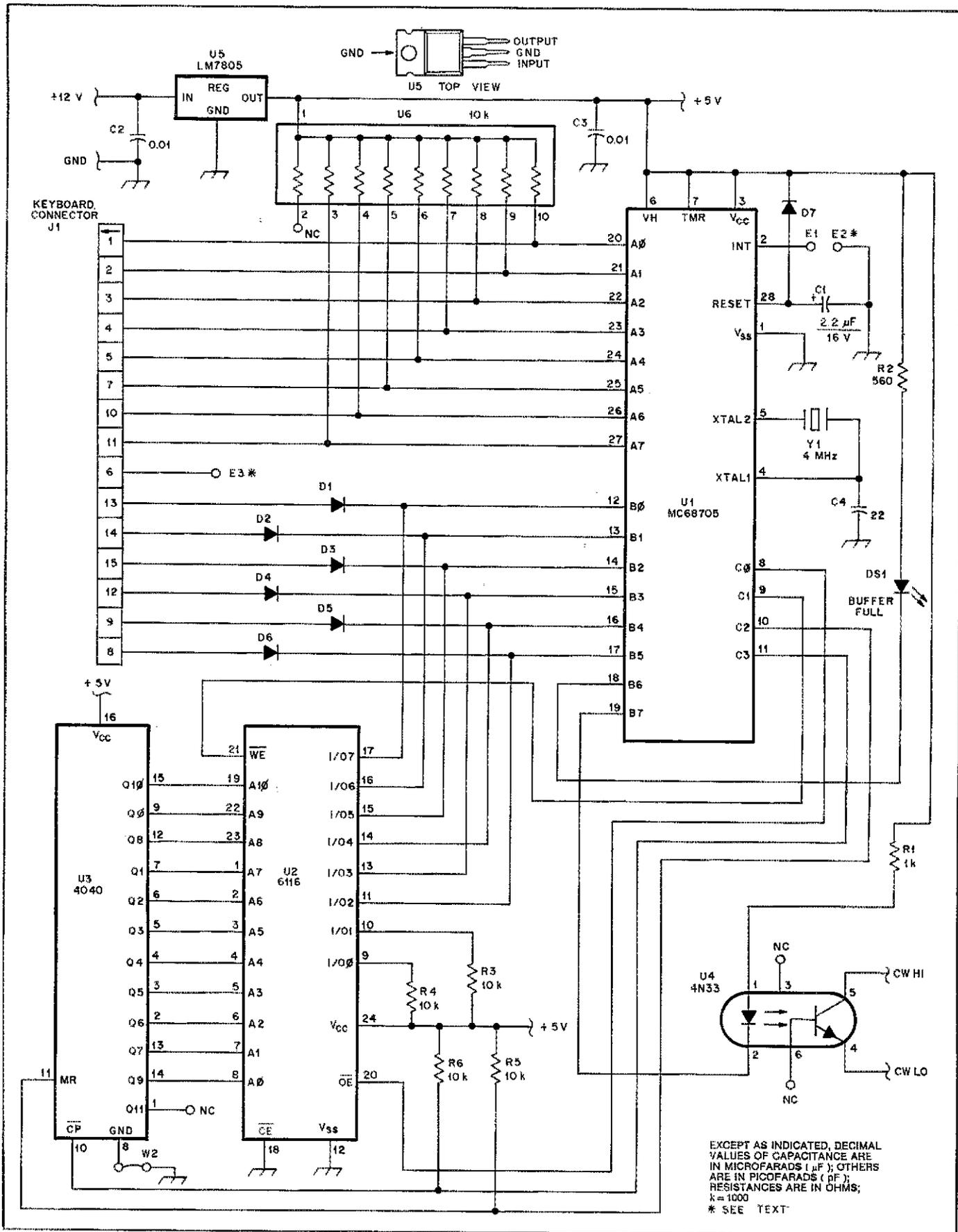


Fig 1—Schematic diagram of the keyer. The interconnection of points E1, E2 and E3 is dependent on the type of keyboard subassembly used and is discussed in the text.

D1-D7—1N914 or 1N4148.
 U1—MC68705P3 microprocessor.
 U2—HM6116 2k × 8 RAM.

U3—CD4040B.
 U4—4N33 optocoupler.

U5—7805 5-V, 1-A voltage regulator.
 U6—10-kΩ resistor assembly.

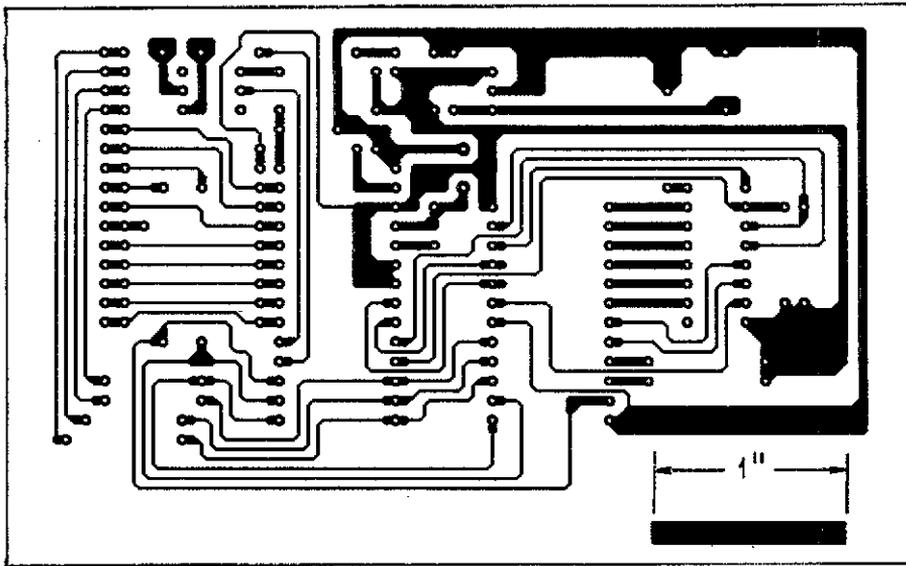


Fig 2—Circuit-board etching pattern for the Morse keyboard. The pattern is shown full-size from the foil side of the board. Black areas represent unetched copper foil.

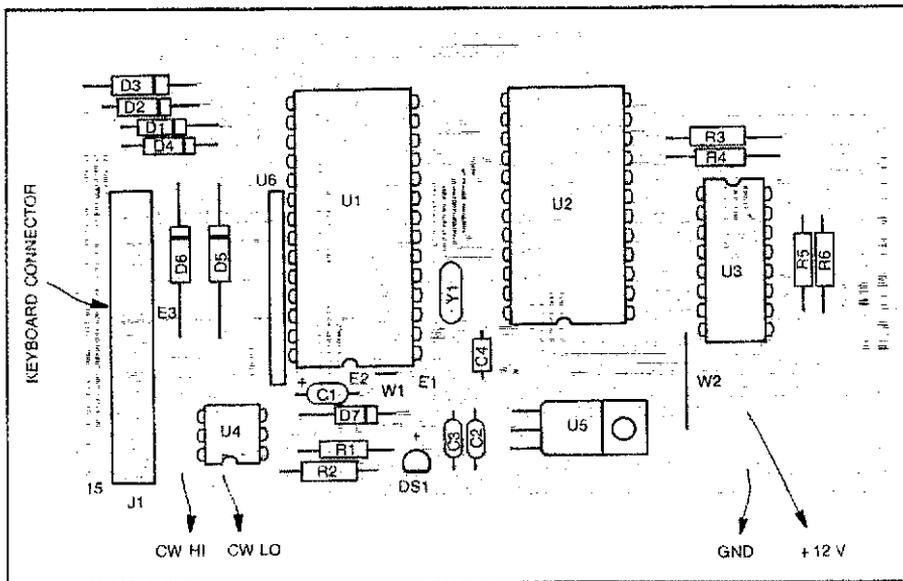


Fig 3—Parts-placement guide for the Morse keyboard. Parts are placed on the nonfoil side of the board; the shaded area represents an X-ray view of the copper pattern.

in Figs 2 and 3, respectively. The TI-99 keyboards can be purchased from several sources.² ASCII-encoded keyboards are available from most of these same parts suppliers.

Two versions of the CW6805 are shown in the title photo and Figs 4, 5 and 6. The unit shown in the title photo and Figs 4 and 5 is built in a plastic case designed and constructed by Dennis Kennedy, N8GGI.³ The original prototype (Fig 6) is contained in a homemade wooden enclosure. In the original prototype, the keyboard assembly is secured to the lower half of the two-section top cover by means of epoxy cement. An ac-operated power supply and the keyer PC board occupy the top left-hand corner of the case. As with any

enclosure used for the CW6805,⁴ little room is needed for the electronics; the size of the mechanical keyboard subassembly is what primarily determines the overall dimensions of the finished unit.

TI-99 Keyboard Styles

As mentioned earlier, TI-99 keyboards are available from a number of sources. I've seen two different styles of this keyboard. Both have very short, stiff cables between the keyboard and its connector; this could be a problem for some mounting configurations. However, the cables on both keyboard types are easy to replace, if necessary.

On one keyboard, the connections are at the back of the assembly and are easy to

change; the other keyboard type requires disassembly. To disassemble the keyboard, place it upside down on a soft surface so as not to damage the keytops. Unsolder the connections to the ALPHA LOCK key. Then, remove all of the screws, including those securing the supports. The PC board should now come free. The connector cable can now be unsoldered and replaced. (You can reuse the cable connector. Use a narrow, sharp-pointed instrument—a safety pin will do—to remove each connector pin, replace the wire and replace each pin.) To reassemble the keyboard, reverse the procedure.

When installing the parts on the PC board, use a low-wattage iron: A 25- to 40-W iron with a fine tip works well. I recommend using sockets for U1-U4. Install the sockets first, then D1-D6, C1 and resistor network U6. Orient these parts correctly with respect to pin numbers and polarity. Pin 1 of U6 is denoted by a stripe at one end of the network. Install a jumper wire between E1 and E2 if you're using a TI-99 keyboard, or between E1 and E3 (connected to J1-6) if you're using an ASCII-encoded keyboard. Don't forget to install jumper W2 between U3 pin 8 and the ground foil.

Before you place U1-U4 in their respective sockets, apply power to the board. Measure the voltage between U3 pin 16 and U3 pin 8 (ground); it should measure +5 V dc. Once you're sure the power supply voltage is correct, turn off the power and install U1-U4.

Before connecting the keyboard output to a tone generator or your transceiver, make sure the key-line voltage and current ratings are within those of the optoisolator. Also, check the polarity of the key-line voltage to ensure correct connection of the optoisolator as described earlier. If you're using a transceiver's sidetone oscillator to monitor the CW6805's keying, make sure you have a dummy load connected to the transceiver and reduce the power output to a minimum.

Test and Operation

Check the operation of the keyboard by sending each character and test the SHIFT and FUNCTION key operations. Try writing a message to memory and sending it. Tables 1, 2 and 3 list the keystrokes necessary to perform the various keyboard functions and the transmission of commonly used prosigns.

If you get no output from the keyer, the problem most likely is with U1 or U4. Missing letters are usually caused by open or incorrectly installed diodes (D1-D6). Problems with memory functions are related to U2 and U3.

The FUNCTION key is used to set the keyboard's operating modes and parameters. This key also sets a software flag that diverts data away from the type-ahead buffer and sends it to a command proces-

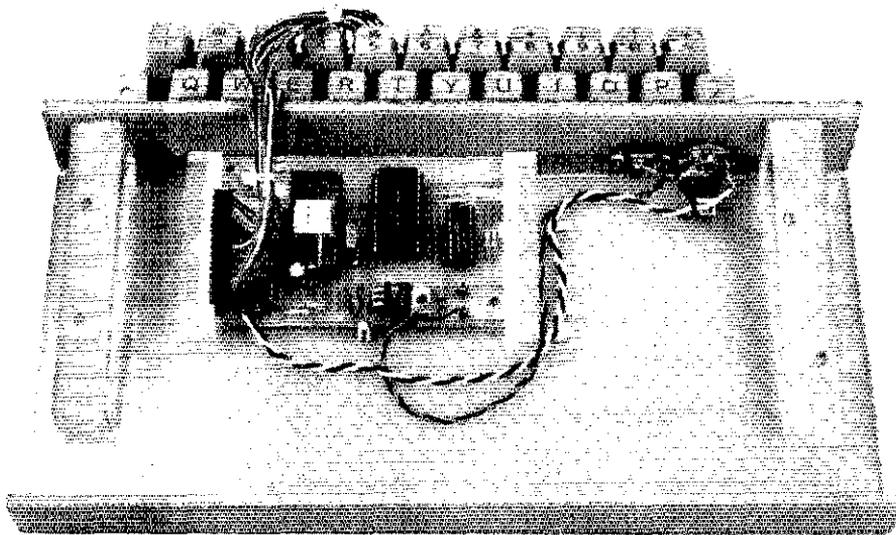


Fig 4—An inside view of one Morse keyboard built in a plastic case designed by Dennis Kennedy, N8GGI. In this version, the PC board slides into two slotted plastic guides that support it. To the left and right of the PC board are two angled plastic support blocks that serve to secure a surplus TI-99 keyboard (partially visible at the top of the photo). The original keyboard connecting cable has been removed from its connector and longer individual wires have been attached between the keyboard and the original connector to provide flexibility and ease disassembly. The dc power-supply connector and keying jack are mounted on the rear panel to the right of the PC board.

sor. The command format (see Table 1) has to be followed exactly—incorrect commands are ignored and also reset the function flag. This sometimes can result in the generation of CW for the remainder of the command if you're not immediately aware of the error. The keyboard's operating parameters can be programmed on the fly, even while CW is being generated. However, one transmitted character may be started with the old parameters and be finished with the new if that is done.

The CW6805 operates in one of two operator-selected modes: RAGCHEW and CONTEST. The basic difference between the two modes is that in the CONTEST mode, you have a 64-character type-ahead buffer and seven programmable, 256-

character messages available to you. In the RAGCHEW mode, the messages are not available, but the type-ahead buffer is increased to 256 characters. One nice feature of this keyboard is that the messages stored in the CONTEST mode *are not lost* if you switch to the RAGCHEW mode! Returning to the CONTEST mode, you'll find everything as you left it.

The SHIFT H command allows entries in the type-ahead buffer to be deleted, starting with the last entry. The SHIFT ENTER command stops CW transmission and resets the type-ahead buffer; any data remaining in the buffer is lost.

When entering a message into a buffer, you won't hear the code for the characters being typed. Also, once power is removed

from the keyboard, the contents of the message buffers will be lost, and the keyboard returns to the default settings when power is reapplied.

Summary

When you're satisfied that all is working properly, button 'er up and start enjoying the second fun stage—put the keyboard on the air!

My thanks to Mark Camerlin (NBIP) and Steven Strauss (NIDKQ) for their help in testing prototypes of the CW6805.

Notes

¹Programmed MC68705P3 microprocessors. PC boards and parts kits are available from Single Chip Solutions, PO Box 680, New Hartford, CT 06057. Programmed MC68705P3, \$25; PC board, \$15; complete kit of parts (excluding case, keyboard and power supply components), \$50; same kit of parts assembled, \$60. Add \$2.50 for shipping. Connecticut residents add 7.5% sales tax. Quantity discounts available. The ARRL and QST in no way warrant this offer.

²Keyboards are available from: Edlie Electronics, 2700 Hempstead Turnpike, Levittown, NY 11758-1443; All Electronics Corp, PO Box 567, Van Nuys, CA 91408; Marlin P. Jones and Associates, PO Box 12685 Lake Park, FL 33403-0685; John J. Meshna Jr, PO Box 62, East Lynn, MA 01904. Some Radio Shack[®] stores may still have these keyboards in stock, although they are a discontinued item.

³D. Kennedy, "Build It Yourself—With Plastic," QST, Aug 1988, pp 30-34. Keyboard cases are not available from Dennis Kennedy.

⁴Keyboard enclosures (usually aluminum) are available from several mail order houses including Jameco[®] Electronics, 1355 Shoreway Rd, Belmont, CA 94002 and Edlie Electronics (see note 2).

APPENDIX

Program Operation

The internal timer of the microprocessor is used to generate interrupts that are used for keyboard scanning and debouncing. The keyboard matrix is set up using ports A and B, with port A acting as the input port. This port has internal pull-up resistors which, although they are of a high value, are sufficient to keep the inputs at a high level when no keys are

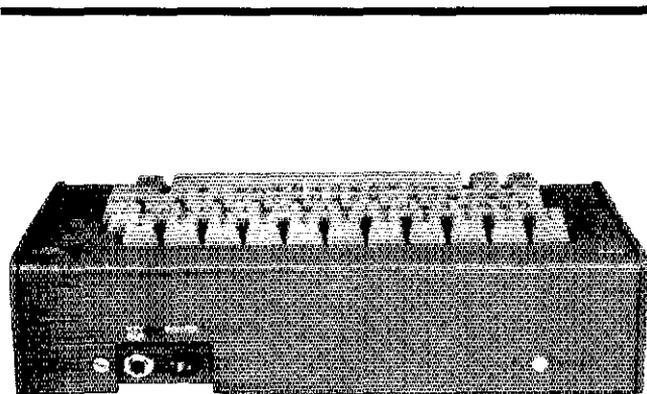


Fig 5—A rear view of the plastic-cased Morse keyboard. The top and bottom of the case are separated by simply removing the two machine screws on the rear and front lips of the top cover (see the title-page photo). A cutout in the rear lip of the top cover provides access to the dc power connector and key jack.

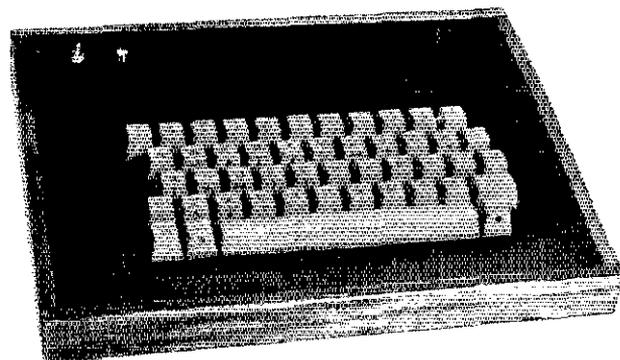


Fig 6—A homemade wooden enclosure was used to house the prototype Morse keyboard. The surplus TI-99 keyboard is secured to the lower half of the two-section top cover by means of epoxy cement. An ac-operated power supply and the keyer PC board occupy the top left-hand corner of the case. The power supply on/off switch and buffer full LED are mounted at the top left-hand corner of the upper section of the keyboard cover.

Table 1
CW6805 TI-99 Keyboard Functions

Keys	Function
SHIFT H	Backspace in the type-ahead buffer
SHIFT Q	Send CQ message; can also be embedded in a message.
SHIFT T	Send PARIS test message.
SHIFT C	Send the contact (QSO) number. Can be embedded in a message. Contact counter increments after number is sent.
SHIFT ENTER	Warm start reset (stops transmission).
FUNCT SHIFT R	Reset all functions. (Speed = 10 WPM, weighting = 1:3, spacing = normal, mode = contest.)
FUNCT S NN	Set CW speed to NN WPM (NN = 05 to 99).
FUNCT G N	Set letter/word spacing. 0 = normal, 9 = maximum.
FUNCT W N	Set weighting (dot/dash ratio). N = 0 to 9. 0 = 1:2, 4 = 1:3, 8 = 1:4, normal = 1:3.
FUNCT P NNNN	Set the contact (QSO) counter to NNNN. NNNN = 0000 to 9999; four digits must be entered.
FUNCT D	Decrement the QSO counter.
FUNCT M N	Program message number N. N = 1 to 7. The message entry is terminated by pressing the ENTER key. Messages are normally 256 characters long, but can be linked by simply typing information into the next message area. Messages should not be programmed while in the RAGCHEW mode.
FUNCT SHIFT 1	Select the CONTEST mode of operation. Type-ahead buffer = 64 characters. Seven 256-character messages.
FUNCT SHIFT 2	Select the RAGCHEW mode of operation. Type-ahead buffer = 256 characters. Message function disabled.
CTRL N	Send message N (1 to 7).

Table 2
CW6805 ASCII Keyboard Functions

If an ASCII keyboard is used for this project, some keystroke assignments will differ from those used with the TI-99 keyboard. These keystroke assignments are listed below.

ASCII Key	TI Keyboard Key
LF (Line Feed)	FUNCTION key
ESC (Escape)	CTRL
CONTROL C	QSO counter
CONTROL Q	CQ message
CONTROL T	PARIS message
LF and CONTROL R	Reset (cold start)
HUBOUT	Reset (warm start)
@	Reset (warm start)

Table 3
TI-99 Keystrokes and Prosigns

Note: Because the TI-99 keyboard has only 44 keys, some of the punctuation marks are located on different keys than those of the standard QWERTY keyboard.

Key(s)	Prosign or Code Sent
# (SHIFT 3)	\overline{AR} (end of message)
\$ (SHIFT 4)	\overline{SK} (end of work)
% (SHIFT 5)	\overline{BK} (break)
^ (SHIFT 7)	\overline{AS} (wait)
((SHIFT 9)	\overline{KN} (left parenthesis)—Also used commonly as "go ahead—you only," an invitation to the station with which one is in contact only to transmit, all others stand by.
) (SHIFT 0)	Right parenthesis (commonly used for both left and right parentheses)
SHIFT I	Question mark
SHIFT O	Apostrophe
SHIFT P	Quotation marks
ENTER	\overline{BT} (double dash)
+ (plus sign)	\overline{SN} (understood; not official)
- (minus sign)	\overline{BA} (hyphen or dash)
= (equals sign)	\overline{HH} (error)

Once this is detected, however, the port B lines are set to all ones. They are then set to zero one at a time until the key is isolated. This step is repeated for every timer interrupt until the key has been pressed for a period exceeding the key debounce time. The key value is then computed from the row selected by port B and the column that is low in port A. That value is then placed in a RAM-based FIFO type-ahead buffer.

One quirk of the TI keyboard is the inclusion in the matrix of the CONTROL, SHIFT, and FUNCTION keys. The CONTROL and FUNCTION keys are treated just like any other in this design. The SHIFT key is used for special characters and therefore must be detected separately from the other keys. The key routine detects the presence of the SHIFT key before the row/column decode routine is executed. The row/column routine ignores the SHIFT key. If SHIFT is pressed, a one-bit flag is appended to the output of the row/column routine producing a new set of characters. These SHIFTED characters are applied to a translation table to introduce only the required special characters; the others revert to the normal key legend.

Once a character is in the type-ahead buffer, the CW transmit routine can process it. The CW routine periodically checks the buffer-empty status flag until it indicates that a character is waiting. The character is then removed from the buffer and the pointer is moved to the next one, if any. If there are no characters left, the empty status bit is set. The data removed from the buffer is then applied to a translation table containing the ones and zeros that make up the Morse code dots and dashes. The routine then shifts out the data, simultaneously applying the programmed amount of time to each dot, dash and space.

Port C does double duty when operating in the expanded mode. The lower two bits of the port are used as the output-enable and write lines to external RAM. This RAM can be selectively used as an expanded type-ahead buffer or as a programmable message buffer with seven 256-character messages.

A CD4040 counter controlled by port C provides the address for the RAM. For simplicity, the processor can only reset the address or increment it. The messages in RAM can be used individually or cascaded, provided that the overlapped message buffer is not reprogrammed at a later time. Port B is used as the data port for the RAM. The RAM data is set up such that only six bits are needed to store all of the characters generated by the keyer.

When the command to send the contents of a message is encountered in the type-ahead buffer, the input to the CW output routine is temporarily diverted to the message routine. The message processor provides data as needed to the CW routine until the ENTER character is encountered in the message. At that point, control is returned to the type-ahead buffer.

The external RAM can also be used as an extra large type-ahead buffer by selecting the RAGCHEW operating mode. In this mode, the counter is allowed to count from 0 to 255. The type-ahead buffer input and output is diverted to the RAM I/O. The counter and an internal counterpart keep track of the data position. In order to keep things simple, the buffer size is restricted to 256 characters. The

messages are also disabled in this mode to eliminate the need to swap the count between a message address and the buffer address. The transfer between modes may occur at any time, and messages programmed when in the CONTEST mode are not lost when control is transferred to the RAGCHEW mode. The messages may be used as usual when the keyboard is returned to the CONTEST mode.

There are two commands that operate immediately (without the need to press the FUNCTION key). The SHIFT H command allows entries in the type-ahead buffer to be deleted, starting with the last entry. The SHIFT ENTER command stops CW transmission and resets the type-ahead buffer; any data remaining in the buffer is lost. The FUNCTION key is not used for these two operations because of the need to perform them quickly.

CW Generation

The generation of CW can be done most

easily with a character-translation table. Because of the limited memory available in the MC68705, a compact table is needed. The format for the table used was described in an article by Wayne Sewell, WB5NYC.[†] An enhanced version of his transmit routine, modified to support variable spacing and dash weighting, is used to generate the CW output. The routine was also modified to operate with the reduced register set and size of the MC68705.

The method used to generate the CW timing was changed from a software timing loop to a routine that uses the built-in hardware timer to set the CW speed. The table format uses a logic zero for dots and logic one

[†]W. Sewell, "If Only Sam Morse Could See Us Now," *BYTE*, Oct 1976, pp 42-49.

for dashes. The upper three bits are the bit count for the character. Special characters (with six bits) use the lower six bits of the byte for the Morse character with the upper two bits set to logic one for the six-bit count. The count and Morse-character data are separated by the program.

The data bits are then output one at a time until the count reaches zero. The dot is always assigned one bit time. The dash gets the programmed weight. The error character is the only one greater than six bits (8) and is given a special code of \$HFF (hexadecimal). When that is detected, the routine sets the bit count to 8 and the Morse-character data to all dots.

In addition to the error character, Morse code uses some other special characters of its own. These characters—with the exception of error and break—are SHIFTED characters located on the top row of the TI keyboard. The key assignments are shown in Table 2.

New Books

AUDIO ENGINEERING HANDBOOK

Edited by K. Blair Benson. Published by McGraw-Hill, Inc, New York, NY, tel 800-262-4729. First edition, 1988. Hardcover, 6 × 9-inches, 1040 pages, \$79.50.

Reviewed by Kirk Kleinschmidt, NT0Z.

The first thing I noticed about this book was its size—it's *big*. It reminds me of a college textbook. The scope of the book matches its size. The *Audio Engineering Handbook* is filled with information encompassing every aspect of sound, from basic principles—hearing and acoustics—to state-of-the-art topics, such as digital audio and signal processing.

This book is not an Amateur Radio how-to handbook. It is intended to be a complete reference for designers and operators of modern audio equipment and systems. There are no construction projects or schematics. There is, however, a wealth of information of use to Amateur Radio operators (because hams make use of microphones, speakers, signal processing, digital audio and so on), as well as audiophiles and broadcasters.

Although the *Audio Engineering Handbook* is not inexpensive, you do get your money's worth. The book is well made and printed on quality paper. There are plenty of illustrations—unlike many less expensive books—and the 30 or so contributing authors are recognized industry figures (the list reads like a who's who of audio engineering).

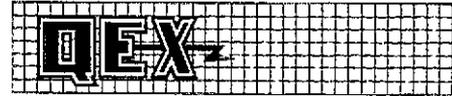
Here's a look at the chapter titles: Principles of Sound and Hearing; Audio Spectrum; Architectural Acoustic Principles

and Design Techniques; Digital Audio; Broadcast Transmission Technology; Microphones and Amplifiers; Sound Reproduction Devices and Systems; Analog Disc Recording and Reproduction; Digital Disc Recording and Reproduction; Analog Magnetic-Tape Recording and Reproduction; Digital Magnetic-Tape Recording and Reproduction; Film Recording and Reproduction; Studio Production Systems; Postproduction Systems and Editing; Noise Reduction Systems; Audio Tests and Measurements; Standards and Recommended Practices.

Most of the book's topics are covered in detail. In fact, the first couple of chapters (basics of audio and hearing) would fit well into a physics text. The bibliographies at the end of each chapter are extensive—if you require more detailed information on a particular subject, it'll probably be mentioned (some chapters have as many as 150 bibliography listings).

Because I was in the process of building a speech processor/equalizer for my Amateur Radio station, I welcomed the opportunity to review this book. The typical amateur construction project is long on how-to, but short on background and fundamentals. This book filled in the gaps and provided much detailed information on microphones, amplification, signal processing and modulation.

Although the *Audio Engineering Handbook* is not slanted towards Amateur Radio topics, it contains a lot of useful information (especially on basic audio-design topics). Because of its \$79.50 price tag, though, most hams will want to examine *this* book at the library.



QEX: THE ARRL EXPERIMENTERS' EXCHANGE AND AMSAT SATELLITE JOURNAL

VHF/UHF enthusiasts will enjoy the November issue of *QEX*. The feature article, by Steve Powlishe, K1FO, details the technical specifications of most currently available 432-MHz power tubes and includes a few personal recommendations. In addition, Dan Becker, WA4EWI, describes a transistorized 6-meter version of the Butler oscillator that he designed and built.

The November issue of *QEX* includes:

- "Characteristics of Some Common Power Tubes at 432 MHz," by Steve Powlishe, K1FO.
- "A 6-Meter Oscillator," by Dan Becker, WA4EWI.

• "An Emergency Broadcast System Receiver," by Karl Williamson, KA0BUA.

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.

Strays

I would like to get in touch with...

anyone with a manual or schematic for a Magnum 6 RF speech processor RF6DB/YX for a Yaesu FT-DX401. Paul Parck, WN5K, 41067 Hwy 931, Gonzales, LA 70737, tel 504-622-2142.

A Portable Vertical-Antenna Mount

Need a temporary, good-performing antenna? The mounting technique described here makes for quick installation of a multiband vertical with a minimum of fuss!

By Guy Black, W4PSJ
12317 Hanger Rd
Fairfax, VA 22033

Field Day contestants, vacationers and tenants sometimes need temporary antennas. On the high-frequency bands, a hunk of wire hung from one or more trees often seems to be the best that can be done. To get such an antenna put up, a weight with a rope tied to it is usually thrown into a tree, and the antenna is then pulled up with the rope. I don't have very good aim and my throwing skills are underwhelming, so the dipoles and end-fed lengths of random wire I've managed to put up as temporary antennas have usually been disappointing performers.

For the last several years, I have used a multiband vertical (a Butternut HF2V) at home with great success, particularly for DXing on the 80, 75 and 40-meter bands. Why not turn such a vertical into a portable antenna? It's essentially pre-tuned, and there's no strain on the throwing arm! Light, uncomplicated and easily transported multiband verticals have many possibilities.

My antenna came with a 22-inch aluminum ground stake. With care, it is possible to drive this stake into the ground repeatedly and without damage by using a short (one foot or more) section of TV masting, which fits nicely over the base insulator, as a driver. Unfortunately, doing this requires the availability of a small sledgehammer (or a large one, depending on the ground!).

Another approach is to use a *portable*

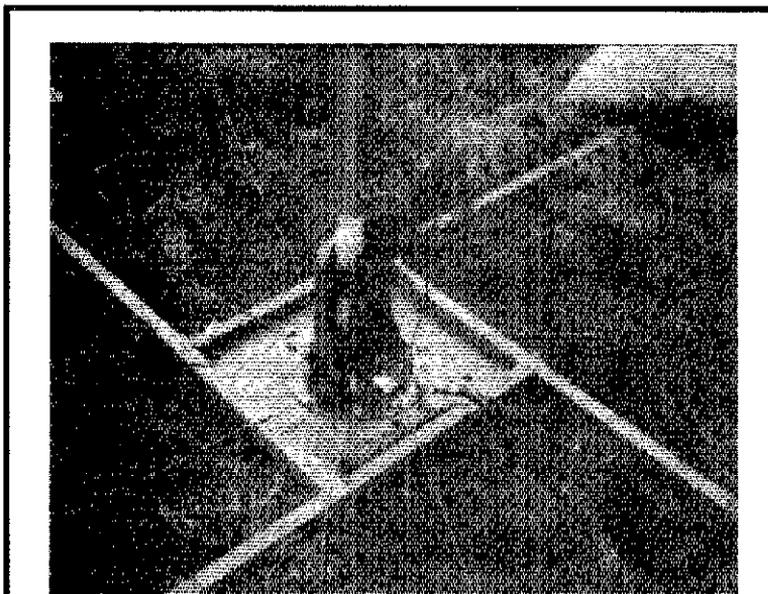


Fig 1—Photograph of the portable vertical-antenna mount. The lower rotator-mast-mount casting is bolted to a steel plate, with a copper disc in between for attachment of radials. One of the bags of garden stone used to hold down the wooden stakes is visible in the upper right corner of the photo.

base with the vertical. This takes up a bit more space in the car than just a ground stake, but at least you don't need to carry along a sledgehammer!

Materials

The parts for my portable base are a 1 × 1-foot metal plate (an old rack panel works fine), the lower mast-support casting from a rotator¹ (with its hardware), a 7-inch-diameter disc of copper-clad PC board, five 6-foot-long 1 × 1-inch hardwood stakes from a garden supply store, a 1 × 12-inch strip of thin hobby brass, a chassis-mount SO-239 connector and a 6-inch length of 1-inch ID plastic water pipe. A few nuts, bolts, spade lugs,

washers, and 500 feet of no. 14 stranded copper wire round out the materials list.

Construction

Bolt four of the hardwood stakes to the steel plate in a pinwheel configuration, as shown in Fig 1. Drill 10 equally spaced holes (large enough to pass no. 6-32 screws) around the outside edge of the PC-board disc. Then, center the mast support on the PC board, and mark and drill the four mounting holes on the PC board. Mark and drill the four mounting holes on the metal plate.

Thread 10 binding-head machine screws into the PC-board disc from the bottom, and connect the mast support, PC-board disc and metal plate using the mast-support casting hardware. The heads of

the machine screws should be between the metal plate and the PC-board disc. There is enough flex in the PC board so that the board won't break when the mast-support hardware is tightened. Slip the section of plastic pipe over the vertical-antenna mount, insert the pipe and antenna mount in the rotator mast support, and tighten the mounting clamps.

The section of plastic water pipe is necessary when using this mounting arrangement with a Butternut vertical, because the minimum diameter the clamps will grasp exceeds the one-inch OD of Butternut's base insulator. Other antennas may not require the plastic pipe section.

Part of the one-inch-wide brass strap is

used to connect the ground side of the vertical to the copper disc. The remaining piece of brass is used for mounting the SO-239 connector. (If your vertical already has a coaxial feed-point connector, skip this paragraph.) This brass piece should be about $1 \times 2\frac{3}{4}$ inches, with a $5/8$ -inch hole near one end, and four no. 32 holes for no. 4-40 mounting hardware around the $5/8$ -inch hole. This hole is for mounting the SO-239 feed-point connector. Put a 90° bend in the brass piece about $3/4$ inch from the end opposite the SO-239 mounting hole. Mount the connector using no. 4-40 hardware, and solder the $3/4$ -inch section of the brass strip to the disc of PC-board material so that the SO-239 faces away from the antenna and clears the hardwood stake (see Fig 1). Connect the shortest practical length of no. 14 wire from the SO-239 to the feed-point connection of the vertical.

Assemble the vertical according to the manufacturer's instructions, and install it on the mount. I'm not sure how much wind force the portable vertical antenna system can handle, so when I use it I weight down the stabilizer stakes with bags of garden stone, one of which can be seen in the upper right corner of Fig 1. An easier (and lighter) solution is to guy the antenna with lightweight nylon rope. Bricks (for holding the ends of the radials) and bags of garden stone or sand are widely available, and cheap enough to discard when you're through with them.

The Radials

I use the portable vertical-antenna mount with ten 50-foot radials, each spaced 36° apart on the ground. By using flanged, solderless spade lugs (Waldon DS-1083) it is not necessary to remove the nuts on the

machine screws to connect the radials. The outer ends of the radials are held down by bricks. (Bricks aren't needed to hold down the radial wires if rocks or some other suitable weights are available.)

The fifth hardwood stake is used in lining up the radials (it also serves as a spare mounting-plate stabilizer). Paint a mark on each radial wire, 9 feet 5 inches from the machine-screw connection point (nail polish works fine for this). At that distance from the casting, uniformly space the radials 36° apart by laying the spare six-foot stake between the painted marks on adjacent radial wires. This makes for a neat layout with a minimum of fuss. Installation is easier if the radial wires are coiled up from the brick end (so that the connection lug is on the outside of the coiled radial). Tape or wire ties can be used to keep the coiled radials from getting tangled.

Results

With the Butternut HF2V erected on the portable mount in my back yard, tune-up went smoothly. The antenna has an SWR of less than 2:1 across the 40-meter band, and over the selected 30 kHz of 75 meters. Switching back and forth between the portable vertical and my permanently installed vertical (also an HF2V, but with a larger radial field) I found little difference in received signal strength. I had the same good results working DX on both antennas. A 100-foot-square area is needed for the ground radials if the antenna is put up as described, but the radials can be bent or shortened if necessary.

This antenna is so easy to put up and take down that it can be erected for just a few days' use. For easy transportation, I use the antenna's original 66-inch-long shipping carton to carry the antenna and

the stakes, and a two-gallon milk crate for the radials, base plate and hardware. All the components of a handy and effective portable antenna system are in two packages, ready to go, and my throwing arm doesn't even get a workout!

"I didn't need the lower mast-support casting from the rotator when I installed the rotator on a flat plate, so I used it for the portable vertical-antenna mount. Lower rotator mast-support castings and hardware are available from Norm's Rotor Service, 677 Southlawn Ln, Rockville, MD 20850, tel 301-340-0520. New mast-support castings are available for about \$30, used castings are \$5, and kits of new stainless-steel hardware are \$12.50. Castings and hardware are also available from Craig's Antenna and Tower Service (CATS), 7368 Scotch Ridge Rd, Pemberville, OH 43450, tel 419-352-4465. Used mount castings are available for \$5, and hardware kits are available for \$6 and \$12 (non-stainless and stainless steel, respectively). Other parts and services are also available from both companies. The ARRL and QST in no way warrant these offers.

Guy Black has been licensed since 1948, and has held the calls W9AGJ, W1RLB, W6RLB, WB8LBX and W4PSJ. Guy earned a PhD in economics from the University of Chicago in 1951. He spent 3 1/2 years in the Air Force during WW II, and had radar and radio operator schooling at Boca Raton, Florida, and Scott Field, Illinois, respectively. Guy spent seven years with Sylvania Electronic Systems in California and Massachusetts. He recently retired from teaching business courses at George Washington University in Washington, DC. Guy has one patent (a computerized Morse Code teaching machine), from which several principles were used by Sylvania in code-teaching machines built for the military.

Guy's ARRL-volunteer background dates to the 1950s, when he was Section Communications Manager of the East Bay Section, and later an Assistant Director of the Pacific Division. He is a member of the ARRL and the Potomac Area VHF Society.

New Products

SSTV AND HF FAX SOFTWARE FROM SSC

IBM® PC-based, SSTV and HF FAX hardware and software packages are now available from Software Systems Consulting of San Clemente, California. The PC SSTV system includes an FSK modem, transceiver interface cable, signal processing software with file utilities, tutorial cassette and reference manual. Suggested list price for the PC SSTV system is \$149.95. The receive-only HF FAX system, suitable for weather facsimile, includes a demodulator, radio interface cable, signal processing software with file utilities, tutorial cassette and reference manual. Suggested list price for the HF FAX system is \$79.95. For more information, contact Software Systems Consulting, 1303 S Ola Vista, San Clemente, CA 92672, tel 714-498-5784.—Tom Francis, NMIQ

SATELLITE TRANSVERTERS

Transverters Unlimited is offering several new UHF RF devices suitable for satellite operations. The LT70S is a two-frequency-range—432- to 434- and 435- to 437-MHz—transverter. Its receive converter uses GaAsFETs and a doubly balanced mixer to produce a noise figure under 1.8 dB and 20 dB of gain. Transverter power output is approximately 20 W. The unit also incorporates an illuminated wattmeter.

Two other units of interest are the LT24S, a 10-W, 144- to 1269-MHz transmit converter and the UEK-13/P3C, a 2400- to 144-MHz receive converter. The UEK-13/P3C features a GaAsFET RF amplifier and mixer and a noise figure under 1.8 dB with 20 dB of gain.

Two solid-state, linear power amplifiers, the TLA 1270-100 (100 W output) and TLA 1270-50 (50 W output), are also available from Transverters Unlimited. These amplifiers use Mitsubishi hybrid power modules coupled with low-loss printed-

circuit board power dividers. A calibrated power-output meter and two temperature-controlled cooling fans are included. A 50-W kit version (model PA2350) is also available. For equipment availability, catalog (\$1 post-paid) or price information, contact Transverters Unlimited, PO Box 178, New Boston, NH 03070, tel 603-547-2213.—Tom Francis, NMIQ

Feedback

In the October 1988 QST Technical Correspondence item, "HW-9 Tips," pp 42-43, U1 was not identified. U1 is a 4011 CMOS NAND gate (Radio Shack 276-2411). You can use an LM78L05 or LM340-5 for U2. Be sure that the shield of the cable (RG-174 is suitable) connecting the marker output to pin 1 of the second mixer is grounded on both the oscillator and TR boards. (Txn Larry East, WIHUE)

Toroids—Some Practical Considerations

Are you confused when it comes to using toroids? The tips given in this article may simplify your next project.

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

Do you work with toroidal inductors and transformers? Are you confused about some of the practical aspects that relate to these useful devices? If your answers to these questions are yes, you're not unique among your experimenting peers!

Numerous articles concerning toroidal coils and transformers have appeared in *QST* over the years, and *The ARRL Handbook* includes a section on the application of toroids. But some of the application methods are not highlighted in the average text that treats these devices. This article focuses on the day-to-day questions that I receive about toroids and how to use them.

A Short Review of Toroid Advantages

Why should we use toroids in place of air-core or slug-tuned coil forms? Foremost of the reasons is cost, at least for experimenters. Small toroid cores are less expensive than good quality ceramic coil forms—especially those that contain adjustable powdered-iron or ferrite slugs. Another benefit from the use of toroids is that shield cans aren't necessary in order to isolate the toroidal coil from adjacent components. Toroids have an inherent self-shielding property. Specifically, the field from a toroidal inductor is pretty much self-contained. This means that radiation from the coil or transformer is minimal compared to a solenoidal coil that has an air or slug core. No metal shield can or shield compartment is needed to prevent a toroidal coil from causing stray coupling to adjacent coils or components.

A tuned circuit that contains a toroidal coil will generally have a high Q (quality factor), if the correct core material is chosen. Some multilayer slug-tuned coils

have relatively low Q factors (100 or less). High Q is important in VFO circuits and in some RF filter units.

Broadband transformers are made easily when we use magnetic cores, with ferrite being the most common of the cores for this purpose. Equivalent performance over a wide range of frequency is not possible when we use air-core inductors for the windings.

Finally, toroids are usually more compact than their conventional equivalents. This helps us to design and build miniature amateur equipment.

Choosing the Proper Core

I am asked frequently, "Should I use ferrite or powdered-iron toroids?" There is no simple answer I can offer. Powdered-iron cores are less prone to saturation at a particular power level (heating and changes in core permeability) than are ferrite cores of equivalent size (cross-sectional area). Unfortunately, a same-size powdered-iron core (compared to a ferrite one) has substantially less permeability. This means that considerably more turns are needed for a given inductance when we use powdered iron. Too large a number of turns can spoil the performance of a broadband transformer. It is for this reason that ferrite rods and toroids are found in most balun and other broadband RF transformers. A concise treatment of this subject is given in Jerry Sevick's book.¹

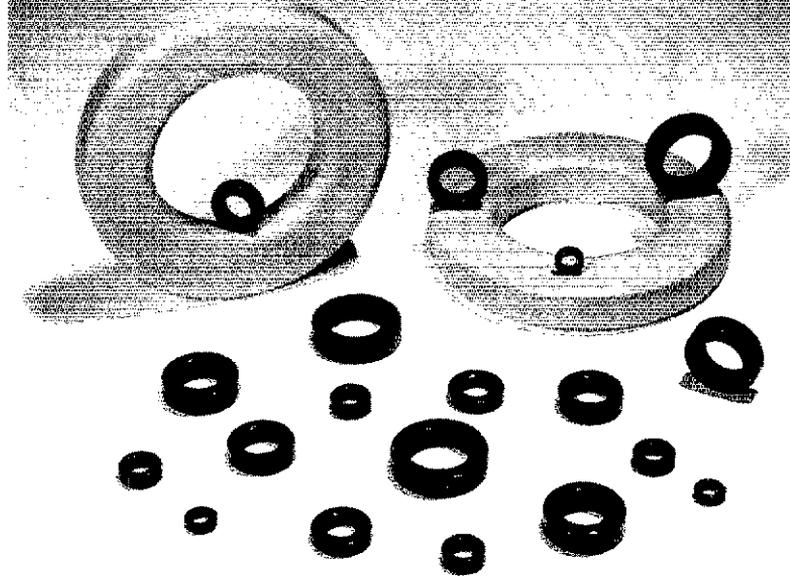
Ferrite and powdered-iron cores are rated for optimum Q versus operating frequency. The catalog from Amidon Associates, Inc contains tables that specify the frequency limits for both types of core material.² Table 1 offers a rule-of-thumb guide that will assist you in selecting a suitable

core for narrow-band tuned circuits in the MF and HF ranges. The cores specified are popular ones that are sold by Amidon Associates, Inc, Palomar Engineers and RadioKit.^{3,4,5}

The recommendations of Table 1 are approximate, and are based on personal experience and preference, respective to safety margins. The Q-versus-frequency listings are for narrow-band tuned circuits. Smaller and larger toroid cores are available. Those listed are the most popular sizes among radio amateurs. The powdered-iron cores are manufactured by Micrometals Corp, and the ferrite ones are produced by Fair-Rite Corp. Permeabilities for all of these cores are listed in the Amidon Associates catalog.

The power ratings given in Table 1 are for low-impedance harmonic filters and broadband transformers, and do not apply to narrow-band tuned circuits. Greater power limits may be possible under some conditions. The high RF voltage associated with tuned high-impedance resonators reduces the maximum ratings in watts per given core size. This is discussed in the *Ferromagnetic-Core Design & Application Handbook*⁶ and in *The ARRL Handbook*. The power ratings of magnetic cores are based on ac and dc voltage in the windings, the number of coil turns, and on other factors. Equations for determining the correct core size are found in the *Ferromagnetic-Core Handbook* and *The ARRL Handbook*.

The Q ratings in Table 1 are for optimum Q versus operating frequency. Acceptable performance is available above and below the listed frequencies (see Amidon Associates charts). You may use any of the toroids in Table 1 at frequencies below the optimum Q notations. You should be aware also that the higher the recommended operating frequency, the lower the core permeability. Most broadband trans-



¹Notes appear on p 36.

Table 1

Guide to Selection of Cores for Narrow-Band Tuned Circuits

Amidon Core no.		Optimum Q V Max Freq, MHz	Core OD (inches)	Suggested Max RF Power (Low-Z Circuits), Watts	Amidon Core no.		Optimum Q V Max Freq, MHz	Core OD (inches)	Suggested Max RF Power (Low-Z Circuits), Watts
T-37-3 (gray)	Iron	0.6	0.37	5	FT-37-43	Ferrite	1	0.37	1
T-37-2 (red)	Iron	4	0.37	5	FT-37-64	Ferrite	4	0.37	1
T-37-6 (yellow)	Iron	12	0.37	5	FT-37-61	Ferrite	10	0.37	1
T-37-10 (black)	Iron	40	0.37	5	FT-37-63	Ferrite	25	0.37	1
T-37-12 (grn/wh)	Iron	90	0.37	5	FT-37-67	Ferrite	80	0.37	1
T-50-3 (gray)	Iron	0.6	0.50	25	FT-37-68	Ferrite	180	0.37	1
T-50-2 (red)	Iron	4	0.50	25	FT-50-43	Ferrite	1	0.50	5
T-50-6 (yellow)	Iron	12	0.50	25	FT-50-64	Ferrite	4	0.50	5
T-50-10 (black)	Iron	40	0.50	25	FT-50-61	Ferrite	10	0.50	5
T-50-12 (grn/wh)	Iron	90	0.50	25	FT-50-63	Ferrite	25	0.50	5
T-68-3 (gray)	Iron	0.6	0.68	75	FT-50-67	Ferrite	80	0.50	5
T-68-2 (red)	Iron	4	0.68	75	FT-50-68	Ferrite	180	0.50	5
T-68-6 (yellow)	Iron	12	0.68	75	FT-82-43	Ferrite	1	0.82	25
T-68-10 (black)	Iron	40	0.68	75	FT-82-64	Ferrite	4	0.82	25
T-68-12 (grn/wh)	Iron	90	0.68	75	FT-82-61	Ferrite	10	0.82	25
					FT-82-63	Ferrite	25	0.82	25
					FT-82-67	Ferrite	80	0.82	25
					FT-82-68	Ferrite	180	0.82	25

formers for the MF and HF spectrum are wound on no. 43 ferrite material (850 permeability). Some broadband transformers (for HF) are wound on no. 61 material (125 permeability). The larger the core, irrespective of the permeability, the fewer turns needed for a specified inductance. Cores may be stacked atop one another to increase the effective cross-sectional area. This permits fewer turns and greater power-handling capability. You may use epoxy cement to affix the cores to one another.

Winding Information

Toroid and rod cores that are used where high values of RF and dc voltage are present should be wrapped with 3M glass tape or Teflon tape before adding the windings. This insulates the windings from the core material, which helps prevent arcing between the windings and the core. I use three layers of plumber's thread-seal tape for core wrapping. It is inexpensive, readily available, and made of Teflon.

I am asked many times, "How should the link (smaller winding) be placed on a toroid, relative to the larger winding?" I always place the larger winding on the core first. It is wound to occupy approximately 300° of the core (leave a small gap between the ends of the winding). The smaller winding is added next. I wind it over the entire area of the larger winding (same polarity or sense), when possible, for broadband transformers. Sometimes this is impractical, especially if the small winding has only one or two turns. In this case, I wind the link over ¼ or ½ of the main winding, at the low-impedance end of the large winding. I always place the link over the low-impedance end of the larger winding when I construct narrow-band toroids. This helps to reduce unwanted capacitive coupling between the windings.

I have also been asked, "Do you wind the wire through the toroid or around the perimeter?" The answer is *definitely* "through the core!"

The Right Number of Toroid Turns

Each core you use has an A_L factor. This relates to the core permeability and the cross-sectional area. When the desired inductance is known, you may calculate the necessary turns to obtain the required inductance. The A_L factor is based on a

specific number of turns for a given inductance. The equation for powdered-iron cores is

$$N \text{ (turns)} = 100 \sqrt{L_{\mu H} / A_L} \quad (\text{Eq 1})$$

where

N = number of turns

$L_{\mu H}$ = required inductance

A_L = specified value for the core being used

(continued on page 36)



The Case of a Portable Hand-Held Transceiver

Do you have a soldering-iron case hanging around the shack? Here's the nifty use I found for mine.

By Ken Goetz, NX7C
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During one of my periodic shack cleaning efforts, I came across one of those items that I had hung onto for no apparent reason: An empty Weller™ soldering-iron case. This bit of “pack-ratting” paid off, though, because I used the case as the basis of a portable 2-meter FM system complete with carrying case, hand-held transceiver, spare battery, speaker microphone and 2-meter ground-plane antenna. There's even room for a copy of my station license, QSL cards and *The ARRL Repeater Directory*. This handy little case travels with me on business trips, camping with the family or when I'm just hanging around the house.

The Carrying-Case Antenna

The principal feature of this portable 2-meter FM system is the antenna, which consists of a telescoping vertical element, aluminum ground plate (mounted on the inside of the carrying case top cover) and four brass rods that are soldered to banana plugs and used as ground radials (see Fig 1). The antenna element and the ground radials can be removed and stored in the carrying case when they are not in use.

The aluminum plate serves two purposes: It stiffens the case lid and serves as a connection point for the radials. (The plate is not absolutely necessary for proper operation of the groundplane antenna, but it makes constructing the antenna much easier.)

Antenna Construction

Size a 1/16-inch thick aluminum plate to fit the cover of the carrying case. (All you need to do is provide sufficient clearance—about 1 inch—for the banana plugs, which are side mounted on the case cover. My plate measured 7 × 8 inches.) Once the plate has been sized, mark four points approximately 1/2 inch from the corners of the plate and one point in the center of the plate (see Fig 2). Next, mark two points, at 1 and 3 inches, to the left of the plate center (these two holes are for the RG-58 antenna cable). Drill holes at the plate marks large enough to accept either no. 4

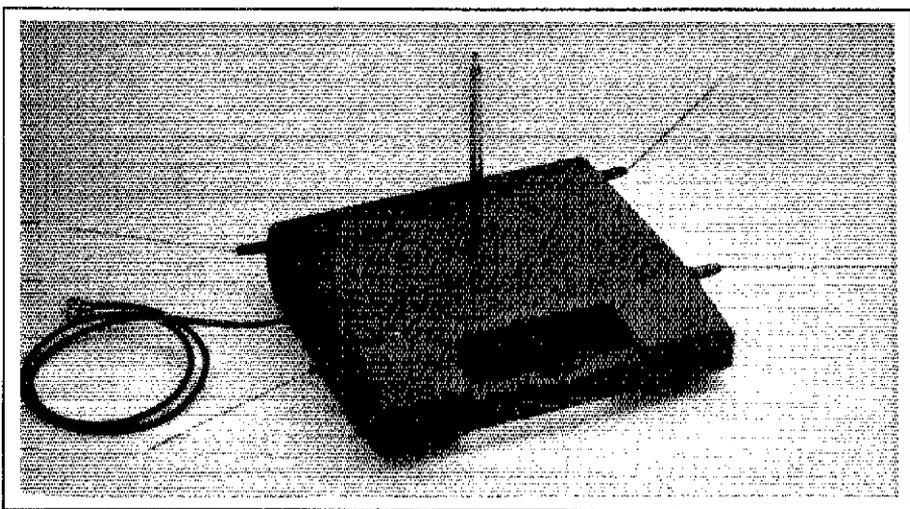


Fig 1—A general overview of the 2-meter hand-held transceiver carrying case. Note the positioning of the ground radials. The coax cable access hole is cut into the top cover only. See text.

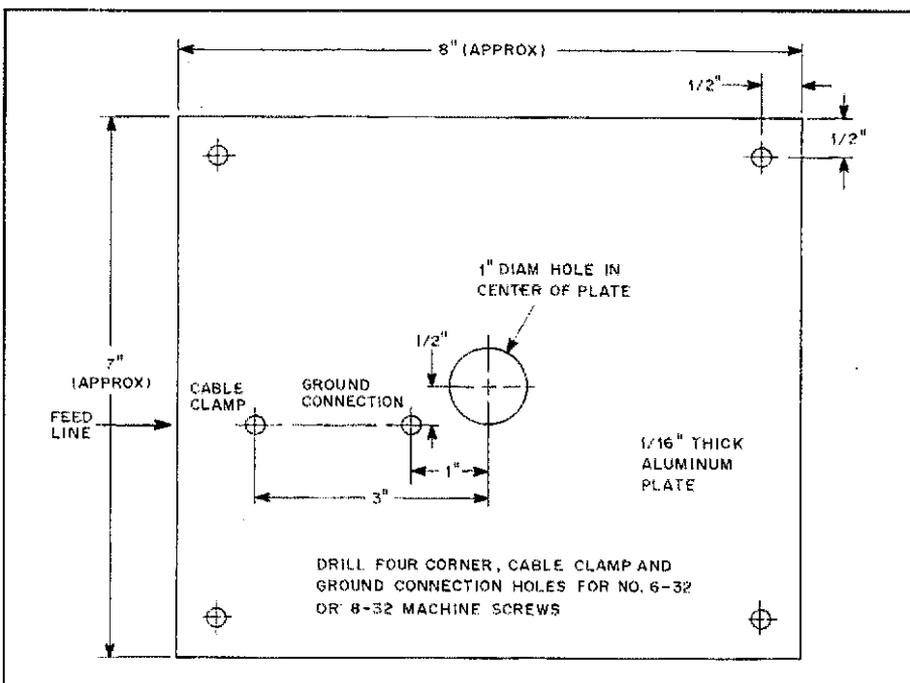


Fig 2—The plan view of the carrying-case ground plate. Be sure to properly space the RF cable ground connection, cable clamp and center conductor holes. (Not to scale.)

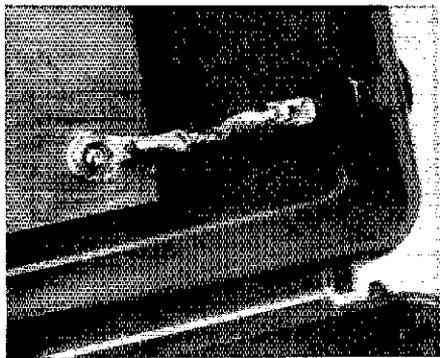


Fig 3—Ground-radial banana jack to ground-plate connection. Phone or phono jacks could also be used. See text.

or 6-32 machine screws. At the center point of the plate, make a 1-inch hole with a hole saw or drill. Smooth and deburr the holes.

Center the drilled plate in the carrying-case cover. (Be sure to position the two RF cable holes on the side of the case that you wish the RF cable to exit on.) Mark the four corners and two cable holes on the carrying case cover. Using the same drill you used on the plate, drill these six holes in the case cover. Attach the ground plate to the case cover using 1/4-inch-long, no. 4- or 6-32 flat-head machine screws, washers, solder lugs and nuts. Note: If you countersink the cover holes to keep the cover surface flat, be careful not to over-drill the hole. If you choose not to counter-

sink the holes, use a small amount of clear RTV sealant on the exposed screw heads to help avoid marring surfaces.

The next step is to install the ground-radial jacks. Drill four holes in the sides of the carrying-case cover large enough to mount banana jacks. Install four banana jacks on the case cover. Using a short length of no. 12- or 14-gauge stranded wire or braid, solder the banana jacks to solder lugs, then attach these lugs to the ground plate mounting screws (see Fig 3).

Cut four 6-inch radials from 1/16-inch thick round brass rod (available at hobby stores) and solder a banana plug to each rod. Plug the radials into the banana jacks and bend the rods so that they are at a 45° angle as shown in Fig 1.

Inspect the antenna you are going to use, determine how large a hole must be made in the carrying-case cover and make that hole. (Be sure that you have sufficient clearance to prevent shorting the coax center conductor against the ground plate.) Expose enough coax ground braid and center conductor and install solder lugs to each. Install the coax ground-braid lug to the ground plate connection and secure the coax cable to the ground plate with a cable clamp. See Fig 4.

Once the coax has been secured to the ground plate, route the cable to the exit point on the carrying case. Mark this point. Then use a small round file to make a notch on the case cover large enough to fit the coax snugly as shown in Fig 1. Install the

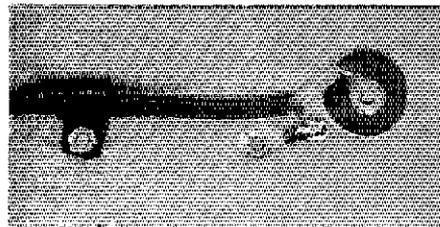


Fig 4—The coaxial-cable connection points on the ground plate. A screw-mount vertical antenna element is used in this model, but a BNC connector would allow use of popular 1/2- or 5/8-λ portable 2-meter antennas.

telescoping antenna element, connect the coax center conductor to the antenna and construction is complete.

Operation

The 2-meter FM system setup is simple: Plug in the radials, connect the hand-held to the vertical antenna via an SWR meter, extend the vertical element approximately 19 inches and have at it! When you tune the antenna, be sure to mark it for your favorite frequencies or subbands.

I have found this carrying case very handy at home and on the road. The next time you clean your shack, take a careful look at that "junk" before you throw it away—you might have "The Case of a Portable Hand-Held Transceiver"! □

Toroids—Some Practical Considerations

(continued from page 33)

Ferrite-core inductances are calculated from

$$N \text{ (turns)} = 1000 \sqrt{L_{\text{mH}}/A_L} \quad (\text{Eq 2})$$

You may use Eq 2 for microhenry values by retaining the 1000 factor and converting microhenrys to millihenrys. For example, if you want to wind a 100-μH coil on a ferrite toroid, use 0.1 mH in Eq 2 for the desired 100-μH value. Similarly, should you need a 10-μH inductor, use 0.01 mH in Eq. 2. The Amidon catalog contains A_L factors for ferrite and powdered-iron toroids.

Some Final Touches

Try to use a wire gauge that permits a close-wound toroid. The Amidon catalog lists the number of turns possible (single-layer winding) for various core sizes versus wire gauge. If you use smaller wire, try to space the turns evenly apart to occupy 300° of the core area. Generally speaking, spaced turns will result in slightly less inductance than the calculated value from the A_L equation. Compressing the turns

will increase the inductance; spreading them will decrease the inductance.

I like to secure my toroid windings, once they are in place. This may be done by coating them with polystyrene Q Dope or polyurethane lacquer.

You may wish to secure the completed toroids on a PC board. I avoid flat mounting when I use one side of a double-sided board as a ground plane. The proximity of the turns to the copper ground plane introduces unwanted stray capacitance across the toroid winding, which in turn increases the apparent inductance of the winding. I do not object to flat mounting when I use single-sided PC boards.

Vertical mounting of toroids is practical when you want to reduce the overall area of your board. This is a space-saving technique. Vertical mounting calls for gluing the coil or transformer to the PC board. This prevents lead flexing, which can cause failure. I use a quick-setting epoxy cement for securing my vertical toroids. A generous blob of cement is placed under the toroid, which is usually about 1/16 inch

above the PC board. Normally, this is at the gap area of the toroid winding. Therefore, the epoxy cement does not cover the winding.

You may also cement flat-mounted toroids to a PC board. Use a small drop of epoxy cement at only two points where the toroid rests against the PC board. The two points should be 180° apart.

I hope these tips are helpful to you. Be sure to check the book references for more detailed information about toroidal coils and transformers.

Notes

- ¹J. Sevick, *Transmission Line Transformers*, 1st ed. (Newington: ARRL, 1987).
- ²Amidon Associates, Inc, 12033 Otsego St, N Hollywood, CA 91607, tel 818-760-4429.
- ³See note 2.
- ⁴Palomar Engineers, PO Box 455, Escondido, CA 92025, tel 619-747-3343.
- ⁵RadioKit, PO Box 973, Pelham, NH 03076.
- ⁶M. F. (D.) DeMaw, *Ferromagnetic-Core Design & Application Handbook*, 1st ed. (Englewood Cliffs, NJ: Prentice-Hall, Inc, 1981). □

ICOM IC-900 Multiband VHF/UHF FM Mobile Transceiver

Reviewed by Larry Wolfgang, WA3VIL

The ICOM IC-900 is a modular FM transceiver that is not a kit, yet you assemble its pieces to provide the frequency coverage you need above 28 MHz. You can customize the radio to cover any or all of the following ranges: 28 to 30, 50 to 54, 144 to 148, 220 to 225, 440 to 450 and 1240 to 1300 MHz. Control and interface circuitry can be the same for any radio, so why not make use of one control box and separate RF units for each band? That's exactly what ICOM has done with the IC-900. The review IC-900 included the basic control and interface modules, as well as the UX-29A 2-meter band module and the UX-39A 220-MHz band module. (ICOM calls these modules "units.")

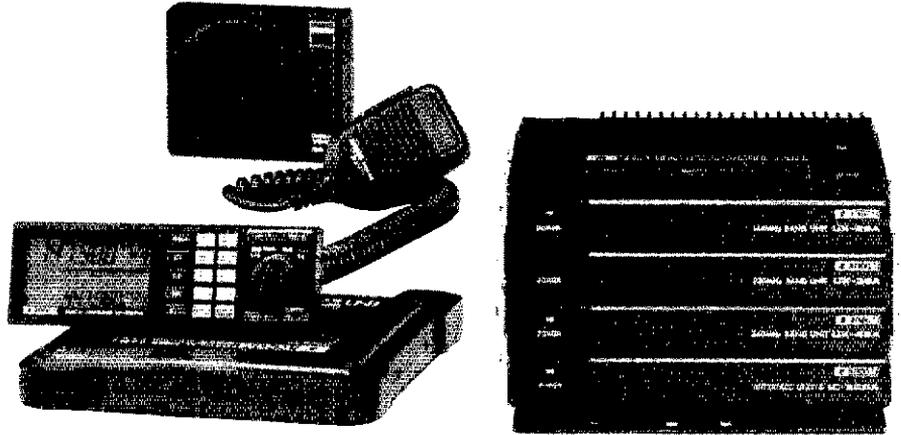
One of the first mobile ham radio installations I ever saw was an old Motorola unit that a friend had converted for use on 2 meters. This large radio had to be mounted in the trunk, with a control cable and small control head mounted under the dash. These days, though, modern VHF/UHF mobile radios are synonymous with compactness: They're small enough to mount under the dash or in another easy-to-reach place, in even the tiniest sub-compact cars.

Now ICOM has come up with a "new" innovation: A radio that can be mounted in the trunk or an out-of-the-way place, with a small remote-control unit that mounts on the dash! While this may seem like a return to an old idea, the IC-900 definitely makes use of the latest technology: It has microprocessor control of the various features, and a fiber-optic cable to carry control signals between the two interface units.

Parts, Parts and More Parts!

The IC-900 modules arrived in several boxes. After emptying them all onto a table, I ended up with: a speaker and microphone, one remote control head, two "interface units" (A and B), a 2-meter band unit and a 220-MHz band unit. In addition to these components, there was a host of other pieces. Here's an overview of the entire system.

After installation, the *remote controller* is the only visible part of the radio—assuming you mount the other modules in the trunk and/or under the seat as described in the instruction manual. Compared to any radio you might mount under the dash of your car, the controller is miniscule. In fact, this module is designed



to mount *on* the dash!

This tiny controller includes a 2¼- by 1¼-inch display and almost all of the operating controls for the radio. The largest operating control is the tuning knob, which measures ¾ inch in diameter. The other controls—20 push buttons and two slide switches—are tightly grouped. Beneath its surface, the remote controller is far more than a display and a bunch of controls, though: It's the brains of the operation! It includes the microprocessor, which accepts input from the control switches and sends the proper control signals to interface unit A, described next.

Interface unit A is designed to fit under a front seat. At seven inches square by an inch high, this box should fit just about anywhere you need it to. To permit you to listen to two band units simultaneously, two audio amplifier sections and two speaker jacks are included in interface unit A. One speaker jack is for the main audio, which includes the sound from both active band units; the other speaker jack is for the secondary band unit (ICOM calls the secondary band the "sub band"). If there is a speaker plugged into the speaker jack for the sub-band unit, each speaker provides audio from only one band.

Interface unit A also serves to send control signals to, and receive feedback from, interface unit B. A microphone extender cable plugs into interface unit A, so the microphone can reach the operator. Interface unit A must be connected to a 12-V source.

The hand-held microphone supplied with the IC-900 includes a 16-key dual-tone, multifrequency (DTMF) pad on the back. UP and DN (down) pushbutton switches are conveniently located on the top edge of the

microphone. These buttons are used for changing the operating frequency in the VFO mode, and for stepping through the memory channels when in memory mode. (More on this later.) The buttons also start the scan functions. A small slide switch just above the DTMF keypad turns the UP/DN buttons on and off.

Interface unit B provides the connections to the various band units and is connected to interface unit A by a fiber-optic cable. Interface unit B measures about 7 × 7½ inches and is 1 inch high. The band units stack on top of interface unit B, and this assembly is designed to be mounted in the trunk. Interface unit B also requires a connection to the 12-V supply. Interface unit B, in turn, has a row of rear-panel connectors to provide the power connection to each band unit.

As you build your stack of band units on top of interface B, you must install a 15-wire jumper cable between each unit and interface B. You must remove the front cover from each band unit to install the jumper, but the front cover is easily removable—it is a plastic cap that snaps into place on the metal box. I was surprised that ICOM chose to use 15 individual wires to make these jumpers. A piece of 15-conductor ribbon cable seems a better choice.

The mounting bracket for interface unit B allows one band module to be stacked directly on top of the interface unit. The band units come with a pair of extender brackets that attach to either side of the stack. All of the band units can be secured atop each other with these extenders.

Each band unit has a power cable equipped with a connector that plugs into the strip on the back of interface unit B.

Table 1**ICOM IC-900 VHF/UHF FM Transceiver, Serial no. 654-001349****Manufacturer's Claimed Specifications**

Frequency coverage: UX-29A band unit—transmitter 140.1-150.0 MHz; receiver, 138-174 MHz (specifications guaranteed 144-148 MHz). UX-39A band unit—220-225 MHz.

Mode of operation: FM.

Frequency display: Not specified.

Frequency resolution: 5 kHz.

Power requirements: 13.8 V dc ($\pm 15\%$) at 6 A max on transmit and 600 mA on receive.

Transmitter

Power output: For UX-29A and UX-39A, 25 W high power and 5 W low power.

Spurious signal and harmonic suppression: Better than 60 dB.

Receiver

Receiver sensitivity: Better than 0.18 μV for 12 dB SINAD for UX-29A and UX-39A.

Squelch sensitivity: UX-29A, less than 0.11 μV ; UX-39A, less than 0.13 μV .

Receiver audio output: More than 2.4 W.

Color: Black.

Size (height, width, depth): Remote controller, 2 x 5.9 x 1 inches; interface unit A, 1 x 7 x 7 inches; interface unit B and UX-29A and UX-39A band units, 1 x 7 x 7.6 inches.

Weight (lbs): Remote controller, 0.4; interface unit A, 1.1; interface unit B, 2; UX-29A and UX-39A band units, 2.4.

Measured in the ARRL Lab

As specified, except UX-39A receives 216-236 MHz.

As specified.

LCD, black digits with light background.

As specified.

13.8 V dc at 5.0 A on transmit (high power) and 2.7 A (low power), and 640 mA on receive.

Transmitter Dynamic Testing

UX-29A: high 27.1 W, low 5.4 W.

UX-39A: high 28.4 W, low 6.1 W.

See Figs 1 and 2.

Receiver Dynamic Testing

UX-29A: 0.145 μV for 12 dB SINAD;

0.275 μV for 20 dB quieting.

UX-39A: 0.15 μV for 12 dB SINAD;

0.315 μV for 20 dB quieting.

UX-29A, 0.09 μV min, 0.25 μV max. UX-39A, 0.13 μV min, 0.25 μV max.

2.53 W at 10% total harmonic distortion (THD) with an 8- Ω load.

In addition, each band unit has a coax pig-tail fitted with a female UHF connector at one end. Each of these connects to an appropriate antenna for the frequency range covered by that band unit.

The instruction manual indicates that a heavier power cable and a cooling fan for interface B are available options. These are required if you plan to use the 45-W 2-meter band unit (UX-29H). The manual suggests using the heavy duty power cable to reduce the voltage drop in the line and recommends the fan, especially to cool the radio in hot summer weather or during long transmissions. I did not have either of these accessories with the review unit, but I experienced no heat problems—even during a summer when the outside temperature soared into the 90s for more than 30 days in a row.

Installation

The lead photo for this review shows a complete IC-900 partially assembled. See what I mean about all the pieces? Assembling the IC-900 system isn't as overwhelming as it sounds once you have all the units in your hands. The instruction manual gives detailed directions for making the interconnections, and there are lots of clear diagrams showing how all the pieces go together.

I spent about an hour planning how to run the required cables and where to locate

the various boxes before I began to actually install the IC-900 in my car. I wasn't anxious to drill holes in the floor or trunk for the sheet metal screws included with the kit to attach the mounting brackets. That's when I realized that my car's carpet looked just like the loops on a strip of Velcro®! Several strips of adhesive-backed Velcro were included in the package, so I put some of them on the corners of the mounting brackets. Interface unit A was quickly secured under the front passenger seat, and interface unit B was stuck to the carpet in the floor of the trunk. I used some of the double-sided tape included with the kit to attach the remote control unit to the dash.

It didn't take long to find a hole through the firewall suitable for connecting the power cables to the battery. By removing a few screws, I was able to lift molding strips along the sides and floor, and I ran the power cable and fiber-optic control cable under these molding strips. Figs 3 and 4 show the remote controller and the interface unit B/band unit stack mounted in my car.

Instruction Manual

The IC-900 instruction manual is a 40-page document that provides detailed installation and operating information. It does not include a description of the circuit theory of operation, nor an extensive troubleshooting section. There is a one-

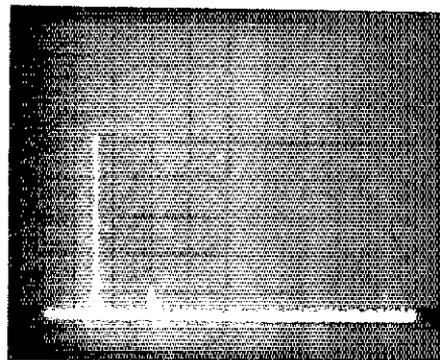


Fig 1—Worst-case spectral display of the ICOM IC-900 using the UX-29A 2-meter band unit. Each horizontal division is 100 MHz; each vertical division is 10 dB. Output power is approximately 27 W at 146 MHz. The fundamental has been reduced by approximately 28 dB with notch cavities to prevent analyzer overload. All harmonics and spurious emissions are at least 69 dB below peak fundamental output. The IC-900/UX-29A complies with current FCC specifications for spectral purity.

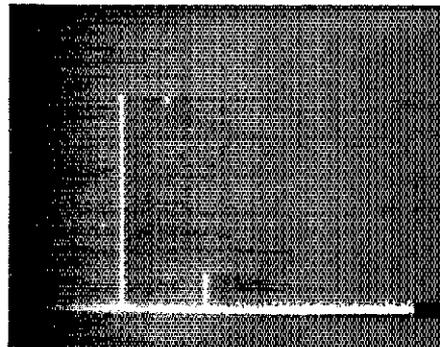


Fig 2—Worst-case spectral display of the ICOM IC-900 using the UX-39A 220-MHz band unit. Each horizontal division is 100 MHz; each vertical division is 10 dB. Output power is approximately 28 W at 222 MHz. The fundamental has been reduced by approximately 18 dB with notch cavities to prevent analyzer overload. All harmonics and spurious emissions are at least 66 dB below peak fundamental output. The IC-900/UX-39A complies with current FCC specifications for spectral purity.

page block diagram, but no schematic diagram of the various modules.

Each band unit comes with a small booklet showing how to unpack and install that band unit to the interface unit B stack. There is also a 12- by 27-inch sheet of paper that includes a complete schematic diagram of the band unit and a block diagram showing how the other units interconnect with it.

The instruction manual gives clear, step-by-step instructions for assembling the pieces of the radio and installing them in a vehicle. It also provides detailed instructions covering every aspect of operating the radio to take the most advantage of its many characteristics. There may be a few typos, and there are certainly some instruc-

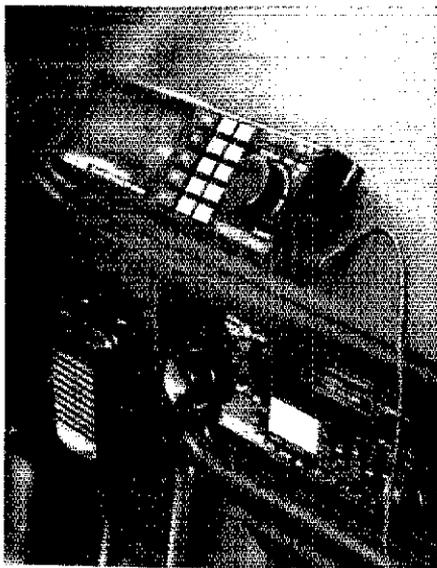


Fig 3—IC-900 remote controller attached to the car dashboard.

tions that could be stated more clearly. The manual is very good overall, however, and I was able to find (and understand) all of the information I needed to enjoy operating the IC-900.

Programming the Radio

The IC-900 is a versatile radio. The remote control unit can address two band units at once. This means you can receive signals on two separate bands, with both signals coming through the same speaker, or with a separate speaker for each band. The remote control unit stores complete operating conditions in each of 10 memories for both bands. This means you can program just about any transmit offset into any memory channel. You can also program a subaudible tone frequency or set the radio to skip over certain channels in the scan mode.

This radio is complicated enough that I had to read the instruction manual to learn how to program the memories. In fact, I had to read through the process a couple of times and practice the maneuvers before I was able to remember how to do it on my own. Most of the labels on the control buttons are self-explanatory, but there are a few that are not immediately obvious. You'll want to study the manual to become familiar with the operation of all the control buttons.

When you press the SET button, the radio begins a special sequence that allows you to program various operating conditions. First is the tuning step. Allowable steps depend on the band unit you are using at the time, but for most band units you can select steps of 5, 10, 15, 20 or 25 kHz. You also select the transmit offset and subaudible tone frequency.

The next two steps in the SET sequence allow you to specify the limits for the programmed scan feature. If you have more than two band units connected to interface unit B, you will also be given the chance to select which two you want to have active. There are some additional steps in this sequence if you have certain options installed. Some band units provide RIT, so you can select the tuning step for this feature. Two optional squelch units are available: a digital code squelch unit and a tone squelch unit. These allow selective calling (in which either a certain digital code or a specific tone must be received to open the squelch and activate the receiver). The SET sequence allows you to activate or deactivate these squelch units.

I mentioned that each band unit has 10 memories, but I discovered that I could program 12 different frequencies into the IC-900! In addition to the memories, there is a CALL channel. This frequency can be accessed at any time by pressing the CALL button. Repeater offset, subaudible tone and other operating conditions can be

programmed into this channel. The last "memory" channel is the VFO. After you have programmed the 10 memory channels and the CALL channel, you can set up the VFO with still another set of operating conditions.

Operating Impressions

For such a small piece of equipment, the remote control unit sure does a lot! Nearly half of its width is taken up with the display, and another 1½ inches are for the tuning knob and the squelch and volume buttons. The 12 buttons that provide nearly all of the control features are packed into a 1½-inch-wide space. Each of those buttons is about ½ inch wide and ¼ inch high. Although the buttons are small, I had little trouble operating them with my somewhat clumsy fingers.

Several people have commented, after looking at the IC-900, that they would rather have rotary controls for the squelch and volume controls. I found that having two buttons to increase and decrease squelch and two more to control the volume was quite convenient. Once I learned where those buttons were, it was a very simple matter to reach over and tap a button to change the volume while driving. Even at night, I can easily find the right button. (The volume-up button is at the bottom right edge and the volume-down button is just to the left of that. The squelch buttons are along the top right side of the remote control unit.)

There are two seldom-used slide switches along the right end rather than on the front panel with all the other controls. One switch changes the background illumination of the display. The other locks the microprocessor (to keep you from making accidental changes to the radio's operating conditions). With the microprocessor locked, you can still change the squelch and volume levels, switch between high and low power and turn off the audio from the sub band.

What is the sub band? The remote control unit can access two band units at once. You can only transmit on one band at a time, however. That band is called the main band. The other band, then, is called the sub band. By pressing the SUB button, you can tune this second band, program its memories, or do anything else except transmit. When you want to transmit with the sub band, you use the M/S button to swap the main- and sub-band frequencies.

Listening to the audio from the sub band while you are trying to carry on a conversation (or even listen to one) on the main band can be quite distracting. Pressing the button labeled S.MUTE once turns off the sub band audio, and pressing it again turns the audio back on. Turning the power to the radio off and back on also turns the sub band audio on again.

There is a button labeled CHECK. While you hold this button in, the receiver

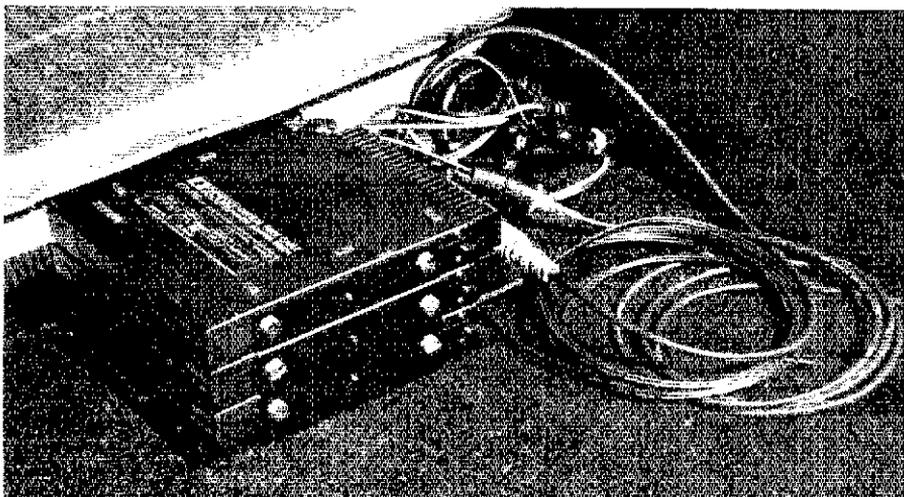


Fig 4—Interface Unit B and the 2-meter and 220-MHz band units make a neat stack in the cargo area of the car.

monitors the transmit frequency. This helps you determine if a station that you are listening to on a repeater is in simplex range. You will not be able to transmit on the normal receive frequency by holding in this button, however. (Some radios do this; with them, you can call another station on the repeater output frequency without going through the repeater.)

Another button that I find quite useful is the MHZ button. Press it once and the tuning knob changes the operating frequency in 1-MHz steps. Press the button again to change back to the programmed tuning step.

Depending on how you mount the remote-control unit, you may find it a bit difficult to read the labels on some of the buttons. In my car, the radio is mounted on the dash, just to the right of the instrument panel. This part of the dash is tilted slightly. It seems nearly ideal to slant the control panel toward my eyes. Because the remote controller is a bit to my right, however, I do not look straight at the panel. The buttons are silver colored, with the letters cut out of the surface to form the labels. This gives the appearance of black lettering on the silver surface during the day. Depending on how the buttons reflect the light, they can be difficult to read—unless I lean over to look straight at the control panel. When the power is on, the labels are backlit. This isn't very noticeable during the day, but at night it does make them easier to read. (I have seen control panels that are easier to read even at night, though.)

The wide tuning range of the UX-29A 2-meter band unit provided some interesting listening. I especially enjoyed being able to program the local National Weather Service channel into one of the memories. This is especially handy for traveling, since it is a simple matter to dial up a local channel and listen to the latest weather info.

I should mention a few concerns that I have about the IC-900. The first is the cable that goes between the remote control unit and interface unit A. It consists of a very thin wire (read "delicate and easily broken") that reminds me of the wires used on the popular lightweight personal stereo headphones. With a miniature stereo plug on both ends, this wire is, I think, likely to be damaged rather easily. Before I installed the IC-900, several people commented that the remote-control cable wouldn't last a week. For them, it probably wouldn't! When I installed the radio, I carefully placed the remote-control cable under some trim moldings to protect it and keep it out of the way. Still, portions of the cable must be in the open, and if it gets caught on something and is stretched or pulled, I think it could break easily.

Another item of concern is the fiber-optic link between interface units A and B. The instruction manual cautions you against bending the cable in a radius of less

than 25 mm (about an inch) and against bending it side to side or cutting it. I'm left to wonder how much of a nick in the outer covering would damage the cable, or how much side-to-side flexing the cable will withstand. How quickly will it break if a bend becomes too sharp, making a corner with less than a 1-inch radius?

I didn't have any trouble with either of these concerns. I suggest you be as careful as I was to hide the wires and fiber-optic cable behind moldings and under carpets to protect them from damage.

Summary

Only one problem occurred with the IC-900 during the review period. During initial testing, intermittent connection in

interface unit A caused the rig to transmit unexpectedly. Interface unit A was returned to the dealer and repaired promptly.

Otherwise, the IC-900 performed flawlessly. It offers a lot of features, yet can be operated after just a little study. If you are interested in operating on several of the popular VHF and UHF bands from your car, but don't know how you could fit several radios under the dash, the IC-900 may be the radio for you.

Manufacturer: ICOM America, Inc, 2380 116th Ave NE, Bellevue, WA 98004, tel 206-454-7619. Price class: IC-900 interface units and remote control unit, \$639; UX-29A 2-meter band unit, \$299; UX-39A 220-MHz band unit, \$349.

YAESU FT-212RH 2-METER AND FT-712RH 70-cm FM TRANSCEIVERS

Reviewed by Jay Mabey, NU0X, and Kirk Kleinschmidt, NT0Z

The controls of Yaesu's new mini-mobile FM transceivers are identical (only the frequency coverage and power output differ), so we decided to review them together. The FT-212RH covers 140 to 174 MHz on receive and 140 to 150 MHz on transmit. The FT-712RH covers 430 to 450 MHz. Both rigs offer a solid lineup of standard features—and a few not-so-standard ones, such as an optional built-in digital voice recording module that doubles as an answering machine for you and your friends.

The first thing you will notice about the radios is their size—they are quite small, measuring approximately 1.75 × 5.5 × 6.5 inches (height, width, depth). That's about the size of a thick paperback book with a three-inch-thick heat sink attached to the spine. The '212 and '712 should be easy to install in almost any mobile installation. A sturdy mounting bracket is included with the rigs, and the three (and only three) rear-panel connectors (a power cable, a cable-mounted RF output connector and an external speaker jack) add to the rig's ease of installation.

General Operation

Since Jay's arrival in Connecticut from North Dakota, he hasn't been actively involved in the 2-meter FM mobile scene. Aside from a little traffic handling, Jay's had very little experience with metropolitan repeaters. When he was asked to review the FT-212RH, he was excited at the idea of having a radio in the car again!

The setup in Jay's car uses a Larsen through-the-windshield antenna, with the radio mounted on the rear of the center console. This system is aesthetically pleasing, but it's extremely difficult to see the radio's controls. The FT-212RH front panel design is so clean and open, though, that this lack of visibility is not a serious problem. Some

other multifunction radios are more cumbersome—you accidentally push three buttons when you mean to push one!

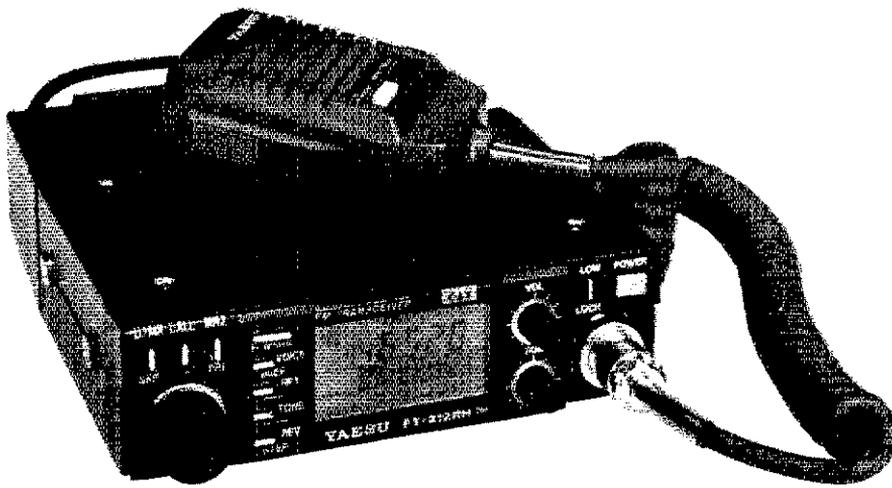
The front panel has 13 controls. Most buttons have a primary and an alternate function, much like a scientific pocket calculator. Primary functions are indicated by white labels on the front panel; secondary functions are labeled in blue. For example, momentarily pressing the F/WRITE button (used as a function key as well as for programming frequencies into the unit's memories) and then pressing the REV button allows the user to select the rig's tuning rate (by rotating the main tuning knob, which is normally used to change the operating frequency!). Getting used to these multiple functions can be confusing, but the result is that the tiny front panel is relatively uncluttered.

The '212 and '712 incorporate a system of high- and low-pitched musical notes to indicate all selected functions, making the transceiver appropriate for visually impaired operators. For those who cringe at the thought of a beeping radio, the beep volume is controlled by the main volume control, and the tones may be disabled by pressing the front-panel BEEP button.

Other Features

We must first compliment Yaesu on the excellent operating manual included with the rigs. A schematic diagram and a quick reference card are also included. (Only the hardiest of hams will look forward to repairing or modifying these radios, however. The insides look like a VLSI modern-art masterpiece—it's fascinating to look at, but most hams would not want to tackle a do-it-yourself repair job.) After unpacking a new radio, it's a good idea to read the manual from cover to cover. This manual is both interesting and informative. Each of the different functions and options is described in detail, and examples are given to assist the owner with the unit's many features.

The FT-212RH features a selectable 5- or 45-watt RF output. The 70-cm



FT-712RH puts out 3 or 35 watts. The use of surface-mount components, modular circuit construction, and a compartmentalized, die-cast chassis make the transceivers both reliable and rugged (as proven by the trial by fire on Connecticut roads).

The liquid-crystal display (LCD), which includes a power/S meter and frequency readout, also shows some 20 other operating parameters. As with many LCDs, the display is somewhat difficult to read in very high ambient light levels—even though Yaesu has included an ambient light sensor to control the legibility of the display. Front-panel controls (with the notable exception of the main power switch and the high/low power switch) are backlit for ease of viewing at night.

For high ambient noise level installations, several optional external speakers (Yaesu SP-3, SP-4 and SP-55) are available for placement near the operator position.

You can also purchase the optional lightweight headset/minature boom microphone (YH-1) for hands-free operation.

The '212 and '712 have 18 general-purpose memories for storing programmable (+ or -) repeater shifts or independent transmit/receive frequencies. There are also three special memories, including C for call channel memory and L and U memories, which are used only in the programmable memory scan mode for storing upper and lower scanning limits (more on this later). One-touch repeater reverse and priority channel monitoring are very easy to set from the front panel.

For those interested in packet radio, the Yaesu transceivers are easily modified to provide microphone jack connections for most popular TNCs. One minor inconvenience: For packet operation, the connection for the tone-burst button on the microphone must be removed and a jumper

must be added to extend the squelch line to the microphone jack. The radio must be partially disassembled, and some soldering is required to perform these modifications. (These mods are easy to perform.) The microphone jack also has connections for controlling the transceiver from an external personal computer.

The test rigs were not equipped with Yaesu's optional digital voice system (DVS), but DVS appears to be an interesting option—one worthy of consideration. The DVS unit allows user-programmable recording and playback of messages—either locally or remotely—by use of dual-tone multifrequency (DTMF) control codes. Messages are stored in RAM, and the memory may be used as a single block or divided into four or eight segments. Incoming messages can be recorded by stations having access to your private station ID number.

Operation

After turning on the main power switch, the first order of business is to tune in your favorite repeater. This can be accomplished by turning the large rotary tuning knob, or by pressing the up/down pushbuttons on the hand microphone. Selectable tuning rates are 5, 10, 12.5, 20 or 25 kHz per step. Scanning functions are also activated by pressing (and holding for a short time) the microphone up/down buttons. If the radio is in "dial mode," the entire band, or a portion thereof, will be scanned. If "memory mode" is selected, the memory channels will be scanned.

Using the memories is simple. To store a set of parameters in memory simply press the F/WRITE button, hold for a half-second, select the memory number and press F/WRITE again. The displayed frequency and selected repeater split are now stored in memory. To recall memories, simply press the D/MR button (a toggle between dial and memory tuning) and

Table 2
Yaesu FT-212RH 2-meter FM Transceiver, Serial no. 7N050451

Manufacturer's Claimed Specifications

Frequency coverage: 144 to 148 MHz.

Mode of operation: FM.

Frequency display: Not specified.

Frequency resolution: 5 kHz.

Power requirements: 13.8 V dc ($\pm 10\%$) at 10 A max on transmit and 500 mA on receive.

Transmitter

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

Spurious signal and harmonic suppression: Better than 60 dB.

Receiver

Receiver sensitivity: Better than 0.18 μV for 12 dB SINAD.

Squelch sensitivity: Not specified.

Receiver audio output: At least 1.5 W at 5% total harmonic distortion (THD) with an 8- Ω load.

Color: Black.

Size (height, width, depth): 1.75 x 5.5 x 6.5 inches.

Weight: 2.8 lbs.

Measured in the ARRL Lab

Transmitter: 140.0 to 150.0 MHz;
receiver: 140.0 to 174.0 MHz.

As specified.

6-digit LCD, black digits with white background.

As specified.

13.8 V dc at 7.75 A on transmit high power) and 2.75 A (low power), and 460 mA on receive.

Transmitter Dynamic Testing

Low, 5 W; high, 47 W.

See Fig 5.

Receiver Dynamic Testing

0.18 μV for 12 dB SINAD.

0.27 μV for 20 dB quieting.

0.13 μV min, 0.34 μV max

1.95 W at 10% THD with an 8- Ω load.

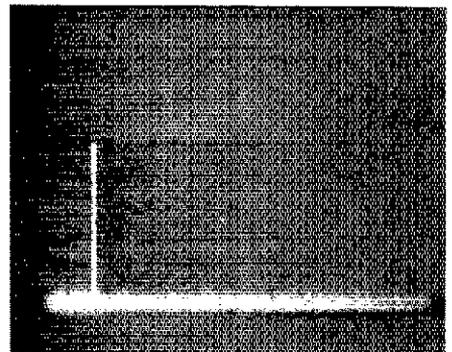
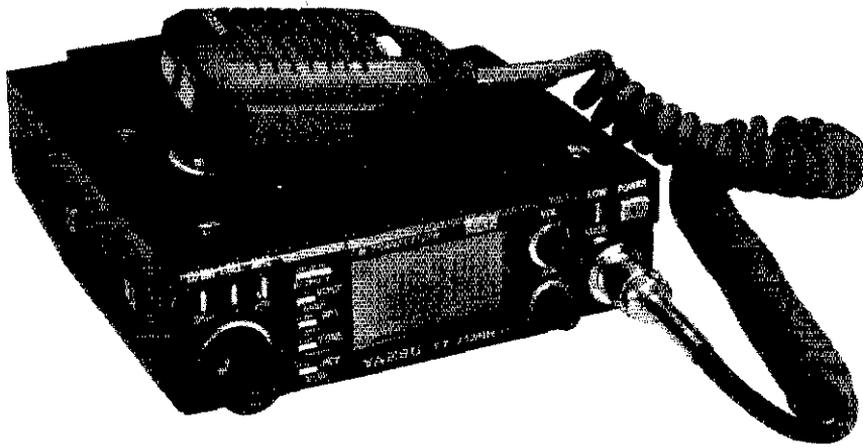


Fig 5—Worst-case spectral display of the Yaesu FT-212RH. Each horizontal division is 100 MHz; each vertical division is 10 dB. Output power is approximately 45 W at 146 MHz. The fundamental has been reduced by approximately 30 dB with notch cavities to prevent analyzer overload. All harmonics and spurious emissions are at least 70 dB below peak fundamental output. The FT-212RH complies with current FCC specifications for spectral purity.



rotate the main tuning knob to select the desired memory. The '212 and '712 also have memory scanning, with the ability to skip certain memories if desired (for example, to keep the transceiver from constantly stopping on a busy local repeater).

As mentioned previously, the U and L memories work together to form the upper and lower limits of a programmable sub-band. The C memory, or call channel, can be recalled instantly via a front-panel push-button and is helpful for storing an often-used frequency, such as a local repeater or simplex channel. Priority channel monitoring is also included. This feature is fairly standard, and allows the monitoring (every five seconds) of a particular selected frequency while the transceiver is operating on a different frequency.

Summary

The FT-212RH and FT-712RH are very easy to operate and remarkably simple, despite their bells and whistles. Audio quality is good in all but very noisy environments. The impressive 45 watts of RF output (35 watts for the '712) is also an asset, especially for mobile operation. The units

are designed to be removed easily from the mobile mounting bracket, which is conducive to both base/mobile operation and theft protection.

These mini-mobiles are representative of the current crop of compact FM mobile transceivers, and warrant consideration if you are looking for a small, versatile and easy-to-use radio. Overall, Yaesu has come up with two well-built, flexible, transceivers in the '212 and the '712.

Price class: FT-212RH, \$460; FT-712RH, \$500. Manufacturer: Yaesu USA, 17210 Edwards Rd, Cerritos, CA 90701, tel 213-404-2700.

SOLICITATION FOR PRODUCT REVIEW EQUIPMENT BIDS

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

The following ARRL-purchased Product Review equipment is for sale to the highest

bidder. Prices quoted are minimum acceptable bids and reflect a discount from the purchase price.

Sealed bids must be submitted by mail and be postmarked on or before December 27, 1988. Bids postmarked after the closing date will not be considered. Bids will be opened seven days after the closing postmark date. In the case of equal high bids, the high bid bearing the earliest postmark will be declared the successful bidder.

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

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

ICOM IC-761 160- to 10-meter transceiver, serial no. 01440, with SM-10 desk microphone (sold as a package only; see Product Review, September 1988 *QST*). Minimum bid \$1506.

Kenwood TS-680S 160- to 6-meter transceiver, serial no. 8111053, with YG-455C-1 500-Hz CW filter, VOX-4 VOX unit, IF-10C computer interface and PS-430 power supply (sold as a package only; see Product Review, October 1988 *QST*). Minimum bid \$825.

Kenwood AT-250 automatic antenna tuner, serial no. 7100135 (see Product Review, October 1988 *QST*). Minimum bid \$238.

ICOM IC-575A 10- and 6-meter multimode transceiver, serial no. 01012 (see Product Review, October 1988 *QST*). Minimum bid \$789.

Table 3

Yaesu FT-712RH 70-cm FM Transceiver, Serial no. 8C050021

Manufacturer's Claimed Specifications

Frequency coverage: 430 to 450 MHz.

Mode of operation: FM.

Frequency display: Not specified.

Frequency resolution: 5 kHz.

Power requirements: 13.8 V dc ($\pm 10\%$) at 10 A max on transmit and 500 mA on receive.

Transmitter

Power output: Low, 3 W; high, 35 W.

Spurious signal and harmonic suppression: Better than 60 dB.

Receiver

Receiver sensitivity: Better than 0.18 μV for 12 dB SINAD.

Squatch sensitivity: Not specified.

Receiver audio output: At least 1.5 W at 5% total harmonic distortion (THD) with an 8- Ω load.

Color: Black.

Size (height, width, depth): 1.75 \times 5.5 \times 6.5 inches.

Weight: 2.8 lbs.

Measured in the ARRL Lab

As specified.

As specified.

6-digit LCD, black digits with white background.

As specified.

13.8 V dc at 8 A on transmit (high power) and 2.75 A (low power), and 490 mA on receive.

Transmitter Dynamic Testing

Low, 4.7 W; high, 40.3 W.

See Fig 6.

Receiver Dynamic Testing

0.17 μV for 12 dB SINAD.

0.27 μV for 20 dB quieting.

0.12 μV min, 0.34 μV max

2.14 W at 10% THD with an 8- Ω load.

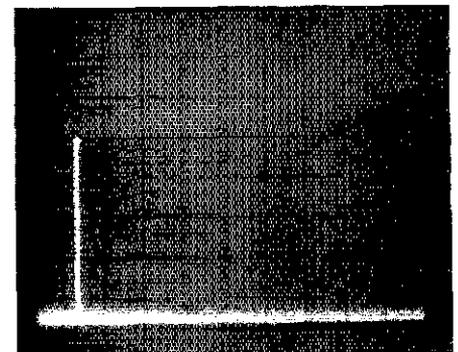


Fig 6—Worst-case spectral display of the Yaesu FT-712RH. Each horizontal division is 100 MHz; each vertical division is 10 dB. Output power is approximately 40 W at 440 MHz. The fundamental has been reduced by approximately 30 dB with notch cavities to prevent analyzer overload. All harmonics and spurious emissions are at least 72 dB below peak fundamental output. The FT-712RH complies with current FCC specifications for spectral purity.

MODIFYING THE MFJ 900 SERIES ANTENNA TUNERS FOR 160 METERS

□ The instructions for the MFJ 300-watt antenna tuners (models 941-945) state that arcing and excessive heating may occur when the tuners are used for 160-meter operation, and suggest reducing power to a point at which arcing and overheating cease. I believe the cause of this problem is the presence of a ferrite toroidal core at the center of a large, tapped air-core coil. (The toroid increases the tuners' matching network inductance at 160 meters.)

In my tuner, the toroidal coil consisted of six turns of plastic-covered no. 20 copper wire wound on a 1-inch-diam core. This assembly is enclosed within two plastic connector covers (diam 1¼ inches) and mounted in the center of the tuner's large, air core inductor. (Because of the small number of turns [six] on the toroidal core, I believe the core material is ferrite.)

The stock toroid's inductance was insufficient to allow the tuner to match my antenna to my rig at 1.8 MHz. Increasing the number of turns from 6 to 14 widened the tuner's range sufficiently to match my antenna to the radio, but applying 100 W to the tuner caused SWR rise, tuning drift and heating in the toroid.

I solved this problem by replacing MFJ's toroid with an inductor consisting of 35 turns of plastic-covered no. 20 wire on a T-200-2 powdered-iron core [OD 2 inches, Carbonyl E material, available from Amidon, Palomar Engineers, Radiokit and other suppliers—Ed.]. (I determined the number of turns empirically; your matching situation may require more or fewer turns. Also, you can make a better coil/core assembly than mine by covering the core with glass tape, winding the coil and covering the winding with glass tape. If possible, apply Q dope to further protect the winding.) I mounted the completed toroid on a modified thread spool and secured the spool to the tuner base with a long no. 6-32 machine screw, nuts and lock washers.

This modification works: I've since used my MFJ tuner in three 160-meter contests with no arcing or overheating problems. —Thomas Jones, K6TS, 1339 Hillview Dr, Livermore, CA 94550

STABLE HIGH-VOLTAGE METERING

□ K1FO's comments on drift in high-voltage (HV) metering circuits¹ brought to mind the initial troubles I had with my 3-kV plate supply, built 27 years ago and still in daily use. The original carbon resistors drifted so much that "accuracy in measurement" took on a wholly new dimension: If the meter read zero, the HV was probably off, but if the meter read anywhere upscale,

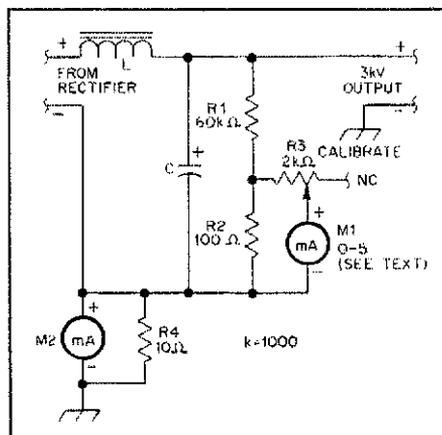


Fig 1—Mark Mandelkern's stable HV metering circuit. M1 meters voltage (0-5 kV) through the action of R1 (the existing supply bleeder), R2 (an added meter shunt) and R3 (an added meter multiplier, here made adjustable to allow calibration of the meter). M2 meters HV supply current, R4 is the existing anode-current meter shunt, and L and C compose the HV filter. See text.

R2—100-Ω, 10-W wirewound. Although this part dissipates less than ¾ watt in this application, using a high-wattage, wire-wound unit ensures stability, safety and bleeder reliability.

R3—2-kΩ, 2-W wirewound potentiometer.

the HV was probably on!

After a few years of this, I thought of using wirewound resistors. When I considered the values available, the cost involved and the space required, adding a wirewound-resistor metering circuit took on the aspect of adding another power-supply bleeder! That's when it occurred to me that the bleeder *already present in the supply* could serve as a bleeder and meter voltage multiplier *at the same time*. Reworking the bleeder to do double duty only involved the addition of one small wirewound resistor at the ground end of the bleeder string (to develop a low voltage proportional to the full supply output) and a small potentiometer for meter calibration. The circuit is shown in Fig 1. Its calibration hasn't drifted in over 20 years.

Fig 1 shows typical values for a meter capable of reading 5 kV full scale. For other HV levels, bleeder currents and meter ranges, adjust the values accordingly. The bleeder (R1, 60 kΩ) draws 50 mA at 3 kV; at the hypothetical 5 kV level (the desired full scale capability of M1), the bleeder would draw about 83 mA. Adding R2 causes a voltage drop (8.3 V at 83 mA) suitable for use in HV metering. This voltage is applied to M1 (5 mA full scale) via a multiplier resistor (R3, the CALIBRATE control). Solved for R with 8 V and 5 mA, Ohm's Law indicates that R3 should be 1.66 kΩ. The 2-kΩ control used at R3 allows ample

leeway for variations in the values of R1 and R2, and for the slight shunting effect the meter and multiplier have on R2. If a suitable HV meter is unavailable as a calibration standard, temporarily install a variable-voltage autotransformer in the HV power transformer primary. Use the autotransformer to reduce the supply output voltage to a level at which calibration is feasible.

This metering method is safer than connecting a multiplier directly to the HV bus—a technique that requires special attention to the meter ground lead and can present a dangerous voltage at the meter (probably on the equipment front panel!) if the meter fails open. The metering circuit at Fig 1 can also indicate bleeder failure, a safety feature not usually included in HV supplies: If R1 fails open, M1 does not deflect.²—Mark Mandelkern, KN5S, 5259 Singer Rd, Las Cruces, NM 88005

SIMPLER CW/RTTY MODE CHANGES WITH THE AEA PK-232

□ After I'd sorted out various options for equipment control and interconnection, CW and RTTY operation with my Advanced Electronics Applications PK-232 multimode communications processor and IC-751A transceiver went well—except for one snag. I prefer to copy code aurally and use the PK-232 only to transmit during CW operation. To do this, as the PK-232 manual says, you must "disconnect your microphone cable from the PK-232 to the radio so that the radio does not hang in transmit."³ The culprit is the PK-232-to-transceiver PTT-line connection, which, in my setup, must be present for RTTY operation but absent during CW operation. Without this connection, the PK-232 cannot switch the IC-751A into RTTY transmit; *with* this connection, the IC-751A transmits a continuous carrier when the PK-232 is commanded to transmit CW! The need to plug and unplug this connection—or install a switch in the PTT line—seemed to be an unnecessary complication of an otherwise elegant PK-232/IC-751A/PC system. There *had* to be a better way!

There is. Lacking the program documentation necessary to figure out a suitable software PTT switch, I looked for an automatic hardware solution. The PK-232 schematic shows signal lines labeled CW and CWN. I suspected that the state of these lines would indicate whether or not the PK-232 is in the CW mode. Tests confirmed my hunch.

²This brings up a high-voltage safety point: A zero HV indication does not necessarily mean that a given power supply is safe to work on. Switch the supply off, watch the HV meter indication drop to zero and *unplug the supply from the ac mains*. Then, short the supply's filter capacitors with a shorting stick—a heavy grounded cable secured to a long, dry wooden handle.

³PK-232 Operating Manual, p 4-4.

¹S. Powlshen, "Improving the K1FO 8874 432-MHz Amplifier," *QST*, Jul 1987, pp 20-23.

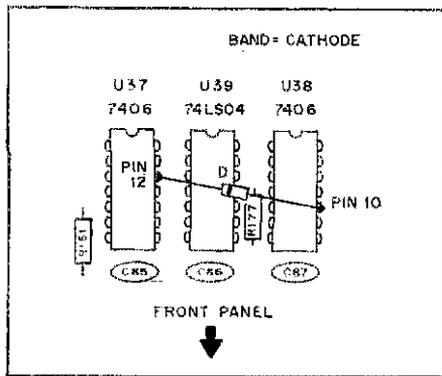


Fig 2—Guy Olbrechts solved his PK-232/IC-751A compatibility problem with this modification. Addition of a diode, D, disables the PK-232's PTT output during CW operation, allowing the transceiver's keyed VOX circuitry to handle TR switching. D is a silicon switching diode (1N914, 1N4148 and others suitable). See text.

Armed with this information, I disabled the PK-232's CW-mode PTT output by adding just *one* component—a silicon switching diode—to the '232. I installed the diode between U37 pin 12 and U38 pin 10, with its cathode at U37 pin 12 on the PK-232 circuit board (see Fig 2). U37 and U38 are close together, allowing the diode leads to be soldered right to the IC pins.

This modification works as follows: The fifth section of U38 (U38 pins 10 and 11) is in series with the '232's PTTN line. PTTN is low when the '232's PTT output goes low to switch the associated transceiver into transmit. The signal at U38 pin 10 is high in this situation. With the diode installed, however, the '232's CWN line—low when the PK-232 is in CW mode—pulls U38 pin 10 low through the diode, keeping the PK-232's PTT output high regardless of whether the PK-232 is in CW transmit or CW receive. This allows the IC-751A's semi-break-in function to handle CW TR switching functions. When the PK-232 is in the RTTY mode, the CWN line is high and the '232 works as if the diode isn't there. Note: I haven't yet tried my PK-232 on AMTOR or packet; I assume that the diode will not affect operation of the PK-232 in those modes.—*Guy Olbrechts, NY7O, 4809 116th Ave SE, Bellevue, WA 98006*

AN UMBRELLA ANTENNA

□ While I was going to work one rainy day in the Pacific Northwest, a strong gust of wind turned my umbrella inside out and made my friends laugh. When I got to work, I fixed my umbrella and let it dry in an open area with my coworkers' umbrellas. Looking at them gathered in the corner of the room reminded me of dish antennas with handle-shaped feed horns! *This* thought, combined with the memory of my inside-out-umbrella experience of earlier in the day, gave me the idea of basing a $\frac{1}{4}$ -wave, 2-meter ground plane antenna on

an umbrella frame. As soon as I got home that day, I started work on the project.

I found an old collapsible umbrella that looked just right for the job. (The right umbrella for the job should [1] be expendable; [2] have a straight, and not curved, grip; [3] have a telescoping metal handle; and [4] have a spoke assembly that is insulated from the handle.) I attached a coaxial feed line to the umbrella by soldering the coax braid to the spoke assembly and the coax center conductor to the metal umbrella handle (just above the plastic spoke bushing, with the umbrella handle up). To improve the performance of the spokes as a ground plane, I soldered connecting wires between the spokes close to the hub. Using an SWR meter and hand-held transceiver, I adjusted the length of the telescoping handle for minimum SWR (between 1.3:1 and 1:1 in this case). I soldered the handle sections together to preserve this adjustment. To help preserve the shape of the inside-out spoke assembly, I threaded nylon fishing line through the holes at the end of the spokes, pulled the line taut and tied it. Finally, I threaded a long machine screw into the plastic umbrella handle—at the top of the vertical antenna element—to allow the umbrella antenna to be hung from an antenna mast.

The antenna works! I can bring up a lot more repeaters with my hand-held transceiver now than I could before.—*Oscar Naimi, N7FXV, 24012 7th Ave W, Bothell, WA 98011*

NOISE BRIDGE AUDIO LINKS

□ Last year, while contemplating a move to a new house with a new antenna system, I decided to build my own 20- and 15-meter Yagis. After running computer design programs for the antennas and the gamma matching stubs, I sought a similarly accurate method of adjusting the matching devices—a method that would not require multiple trips up and down the tower to check the system SWR in the shack.

Part of my solution to this problem was to use a noise bridge at the antenna. Using a noise bridge at any other location—separated from the unknown impedance by a length of feed line—requires that the length of the feed line be known. (Feed-line lengths that are multiples of electrical $\frac{1}{2}$ λ allow R and X to be read directly from the bridge dials with no additional calculations; other lengths require correction of the bridge readings according to the electrical length of the line.)

The difficulty with locating the noise bridge at the antenna is that the station receiver has to be left in the shack. I solved this problem by having a helper transmit the receiver audio from the shack to me on the tower by means of hand-held VHF transceivers. This is now standard practice at my station, and it makes antenna adjustment bearable, even in the winter months.

—*David Rodman, MD, KN2M, 368 Hedstrom Dr, Buffalo, NY 14226*

□ Lugging the station receiver outside for noise bridge measurements can be avoided by using a "wireless" intercom at the end of an extension power cord. (Actually, *wireless* is a misnomer in this case because such intercoms use the ac power lines for interconnection!) Tune the station receiver to the desired frequency and place the speaker or headphones near the shack intercom unit. Press the intercom HOLD button and take the companion intercom unit—plugged into the extension cord—to the antenna site. Connect the noise bridge to the antenna, and connect the feed line to the noise bridge RECEIVER terminals. Now, you can adjust, cut and try to your heart's content! If you're using an impedance bridge and a dip meter instead of a noise bridge, the intercom can be used to keep track of the dip meter frequency as it varies with tuning and loading.—*Arthur C. Erdman, W8VWX, 224 Chaucer Ct, Worthington, OH 43085*

AK7M: Depending on the distance between the shack and the antenna site, a long speaker cord might suffice as a wire "noise bridge remoter." If a radio link is what you need, though, and hand-held ham transceivers aren't available, 49-MHz transceivers may provide the solution. Speaking of solutions and their problems, let's not leave the subject of noise and impedance bridges until Arthur Erdman clues us in on an effect worth watching for:

"If a smooth bridge null (down to almost zero) cannot be obtained and all calculated [matching network] values appear to be correct, don't overlook the possibility that a local AM or FM broadcaster is inducing an unwanted voltage in the system. In my case, when I tune even a short vertical to the broadcast band and listen in with a pair of headphones connected in series with the impedance bridge indicator, I can receive several stations—just like a crystal set! The strongest station produces an indication of over 100 μ A in an RF ammeter connected between the antenna base and ground; the nearest station is 7 miles away!

"Traps aren't the solution in this case; they add reactances that throw measurements and adjustments off. Adjusting for the best SWR at a transmitter power sufficient to mask the effects of the unwanted signals is the way to go—but remember that increasing power means increasing QRM!"

SOME THOUGHTS ON PANEL LABELING

□ When commercial ham equipment is modified sufficiently to require front-panel marking changes, or homegrown gear is to be polished up a bit, it's usually difficult to make the front panel labeling look decent and fit in with the rest of the station. I faced this problem after I modified my Heathkit® SB-200 amplifier to cover the 160- and 12-meter bands.⁴ As a result of my modifications, the SB-200's TUNE and BAND switches required relabeling, and I

⁴S. M. North, "Putting the Heath SB-200 on 160 Meters," QST, Nov 1987, pp 33-35.

wanted the amplifier to look as good as it performed.

My solution to this problem was to cut a rectangular piece of black pasteboard large enough to cover the scales around the SB-200's LOAD, TUNE and BAND controls. I used white ink to draw the band arcs around the TUNE control and white dry-transfer lettering for the LOAD and BAND scales, and for labeling the band arcs (Fig 3A).

With suitable slots cut to pass the LOAD, TUNE and BAND control shafts, the labeled subpanel slides neatly into place on the SB-200 (Fig 3B). The white-on-black appearance of the subpanel is striking and the controls are properly labeled—all without modifying the equipment front panel itself in any way.—*Safford M. North, KG2M, 1426 Riverbend Dr, Baldwinsville, NY 13027*

PC BOARD FABRICATION WITH PREDRILLED HOLES

□ I enjoyed Doug DeMaw's August 1987 article on PC board fabrication.⁵ I have made piles of boards and developed my own style, an important facet of which I've not seen others use: I drill my holes *before* etching the board. This technique is useful for several reasons: (1) predrilled holes can speed the process of transferring the layout to the boards; (2) several boards can be drilled at the same time; and (3) predrilled holes can serve as guides for registering double-sided boards. Here are the steps in my process:

1) On 0.1-inch-grid paper, draw a full-sized board pattern (as seen from the copper foil side of the board).

2) Clean the foil side of the board (or the bottom foil for a double-sided board) and glue the pattern to the foil. (Rubber cement works well for this purpose. Also, it's a good idea to make a full-sized photocopy of the layout before gluing if you intend to use the layout again later on.)

3) If you're only doing one board, skip this step and go to step 4. If you want to drill more than one board at a time, glue several pieces of board together. (I suggest doing no more than four boards at once to keep drill drift errors to a minimum when

the holes are drilled.)

4) Using the glued-on pattern as a guide, drill the board(s). (Drill a small pilot hole first for large holes.) The pattern paper helps center the bit.

5) Peel off the pattern and clean the board(s) of rubber cement and burrs. Chemically clean the boards with copper-pot cleaner.

6) Using a pencil, draw the traces on the board(s), using the holes as a guide. (The presence of the holes at this point results in automatic registration of double-sided boards.)

7) Redraw the traces with etch-resist pens or paint.

8) Etch the boards and clean them of resist as usual.

I've been making fast circuit boards this way for about 27 years. The method is okay for 0.1-inch pin spacing, but not for work much finer than that.—*S. Premena, AJ0J, PO Box 1038, Boulder, CO 80306-1038*

BETTER TRANSMIT PROTECTION FOR GaAsFET PREAMPS

□ My mast-mounted 2-meter GaAsFET preamp (an Advanced Radio Research MM144VDG) was damaged on transmit despite the fact that I was using the manufacturer's TR sequencer.

Fig 4A shows a portion of the MM144VDG's sequencer output circuit; it's similar to the time-delay generator in recent *ARRL Handbooks*. Normally, when the mic PTT button is pressed, relay A opens immediately to take the preamp out of the line, and relay C closes after a set delay to key the transceiver. If relay A fails to operate or sticks for a period longer than C's delay (the apparent failure mode in my case), however, it's possible to transmit into the preamp.

A simple, albeit brute-force, solution to this problem is to add a DPDT relay (relay E) as shown in Fig 4B. Relay E is energized in receive and must release to allow its normally closed contacts to key the system transceiver. This ensures that power has been removed from the preamp before transmission begins. To guarantee that relay E is operational—preventing recurrence of the original failure mode—one set of relay E NO contacts is connected in series with the preamp power. If relay E fails, the preamp is turned off.

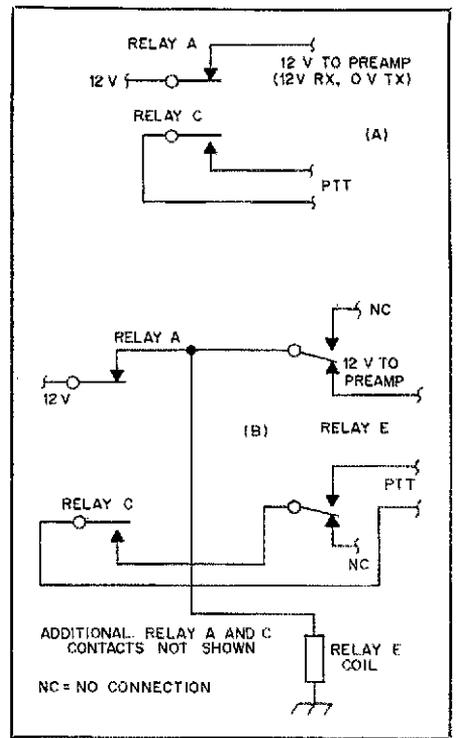


Fig 4—John Siegel modified the TR sequencing circuitry of his GaAsFET 2-meter preamp for fail-safe operation by adding a DPDT relay to the unit. The original preamp power and PTT switching circuit is shown at A; B shows the modified arrangement. Note that relay E is shown in the energized position. See text.

With relay E in place in the MM144VDG, transmit timing is unchanged, but return to receive is delayed by the relay E's pull-in time. If relay E sticks momentarily, the keying delay will be no shorter than the release time of relay E. Even if this happens, transmission into the preamp is impossible.

Although I haven't investigated this, a more elegant solution to this TR switching problem would modify the sequencer so that the timing for the MM144VDG's relays B, C and D is dependent upon the operation of relay A.—*John Siegel, K4BNC, 4 Quincy St, Marlboro, NJ 07446*

⁵D. DeMaw, "Homemade Circuit Boards—Don't Fear Them!," *QST*, Aug 1987, pp 14-16 and 23.

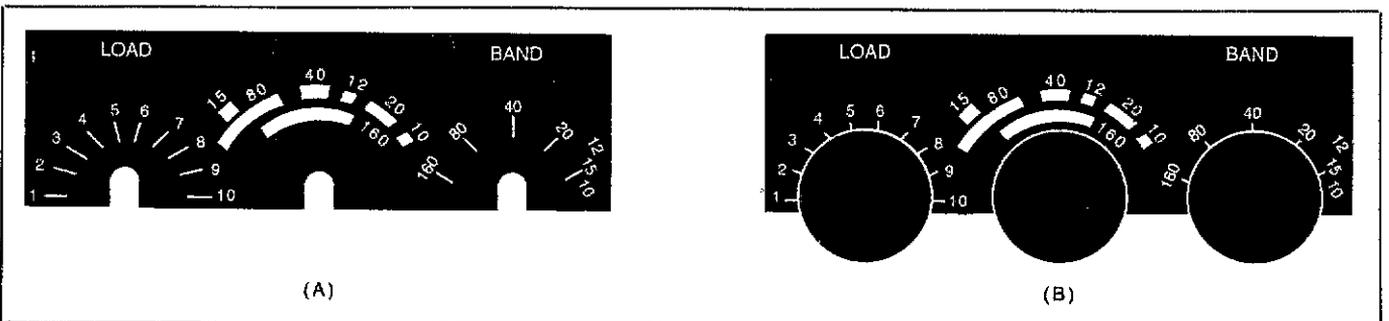


Fig 3—Safford North relabeled his SB-200 amplifier without modification by using a labeled pasteboard subpanel. Installation is easy: The slotted pasteboard just slides into place behind the amplifier controls.

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SNIFFING OUT RF RECTIFICATION

□ About 30 years ago, I had a TVI problem that nearly drove me mad! It didn't take long to analyze the problem—RF rectification—but it took nearly three years to locate the *source* of the problem. In case you're not aware of it, TVI can be caused by RF rectification occurring in unexpected places: a rain gutter, a fence, a household appliance or any number of other sources.

The method I devised for locating a rectification source is a relatively simple one that hit the bull's-eye for me. (I'd never before—or since—read or heard of this procedure.) My RF sniffer (see Fig 1) produces a small radiation field. When this field encounters an object that rectifies the RF, the energy is picked up by an antenna and sent back to a TV set.

The sniffer probe consists of a broom handle on which is mounted a dummy load with a wire loop (receiving antenna) around it. Energy from a low-power transmitter is fed to the dummy load through a length of RG-58 coaxial cable; another length of RG-58 runs between the receiving loop and the TV set. The dummy load I used is a 50-ohm, 25-W noninductive resistor, although a 5- or 10-W resistor would probably suffice.

A few watts fed into a dummy load won't go far. The sniffer must be within approximately 10 feet of the rectification source. When you think about it, this is advantageous because it immediately narrows the search area. Prior to using the test set-up, place it in a clear area and check to see that there is no interference to the TV set with power applied to the dummy load. If there is TVI at this point, try another transmitter and/or TV set.

Don't go Easter-egg hunting with the

broomstick probe. Save time and energy by initially trying to locate the general area of rectification.

In my case, I found the house walls were the culprits. They were plaster on Peg-Board™, and had overlapping 10-foot lengths of six-inch wide heavy wire mesh between the plaster and the boards. The pieces of wire mesh were at the top of the walls. Rectification at some of the overlapped joints is what caused my TVI. That's when I called my builder. —*Jack Holmes, W6BUY, 104 Jamaica St, Tiburon, CA 94920*

SURGE PROTECTOR?

□ Some time ago, I purchased a six-outlet transient and surge protector for use with some transistorized equipment. I don't remember where I bought it. This unit is equipped with two three-prong male plugs at the rear, and is designed to occupy both sockets of a wall outlet, providing a wall-mounted block of six outlets. The unit bears the following identification: Eagle Electric Mfg Co, Catalog 1177, Part 1177W, 15A, 125 V ac, 375 V peak suppression, J73CB Clayton C/B.

The power-distribution block is equipped with one green and one amber light that are lit when everything is okay. One day, I noticed that both lights were out—I took the unit apart to find out why.

The strip contains a fuse in each side of the ac line, a couple of bypass capacitors and two MOVs. Unfortunately, the protection is provided *only to the top three outlets!* The bottom three outlets are connected *directly* to the ac line, and offer no protection against ac-line transients or surges!

I found the trouble in my power strip to be caused by two open fuses; one neon pilot

light was also defective. When I reassembled the unit, I marked the bottom three outlets for use with electric lights only! I should add that the label on the rear of the "electronic surge protector with noise protection" contains the following statement: "The effect of this product on connected equipment and the adequacy of the voltage suppression to protect connected equipment from voltage surges has not been evaluated by Underwriters Laboratories, Inc."—*Frank J. Hoose, K4RZ, PO Box 209, Bluemont, VA 22012*

[Evidently, the manufacturer of this device assumes that the dual wall outlet to which this block is attached is wired in parallel, and that protection is thus applied to all six sockets through the common connection. I've seen "surge and noise protection" power strips (equipped with line cords, a circuit breaker or fuse and six outlets) that use a *single MOV and one capacitor* for protection. "Bargain" surge protectors should be inspected before you decide to use them to protect valuable equipment. The subject of surge protection/EMI has been covered elsewhere.¹⁻⁴—*Ed.J*

USER FRIENDLINESS

□ I think there's a way to make handicapped persons more comfortable in the increasingly computerized world of Amateur Radio. It's sort of a technological solution, otherwise known as *user friendliness*.

I admit it—user friendliness initially meant kicking my heels up to the desktop and exploring the computer-program spectrum with a joystick while stress-testing the tilt springs on my chair. What passed for laziness when I started programming has evolved into a new philosophy incorporating two principles: (1) Anything that I can do with the *keyboard* can also be done with a *joystick*; (2) if I incorporate *audio* prompts, I provide *visual* prompts as well. Audible Morse code has a corresponding visual representation on the screen. There are lots of programs with on-screen menus and sub-menus from which all choices can be made with the joystick. Thus, with minimal hardware modifications, these programs can be used by persons who might otherwise be unable to enjoy them.

I am currently working on a joystick-controlled interface for the 8-bit Atari computer and the Yaesu FT-757GX transceiver. Persons interested in this program and/or in HAMPACK, an Atari-computer Novice

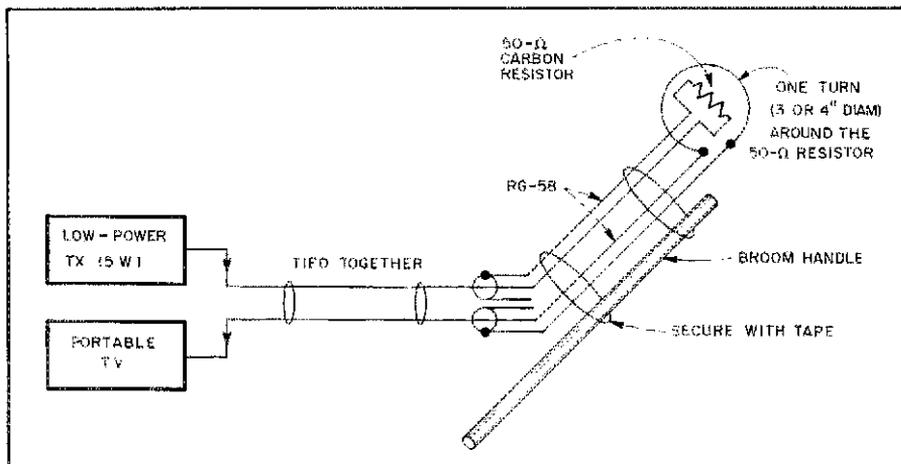


Fig 1—W6BUY's TVI RF sniffer. A low-power transmitter feeds a dummy load attached to the end of a broom handle. Surrounding the dummy load is a three- or four-inch diameter loop antenna.

¹S. Clarcla, "Keep Power-Line Pollution Out of Your Computer," *BYTE*, Dec 1983, pp 36-44.
²K. Stuart and G. Collick, "Protect Your Equipment from Damaging Power-Line Transients," *QST*, Feb 1982, pp 35-38.
³D. DeMaw, "A Ham-Shack AC-Outlet Strip with Filtering," *QST*, Dec 1986, pp 25-27.
⁴R. Beaudry, "AC-Outlet Positioning," Technical Correspondence, *QST*, Jul 1987, pp 40-41.

tutorial, may send an SAS disk mailer and blank disk (or two) to me.—Richard Myers, 9020 Coalton Dr, Louisville, CO 80027. (The ARRL and QST in no way warrant this offer.)

SCALING THE EXTENDED DOUBLE ZEPP

□ You can easily scale the design of an extended double Zepp (EDZ)⁵ to work on another band. For example, assume you wanted to build an EDZ for 7.2 MHz, basing the design on the 24.95-MHz antenna presented in my December article. The 24.95-MHz antenna has element lengths of 25' 3" and the matching-transformer line length is 5' 5". Use the following formula to scale the antenna dimensions to the desired band:

$$L_2 = \frac{(f_1 \times L_1)}{f_2} \quad (\text{Eq 1})$$

where

L_2 = length at the desired frequency

f_1 = resonant frequency of the original antenna

L_1 = length of interest at the resonant frequency of the original antenna

f_2 = resonant frequency of the new antenna

Lengths for L_1 and L_2 must be expressed in similar units of measurement (feet, meters, etc); this also applies to the units of measurement used for f_1 and f_2 (kilohertz, megahertz, etc).

Substituting the values for element length

$$L_2 = \frac{24.95 \times 25.25}{7.2} = 87'6" \quad (\text{Eq 2})$$

and matching-transformer length

$$L_2 = \frac{24.95 \times 5.417}{7.2} = 18'9" \quad (\text{Eq 3})$$

This scaling technique also works for element spacings. Velocity-factor considerations can be ignored because they were included in the initial design.—John Reh, K7KGP, 510 Mt Defiance Cir SW, Issaquah, WA 98027

MORE ABOUT THE MOON

The "Experimenters Section Report," QST, Aug 1924, p 35, contains a quote from the A.R.R.L. weekly newspaper service of March 25 (see Fig 2):

"Radio reception appears to be influenced by the moon in some manner. The only observation made has been on European long wave transatlantic signals. The rules given below can accordingly be applied only to long wave signals traveling in a westerly direction across the Atlantic. Whether reception in the opposite direction is similarly affected is not known.

"In the tests that were made, best reception came during the period of a full moon. Generally the signal would not be particularly strong but there would be almost no static and very clear and steady signals would be recorded. During the new moon the static would be very bad but signals [sic]

⁵J. Reh, "An Extended Double Zepp Antenna for 12 Meters," QST, Dec 1987, pp 25-27.

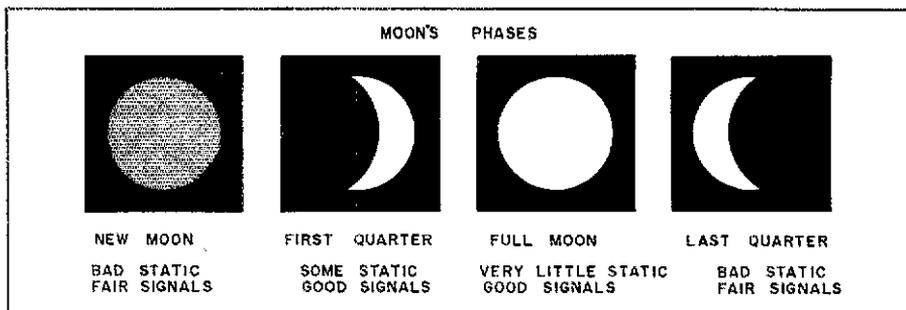


Fig 2—From QST, Aug 1924.

strength fair. During the first quarter both the signal strength and static would increase. During the last quarter the static would be very bad and generally louder than the signal.

"These observations do not take into account local disturbances such as thunderstorms nor do they cover fading, there being very little of the latter on long waves."

The column went on to say:

"We should like to hear from all those interested in making observations on this particular phase of radio. If there is anything in the theory a series of concerted observations would clarify the matter."

In QST, Jan 1925, p 35, Virgil Henthorn of Paden City, West Virginia, summed up his observations of the effects of weather (barometer readings) and the moon on radio conditions for the month of September 1924. Virgil monitored radio station KDKA (100 miles airline from his location) on 326 meters.

"Conclusion: Unable to draw any definite conclusion. Evidently very little static during full moon. Also evidently none during no moon."

The QST column went on to say:

"More observations of this sort are needed. Pick some broadcast or commercial station that is heard regularly as it is important to observe signal strength along with the static. Incidentally—the observations so far have all been on rather short waves, why not some above 10,000 meters?"

[Tx to Dave Newkirk, AK7M, for bringing these bits of history to our attention.—Ed.]

NO WEREWOLVES

□ The speculation that the moon might affect radio propagation⁶ aroused my curiosity. Being a sailor, I began thinking along the following line: The gravitational pulls of the sun and the moon cause oceanic tides. The moon's pull—being 2.2 times stronger than that of the sun—dominates. Likewise, the atmosphere, being a massive fluid, exhibits tides. These tides periodically increase the depth of the atmosphere, and therefore could conceivably elevate the ionosphere and increase the skip distance.

However, the first analysis of these tides⁷ showed that they are dominated by the sun.

⁶P. Loosen, "The Moon and Ions," Technical Correspondence, QST, Oct 1987, p 38.

⁷P. S. LaPlace, "Mécanique Céleste," 1799-1825; see note 8.

Because the atmosphere is elastic, solar heating, rather than gravity, is the principal factor in atmospheric tides. No significant correlation with the moon's motion has been detected.⁸

My next idea, which I believe is a plausible one, explains Phil's observations as follows: The ionosphere is affected by sunspots that appear and disappear irregularly. Their number, size, position and lifetime vary. In order to get a quantitative handle on this phenomenon, Rudolph Wolf devised a simple formula to calculate the (Wolf) sunspot number.⁹ Each day, a new hemisphere of the sun is visible from the earth, and the sunspot number is recorded every day. The 11-year sunspot cycle is well known, but perhaps the short-term variation in sunspot number is not. The sun has an axial rotation period of 25 to 35 days (depending on solar latitude, the sun being fluid).¹⁰ Consequently, a cycle of sunspot numbers of about this period can occur. In fact, knowledgeable DXers—when they observe a good opening—mark their calendars for special attention four weeks into the future.

The period between full moons is 29.53 days (the synodic month; see note 6). Inevitably, from time to time, the date on which the solar hemisphere with a maximum sunspot number is visible from the earth (and propagation conditions are above average) will coincide with the date on which the full moon occurs. Because the synodic month is close to the average period of the sun's rotation, this coincidence can persist for several consecutive months. It's understandable, therefore, that a casual observer might conclude that the moon is responsible for improved propagation. A more scientific approach would be to compare records of observations of good propagation with the solar parameters broadcast daily by WWV.

I don't believe in werewolves.—Brice A. Wightman, VE3EDR, 505 St Laurent Blvd, Apt 2204, Ottawa, ON K1K 3X4, Canada

⁸M. Siebert, "Atmospheric Tides," *Advances In Geophysics*, Vol 7, (New York: Academic Press, 1961), pp 105-187.

⁹G. Jacobs and T. Cohen, *The Shortwave Propagation Handbook*, (Hicksville: CQ Publishing, Inc, 1982), 2nd edition, p 32; (76 North Broadway, Hicksville, NY 11801).

¹⁰R. Bishop, *Observer's Handbook*, (Toronto: The Royal Astronomical Society of Canada, 1985), pp 8 and 17; (136 Dupont St, M5R 1V2).

A Cake, a Present and a Little Drink

Ever wonder what is coincidence and what isn't? This tale of one man's seventieth birthday will start you thinking.

By Trevor MacDiarmid Artingstoll, GWØJOE

16 Marlborough Rd
Romford, Essex RM7 8AJ, England

Early on the morning of the day that God had arranged to surprise him, Jim Nuttall, G3YYY, snored very loudly and woke himself up. What he awoke to that Saturday didn't seem very much. A bedroom ceiling displaying a small, damp spot he had been meaning to fix for years stared gloomily down at him. In the uncertain murk of dawn's light a mahogany chest of drawers carrying an old, conical-shaped Bush radio loomed over the single bed like a policeman emerging from a thick fog.

Leaving his tiny bedroom he went for a splash. A long bathroom mirror coldly photocopied him with the cruel honesty small children can display: below medium height; of slim build; bald, with a fringe of white hair; blue of eye; whiskered of cheek, but not of chin, in the style termed "mutton chop" some half-century before his own seventy summers began; mildly paunched; pale complexion; long of face; sad and sensitive of visage.

The sadness was not a typical expression, but there was a reason for it as far as G3YYY saw matters. It was the sixth of December, his birthday. For the seventieth time he would celebrate it, if that was quite the word, because Jim had a gloomy premonition that not one planetary inhabitant except himself knew, much less cared, that he was this day a septuagenarian.

It wasn't that he wanted the national press to wish him many happy returns. Jim Nuttall had a markedly self-effacing, pleasant, homely personality. A lifetime of tending to give rather more than he ever received would by contrast have made garden pansies seem brash.

No, it was just that this morning he missed old G3YYZ even more keenly than he had for the past six months, at the commencement of which period of time his old friend had advanced to the status of Silent Key.

Hardly silent, in the initial stage of shuffling off the mortal coil, actually. He had collapsed, dead, across his key in the early hours and sent out the longest dah on

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14 megs that GCHQ Cheltenham had ever recorded. Jim found him at breakfast time gazing reproachfully from sightless eyes at a ruin of burnt-out PAs.

Bobby Bobbin, G3YYZ, and Jim had been chums since the second World War, when they met abruptly, tin hat to tin hat, whilst diving into a slit trench just behind Tel El Kebir, knocking each other silly. The impact seemingly triggered off a 40-year friendship.

Unkind people were to declare on several occasions during this lengthy collaboration and after drawing attention to Bobby's somewhat saturnine, stolid, weighty approach to life which rather dramatically contrasted with Jim's more waif-like sensitive one, that the latter played Laurel to the former's Hardy. Unkind it was, because Jim and Bobby enjoyed a far more placid, mutually respectful relationship. Nevertheless, at rallies and if they chanced to stand side by side against the light, a note or two of *The Trail of the Lonesome Pine* had occasionally been whistled by younger hams peering deep into their rigs at some recently found and quite absorbing bug!

On demob, the pair found themselves working side by side in the Post Office. They took their B and then their A licenses

simultaneously and eventually settled down, as most of us do. What distinguished them from other young men, however, was that each decided that marriage and children were not for him.

They chose to live together in a small terraced house in Bonk Hill, an Ussex town small enough to overlook whilst one stood in its center, and which was set in East England. Ussex, because they were employed there and had both retired there.

Their friendship, while deep, was of the platonic kind which has so often been the despair of ambitious YLs. The same relationship, it has been alleged, was enjoyed for half a century by the late J. Edgar Hoover with some gent whose name has escaped history; they shared a home and liked it that way. Unlike J. Edgar and his friend, the chains which bound Jim and Bobby were those forged by Amateur Radio, surely the emperor of hobbies, mere kings being confined within their natural borders as they are. Jim and Bobby were dedicated hams.

QRP CW DXing was their game. This was carried out on rigs they alternately built and dismantled at the sort of workbench, in the kind of shack, which made visiting hams from the Bonk Hill Amateur Radio Club suck in their lips whilst uttering little cries of delight. The very breath of life for the two old men was the thick, exciting smell of flux boiling off the expensive professional soldering irons they used. Sometimes, particularly when working on similar projects, they exhibited the deep, unconscious rapport of those close to one another by wielding them in unison, like ice dancers.

Jim descended the stairs and stood in the kitchen wondering what to have for his breakfast. Since retiring, the friends had taken turns cooking, although Bobby was by far the better chef, having served in the Army Catering Corps. So after his friend died, Jim had lived mainly on French fries, store-bought meat pies and the less-noisy rice crispies. His heart simply wasn't in cooking any more.

Up and About

On impulse, Jim decided to treat himself to an egg with toast in the Bonk Hill cafe. Cooking at home that day of all days simply wasn't on. Hesitating over what to wear, as always, he regarded the items of clothing on brass hooks on the hallstand.

"Think I'll take the anorak. Leather jacket's still a bit wet." As was often the case, he chose neither, donning a waxed shooting jacket which he felt, with the shy vanity elderly bachelors sometimes develop, looked rather well on him.

In the little hall he stood with bent head, gazing ruefully at the floor just under the great brass flap set in the front door for the receipt of letters and parcels. Every birthday each had had for the past 20 years in that house a box wrapped in brown paper, lavishly strung and heavy with goodies, had been pushed through it, sent by post from the other man.

Jim went in for arty presents: Turkish tobacco for Bobby's coal scuttle of a pipe; once a hookah. Bobby never varied his offerings: a chocolate cake, a small present of whatever Jim had said in his presence that he needed, and a drink, usually a bottle of the Welsh-brewed strong beer, Crow. Both liked going out for the occasional half-pint, but their greatest relaxation was to spend hours at a time inflicting grievous harm on the ionosphere from the shack in their minute backyard.

Going Fishing?

There was no carefully packed little parcel today, however, nor would there ever be again. Sadly, Jim headed for the cafe. Enroute, he turned into Dai Owen's fishing tackle shop.

Dai, a dark little Welshman, glanced benignly around his small kingdom then advanced on his prospective customer.

"Er—I'm looking for some fishing line?"

"Going fishing, is it?" cried Dai cheerfully, upending a drawer full of tackle onto the counter. "Today's the weather for it, eh?" It was freezing outside, but the sun shone coldly in a gunbarrel-blue sky.

"Nothing expensive," said Jim firmly, eyeing some of the price labels. "I want it to support an antenna. I'm a licensed amateur," he explained, not without some pride.

"Licentious amateur, eh? There's some wicked you are. But then, so am I," whispered Dai in his sing-song Welsh accent, grinning and winking significantly at his customer then leering at a buxom assistant on the other side of the shop.

"Radio amateur, I mean," Jim corrected hastily, thankful his pinkening cheeks were masked by the whiskers, "—er—licensed, not licentious, Mr Owen."

"Ah, radio is it? I have a little problem with a radio," remarked Dai, picking out a reel of line from the pile on the counter and handing it to Jim to inspect. "This is

There was no carefully packed little parcel today, however, nor would there ever be again.

20-pound breaking strain and costs one pound. I wouldn't sell very much of it if it was the other way 'round, look you."

His little joke fell flat. Jim wasn't in a comic mood that day. Feeling in his pocket, he rattled the few coins there and thought about the coming week's expenses.

"I need all the money I've got on me, Mr Owen. I'll come in Monday and get it." About to leave, he thought of Dai's remark. "Having a radio problem, you said? I might be able to help."

For the next half-hour the two men conversed on the topic of lazy VHF waves that refused to travel a mere two miles from Mr Owen's country cottage to the local police station and operate an intruder alarm there.

"Height, Mr Owen. Get up as far as y' can. Even dandelion fluff'll stop VHF." So saying, Jim finally got to his egg on toast.

As he was finishing, a figure passing the steamy window of the cafe paused and looked in, then entered to stand before Jim. "Hello, hello, Mr Nuttall!" boomed a cheerful voice. "Not seen you for years. Abandoned us, eh?" It was the secretary of the local ramblers club. On several occasions in past years Jim and Bobby had been on Raynet teams which had assisted in dragging lost hill-walkers and ramblers from the jaws of death by exposure on the dank winter moors around Bonk Hill. The secretary had been one such and since shown every sign of gratitude.

This encounter solved Jim's little problem of what to do on his birthday and soon he was trudging across the moor with several other middle-aged walkers of each sex. It happened to be a ten-miler, and ended with afternoon tea. This was served in a pleasant hotel set on the northern slope of the hill which gave the town its name.

A New Husband Waiting

The cake was a chocolate one, of which Jim was particularly fond. "Tell the lass who made this," he jocularly addressed the nonagenarian waitress who served them, "she's got a new husband waiting. Me!"

"I made it," the ancient lady replied instantly and somewhat to his dismay. Lifting her voice above the laughter at this sally which was sharpened a little by Jim's discomfort, she went on with mock tartness. "You'll wait your turn, my lad! There's a queue of 40 men after me 'cause

of my chocolate cake." But as the ramblers poured out of the hotel enroute for the car park and home, a shy little girl pushed an enormous piece of the cake, indeed the whole of the remainder wrapped in tinfoil, into Jim's hands. "Gran sent it," she whispered and fled. He had seemingly been moved up the queue!

Back in town, G3YYY made for home. He passed Dai Owen's shop, which was just closing. It was as if he had been waited for. Running out of the shop, Dai poked an object wrapped in paper at Jim, then seeing Jim's hands were full with the cake, he slipped it into Jim's jacket pocket.

"Outrageous, I was," he castigated himself. Jim stared, not quite understanding. "All that free technical advice and I was going to charge you for a little bit of fishing line. Take it. Ashamed I am," and Dai disappeared back into his shop, firmly slamming and locking the doors before he could be thanked.

Later, pushing his plate away after yet another panfull of French fries for dinner, Jim picked up the newspaper. An acre of meaningless print outstared him mournfully on every page. Boredom reigned. . .

Back in town, G3YYY made for home. He passed Dai Owen's shop, which was just closing. It was as if he had been waited for.

At The Bear

Nine o'clock found G3YYY pacing through the freezing dark air towards the hotel. On his lonely birthday he felt he would like to bathe himself in the warmth and cheerful, chattering indifference of the lounge at *The Bear*.

Ordering, most unusually, a full pint of beer, the little man danced slowly with it held above his head through the packed assemble to the back of the lounge and sat down behind a large pillar. From this vantage point he could see and hardly be seen. But he was seen.

"Hi, remember me?"

The moustached face staring down was that of a young man, and one vaguely familiar. Jim couldn't quite. . . "I was the steward on the Rapide."

It came back. Jim and Bobby had

(continued on page 54)

Relocating Unattended Beacon Subbands in the Amateur Bands Above 50 MHz

By Tom Kirby, W1EJ

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Chairman ARRL VHF-UHF Advisory Committee

One of the tasks of the ARRL VHF/UHF Advisory Committee (VUAC) over the past two years has been to study amateur experience relating to the use of unattended or automatic beacons at frequencies above HF.

Band Plans versus FCC Allocations

Above 902 MHz the FCC allows amateurs to operate unattended beacon transmitters without subband frequency restrictions. In these bands the amateur community is free to modify the amateur subband convention without involving the FCC. For these amateur bands the VUAC recommended that the ARRL Board modify each of the amateur band plans to reflect the advisory committee's advice for recommended unattended beacon subbands.

At 144, 220 and 432 MHz amateur unattended beacon operation is restricted by the FCC to narrow (10-kHz-wide) subbands. To change the present amateur practice on these bands requires that we petition the FCC to change the existing regulations. (See Table 1.)

ARRL Board Review

As a result of its study, the VUAC reported to the Board of Directors, at their January 1988 meeting, its conclusions that the amateur community should act to relocate the unattended or automatic beacon subbands in the amateur bands of 144 MHz and above. As was reported in *QST*, the Board approved the VUAC recommendations but requested that the Membership Services Committee of the Board (MSC) seek further amateur comment on the proposal and offer a report to the Board at its July 1988 meeting. Details of the changes proposed by the VUAC and supported by the Board are presented in Table 1.

The 50-MHz band has unique qualities of both VHF and HF and requires worldwide consideration before conclusions on beacon subbands are developed. The VUAC did conclude that a change in the remaining automatic beacon subbands above 50 MHz is desirable. Therefore, early on, the decision was made not to seek a change in the

Table 1

FCC Allocations and Amateur Practice for Unattended Beacon Operation Above HF

FCC Allocation	Practice	Proposed
50.06-50.08	50.06-50.08	No change
144.05-144.06	144.05-144.06	144.275-144.30
220.05-220.06	220.05-220.06	220.275-220.30
222.05-222.06	Not used	Not Proposed
432.07-432.08	432.07-432.08	432.30-432.40
902.00-928.00*	903.07-903.08	902.30-902.40
1240.00-1300.00*	1296.07-1296.08	1296.30-1296.40
2300.00-2310.00*	2304.07-2304.08	2304.30-2304.40
2390.00-2450.00*	Not Used	Not Proposed
3300.00-3500.00*	Undefined	3456.30-3456.40
5650.00-5925.00*	Undefined	5760.30-5760.40
10000.0-10500.0*	10368.07-10368.08	10368.3-10368.4

*Beacons are not restricted to a subband.

automatic beacon subbands at 50 MHz.

Interference on the Plains

Relocating the unattended (automatic) beacon subbands was first proposed by amateurs in the Midwestern states. VHF operators, especially those engaged in EME (Earth-Moon-Earth, or moonbounce) communications, experienced serious interference problems due to nearby beacon transmitters.

*VHF operators . . .
experienced serious
interference problems
from nearby beacon
transmitters.*

As a result of his experiences, Roger A. Cox, WBØDGF, submitted a Petition For Rule Making to the FCC on September 5, 1986, requesting that the FCC move and expand the present beacon frequency assignments to become: 144.30 to 144.35 MHz, 220.20 to 220.25 MHz and 432.20 to 432.25 MHz. However, at that time,

Cox's petition drew little comment from the amateur community and was shortly thereafter denied.

Meanwhile, on the plains, EME operators and others continued to experience interference. And with continued input from the membership, the ARRL Board tasked the VUAC to study the interference problem and to develop a recommendation.

Understanding the Problem

Interference between stations is not an unusual occurrence for amateurs. Interference arising from automatic beacon transmissions, however, is an extreme case of such interference.

In the amateur bands, most stations are in intermittent operation; interference is thus temporary and variable. Beacons, however, may be on one frequency continuously. Thus, objectionable interference from a beacon may be incessant.

Beacon owner/operators must give serious consideration to the minimizing of potential interference problems. Beacon transmitters are no different than other radio sources. They can cause interference by the transmission of unwanted signals, or they may cause overload problems to a nearby receiver.

To understand the beacon interference problem, some VUAC members conducted on-the-air experiments with interested

friends. These tests provided insight into the nature of the interference. Some members found that tuning a receiver's frequency as little as 250 kHz away from a beacon transmitting frequency provided a noticeable improvement in combating interference. Yet with only a 50-kHz separation in frequency, severe interference was experienced. For the weak-signal enthusiast, this is a significant problem because presently the beacon subbands are located within the subbands where weak-signal operation occurs. This weak-signal subband is the 100-kHz region of our VHF/UHF/SHF bands where CW communications usually takes place. When operating anywhere in this subband an amateur will normally look for very weak CW EME signals no more than 50 kHz from the present beacon subbands. With only a maximum of 50 kHz between strong beacons and very weak EME signals, it's no wonder that amateurs experience severe adjacent-frequency interference.

The VUAC concluded that the interference potential is very high if the beacon subbands continue to be located within the weak-signal/CW subbands. At 144 MHz, a 200- to 250-kHz frequency move of the beacon subband would help to significantly reduce—and in some cases eliminate—interference problems within the CW subband. These results are generally applicable to the bands above 144 MHz as well. The analysis indicated that relocating the beacon subbands would be advantageous to the amateur community—and that a move of only 250 kHz would be very helpful to weak-signal operations. The committee also felt that the frequency ranges of beacon subbands should be generally consistent within all the amateur bands.

In several different areas across the country beacons within the present narrow 10-kHz subbands even interfere with each other. By widening the beacon subbands, per the proposal, the potential for interference is reduced. In the VHF bands activity is high. A significant widening of the beacon subband is not possible without displacing other amateur operations. So, above VHF, a maximum subband segment of 100 kHz was recommended. Even at 432 MHz, though, allocation of this much spectrum to beacon operation is questionable.

The Effects at VHF

At VHF, the VUAC considered approximately doubling the beacon subband width from the present 10 kHz. This results in a beacon subband 20- to 25-kHz wide on 144 and 220 MHz. While this width is comparable to a single wide VHF-FM voice channel, it was felt that such a subband allocation would have minor impact on existing amateur operations. At 144 MHz, the region 144.3 to 144.5 MHz has been prioritized in the band plan for satellite use. OSCAR 13 is now operating in a small segment of this region near 144.5 MHz. This is the first satellite use of this subband since

the frequency range was set aside in the band plan.

Amateurs did express a reluctance to reduce the width of the SSB operating region at 144.2 to 144.3 MHz. These considerations—as well as satellite priorities—weighed heavily in the final decision.

In the absence of other considerations at VHF, the VUAC recommended making the 2-meter beacon subband 144.275 to 144.300 MHz and the 1 1/4 -meter band to follow as 220.275 to 220.300 MHz. (The League continues to oppose the FCC reallocation of 220-222 MHz. On October 19, ARRL filed a Petition For Reconsideration. The VUAC is taking all this into consideration in reviewing beacon needs for the 1 1/4-meter band.)

UHF and Above

Above VHF, a 100-kHz-wide beacon subband was suggested by the VUAC. A subband of this width could only be accommodated by placing it above the 300-kHz boundary. Below the 300-kHz boundary, a 100-kHz wide subband would be too close to the weak-signal region. Thus the 300- to 400-kHz subbands (as shown in Table 1) were recommended. Some concern was also expressed regarding the 432-MHz segment. With the 420- to 450-MHz band being so heavily used, a 20-kHz-wide 432.300- to 432.320-MHz subband was considered, but again the narrow subband concept was not recommended.

Beacon Operating Standards Visited

Beacons can be useful in many ways. They indicate radio propagation conditions and alert the amateur community to unusual enhancements. This was the incentive that led to the provision for beacon operation. A beacon you have not yet heard is a beacon of great interest. In addition, beacons are a useful frequency reference on bands where a large uncertainty in frequency determination often exists.

A beacon you have not yet heard is a beacon of great interest.

A need exists for technical standards for beacon operation. The VUAC, in reviewing beacon standards, is discussing the following:

- Beacon frequencies based on location (latitude, longitude or grid square/locator).
- Frequency precision.
- Beacon transmitter power output. (Currently limited to 100 W PEP output with CW or FSK emission [FSK is limited to 1-kHz maximum shift].)

These standards should be entirely

voluntary, and working toward their attainment will add enjoyment to the efforts of amateurs who are interested in working with beacons.

What About QRM In the 1 1/4-Meter Band?

Some concerns not originally considered by the VUAC did surface later. The most significant of these is the technical issue of 220-MHz interference from TV Channel 13.

In most TV Channel 13 service areas, a severe interference problem to amateur operation exists arising from the relationship between the Channel 13 video and audio carriers. Third-order distortion products are uncontrolled in many TV Channel 13 transmitters, which results in strong spurious output around 220.250 MHz ((2 times 215.75 MHz[audio]) - 211.25 MHz[video]). With the assignment offsets, and the strong picture components from 211.250 to 211.300 MHz, the region from 220.250 to 220.300 MHz in some areas can contain strong spurious signals. TV Channel 13 is common in the more populous regions of the United States. Thus, the proposed 220 MHz beacon subband will be subject to this Channel 13 interference.

How the Proposal Affects 2 Meters

Concerns about reducing the SSB operating region between 144.200 and 144.300 MHz were raised and emphasized by many amateurs. An analysis was developed which is too long to be presented herein. [Copies of the analysis can be obtained by writing the author.] This analysis emphasizes the importance of frequency separation from the weak signal area. And, illuminates the advantages of moving beacons away from the weak-signal subbands.

Other beacon considerations among the VUAC members concern voice operation within the beacon subbands. Widebandwidth phone operations may cause severe interference to beacons and vice versa. Today some amateurs monitor beacons automatically, and the allowance of wideband nonbeacon signals in the subband could markedly reduce the effectiveness of such monitoring. As yet, no action is proposed to restrict those modes from use in the subband.

ARRL Files Petition

On September 7, 1988, the ARRL filed a Petition For Rule Making—designated RM-6512. This petition requests that the FCC amend Section 97.87(e) to specify that, in the 144-148 MHz, 220-225 MHz and 420-450 MHz bands, that the beacon subbands become: 144.275-144.300 MHz, 220.275-220.300 MHz and 432.300-432.400 MHz.

Beacons continue to offer amateurs an additional opportunity for interesting and constructive radio activity. These active efforts in improving our beacon subbands can enhance amateur beacon opportunities while preserving all amateur activities. 

Christmas—Cycle 22

By Bruce Vaughan, NR5Q
PO Box 203
Springdale, AR 72765

Glancing at his stainless steel wristwatch, the Old Timer noted the time was nearing midnight and that 20 meters was still open. Solar Cycle 22 was sure getting off to a great start. Here it was Christmas week 1988, only two years since we were near the bottom of Cycle 21.

"Guess I was lucky retiring last year, just at the beginning of this new Cycle," he thought. "Now I should have six or seven years of good DX ahead of me."

Turning off the rig, he quietly made his way to the kitchen, careful not to disturb his XYL, Alice, who was sound asleep in the front bedroom.

Putting the coffee pot on to heat, he remembered how he had always enjoyed a late night cup. Now it was decaf instead of the real thing; still, the custom remained. He had always been a night person, probably starting with the 2:00-AM-till sunrise sessions, chasing DX during those early days of his ham career. What a thrill it was to finally work a VK or ZL...not an easy task using push-pull 45s and the three-tube TRF receiver. With 25 watts and a 40-meter zepp 20 feet in the air, you weren't going to work DX without losing a lot of sleep!

As he poured his coffee, he again glanced at the wristwatch. The boys at the plant had chipped in and gave it to him when he retired. "I'll bet this stainless-steel watch cost them more than the gold pocket watch my Dad received when he retired," he thought.

These days dollars were more plentiful, but money could be a problem now, as then. With everything paid for, the \$20,000-per-year retirement income had seemed sufficient, even though he and Alice had realized that it would be necessary to follow a rigid budget.

Last week, when they were shopping in the Mall, he had noticed how long she gazed at the cultured pearl necklace in the jewelry-store window. Its \$900 price tag put it in the "wouldn't it be wonderful, but let's be practical" category. The look on her face took him back to those depression years of the '30s.

Filling his favorite pipe with tobacco, and with coffee cup in hand, he eased himself into the old rocking chair in the den. Yes, there had sure been a lot of changes since you could buy

a gold pocket watch for \$100.

The OT watched as the miniature lights blinked on and off on the tree in the corner of the room. The scent of Christmas

filled the air—fresh baked cookies and pies in the kitchen, and, of course, the evergreen scent of the tree.

Memories of the many past holiday seasons filled his mind. He remembered the rich kid in the next block

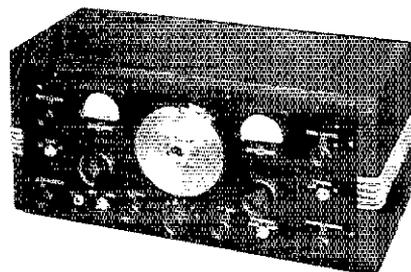
who had received his license the same year as the OT, and he also remembered the same kid getting a Hallicrafters SX-17 receiver for Christmas. The OT had dreamed of getting a Sky Buddy...the SX-17 was more than he could even imagine. Instead of the Sky Buddy, he had received a white shirt and a tie, along with the advice to "save it for your graduation next spring." That was when he had made himself a promise, a promise to have a good ham station in the future. He would economize on many things—but come what may, he would always own good radio gear.

Now, 50 years later, he realized that this could very well be his last solar cycle. He was hoping for Cycle 23, but at his age that was about the most you could ask. One thing was for sure: A lot of fine equipment had passed through his shack in the past 50 years. Fondly,

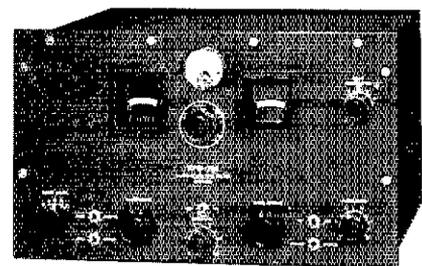
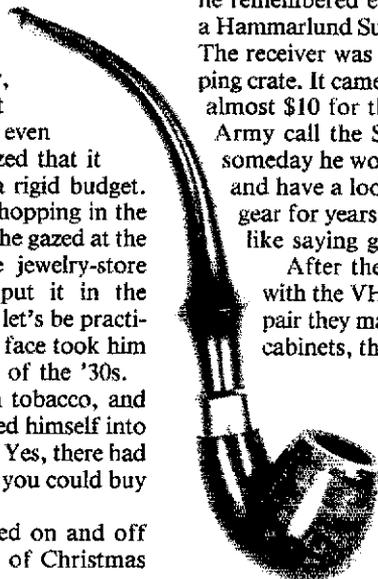
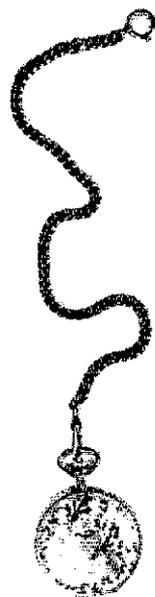
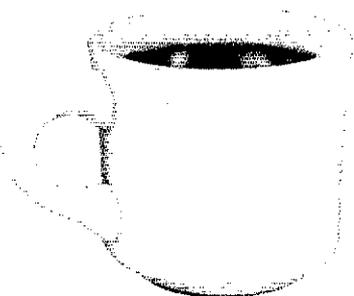
he remembered each piece of gear. His first good receiver was a Hammarlund Super Pro, purchased in November 1945 for \$100. The receiver was brand new and packed in a heavy wood shipping crate. It came by railway express and the express charges were almost \$10 for the 200-pound box. "Let's see...what did the Army call the Super Pro...was it BC-779?" Well, anyway, someday he would go out to the storeroom behind the garage and have a look at it again. Somehow, after using a piece of gear for years, he could never seem to part with it. Too much like saying goodbye to an old friend.

After the Super Pro, there was the beautiful RME-45 with the VHF-152 converter ahead of it. What a handsome pair they made—the gray crackle finish of the well-designed cabinets, the lighted dials and the black knobs were a sight to thrill any ham.

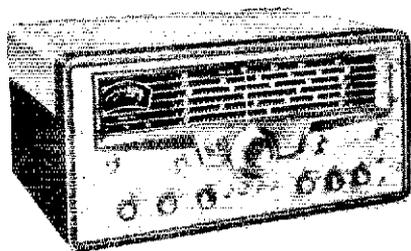
Then, in the late '40s the OT had purchased his first piece of commercial transmitting equipment, a Meissner Signal-Shifter. The transmitter was still homebrew...a 700-watt job in a homebuilt, 6-foot-high rack, using a pair of 813s in the final.



Hallicrafters SX17 Super Sky rider



Hammarlund Super-Pro



Hallicrafters SX-101

In the early '50s, TVI reared its ugly head, prompting the purchase of a Johnson Viking kit. He had it on the air in two weeks, and sure enough, it was TVI-free. Now he could operate while learning how to slay the TVI dragon.

The OT had always been a pushover for anything built by Bill Halligan, usually having two or more Hallicrafters products in his lineup. There was the SX-28, SX-101, and SX-115 receivers and the HT-37 transmitter. One of his favorites was the "Loudenboomer" linear, or HT-45, as Hallicrafters named it.

Now, each was carefully wrapped, boxed and stored. He was careful to see that the storeroom was well ventilated and dry. It was only fitting that old friends be properly cared for in their old age.

"I must be getting senile," he thought, "sitting here at 1 AM reliving those early years of hamming, when I could be in a good, warm bed, sleeping." Arising, he slipped into the bedroom and into bed. Within minutes, he was asleep.

He awoke at 8 the next morning. The smell of hot coffee and frying bacon made it easy for him to get out of bed and dressed.

During the night, a light snow had begun to fall and the ground was now covered. "Well, at least our grandson Mike will have the white Christmas he's been wishing for," said Alice, setting the plate of pancakes and bacon in front of the OT.

"Yeah," he answered, "I only wish he could have the keyboard and monitor he's been talking about. I'm sure he understands that with an older brother and sister in college, his parents can't afford large gifts.

"He sure enjoys that radio you gave him when he passed his Novice exam last summer," said Alice. "That's right," mused the OT, "he's worked 34 states and five countries with that Kenwood 520, and he's almost ready for his General exam."

"Yes," he answered, "at 14, he's starting a couple of years earlier than I did. I suppose he can wait a few years for that computer setup, the same way I waited for a receiver."

After breakfast, the OT filled his cup with hot coffee and went into the shack. Turning on the "big switch," he lowered himself into the comfortable office chair. Leaning back, he admired the impressive array of equipment. Fifty years of hamming was represented by the items here and in storage. Certificates and awards, and QSLs from rare countries, covered the walls. Here he was at home and felt good about the world.

There was the transceiver with its dual VFOs, 16 memories and a few buttons he neither understood nor needed. He had become very fond of this radio after using it for three years. Going back to the good old days might be great, but he sure would hate to give up that transceiver.

On the end of the operations desk sat the solid-state linear purchased last year at a hamfest. He had just beaten his friend

Bob to it by seconds. Buying a year-old amp for half its original selling price was a great deal. Bob still hit the OT up to buy the amplifier at every club meeting.

In the center of the desk sat the Commodore 64, and directly above it was the monitor he had purchased just last September. He still marveled at it. Just type on the keyboard, like a typewriter, and the darn thing sent perfect CW—no mistakes, no variations in dot-to-dash ratio, just perfect code.

And the computer—if the signal is good, and the fellow on the other end had a good fist or was using a keyboard, it printed out the code on the screen. "It was truly amazing," thought the OT. Only one problem... he had trouble remembering to look at the screen, and besides, he was usually doing something else while copying a QSO, like filling out QSL cards or making entries in the log.

Turning on the transceiver, he first checked 40 meters to see if he could hear any of his old friends. Hearing none, he switched to 20 to see if there was any interesting DX. There seemed to be a good opening to Europe, but little else. Turning off the radio, the OT wondered why he was less interested in making contacts and rag chewing than he used to be. "Wish this radio had a broadcast band on it. I'd like to hear some Christmas music," he mused. His mind drifted back to how he used to go into the shack when he really wanted to hear something on the radio. Boy, did Benny Goodman and Tommy Dorsey sound great on the old SX-28. Its pair of 6V6s could really pump out the audio. Even if his new transceiver did have a broadcast band, its 1-watt audio and small speaker would do very little for music.

Going into the den, he turned on the old Magnavox and stood at the window looking at the winter scene outside.

Maybe it was the falling snow, or the Christmas music, or maybe the idea had been there for some time, just waiting to surface. He went to the phone and dialed Bob. "Say Bob, if you still want the linear, it's yours for a hundred bucks less than I paid for it, plus about 30 minutes of your time helping me carry a couple of boxes... Sure, you can pick it up this morning."

After Bob had picked up the amplifier and left, the OT went straight to work. He carefully packed the Commodore and monitor into their original boxes along with the instruction booklets. Then, the other boxes were opened, cables connected, equipment dusted and polished. He became so involved with his work that he skipped lunch, not completing the many changes until mid-afternoon. Now, he had to make a trip downtown before dinner.

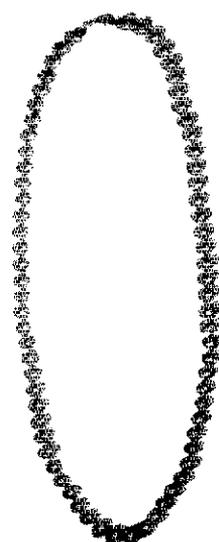
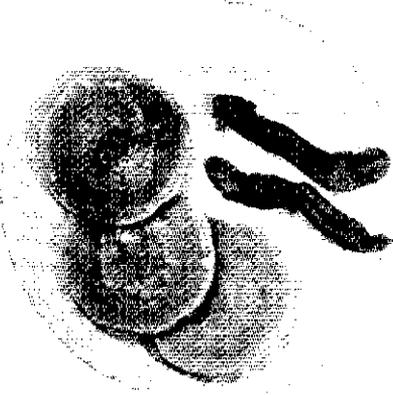
"Alice," he hollered, "I'll be back soon. I have some last-minute shopping to do." Alice was so busy in the kitchen she hardly heard him. He was counting on that.

He was relieved to find that the necklace was still in the jewelry-store window. Most of the money from the linear was left with the jeweler. Putting the gaily wrapped box in his pocket, the OT headed for the computer store down the mall.

Driving as fast as he dared on the snow-covered streets, he arrived home just in time for a delicious meal. After dinner, he retired to the shack. The newly purchased disk drive had been gift wrapped by the computer store. He had to wrap the computer and monitor, which he managed to do rather well, considering that he was using the floor for a work table.

"Alice, would you please come in here... I've something to show you," he yelled. "Look at what we are giving our grandson for Christmas."

"One other thing... this is for you,"



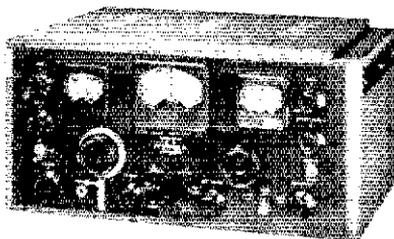
handing her the small gift. Then, with a big hug: "Merry Christmas, Alice."

There were tears in her eyes when she unwrapped the pearl necklace. Knowing he did not have that kind of pocket money, she insisted that he tell her how he had been able to afford the necklace and the disk drive.

"I'm so happy," she whispered, after he had told her, "but I feel sad at the same time. I'm happy you think enough of me to sell your amplifier to buy me a present... but, I'm sad that I can't do as much for you."

"Alice, you can. Come into the shack and spend the next hour with me."

The old homebuilt linear now occupied the space vacated by



Hallicrafters SX-28-A Super Sky rider

the sale of the fancy, solid-state amp. The National type "O" dials gleamed like solid silver in the soft room light. The Weston meters in the plate and grid circuits brought back memories of past years of hamming. The 813s gave off yellow-white warm red glow that filtered through the ventilating holes in the black crackle cabinet.

The space left by the monitor was now filled with the SX-28 with the large Hallicrafters speaker on top. The Commodore keyboard had been replaced with a gleaming Vibroplex.

Turning on the rig, the OT reached for the bug and rattled out a snappy CQ. He could hear a slight transformer hum as he keyed the rig. The output meter read 550 watts.

After a short QSO and an exchange of MERRY CHRISTMAS, 73 AND A VERY HAPPY NEW YEAR, he turned off the rig. Switching on the SX-28, the sound of "White Christmas" came from the large matching speaker. Oh! Bing never sounded better.

"Alice, my radios are like old friends to me. I've acquired new friends along the way... but old friends can never be replaced..."

"Here, in this room, is my Christmas present. We have been married 42 years, and you have never complained or objected when I purchased a new piece of ham gear. Alice, your present to me is you just being you." RST

A Cake, A Present and A Little Drink

(continued from page 49)

wanted to visit the Birmingham RSGB Rally earlier in the year and decided to travel there by bus. It was cheaper and more comfortable than going all that way by car. Excitedly they had clambered aboard and inspected the facilities. "Hey, up there's a laboratory," enthused Bobby, who was getting a bit dicey in the waterworks.

"And there'll be a film shortly," announced the steward, smiling. Thereafter he spoilt the two travelers, pitying their age and uncertainty in a scene quite new to both of them.

"Sit down, lad, sit down," Jim begged. "I was just needing someone to talk to." The two conversed idly until the younger man looked at his watch.

"Must be off," he announced, rising to his feet. "I'm on the Glasgow run and I'll be 60 miles down the road before I get me head down."

Jim remained in his seat, sipping at the beer and thinking nostalgically of the happy trip to Birmingham.

Deciding on one final sup of beer, he made his way to the bar and ordered. The barmaid, who always reminded him of the young Marlene Dietrich, smiled at him with unconscious seductiveness. "S'bin bordin'!"

"Eh?" queried G3YYY, not as au fait with pub jargon as he was with Radspeak. "What's that, young lady?"

She smiled brilliantly at him. "Your friend, the one with the moustache, paid for a pint for you." Jim retired to his secluded table once again. Perhaps due to the unaccustomed influence of two pints of beer instead of his usual half, he was unable

to prevent his thoughts from returning sadly to a comparison of previous jolly birthday celebrations with the lonely one he was now enduring.

"I miss thee, Bobby," he whispered under his breath, ever unconsciously returning to the dialect of a Lancashire childhood when he felt stressed. "Ah do an' all. T'was standin' in t' hall an' thinkin' there'd be no more cake, no little present, no bottle of Crow. That's what did it."

Moved by the trepidation of a shy man fearful of having inner grievings observed or guessed at, Jim raised his head, adopted an interested expression, and forced himself to look about his immediate surroundings.

It was nearing closing time and he moved to the exit. "Enjoy your pint?" smiled Marlene Dietrich, looking at him from her heavy-lidded blue eyes.

"I did," answered Jim briskly, opening the door. "Happened just right. It—it's my birthday—"

"Did y'ave a cake?" she called as he made to leave.

"Nope—well—er—" he hesitated. He could have provided Honesty with a testimonial. He had had a cake. A big piece of one, anyway. Almost the whole of it...

"Ah, there you are," smiled Marlene, and descended in her shining beauty behind the bar as Gaia went to Hades, but to retrieve a Pepsi.

A Cake...

"Ah've had a cake, right enough," mused G3YYY on his way home along the short high street Bonk Hill boasted. He passed Dai Owen's shop. An odd thought struck with some sudden force. Coming to

*"Tha's gotten thee a job
in t'kitchens up there,
as'n tha Bobby lad?"*

an abrupt halt, he stared blindly into the black glass of the big window. "And a present—"

Unbidden too, the memory of the young man's kindly act in buying him a drink rose up. "—by gum! And a drink!"

The curious mixture of events that day processed across his mind with a strength of significance he had not felt before. "Tha's gotten thee a job in t'kitchens up there, as'n tha Bobby lad?" This sad little attempt at humor proved his final undoing.

Bronwen Owen softly closed the curtains of the window in the room above the shop and slid gratefully under her electric blanket. In the next bed her husband, wearing half-moon spectacles, was reading.

"Dai!"

"Hmphf?"

"Y'know the man you gave the fishing line to, the radio expert—"

"—Ham—amateur. Not an expert. But very resourceful, see? Duw, e' knows a 'ell of a lot," corrected her husband absently, turning a page of his book. "Why?"

"I just saw him standing outside the shop. Under the lamp. He's crying his eyes out. There's sad, eh? Poor old man!"

But Time heals all, so God thought He'd managed things rather cleverly! RST

Inside Antennas— Do They Really Work?

Has living in an apartment put a severe crimp in your HF operations? Fear not—you can still get a signal out!

By Jeff Kilgore, N1FGB
ARRL Editorial Supervisor

Let's face it: Most hams would love to have a nice outside antenna farm, perhaps with monobanders on 20-15-10 meters and some type of wire antennas for the lower bands. For many amateurs, however, this is not possible.

Perhaps one of the most severe restrictions on HF operation is living in an apartment, particularly if there is no way to get even a modest antenna outside. If you find yourself in this situation, should you just give up entirely on HF operation?

Definitely not! The amateur spirit being what it is, many have overcome seemingly insurmountable obstacles in order to enjoy the hobby. All it takes is the right attitude (the difficult we do immediately, the impossible takes a little longer!) and a willingness to experiment until the desired results are achieved.

What Are My Options?

Even in an apartment, it may be possible to install a dipole, particularly on the higher bands (a dipole for the 10-meter band is only a little over 16 feet long). If space (and other family members!) permits, a dipole may be the best answer to your problem. After all, it's pretty much a given that you won't be installing a three-element beam inside an apartment!

On the lower bands, a dipole is often not a viable option because of its size (a dipole cut for the center of the 80-meter Novice subband is about 126 feet long!). I had an 80-meter dipole up for a short time while living in an apartment, but my wife was not very impressed! No. 12 Copperweld™ snaking through the living room does not fit most people's idea of art!

You will probably have to run wire wherever you can, or use a (very) small

(very) small vertical. There are small verticals made for indoor operation, and these can give surprisingly good results (see the sidebar "Never Say Never, or All Things Are Possible" for one amateur's experience with such an antenna). Some of these antennas have a rudimentary antenna tuner built in, thus eliminating the need for a separate unit. If you are thinking of buying such an antenna, remember the money you'll save by not having to purchase a separate tuner. This may make the vertical an attractive choice despite its somewhat higher cost than a wire antenna.

If you do not use a dipole or a small vertical, perhaps the best alternative is an end-fed random wire. If you go this route, put up as much wire as you can. If you can string up 100 feet, that's great.

If you can't install this much wire, don't give up! Perhaps all you can manage is 20 or 30 feet around your radio room. Give it a try; you may be pleasantly surprised at the results. While the efficiency of an antenna decreases rapidly when it is less than a quarter-wavelength long (see Table 1 for quarter-wavelength measurements on several bands), you may still find such an antenna quite usable. With the arrival of the new sunspot cycle, you will find the 10- and 15-meter bands (where it is relatively easy to install a quarter-wavelength or more of wire) a great place to do much of your operating.

Keep in mind that you can use fairly small wire if you are running 200 watts or less. Also, since the antenna is inside, it does not need to contend with stresses such as icing and high winds. For most inside

Novice Notes:

• What kind of antenna can I put up inside?

• Will an antenna tuner help?

• Is it worth the effort?

Table 1

Quarter Wavelengths for Novice Subbands

Band (meters)	Center Frequency (kHz)	Quarter Wavelength
80	3725	62'10"
40	7125	32'10"
15	21125	11'1"
10	28300	8'3"

antennas, no. 24 or 26 wire will serve quite nicely and be much less of an eyesore than a heavier-gauge wire.

Whatever type of inside antenna you use, route it as far away as possible from conductive objects such as electrical wiring and pipes. Since their exact location in walls is not always known, try moving your antenna around some until you get the best results. Often a difference of only a few feet will result in a significant improvement in your transmitted signal (and in reception as well).

Be careful to route your antenna so that people and pets will not accidentally come in contact with it—RF burns are not conducive to the rest of the family tolerating your hobby!

Antenna Tuners

If you opt for an end-fed random wire, you will have to use an antenna tuner. An

Never Say Never, or All Things Are Possible

Having passed the General-class exam in December 1986, I was looking forward to HF voice privileges. However, there was one large obstacle to overcome: What type of antenna was I going to use with my new solid-state rig? This was a problem since I lived in an apartment in an antenna-restricted area.

By chance I saw an ad for a portable antenna that would work on 40-10 meters. Would this small antenna really work? I thought, "all things are possible."

I got the antenna in mid-December and was surprised and delighted. The little bugger worked wonders. First contact was Oregon on 20-meter SSB. Over a period of four months I worked the other 49 states on 20- and 15-meter SSB.

I also began to make DX contacts. So far, I've made many DX contacts and have worked all continents. I have been really pleased to have QSOs with hams in such places as Sweden, Japan, South Africa, Chile, Tahiti and the Antarctic Peninsula.

For amateurs living in an antenna-restricted area, this little antenna proves the adage never say never. There is still a way to enjoy Amateur Radio and make worldwide contacts. —Chuck Joseph, N5JED



Chuck Joseph, N5JED, at his station, which features a small indoor vertical. All the stuff on the wall (and more) was worked with the indoor vertical! (photo courtesy N5JED)

antenna tuner allows your transmitter to operate safely and deliver full power to an antenna that is not resonant at your operating frequency.

Antenna tuners do have limitations. They do not make the antenna itself more efficient at radiating your signal; they merely allow your transmitter to think it is operating into an antenna that is tuned to resonance at the operating frequency. Also, depending on the type of antenna tuner you use, it may or may not have sufficient range to tune a given antenna enough to provide the transmitter with a proper load (one that appears resonant at the operating frequency).

Still, if you keep its limitations in mind, an antenna tuner can be a big help in getting the best possible results from your antenna.

Learning to adjust an antenna tuner is not difficult. Most units have two or three controls, although some may have additional features such as an antenna switch and forward- and reflected-power meters. You can select the correct inductor while listening to your receiver; you merely place the switch in the position that provides the highest signal (or noise, in the absence of a signal) level. Then key your transmitter (at low power) and tune the other control(s) for minimum SWR. If your tuner has two controls (besides the inductor selector switch), first adjust one, then the other, until you have a good match (low SWR). The two controls interact somewhat, so be patient. You can do a final touchup of the controls (if necessary) when you bring your transmitter up to full power. In no time at all, the whole procedure will be second nature.

One note: If your rig has an automatic

DXing With Indoor Antennas

DXing with an indoor antenna may, at first, seem to be impossible. It's a popular misconception among many hams that large outdoor antennas are needed to regularly work DX stations. If you're trying to work DXCC on 160 meters, an outdoor antenna is probably a necessity, but since propagation conditions are rapidly improving (thanks to a cooperative cycle 22), working DXCC on 15 and 10 meters with an indoor antenna isn't an impossible task.

At my former QTHs in Minnesota and North Dakota I had plenty of "real estate" for my antenna farm. Although I frequently experimented with different wire antennas, my typical setup consisted of a horizontal 40-meter quad loop for 40 through 10 meters, and a 150-foot-long end-fed wire. With these relatively simple skywires, I had managed to work about 175 countries during the past several years. When I decided to move to Connecticut (to work at HQ), I wondered if my DXing days were over; I'm happy to say they're better than ever!

I was fortunate enough to locate a third-floor apartment in a wood-frame three-family house. I have easy access to a large walk-up attic (about 45 x 30 feet) that has a high ceiling. My landlord wasn't opposed to the installation of a couple of wire antennas, as long as they were completely contained in the attic. The first antenna I installed was my trusty 40-meter horizontal loop; this one runs around the edges of the attic, about 8 inches off the floor. The coaxial feed line runs through the floor into a closet located in my bedroom ham shack. I didn't ask my landlord if I could drill the hole, but I later learned that he didn't mind. Like I said, I got lucky.

The loop is about 35 feet off the ground—approximately the same height as its outdoor predecessor. Even though the antenna is indoors (and snakes around and through a lot of junk in the attic), it performs well. I have been steadily adding to my 5-band DXCC tally, especially on 40 meters. In a short time I have worked nearly every continent on 40 through 10 meters—many times at QRP power levels. (QRP power levels help reduce the possibility of TVI during "prime-time" operating.)

The loop works so well I started daydreaming about attic-mounted gain antennas. A west-firing, three-element wire triband Yagi soon followed (strung up in the rafters). To my surprise, the Yagi worked just fine, exhibiting excellent forward gain and good directivity. An east-firing duplicate will be erected shortly!

If an indoor antenna is your only alternative, by all means put it up. You may be pleasantly surprised. Oh, by the way, don't waste too much time listening to other hams who'll inevitably tell you "it'll never work." They'll tell you about the dielectric effect and the detuning effects of other nearby metal objects, and a bunch of other signal-destroying phenomenon. The bottom line is: indoor antennas do work. With a little luck, yours will too.

My experience isn't unique. Many hams have good luck with indoor antennas. Two that come to mind are a 0-land ham who runs a successful 40-meter DX net while using an indoor dipole and a 4-land ham, a prominent QRPer, who worked DXCC with his Argonaut and several attic antennas.—Kirk Kleinschmidt, NT0Z

antenna tuner, you may be tempted to rely solely on it. However, automatic tuners are more limited in their matching range than manual tuners (and are not designed to match an end-fed random wire), so you may still need a separate antenna tuner. Your automatic tuner can still be of use—it may be practical to tune up your system with the manual tuner and then use the automatic tuner for moving around a given band.

Don't Forget the Ground!

Don't forget the importance of a good RF ground—this is even more critical when using an inside antenna. Without a good RF ground, you will almost certainly have a problem with RF "hot spots" around your radio—no one likes being "bitten"!

If it is impossible to install a good ground rod near your radio, try whatever you can. Sometimes cold water pipes will serve as an effective RF ground, but don't be too sure—many plumbing systems use PVC (plastic) pipe, making them useless as a ground. Perhaps you can use the hot-water heating system if your apartment or home has one—this worked well in my station.

Remember to keep the lead between your radio and whatever ground you use as short

as possible—it should be significantly less than a quarter-wavelength on the highest-frequency band you operate. Also, use as large a wire as possible—I use the braid from a length of RG-8 coax.

If you cannot find a good RF ground, make one! Cut a lead that is a quarter-wavelength long on the band you will be operating and attach it to the ground terminal on your radio. Make sure the end of the lead is located where it won't accidentally be touched—there's high RF voltage on it, and it's sure to bite! See the sidebar, "What is a Counterpoise," which appeared on page 44 of November *QST*.

More is Not Always Better

Even with proper grounding, you may not be able to run your rig at full power, due to the proximity of your antenna to your radio. A good RF ground will certainly help, but if you still have problems with RF getting into your equipment, try reducing your power.

If your rig normally puts out 100 W, try cutting back to about 40 or 50 W output. This may clear up the problem, and the reduction in power is only about 3 dB—hardly noticeable at the other station's receiver. You'll still be able to make plenty

of contacts, both stateside and DX.

For Your Reading Pleasure

If you want (or need!) more information on antennas, there are several excellent sources of information.¹ Talking to fellow hams is another way to get an idea of what may or may not work. Amateur antenna experimentation offers endless diversity, and nothing matches the thrill of seeing your antenna efforts pay off.

Don't Give Up!

If you must use an inside antenna, don't let it stop you from enjoying Amateur Radio. While you won't have the loudest signal on the band, there is no reason you can't enjoy your favorite part(s) of operating. With a little time and effort, you too can overcome the obstacles of operating inside an apartment.

¹Some good places to learn more about antennas, antenna tuners and transmission lines are the *Novice Antenna Notebook*, *The ARRL Handbook for the Radio Amateur* and *The ARRL Antenna Book*, all available from ARRL. Other ARRL publications also contain valuable information on antennas. □

New Books

THE K1BV DX AWARDS DIRECTORY

By Ted Melinosky, K1BV. Published by K1BV, 525 Foster St, Suite B, South Windsor, CT 06074-2934. Second edition, 1988. Looseleaf, softcover, 8½ × 11 inches, 203 pages. \$14.35. (US and Canada, First Class postage paid. For orders in Connecticut, add 7.5% sales tax. Contact the publisher for foreign order rates.)

Reviewed by Robert Halprin, K1XA

Each QSO that you make on the air has some awards potential. That West German you just worked could be in a rare DOK, or that Soviet might be in a sought-after oblast. K1BV's awards directory, a listing of worldwide Amateur Radio operating awards and certificates, contains rules for approximately 820 different non-US operating awards, and some US awards with a DX orientation. As Ted points out, "There's a whole world out there beyond DXCC and WAS." If you're already into wallpaper, or perhaps contemplating what to do with all those DX QSL cards in the basement, Ted's directory is a great resource. Chasing awards is not only a great way to juice up your routine operating, but it's also a fascinating way to learn about the geography, history, culture or political structure of other countries.

Having put together the awards chapter in *The ARRL Operating Manual*, I can appreciate the magnitude of the task that Ted faced in preparing his directory of DX

awards. The task consists of gathering all data, word processing all the material, and the careful fact-finding necessary to resolve any inconsistencies.

The *Operating Manual* awards chapter principally covers awards officially sponsored by the IARU (International Amateur Radio Union) societies throughout the world, at least for now. Ted's book is more comprehensive—it includes all sorts of locally, individually and independently sponsored awards. This is really impressive when you consider that he has put together this volume as a service to the amateur community, and as an outgrowth of his passion for collecting awards. His stated goal is to "Present the most complete listing of DX awards in the world and to do it at a reasonable cost."

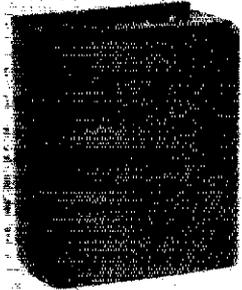
In addition to page after page of rules for DX awards, K1BV provides tips on obtaining QSL cards and awards-application procedures. He also includes a sample all-purpose awards application. This kind of guidance is very useful, because it is important, when applying for DX awards, to state precisely what award and/or endorsement you are seeking. (Remember, not everyone is fluent in English!)

If you enjoy having all sorts of beautiful certificates and plaques gracing your shack walls, the *K1BV DX Awards Directory* is just the thing for you. Everything from the Tasmanian Devil Award (Australia) to the Catch 22 Award (Hong Kong) is there—under one cover. Have fun!

New Products

PERIPHEx NiCd BATTERY PACK FOR KENWOOD HAND-HELD RIGS

□ Periphex has expanded their line of replacement NiCd battery packs for hand-held rigs. The new packs are made for the Kenwood TR-2500 and -3500 (PB25S), and the TR-2600A and -3600A (PB26S).



Both are 8.4-V packs with 900-mAh capacity, and both are compatible with Kenwood's ST-2 base charger, MS-1 mobile charger, and wall trickle charger. The packs include protection from overcharging, short circuits and excessive temperature. Each pack has a one-year warranty. Price, \$65 plus \$3 shipping. Available from Periphex, Inc, 149 Palmer Rd, Southbury, CT 06488, tel 203-264-3985.—Rus Healy, NJ2L

Strays



I would like to get in touch with . . .

□ anyone who has modified and improved the performance of the Ten Tec Corsair 560. Phil Stevens, G3SES, 20 Abbots Park, Chester CH1 4AN, England.

W1AW Renovation Ready to Move Forward

Blueprints prepared, construction to begin by the end of the year.

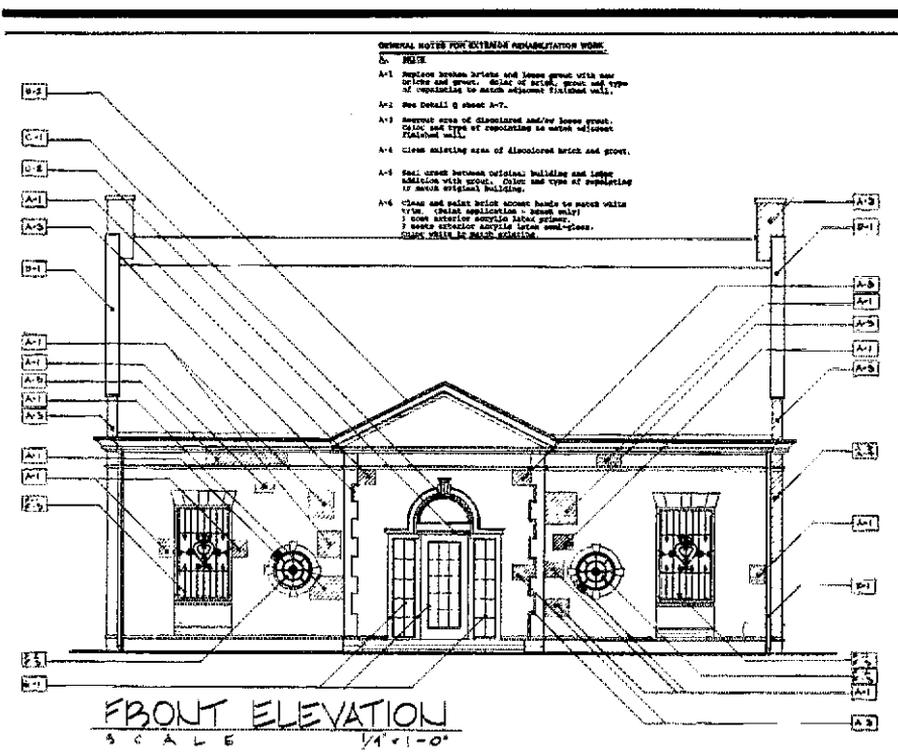
By John F. Lindholm, W1XX
Trustee, W1AW

The rich history of the ARRL headquarters station, W1AW, has graced the pages of *QST* for the past several issues.

We now set our sights on the future. Blueprints have been developed in meticulous detail. Contracts are presently out for bid, with "building breaking" (as opposed to ground breaking) to commence before the end of the year. We're pleased to share some of these plans with you here.

The monetary support of the membership to this project has been gratifying, as we continue to hoist the antenna up the "giving tower." For those who have not yet contributed to the W1AW renovation, we ask for your generous support. We appeal also to those who have already contributed, but may wish to add to their previous donation.

In the coming months, we will be reporting on further progress with the



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

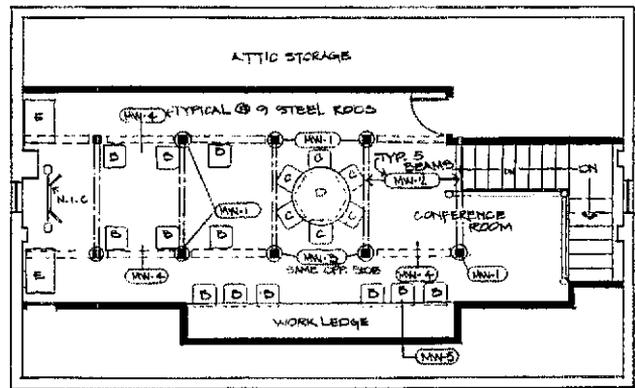
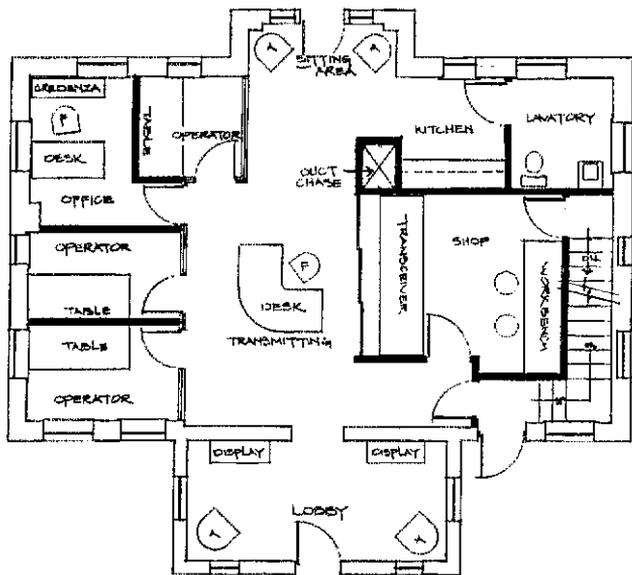
Contributors to the W1AW Fund Drive will be recognized as follows:

- *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.

The architects selected are experienced in the preservation of historic buildings. What a treasure the W1AW building is to radio amateurs worldwide. Specifications include brick face restoration—matching the original surface of 1938—where many harsh New England winters have taken their toll. Much attention to detail will restore the outside of the building to its previous prominence.

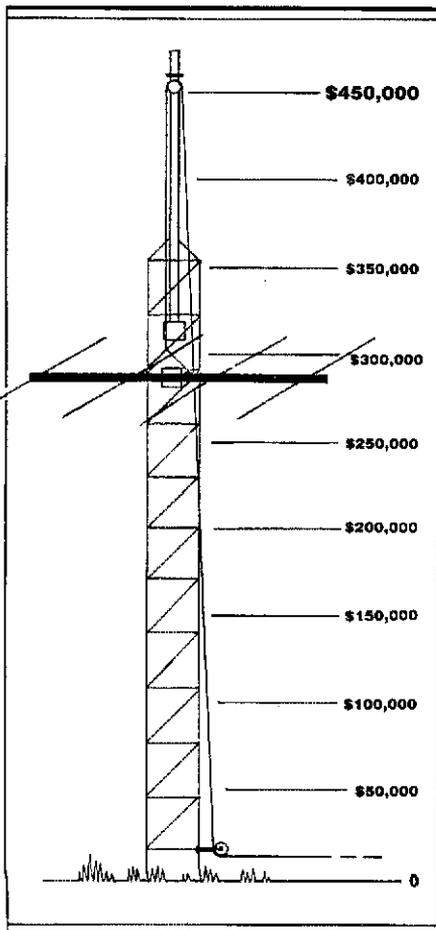
construction, as well as the development of plans for new radio equipment and antennas. Rest assured that while all this is happening, our dedicated W1AW service of bulletins and code practice for the amateur fraternity will continue. Our goal for 1989—the Diamond Jubilee of the ARRL—is the ribbon cutting ceremony for the new W1AW.



2nd FLOOR PLAN SCALE 1/4" = 1'-0"

The ground-floor "working" part of the station will house a rack of bulletin transmitters serviced by an L-shaped main console, and three studio type visitors' operating positions separated from the main floor by glass partitions. Soundproofing will be utilized extensively between operating positions. Entrance will be through a lobby, with display cases recalling previous ages in the history of W1AW. Office, kitchenette and lavatory facilities will be available, as well as a shop area with direct access to the rear of the bulletin transmitters. Bulletins and code practice transmissions will be computer controlled.

The second floor attic is presently visited at one's own peril. With 14-foot floor-to-ceiling clearance, it's a waste of valuable space. Enter a conference or club meeting room, just right for instructional seminars with audio/visual equipment in place. Also, what a wonderful communications crisis center, for use during emergency situations anywhere in the world. Attic storage will still be available in the wings where the roof line prevents standing room. Some limited space will be devoted to the permanent display of station memorabilia.



Strays



DX QSO

□ On June 28, 1939, I had what proved to be my last contact for quite some time to come—40-meter CW with G4AS. The next few years kept me QRT. I was finishing my last two years of school and was married. Then, of course, came the war years of 1941-45. By early '46, I was getting an itch to get back into ham radio. My wife and I were now living on the first floor of a five story apartment building in Jersey City, New Jersey. Considering the special limitations of our apartment, the number of neighbors nearby and the problems of a large antenna on the roof, I elected to go the 2-meter route.

My "state of the art" on 144 MHz was not very sophisticated, and my station (homebrew of course) consisted of a 6C4 modulated oscillator and 9002 regenerative receiver. The receiver's 6AQ5 audio output served as the modulator, driven by a carbon microphone. To keep my antenna inconspicuous, I made and installed a vertical antenna fed with about 80 feet of coax leading down the five stories from the roof to my apartment.

Considering that my transmitter had an input power of about 6 watts, and with the obvious line losses, little, if any, power actually reached the antenna. However, I was now able to "get back on the air."

I had no difficulty hearing many good signals and made many fruitless calls. But, I could *not* raise a soul.

Finally, on July 6, 1946, I heard W2HRT calling CQ. I called him, and he responded. Eureka! I was back in business. W2HRT's name was Les. He gave me a Q5, S9 report, and told me he was in Jersey City. I responded with my name and gave him a 59 also. Since we were both in the same city, I asked where he was located. He replied that he lived on Harrison Avenue. When I asked, "Where on Harrison?" he answered, "275 Harrison." My next question was... "What floor?" His response... "The 5th!... What floor do you live on?" So much for my first 2-meter DX QSO. 73 Les, wherever you are, and thanks again.—*Matthew M. Bell, W8KST, ex-W2JSSX*

ARMED FORCES COMMUNICATIONS AND ELECTRONICS ASSN (AFCEA)

□ The next meeting of the 1988/1989 season for the Washington Chapter of AFCEA will be held December 8 at the Sheraton—Washington DC. Adm William J. Crowe, Chairman, Joint Chiefs of Staff will be the guest speaker. The luncheon and meeting will take place at 11:15 AM, and the Joint Service will be honored. The January luncheon and meeting will be held on January 17 at the Sheraton—Washington Hotel at 11:15 AM. Gen Carl occasion the Association will honor the United States Army. For additional information on reservations, please call Ms. Diane Sibley, tel: 202-457 3060. The cost of the luncheon is \$20.

20-Meter Beacons Revisited

Can't find them? Timing, not tuning, may be the problem.

By Jerry S. Stover, W5AE

4025 Druid Lane
Dallas, TX 75205

Amateur Radio has a proud record of advancing the frontiers of propagation studies, starting in 1921 when the ARRL sent Paul Godley to Europe to listen for North American hams. The VHF DX work of Ross Hull in the 1930s was the forerunner of current tropo scatter systems. Present day over-the-horizon radars of the Russian "woodpecker" and the US Air Force's OTH-B use techniques pioneered by Dr Oswald Villard, W6QYT, in the 50s.

A more recent (1982) and very successful amateur project, also suggested by Dr Villard, is the worldwide beacon system built by the Northern California DX Foundation (NCDXF). Sophisticated automatic beacons on 14.100 MHz are installed at nine locations on five continents (Table 1). Set up by local universities and clubs and with approval of the various governments, the project is an outstanding example of international cooperation and goodwill.

Numerous articles have described the project.^{1,2,3} Nevertheless, many newer hams are unaware of this resource, and many more complain they never hear the beacons or confuse them with the "burps" of packet radio spreading down from 14.105 MHz.

Although installed by NCDXF, the system is not just for DXers. Anyone

Table 1

00:00	4U1UN/B	United Nations, NYC
00:01	W6WX/B	Stanford University, CA
00:02	KH6O/B	Honolulu Community College, HI
00:03	JA2IGY	Tokyo, Japan (JARL)
00:04	4X4TU/B	Tel Aviv University, Israel
00:05	OH2B	Helsinki Technical University, Finland
00:06	CT3B	Madeira Island (ARRM)
00:07	ZS6DN/B	Transvaal, South Africa
00:08	LU4AA/B	Buenos Aires, Argentina (RCA)

interested in propagation or wanting to calibrate or compare equipment will find it useful.

The nine beacons operate around-the-clock in carefully timed one-minute slots. During the one-minute slot, each beacon starts with an output of 100 W, then drops successively to 10, 1.0 and 0.1 watts (see Table 2). These 10 dB steps are ideal for calibrating beams, comparing two antennas or calibrating receivers.

Timing is the Key

The most important tool in finding the beacons is a digital watch or clock, displaying minutes and seconds, set to the nearest second with WWV. Remember, the beacons are at 10 W or less for over half of the

Table 2

100 watts	—	(9-second dash)
10 watts	..	
1 watt	...	
0.1 watt	....
100 watts		SK (call sign)

total time. Even for the expert, it is easier to locate a 100 W signal than a 10, 1 or 0.1 W signal! It is essential to listen at the very start of each one-minute period.

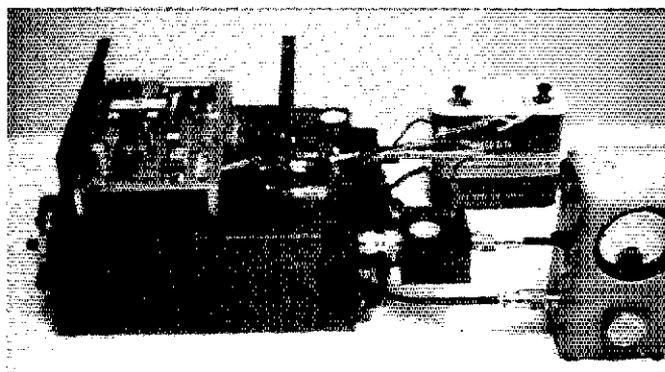
The timing also identifies the beacon location if, like most of us SSB operators, you have a problem copying the 20-WPM call sign. But you should be able to figure it out by knowing the calls as shown in Table 1.

Once you have the exact time in minutes and seconds, start listening on 14.100 MHz. On newer digital transceivers, with CW mode and built-in offset, this is easy. On older receivers with a BFO or product detector (such as my Drake R4B), you will not hear a 14.1-MHz CW signal by tuning exactly to 14.1 MHz because you are "zero-beat." Tune off one side by 800 to 1000 cycles to get a beat note. The best way is to use a crystal calibrator for a signal at 14.1 MHz. Tune it for best tone, turn it off, and, depending on the time and band conditions, you should soon hear one or more of the beacons.

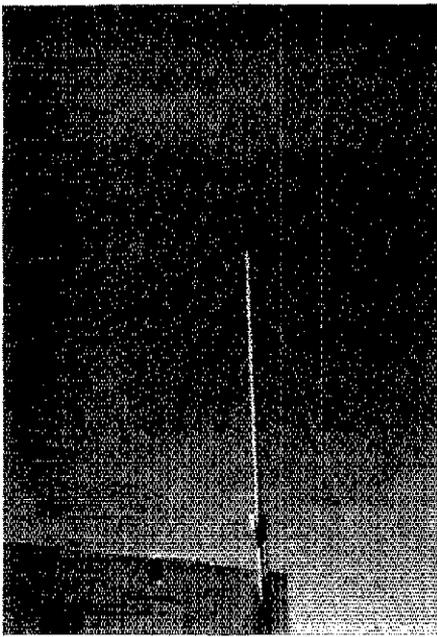
Let's try. Say it is about noon in the Midwest on a normal day (no solar blackouts!).



The NCDXF's beacon package consists of a Kenwood TS-130 plus a beacon controller unit. (photos courtesy of NCDXF)



The battery acts as an emergency clock power supply.



Twin quad loop antennas at W6WX/B located on a low hill overlooking Stanford University campus.

Exactly on the hour (within 2 or 3 seconds) or on each 10 minutes after (10, 20, 30 and so on) you will hear the 4UIUN beacon in New York City transmit QST DE 4UIUN/B BEACON. Next it will send 1 dot and then a 9-second dash. All of this is at 100 W into a vertical antenna on top of the United Nations Building. Following the 100 W dash, it drops to 10 W, sends 2 dots and a 9 second dash, etc (see Table 2). After the 0.1 W dash, it goes back to 100 W for a quick SK DE 4UIUN/B which completes the one minute cycle. The actual transmission time takes 58 seconds.

Two seconds later, at 1, 11, 21 minutes, and so on after the hour, you will hear: QST DE W6WX/B BEACON, with the same sequence coming from Stanford University in California. In the late afternoon or evening, and if conditions are good, you will next hear the KH6 beacon. Orient your beam toward Japan, and you may even hear JA2IGY.

In the morning around 1100 or 1200 UTC, swing your beam toward Israel and try to hear the 4X4 beacon at 4 (14, 24 and so on) after the hour. Later, the OH and CT beacons can often be heard; with the ZS and LU beacons even later in the afternoon. With improving conditions, as many as nine beacons can be heard in one complete 10-minute sequence.

It is interesting to check the beacons to see how they correlate with propagation conditions (reported by WWV at 18 minutes after each hour), especially the A Index. Often, there seems to be no correlation. For example, during one April evening, WWV reported flux 120, A of 6 and K of 3—not bad, but not outstanding. Nevertheless, all

beacons, except LU (reported temporarily off) were in strong for over an hour, and 20-meter phone was wide open to all continents. Moral: Check the beacons—do not rely on WWV!

Because the New York and/or California beacons are strong almost all day, every day at North American stations, they are the ones to use to compare antennas and make other tests.

I again emphasize the need for an accurate digital watch or clock set to the second with WWV. The reset is important. Power companies keep electric clocks fairly accurate over a 24-hour period, but at any given time, they can be off 15-20 seconds—that's too much. Timing is more important than tuning, since you have only a few seconds to tune for a 100 W signal. After about 20 seconds, it will be down to 10 watts or less. This can be tough, even receiving with a beam. However, you will be astounded to hear the 1-W, even the 0.1-W, signals.

Even though the beacons have been operating around the clock for many years, they have had an outstanding reliability record—better than 99 percent. Nevertheless, occasionally one will be off the air for a period, usually due to lightning damage. Recently, the W6WX beacon was stolen. Unless recovered, a new controller unit must be built, so it may be silent for some time.

The Northern California DX Foundation is presently studying the feasibility of upgrading the present 14.1 MHz net to 15 or more stations, and also of developing three-band capability for each beacon—14, 21 and 28 MHz. One transmitter and one trap antenna would service all three bands at each beacon station. Hopefully, a prototype controller will be developed in the next year.

For more information on this highly successful project, write Al Lotze, W6RQ, 46 Cragmont Ave, San Francisco, CA 94116-1308.

Notes

- ¹R. J. Halprin, K1XA, *ARRL Operating Manual*, American Radio Relay League, 1987, p 2-17.
- ²D. Ingram, K4TWJ, "Tuning the 20 Meter Beacon Network," *CQ Magazine*, March 1984, p 66.
- ³J. Troster, W6ISQ, and C. Pierce, K6RU, "World-wide Beacon Net: The Possibilities Abound," *QST*, June 1983, p 27.

Jerry Stover was first licensed in 1933 as W9PEV at Rochester, MN (before MN was W0). He received his BS in Electrical Engineering from Southern Methodist University. While at SMU, he was trustee of the school station, W5YF. A major in WWII, Jerry received the Bronze Star for establishing communications on Omaha Beach during the 1944 invasion of Normandy. Following the war, Jerry and Tom McMullin, ex-W8CBG, founded Communications Industries (CI), a mobile radio firm, and Decibel Products, an antenna manufacturer. Since his 1980 retirement as Chairman of CI, Jerry has served as a volunteer assistant to the Dean of Engineering at SMU. Jerry is a member of the IEEE and a Fellow of the Radio Club of America.

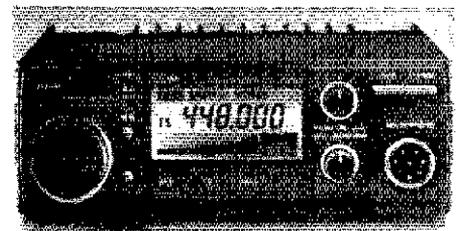
New Products

ICOM IC-12GAT AND IC-448

□ ICOM America, Inc, has introduced a 1.2-GHz handheld transceiver, the IC-12GAT. This 1-W unit covers 1240 to 1300 MHz (transmit and receive), 20 memory channels, programmable frequency scan, memory scan, battery saver, multi-function LCD readout and DTMF pad. Accessories from the popular IC-2AT series transceivers—battery packs, headsets and speaker mics—can also be used with the IC-12GAT. The suggested list price of the IC-12GAT is \$529.

ICOM has also introduced the IC-448, a 25-W, 440- to 450-MHz mobile FM transceiver. Operating features include a multicolored LCD, 20 memory channels, programmable memory scan and optional tone squelch. The physical dimensions of the IC-448 are 5½ × 2 × 5½-inches.

For more information, contact ICOM America, Inc, 2380 116th Ave NE, PO Box C-90029, Bellevue, WA 98009-9029, tel 208-454-6155.—Tom Francis, NMIQ



The W6AM Rhombic Antenna Farm Dismantled

Here's the story of one of the more famous Amateur Radio antenna farms, now dismantled after many years of service.

By Jan D. Perkins, N6AW
524 Bonita Canyon Way
Brea, CA 92621

Don C. Wallace, W6AM, became a Silent Key on May 25, 1985, after 75 years of Amateur Radio activity. The W6AM rhombic antenna farm was recently dismantled, marking the end of an era.

Don's accomplishments were impressive. In 1919 he was the Chief Radio Officer for President Wilson, aboard the *USS George Washington*, at the Versailles Peace Conference. He received one of the first Worked All States certificates and was a charter member of Worked All Continents. Don finished first in two divisions in the first ARRL-sponsored DX contest in 1927.

In the 1920s and '30s, a series of natural catastrophes resulted in problems with commercial communications, and Don received 17 certificates for handling traffic during emergencies.

The Antenna Farm Takes Shape

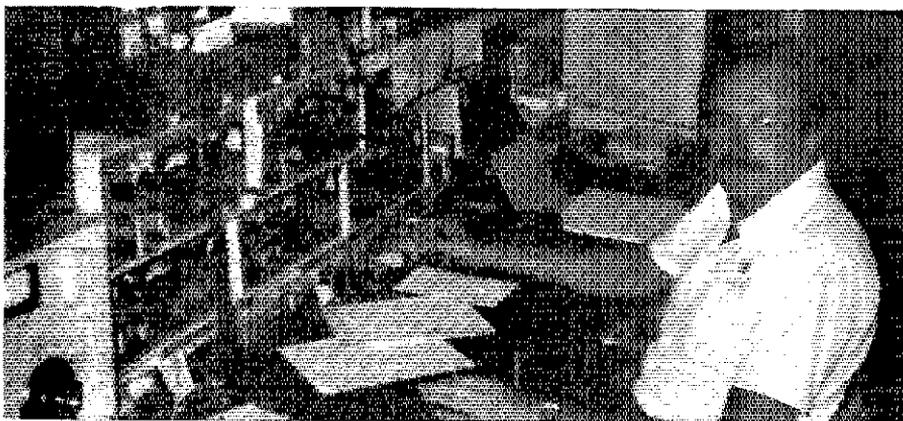
In 1945 Don acquired 120 acres on the top of Palos Verdes Peninsula from Press Wireless. He installed 16 rhombic antennas, the longest being 1550 feet, plus assorted lesser antennas. This required 61 telephone poles, each 80 feet high. Another 90 feeder poles, each 25 feet high, carried the 52 miles of feed line, which was #8 Copperweld™. Four of the antennas had a bearing very close to each other and could be phased together from inside the shack.

1956 marked the achievement of a DXer's dream, the top of the ARRL DXCC Honor Roll. Don remained at or near the top for the rest of his life. He was also honored by induction into the CQ DX Hall of Fame and the QCWA Hall of Fame. He received a number of cups for his code copying ability and was the West Coast champion until 1959. Over the years, he made 500,000 QSOs and received 100,000 QSLs.

In 1962, he sold 95 acres of the property. He installed ten 140-ft poles on the perimeter of his remaining 25 acres, and layered antennas, 6 feet apart, from the



In 1919 Don was the Chief Radio Officer for President Wilson aboard the *USS George Washington* at the Versailles Peace Conference.



Jan, N6AW, at the operating position of W6AM.

140-ft level down to the 90-ft level. The longest antenna was trimmed to 1100 feet. The rhombic that had spanned five football fields in length would come to have 11 hams with Yagis residing in its place.

A Dream and a Task

Don had specified to his family that when the time came, he wanted me to keep his station on the air one more year, and then dismantle it. Though I had operated many DX contests from there and had helped maintain the station the previous six years, little did I realize the magnitude of the task I accepted.

Spending a year operating the ranch was a dream. 5BDXCC became a snap, as it took three weeks to work 100 countries on 80 meters! I started dabbling on 160 meters, and worked 50 JAs one night.

The process of dismantling the rhombic farm began in earnest when the property was sold in May 1986. Hams rallied around from all over. Each evening after work we toiled until sunset. On weekend mornings I fixed omelets at sunrise. We rolled wire and pulled poles all day, and I barbecued steaks at sunset for the survivors.

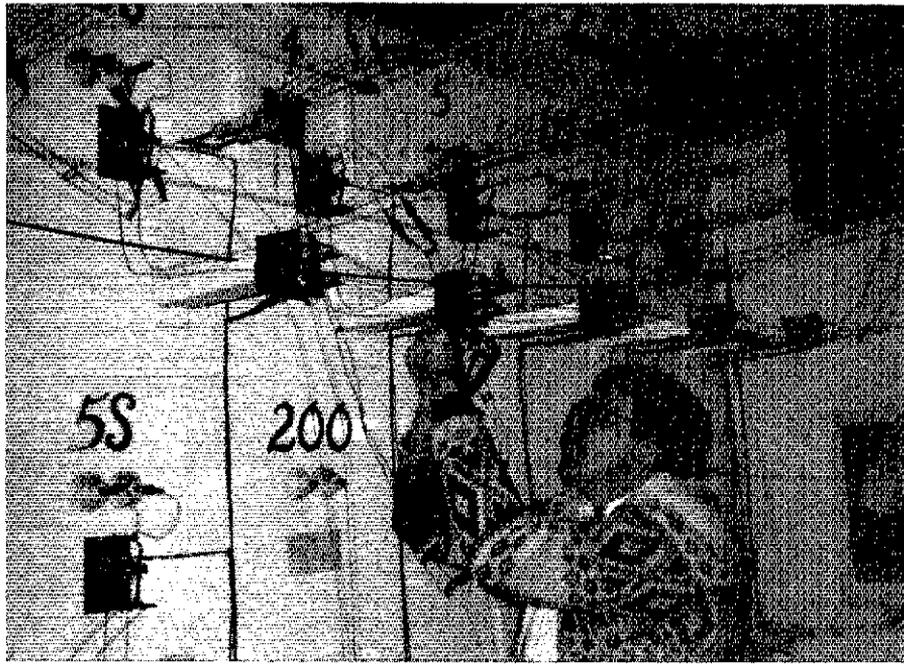
By September the task was done. Espe-

New Products

CURTIS 8044ABM CW KEYSER KIT

□ Curtis Electro Devices of Mountain View, California, has introduced a CW keyer kit designed around the 8044ABM IC. The 8044ABM is the latest Curtis IC keyer, and incorporates all the features of the earlier 8044 series chips, with the addition of *negative* weighting. The 8044ABM keyer kit PC board allows construction of a keyer with the following features: 8-50 WPM speed range, variable sidetone pitch, volume and keying weighting, switch-selectable iambic (type A or B) keying, and positive or negative weighting. An optional analog speed meter is also available. The circuit's audio output is sufficient to drive a small speaker or headphones. The 8044ABM keyer can key up to 300 V dc at 200 mA, positive or negative.

The 8044ABM-3 kit includes the 8044ABM IC, PC board, 20-pin socket and manual. Price class: \$29.95. The 8044ABM-4 kit includes the 8044ABM-3 kit plus all PC-board-mounted parts, speed, weight, pitch and volume controls and a 26-pin IDC connector and ribbon cable. Price class: \$64.95. Both kits can be purchased directly from Curtis. For more information, contact Curtis Electro Devices, 1235 Pear Ave, Suite 100, Mountain View, CA 94043, tel 415-964-3846. —Tom Francis, NMIQ



A matrix of 108 relays selected which rhombic antenna was used. Each rhombic had its own dedicated termination resistor. Here N6AW cleans a noisy relay.



Jerry Hagen, N6AV, made the last QSO from the Wallace radio ranch from this temporary operating position.



The old master himself, W6AM, repairing a rhombic.



Bob Kliman, KB6CIO, hauling part of the 17 miles of antenna wire. (photos courtesy N6AW)

cially noteworthy were the efforts of N6EKX, KB6CIO, KM6B, W6KP, N6AV, W6EUF, the Southern California DX Club, the San Diego DX Club and the Northern California DX Foundation. Lots of others helped, but without the support of those mentioned above, the task would have been much more formidable. Many family members pitched in when they could. Joanie Wallace Swanson, Alex Wallace and Anne Wallace Hedley always had a big smile and encouragement to hang in there and keep going.

Strays



The Governor of Idaho proclaimed July 2-8, 1988, as Amateur Radio Recognition Week calling "upon all our citizens to join in recognition of the invaluable service provided by our nation's Amateur Radio operators and take the time during this week to learn more about this most important means of communication which they perform so well." Pictured here (l-r) are Jack Blake, State CD Director; Dan Marler, K7REX, SEC; Gov Cecil D. Andrus; and Don Clower, KA7T, SM. *photo courtesy KA7T*

Answer to the UpFront in QST Quiz
The stack would be about 38,000 feet high and would weigh about 750 tons!

Meet Our 1988-89 Scholarship Recipients

When a young scholar, with the "right stuff" combination of academic excellence and active Amateur Radio involvement is awarded a scholarship, we can all celebrate!

By Mary Schetgen, N7IAL
Assistant Secretary
The ARRL Foundation

You may recall reading or hearing our announcement this past summer of the recipients of the 1988-89 academic year scholarship awards. Let's take a closer look now and hear the comments of each of the appreciative students your generous contributions have helped this year:

ARRL Scholarship Honoring Barry Goldwater—\$5000

"I would like to sincerely thank everyone responsible for selecting me the recipient of this year's award. . . I am truly grateful. The scholarship will be a tremendous help in financing my education at the University of Oklahoma. Amateur Radio has opened many doors for me, and I selected Electrical Engineering as a major because of my experiences as a ham. I hope that the Foundation continues to offer this scholarship because I know it will benefit many students in the future. Once again,

thank you, and I wish you the best of luck in all your endeavors."—*WK5P*

Dr. James L. Lawson Memorial Scholarship—\$500

"My plans are to study at Northeastern University, majoring in computer sciences. I intend to make a career switch from my present occupation as a truck driver to work in the computer industry or do college-level teaching. I'd like to express my appreciation to everyone supporting the Foundation and especially Amalia Lawson."—*K1VUT*

L. Phil and Alice J. Wicker Scholarship—\$500

"I'm presently attending Virginia Polytechnic Institute and I'm willing to work hard! As an electrical engineer, I will have the opportunity to design things that will make life better."—*NK3M*

Paul and Helen L. Grauer Scholarship—\$500

"I'm majoring in meteorology at the University of Kansas with a special interest in severe storms forecasting. My career intentions are to be a forecasting meteorologist with the National Severe Storms Forecast Center. My spotting duties as a ham are not only useful, but have brought other spotters into the hobby!"—*N0GNA*

You've Got A Friend In Pennsylvania Scholarship—\$750

"I'm enrolled in a four-year Bachelors Degree program at the Pennsylvania State University at Wilkes-Barre. With an Electrical Engineering degree there will be a wide variety of employment that is available to me. My interest in electronics is via Amateur Radio. I am very grateful for this scholarship."—*N3CXB*



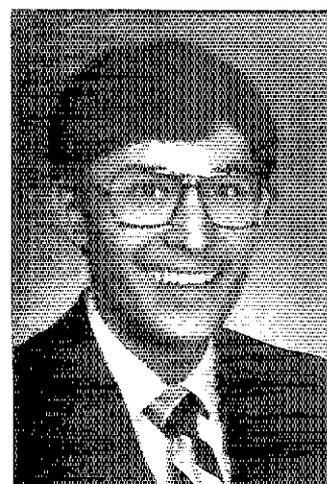
Shawn A. Wakefield,
WK5P



David A. Clemons,
K1VUT



Paul W. Hoffman,
NK3M



Raymond J. Gomez, Jr.,
N0GNA



Douglas M. Benish,
N3CXB

Stephanie A. Dougherty,
N8FIT

Raymond P. Klump,
KA9WFR

Robert N. Keenan,
WU6L

**Edward D. Jaikins Memorial
Scholarship—\$500**

"Thank you very much for this scholarship. I am studying Electrical Engineering at Michigan State University to earn my Bachelor's Degree and hopefully become an engineer for NASA. I would like to work on the space shuttle, which is my ultimate goal."—N8FIT

Edmond A. Metzger Scholarship—\$500

"I plan to perform research in the applications of opto-electronics in communications or to explore electronic music synthesis as music, electronics and optics are prime interests of mine. I attend the University of Illinois, where I am majoring in electronics."—KA9WFR

**Perry F. Hadlock Memorial Scholarship
—\$500**

"I'm fascinated by electronics and enjoy math and science. Now that I am 18, I am currently in the process of becoming a certified Volunteer Examiner so that I can become involved with license testing. I am studying Electronic Engineering at the University of Southern California. As you know, USC is one of the most expensive universities to attend, so I am very grateful for this scholarship award."—WU6L

**RADIO SHACK'S PARENT
CORPORATION SEEKING TO
REWARD SCHOLARS**

Tandy Corporation, in conjunction with Texas Christian University, has announced a scholars program to recognize the outstanding math or science teacher at each participating high school in the USA. The top 100 teachers will each receive a cash stipend of \$2,500 for their contribution inside and outside the classroom. The top 2% of high school students will also be recognized for academic excellence and the top 100 math and science students will each receive a \$1000 cash scholarship. If you are

a high school teacher or student wanting to know more about this sure-to-be-popular program, check with your high school principal for details.

TAX REMINDER

The ARRL Foundation is a not-for-profit, tax-exempt, 501 (c)(3) organization. Any contributions made to it are tax-deductible to the extent permitted by the IRS. If you are thinking of making a year-end, tax-deductible gift, be sure your contribution is postmarked before midnight, December 31, 1988. Our address is The ARRL Foundation, 225 Main St, Newington, CT 06111.

Contributor's Corner

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

*The Victor C. Clark Youth Incentive
Program*

Tom Frenaye, K1KI

The Goldwater Scholarship Fund

Bill Dean, W4GJ
Six Meter Club of Chicago

The Edmund A. Metzger Scholarship Fund

Six Meter Club of Chicago

The General Fund

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Harvey F. Hoffman, WA1YCP
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Wolfgang Stachuletz, KA1JDR

Willie Sams, K2MTN
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Richard H. Burgard, KA3MKI
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B. J. Kurtin, W9DQV
G. A. Pelfrey, N4BBX
Charles W. Haas, WB2JDT
Daniel G. Damon, KA1OYX
Joseph C. Ducros, KP4AT
Dennis A. Aughenbaugh, N3CZN
P. Kenneth Pierpont, KF4OW
Charles E. Debes, KA5VWH
Richard J. Gusefski, WB2SXI
James Bailey, N0IAA
C. Francis Leary, K1YKQ
B. Browe Stone, N3CD in memory of

Theron L. Philley, K2RRM
Keisuke Ookuma
Vincent G. Martlew, K8VM
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William E. Rheney, NA4X
David H. Palmer, W6PHF
Joel S. Tuchfeld, WB2AYS
Kenneth C. Hopper, N9VV
Jerome C. Sumner, WA1CKV
Dennis Mursier, Jr, KA2RIT
Raymond Godfrey, N3DQW

As received and acknowledged during the month of September. 



THE ARRL FOUNDATION, INC.

"for the advancement of amateur radio"

Congress Helps Hams, Heads Home

In its last week of business before the 1988 Presidential and Congressional elections, both the House and Senate turn out an amazing amount of paper. The name of the game must be "Trust Your Leaders." Bills selected by Committee Chairmen and the leaders of both parties as being at once necessary, and in a form which is no longer controversial, are brought up one after the other, under "Suspension of the Rules." The few amendments which make it are accepted on unanimous consent; there is no debate, and adoption is by voice vote.

Into this maelstrom came a nice little resolution commending amateurs for their work in handling emergency communications for the public and urging government agencies to take this record into account when they take any action affecting amateurs.

The resolution started out as House Concurrent Resolution 317 (HConRes 317) on June 14. Similar text was introduced as Senate Concurrent Resolution 127 (SConRes 127) on June 28. Though cosponsors were coming aboard at a fair rate, it looked as though there would not be enough support to force adoption of either resolution in early October.

Then along came the opportunity to have essentially the text of SConRes 127 added as an amendment to the FCC Authorization Bill, S.1048, which was about to be considered by the Senate. Would the sponsor, Senator Pete Wilson (R-CA), consent to a change in the wording, offered by the Committee on Energy and Commerce? He checked with the ARRL, found agreement, and the last sentence was made less specific. Thereupon, on October 7, Senator Hatfield (R-OR) offered Mr Wilson's amendment—now called Section 10—from the floor; Senator Danforth (R-MO) brought up the compromise version of the FCC authorization bill, the text of which had been "agreed to on both sides of the aisle and in both Houses," and by the majority leader. Speaking in support of the amendment, Senator Wilson had some very nice things to say about Amateur Radio, as reported in the *Congressional Record*:

Mr. President, I rise today to offer an amendment to the FCC reauthorization bill S. 1048 to recognize the invaluable public communications services performed by volunteer radio operators in emergency, and oftentimes life-threatening, situations.

The ability and willingness of amateur radio operators to provide life-saving emergency communications services when normal lines of contact are down is exceptional. Indeed, their efforts have been

indispensable to the work of public safety and civic organizations worldwide.

Without the services of our ham radio enthusiasts—which number over 435,000 throughout the United States—we would see a significant and unfortunate reduction in the ability of voluntary groups, like the Red Cross, to meet the needs of individuals, towns and entire countries in the event of natural disasters, such as earthquakes, tornadoes, hurricanes and blizzards, and tragic accidents, such as train wrecks and chemical spills.

Relief to areas hit by the forest fires which plagued my State this year and last, as well as to Yellowstone National Park this year, was quickened because of the services provided by these dedicated volunteers. Most recently, these radio operators proved helpful in providing communications between the United States and the Cayman Islands, Jamaica, and the Mexican communities of Cozumel and Cancun following Hurricane Gilbert and the devastating effects it had on these lands and their people—many of whom are poor and were left homeless.

Now I understand that some of my colleagues here in the Senate have reservations about my resolution which I offer today as an amendment. But I simply do not understand why this is a contentious issue. My amendment simply expresses Congress' strong support of the amateur radio service and its emergency communications efforts. In addition, it symbolizes Congress' belief that Government agencies, such as the FCC, should carefully consider the valuable, selfless efforts of amateur radio operators when making decisions that would affect the amateur radio service. . .

Mr. President, I think it should be noted that if our illustrious former colleague, Senator Barry Goldwater of Arizona, was in the Chamber today, he would undoubtedly be supporting—if not, indeed, offering—this measure. I believe all of us in the Chamber will agree that the amendment I have offered is not only a tribute to amateur radio operators everywhere, but also one to our distinguished former colleague, Barry Goldwater.

It is time for Congress to recognize the distinguished service of our Nation's amateur radio operators and I ask for the support of my colleagues on this important matter.

At the conclusion of Senator Wilson's remarks, Senate Majority Leader Byrd (D-WV) asked for and got unanimous consent for final acceptance of the whole package.

The authorization bill, carrying the Amateur Radio text as the "Sense of the Congress," then went on to the House, where it was scheduled with 34 other bills for action on Wednesday afternoon,

October 19. Several members of the House praised the Amateur Radio Service. Some of their remarks, taken from the *Congressional Record*, are reproduced in the following paragraphs.

When the FCC authorization bill was introduced, Congressman Markey (D-MA) requested the rules be suspended. In discussing the Amateur Radio provision, he said:

The final provision in the Senate version of the legislation expresses Congress' recognition of the significant contribution of the amateur radio service to this Nation. The amendment is similar to House Concurrent Resolution 317 which has 97 cosponsors. Recently, I received a letter from a representative of the American Radio Relay League, which represents the over 435,400 licensed amateur radio operators in the United States. They support this legislation and asked that the House pass the Senate bill as amended.

The communication skills of amateur radio operators have been extremely valuable to this Nation in many emergency situations. They have consistently volunteered to help with emergency communications during floods, tornadoes, forest fires, earthquakes and blizzards. This amendment recognizes Congress' appreciation for the help of the amateur radio operators, however, it does not intend to influence the frequency allocation process.

Congressman Rinaldo (R-NJ) said:

This bill also contains a provision expressing the sense of Congress in support of amateur radio. Specifically, the amendment states that Government agencies should take into account the valuable contributions made by amateurs when considering actions affecting that service.

I could not agree more. Amateur radio operators are much more than hobbyists—they are frequently the first line of help in natural disasters. Without their services during events like the Air Florida crash a few years ago, or in the forest fires ravaging our national forests in the West, many more lives would be lost and much more property would be damaged beyond repair. As the radio spectrum becomes more crowded, there may be increasing pressure to convert amateur frequencies to other uses. That is why recognizing the importance of amateurs in this way is so important. I note that this provision is general in nature. It is not directed to any particular proceeding before any Federal or State agency, and is not intended to affect existing standards or policies of any agency. It is intended to recognize the services of our true radio pioneers—amateur radio operators.

Congressman Cooper (D-TN) spoke briefly:

Mr. Speaker, I appreciate the gentleman

from Massachusetts [Mr. MARKEY], the distinguished subcommittee chairman, for yielding this time to me, and I would like to thank him for his leadership on telecommunications issues.

Mr. Speaker, as he pointed out, the ham radio operators of the United States are very much in support of this bill. There is a provision in it that tries to take care of some of their concerns. It is difficult to allocate the spectrum fairly, but this bill makes an effort to encourage all Federal agencies to take into account the valuable contributions that have been made by the 435,000 amateur radio operators across the country.

So, Mr. Speaker, I appreciate the chairman's leadership in this area, and I look forward to the passage of the bill.

Congressman Dornan (R-CA) made extensive comments:

Mr. Speaker, I rise today in support of the Federal Communications Commission reauthorization bill S.1048, and to talk about one particularly important provision regarding amateur radio operators.

As you may know, Mr. Speaker, back in June I sponsored House Concurrent Resolution 317, which expresses the sense of the Congress that: the Amateur Radio Service should be supported in its emergency communications efforts in every way possible; and Government agencies shall avoid action which would reduce amateur radio frequency allocations used for such purposes. As of today, House Concurrent Resolution 317 has 107 cosponsors and enjoys tremendous bipartisan support.

Senator PETE WILSON, of my home State of California, introduced similar language in the other body, Senate Concurrent Resolution 127. The Wilson resolution expresses the sense of the Congress that: it strongly encourages and supports the Amateur Radio Service and its emergency communications efforts; and Government agencies shall take into account the valuable contributions made by amateur radio operators when considering action affecting the Amateur Radio Service. Senator WILSON'S resolution had the support of 41 cosponsors,* 21 of which

*The final tally was 52 Senators in addition to Senator Wilson—Ed.

were Democrats, again indicating there is broad bipartisan support on this issue.

During Senate consideration of S. 1048, Senator WILSON offered his resolution as an amendment to that legislation. The amendment was agreed to and is part of the bill we are now considering.

I therefore want to ask my colleagues to join me in supporting this important legislation. There are over 435,000 amateur radio operators nationwide and they form an indispensable communications network during emergencies. Public and private emergency service organizations throughout the United States rely on them when ordinary communication networks are unavailable. In fact, FCC regulations describe emergency communications as one of the basic purposes of the amateur radio service. Whether it is an earthquake, tornado, flood, blizzard, hurricane, forest fire, train wreck, or other disaster situation, the amateur radio service can be counted on to provide important communications services to stricken areas.

Just recently we have seen the impact amateur radio operators can have in assisting emergency relief efforts. During Hurricane Gilbert, which devastated several island nations in the Caribbean as well as Mexican communities along the coast, amateur radio operators provided a vital communications link between the United States and the devastated areas. During efforts to fight forest fires throughout California and in Yellowstone National Park, amateur radio volunteers provided communications assistance that helped speed relief to ravaged areas.

Mr. Speaker, this language will give the amateur radio operators some long overdue recognition. It is not a contentious issue. It is simply a way to let Congress show its strong support for the vital role played by the amateur radio community. It also recognizes that Government agencies, such as the FCC, should carefully consider the tremendous service performed by the amateur radio service provides at no cost when making decisions that will affect that service. Amateur radio is a valuable national asset. We should do all we can to preserve and support it. I again urge my colleagues to support this language.

The bill then passed under the same type of procedure as in the Senate, and now

awaits the signature of the President and its entry into the books as a Public Law!

A word of caution and a historical note: **the Sense of the Congress support for radio amateurs does not force anybody to do anything; it does not automatically wipe out the FCC Report and Order in Docket 87-14 adopted on August 4, 1988.** But it may well be a building block toward a final solution amateurs can live with.

And the historical note: No one we've talked to can recall that a text which started out as a Concurrent Resolution ever became a Public Law—until now!

Here is the text of Section 10:

SENSE OF CONGRESS

Section 10. (a) The Congress finds that—

(1) more than four hundred and thirty-five thousand radio amateurs in the United States are licensed by the Federal Communications Commission upon examination in radio regulations, technical principles, and the international Morse code;

(2) by international treaty and the Federal Communications Commission regulations, the amateur is authorized to operate his or her station in a radio service in intercommunications and technical investigations solely with a personal aim and without pecuniary interest;

(3) among the basic purposes for the Amateur Radio Service is the provision of voluntary, noncommercial radio service, particularly emergency communications; and

(4) volunteer amateur radio emergency communications services have consistently and reliably been provided before, during, and after floods, tornadoes, forest fires, earthquakes, blizzards, train wrecks, chemical spills, and other disasters.

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

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

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

ARRL FILES PETITION FOR RECONSIDERATION IN 87-14

On October 19, the ARRL filed its Petition for Reconsideration in Docket 87-14, the FCC order which reallocates 220-222 MHz to the Land Mobile Service. The petition is 25 pages long and contains another 80 pages of exhibits! The strongly worded petition accuses the FCC of predetermining the outcome of the original proposal: "In order to justify what clearly was a predetermined outcome of this proceeding, the Commission failed to address the arguments of the amateur commenters; it extended the reply comment dates after the deadline for filing reply

comments without advance notice; it accepted comments from the United Parcel Service more than six months after the close of the already extended comment dates because the record lacked support for the position the Commission had already chosen in this proceeding. . . ."

The ARRL said the Order showed a complete ignorance of, and lack of any interest in, the spectrum needs of amateurs. "The extensive, varied and growing uses of the 220-222 MHz segment by amateurs are misstated and minimized; arguments made in the thousands of comments of amateurs are virtually ignored, while the need for any reallocation of spectrum for the Land

Mobile Service is grossly overstated. . . ."

"Absurd" is the ARRL response to the FCC's statement that the ARRL Repeater Directory "provides the best available representation of amateur fixed/mobile/repeater operations." The ARRL said: "The Repeater Directory is intended to, and does, list only repeaters, and not fixed operations, save for a few unsolicited packet station listings. It thus has no relevance to the fixed, mobile and auxiliary uses made by amateurs at 220-222 MHz as there are few repeaters in that segment."

Of course, these facts were pointed out in "volumes of amateur comments" to the FCC. Since the FCC continues to rely on

this data, our petition points out that this shows that the FCC has never taken any time or effort to obtain its own data, and secondly, that it suggests the FCC may not have read the amateur comments sent to them!

Our petition emphasizes that the 220-222 MHz band is "the only band available (because of bandwidth, path distance and loading of other bands) for the inter-city long distance high speed packet links now developing, and this use is critical to the development of the national packet radio emergency communications network.

"The real issue, unaddressed by the Commission, is the worth to the Nation to have, free of cost to the taxpayer and the public relief agencies, an adequate disaster communication service. What would it cost the taxpayer and the disaster relief agencies to provide an equivalent service if the amateurs did not provide it?"

The FCC wants to use 220-222 MHz as an exclusive band for narrowband operations, mainly ACSSB, for the Land Mobile Service. Some amateurs in their comments pointed out valid questions concerning the spectrum efficiency of ACSSB. Our petition discusses a paper prepared by the National Telecommunications Information Administration (NTIA) in 1987 which "shows that the presumed spectrum efficiency of ACSSB is grossly exaggerated. Even under the best real-world circumstances, ACSSB is no more than 2.5 times as spectrum-efficient as conventional NBFM. Moreover, merely reducing the deviation of a conventional FM signal can achieve efficiency of 1.8 times." However, "when a large adjacent channel signal protection ratio is required such as in congested environments, the spectrum efficiency of NBFM is commensurate with that of ACSSB." In other words, in densely populated areas (the only areas where there is land mobile congestion) ACSSB is no better than narrowband FM. Our petition notes that the Commission knew of this report, but apparently ignored it. A report adopted at the Interim Meeting of CCIR Study Group I in General last April is even more pessimistic about ACSSB.

Our petition concludes that the FCC Order "is as rife with unsupported assumptions as was the Notice of Proposed Rule Making. The Commission made a spectrum allocation decision against the weight of more than five thousand comments, filed by non-commercial users which cannot bear the burden (or recoup the cost) of the loss of 220-222 MHz. The mischaracterization of the amateur uses of the band, and of the possibility of reaccommodation of those uses in other bands or at 222-225 MHz, is an error which will stifle the development of both new technology and emergency communications capabilities without any concomitant benefit to the land mobile service."

ARRL PETITIONS FOR EARLY ENTRY TO 17-METER BAND

The ARRL has requested that the FCC

FCC-ISSUED CALL SIGNS UPDATE

The following is a list of "just issued" call signs as of October 1.

District	Group "A"	Group "B"	Group "C"	Group "D"
0	WN0V	KE0YD	N0JUU	KB0DHE
1	NT1W	KC1LK	N1FZM	KA1SPD
2	WK2C	KE2JF	N2IPE	KB2GJG
3	NS3D	KD3JP	N3GNT	KA3TQT
4	AB4KP	KM4IE	N4UAC	KC4HAF
5	AA5IB	KG5NR	N5NFW	KB5HLJ
6	AA6KU	KJ6MR	N6TIV	KC6AFQ
7	WT7J	KF7OG	N7LSN	KB7FWC
8	WK8I	KE8UL	N8JYT	KB8FNV
9	WD9G	KE9MX	N9HVD	KB9BNT
Guam	KH2K	AH2CC	KH2DM	WH2ALT
Hawaii	**	AH8JD	NH6QY	WH6CAG
Alaska	**	AL7KI	NL7OY	WL7BSF
Virgin Islands	NP2D	KP2BN	NP2CR	WP2AGB
Puerto Rico	**	KP4PR	WP4RQ	WP4IEN

**All 2 x 1 calls have been issued in the district.

issue an Order permitting immediate interim use of 17 meters (18.068-18.168 MHz) by US radio amateurs on a secondary, non-interference basis.

The ARRL said that US amateurs have been waiting for the opportunity to use the band since the results of the 1979 WARC were announced nearly 10 years ago. The rapid rise in the current sunspot cycle is "providing significant opportunities for worldwide communications in the 17-meter band" and amateur interest in using this band is high.

The FCC has already reallocated the band to the Amateur Radio Service on a primary, exclusive basis, effective July 1, 1989. Until that time, the band remains an alternative allocation to the Fixed Service, and some government stations are still operating there. FCC has initiated PR Docket 88-467 to develop permanent rules for amateur use of the band.

In support of its request, the ARRL said that the large number of amateurs from more than 60 other countries already operating on 17 meters has shown that immediate US amateur operation "would cause no significant additional interference" to the few, if any, remaining government stations still using the band.

The ARRL also argued that "failure to provide early access to the band will preclude propagation studies covering an entire sunspot cycle, thus deferring research for a great number of years. As each sunspot cycle is unique, some work would be precluded entirely unless immediate access to the band is permitted."

According to the ARRL request, amateurs would follow the FCC suggested band plan of 18.068-18.110 MHz for digital and CW emissions, and 18.110-18.168 MHz for CW, phone, facsimile and television emissions. Furthermore, if deemed necessary by the FCC, the ARRL would not object to an interim power limitation of 200 watts output.

There is a precedent for amateur interim use of a new band. In 1982, prior to the ratification of the WARC-79 treaty by the

US, the FCC issued an Order permitting interim amateur use of the 10.100-10.150 MHz band.

ARRL FILES PETITION FOR AUTOMATIC BEACON SUBBAND CHANGE

Due to increasing requests from VHF and UHF weak-signal users and from the amateur community generally active on the VHF/UHF bands, the ARRL has filed a petition requesting the FCC to change the 2-meter and higher-frequency automatically controlled beacon subbands. Here is a comparison between the present subbands and the ARRL proposal:

Present	Proposed
144.05-144.06 MHz	144.275-144.300 MHz
220.05-220.06 MHz	220.275-220.300 MHz
222.05-222.06	-----
432.07-432.08 MHz	432.300-432.400 MHz

Our petition states that the present automatic beacon subband is completely within the portions of each band used for weak-signal amateur communications. "The presence of powerful beacons has...resulted in interference to moon-bounce and other weak-signal amateur experimentation. Overall, it would better serve the needs of weak-signal experimenters to have the beacons outside the band segments primarily used for weak-signal communications and experimentation."

We conclude that this proposed change in frequency for automatic beacons is not a controversial one, and that the new subbands were arrived at only after a great deal of study and comments from the field. Consequently, our comments suggest the FCC could amend the rules by issuing an Order if it wished, rather than to issue a Notice of Proposed Rule Making (NPRM). (An NPRM would delay this rule change due to the comment period required and other required government procedures.) The

(continued on page 70)

Amateur Radio Testing for Persons with Disabilities

Nearly all amateurs experience some anxiety while taking an Amateur Radio examination. Picture how you would feel if you had a sensory impairment, such as blindness or deafness, or a physical disability like quadriplegia, and you wanted to take an amateur test! Disabled amateurs or potential amateurs are faced with various barriers which nonhandicapped persons are not. Without changing the level of difficulty of the exam, volunteer examiners and instructors must remove these "barriers" so that disabled persons have the same chance of passing an amateur exam as do nonhandicapped persons.

The Volunteer Examiner Program has been a resounding success since the FCC stopped administering amateur examinations in late 1983. Volunteer Examiners (VEs) and instructors are well versed in administering exams and teaching ham radio. VEs or instructors who have agreed to administer an exam or to teach a person or persons with a disability may not always know of the special needs persons with disabilities require to put them on a par with people without disabilities.

In this month's Washington Mailbox, we shall review some of the common problems and solutions regarding Amateur Radio testing for persons with disabilities.

Q. I am deaf and interested in becoming a radio amateur. Will the code exam be waived since I can't hear?

A. No. Section 97.23 indicates that no matter how severe a handicap you have, you must fulfill the same exam requirements as someone without a disability. The FCC does permit you to use special devices and procedures, however. Persons who are deaf or hearing impaired may use an audio transducer so they "feel" the code transmission. Examiners may be asked to vary the tone as well as the amplitude of the code examination to accommodate persons with tone-range hearing impairment. A flashing light may also be used in administering the code exam to persons who are deaf. It should be noted that many people have a severe hearing impairment without experiencing profound deafness.

Q. I have a physical disability which makes it difficult for me to take exams in the conventional manner. I also need special study materials. Where can I find a person who is qualified to help?

A. You may obtain the names of Elmers who are aware of the special needs of

persons with a handicap from the Courage HANDI-HAM System. Among the other services the HANDI-HAMS provide is the sending of taped study material to persons who are visually impaired. Their address is: Courage HANDI-HAM Center, 3915 Golden Valley Rd, Golden Valley, MN 55422, Tel 612-588-0811.

Q. What is the Courage HANDI-HAM Center?

A. Located just outside Minneapolis, Minnesota, the Courage Center is a non-profit organization providing rehabilitation and independent living services to people with physical disabilities and speech, hearing and vision impairments. One of their many services includes Amateur Radio and this outreach of the Center is called the HANDI-HAM System. The only two requirements for Student Membership with the HANDI-HAMS are that the applicant has a disability and has an Amateur Radio license or an interest in obtaining one.

Nonhandicapped people can also become Members of the Courage HANDI-HAM System, and they are needed to volunteer their time and talents by helping students study for their amateur license on a one-to-one basis. Other nonhandicapped Members of the HANDI-HAM System assist in installing and repairing equipment. Nonhandicapped Members also help the HANDI-HAM System by donating money and equipment.

Q. Where can I obtain a list of VE testing sessions in my area?

A. A list of VE sessions (and ARRL affiliated clubs) can be obtained by sending an SASE to ARRL HQ. Local amateurs can also provide you with this information.

Q. Are individual VEs required to accommodate the special needs of amateurs or potential amateurs with disabilities?

A. Yes. Federal law does not permit discrimination on the basis of a person's handicap. You should contact the Volunteer Examiners who administer the test at your exam session and make known your special needs well in advance of the testing date. A person with a handicap will not be refused if the applicant makes arrangements with the team for special accommodations.

Q. My Dad is a quadriplegic and this disability makes it difficult for him to attend

and participate in exam sessions. Because of this, may I give him any amateur exam he wishes to take?

A. No, you may not. According to Section 97.31(a): "each person administering an exam for an amateur license must: (1) be at least 18 years of age; and (2) not be related to the candidate." Amateurs or potential amateurs should not be discouraged from taking an amateur exam just because they happen to have a disability. As stated above, a VE Team will, upon request, make special arrangements for persons with disabilities. In this case, the VE Team may travel to the applicant's home in order to administer the examination.

Q. When a special testing session is required, how does the handicapped applicant indicate this on Form 610 and to the VE team?

A. Section 97.26(g) states that when "a candidate whose physical disabilities require special procedures to allow participation in examination sessions, he or she shall attach a physician's statement to the application indicating the nature of the disability. For exams other than Novice, this statement must be retained in the files of the Volunteer Examiner Coordinator (VEC) issuing the test papers. The statement for a Novice class examination shall be retained by the examiner(s) for one year. The statement shall include (1) A physician's certification indicating the nature of the disability; and (2) the name(s) of persons taking and transcribing the applicant's dictation of the test questions and answers, if such a procedure is necessary."

Q. I have a physical disability and require special equipment for the testing session. Who is responsible for providing this equipment?

A. The applicant is responsible for providing any special equipment that may be needed, such as a Braille writer, talking calculator, audio transducer or other equipment.

Q. As an examiner, how do I obtain tests designed for persons with a physical or sensory disability?

A. There are no special tests since handicapped hams or potential hams are expected to fulfill the same requirements as persons without a disability. For example, if you are one of the two

examiners for the Novice class examination, you and the other examiner share responsibility for developing Element 1(A) and designing Element 2 from the information contained in the question pools designed by the individual VECs.

Q. I am blind and have been given a question concerning a schematic. How can I be expected to answer questions on a schematic since I can't see the diagram?

A. A question containing a schematic diagram is the same as any other question. The schematic can be described to the visually impaired person and questions can be answered by the applicant based on this explanation.

Q. Since I am blind, how can I be expected to fulfill the code receiving requirement?

A. Blindness, and other disabilities for that

matter, have been proven not to be a deterrent to obtaining an Amateur Radio license. Applicants can dictate the code, as it is being sent, to the examiner, who writes it down. The examiner may read the questions and the applicant can answer verbally. At HANDI-HAM Radio Camps, it is always insisted that the "amenuis" (the person being dictated to and writing the dictation) be either: (1) not a ham or (2) one of the VEs. Using these two suggestions, there is no possibility that this person will inadvertently "copy and write" rather than writing only what is being dictated. These are not the only ways of administering an amateur exam to someone who is blind, however; the procedure that is best for the applicant is the best one to use.

Q. I am confined to my bed and can't leave my home. I understand that a team of three

Extra Class amateurs are required to administer the exams for General and above (three Advanced or Extra Class amateurs are required to administer the Technician exam). Does this rule apply in my particular case?

A. Yes. According to Section 97.28(a) of FCC rules, "Unless otherwise prescribed by the Commission, each examination for an Amateur Radio license (except the Novice class operator license) shall be administered by three accredited volunteer examiners." You may, however, make arrangements beforehand to have the VEs administer the exam to you in your home.

[Note: Questions in this column are typical of those asked of the FCC and other agencies. Questions and answers are prepared by ARRL staff and have been reviewed by ARRL Counsel Chris Imlay, N3AKD, and by the ARRL/VEC for agreement with current FCC interpretations and policy.]

Happenings

(continued from page 68)

ARRL filed its petition on September 7.

For more information, see "Relocating Unattended Beacon Subbands in the Amateur Bands Above 50 MHz" starting on page 50 of this issue of *QST*.

FCC DENIES SIVO PETITION

The FCC has denied a petition filed by Anthony J. Sivo, W2FJ, to amend Section 97.61(a) of the FCC rules to permit SSB telephony in the entire 30-meter band (10.100-10.150 MHz). Sivo alleged that the band was not being fully utilized by stations using digital and telegraphy modes. The ARRL filed an opposing opinion, taking issue with the petitioner's premise that the band was underutilized, noting the extensive digital communications that take place in the band. The League also noted that the 30-meter band is limited to CW and digital modes to prevent interference to fixed service stations, the primary users of this small band, and concluded that there is no showing "that the creation of a telephony subband at 30 meters is in any sense necessary or desirable at this time."

Jan H. Clute, KF0Z, also filed an opposing view, disputing Sivo's statement that the band was underutilized. Clute maintained that telephony emissions would "destroy the utility of the band."

On June 22, 1988, Sivo filed a reply to the ARRL opposition. He disagreed with the ARRL as to the amount of activity on the 30-meter band, and stated that he is aware of the amateurs' responsibility to avoid interference to fixed stations there. He contended that amateurs using SSB emissions would be just as careful about the non-interference requirement as the present users of the band.

The Commission, in denying the Sivo petition cited the upcoming (July 1, 1989)

opening of the 17-meter band, allowing additional amateur phone privileges, and "telephony transmissions on frequencies shared with other emissions mode transmissions tend to dominate those frequencies." The FCC also cited both the ARRL and Clute positions that activity on 30 meters is sufficient and will be on the rise as sunspots increase. Concluding, the Commission said the "need for telephony transmissions in the 30-meter band has not been established. The 30-meter band is a small band that is utilized extensively for telegraphy and digital communications. These uses have proven... compatible with... the primary user of the band, the fixed service. Further, telephony is currently permitted in segments of six other amateur... bands... Accordingly, the petition does not raise any new... issues warranting consideration by the full Commission."

TAKE ADVANTAGE OF A NEW MEMBERSHIP BENEFIT—ARRL GOLD MASTERCARD PROGRAM

ARRL and Maryland Bank, N.A. (MBNA) have joined together to develop a special offer for ARRL members. This program provides you with an ARRL Gold MasterCard®, which has many benefits not offered by other organizations.

One of the major benefits of the ARRL MasterCard is that it proudly bears our name, logo and your FCC call sign. This is an excellent way to show your pride in being a member of our organization.

Next, the issuing bank, MBNA, believes in the personal touch, so each application is individually reviewed, ensuring you the highest credit line possible. There is even a convenient toll-free number that allows you to contact MBNA's 24-hour Customer Satisfaction Department whenever you need to. There is also a Credit Card Registration Service, which protects you from being held responsible for purchases made on your credit card if it is ever lost or stolen. This service will also notify your other credit card companies for you if your

cards have been lost or stolen, provided the cards have been registered. These two services are free of charge.

The card itself is a valuable asset. The ARRL MasterCard will be offered free of annual fee for the first year, and renewable each year thereafter at the low fee of \$36. In addition, the Annual Percentage Rate is a low rate of 16.9% on average daily balances up to \$3500 and an even lower rate of 15.9% for that portion of your average daily balance over \$3500.

Lastly, the ARRL MasterCard carries many additional travel benefits, including up to \$1,000,000 accidental death and dismemberment insurance, up to \$3000 lost luggage service, emergency cash/airline ticket service, 24-hour traveler's message service, collision/loss damage insurance for rental cars—up to the value of the vehicle—and immediate cash up to your available line of credit to name a few.

ARRL members will soon be receiving information on how to take advantage of this fine membership benefit by direct mail.

FCC FORM 610-B EXTENDED

The present FCC Form 610-B, the form used to renew or modify existing amateur club station licenses, has been extended through August 31, 1991. Although the forms carry an expiration date of August 31, 1988, they will continue to be valid for another three years.

SECTION MANAGER ELECTION RESULTS

The following Section Managers will begin a two-year term of office January 1, 1989:

Uncontested;

Eastern Mass	Barry M. Porter, KB1PA
Nebraska	Vern Wirka, WB0GQM
NYC-LI	Walter Wenzel, KA2RGI
South Carolina	Charles E. Moeller, N4FVU
Southern NJ	Richard Baier, WA2HEB
Western PA	Otto L. Schuler, K3SMB



President: Richard L. Baldwin, W1RU
Vice President: Carl L. Smith, W0BWJ
Secretary: David Sumner, K1ZZ
Assistant to the Secretary: Naoki Akiyama,
N1CIX/JH1VRQ

Regional Secretaries:
John Allaway, G9FKM
Secretary, IARU Region 1
10 Knightlow Rd
Birmingham B17 8QB
England

Alberto Shaio, HK3DEU
Secretary, IARU Region 2
9 Sidney Lanier La
Greenwich, CT 06830
USA

Masayoshi Fujjoka, JM1UXU
Secretary, IARU Region 3 Association
PO Box 73, Toshima
Tokyo 170-91
Japan

The International Amateur Radio Union—since 1925 the federation of national Amateur Radio societies representing the interests of two-way Amateur Radio communications.

WARC-ORB

WARC-ORB—What kind of a crazy abbreviation is that? What is a WARC, anyway?

A WARC is a World Administrative Radio Conference, a telecommunications conference conducted by the International Telecommunication Union (ITU). There are various kinds of WARCs. There is a General WARC, which examines *all* of the international Radio Regulations, including spectrum allocations, definitions of the various services, technical standards, operational provisions, and so forth. A General WARC is a full-scale effort and usually lasts for two or three months, involving perhaps 2000 delegates from most of the ITU's 165 members.

Then there are specialized WARCs, conferences which concentrate on the needs and problems of a specific area of the international Radio Regulations. There might be a Mobile WARC, an Aeronautical WARC, a Broadcasting WARC, and so on. These specialized WARCs deal only with a very specific area of concern, and they are not supposed to venture beyond the agenda that is established by action of the ITU's Administrative Council.

The most recent WARC was WARC-ORB 88, a very specialized WARC having to do with the orbit for geostationary satellites and the planning for services which use that orbit. Geostationary satellites orbit the earth just above the equator in such a fashion that they seem to hover over one spot on the earth. The space mechanics are such that the satellite has to be about 22,000 miles above the surface of the earth. Today there are a total of about 200 geostationary satellites in orbit, with another 100 or so in the planning stage.

You'd think that there was plenty of space out there for two or three hundred satellites, but it isn't quite that simple. For one thing, because of the distribution of the population on the face of the earth, there are favored locations for geostationary satellites in order to provide the desired coverage.

The second thing is that if you're going to place a couple of satellites in *approximately* the same spot in space, you have to take into consideration whether or not their communications equipment will cause mutual interference. So the satellites have to be separated by some finite distance, a distance which can be calculated by various formulae which the ITU has developed.

So how do you decide who puts what satellite where? That's the problem for the specialized WARC called WARC-ORB. More than 100 countries, with some 750 delegates, gathered in Geneva in September and October to plan the use of the geostationary satellite orbit, both in terms of locations of satellites and the technical provisions for the services using the geostationary satellites. Although there are always differences of opinion, nevertheless this was a *technical* conference and there was a notable lack of political harangue.

IARU was there, representing the Amateur and Amateur-Satellite Services. Present at various times for differing periods of time (no IARU individual was there for the entire span of the conference) were 11RYS, PA0LOU, SP5FM, W1RU, YT7MM and 7X4MD. If there was no amateur matter on the agenda (and there wasn't), why were we there?

Even though an ITU agenda may not specify an amateur-related item, sometimes a problem will crop up that could have an effect on the Amateur or Amateur-Satellite Services. We've seen it happen time and time again. So we're there as insurance, to put out an unscheduled fire.

For another thing, there is *always* some delegate to a WARC who will have some question about the amateur service. His question may be just for information, or he may have some real problem back home. On occasion, IARU representatives have arbitrated disputes between telecommunications administrations and their amateur societies, or have even helped to establish meaningful communications between these two groups.

Finally, we're there to make friends and influence people. Most of the delegates that we see at ITU conferences show up at many of the conferences. They don't just come to one conference and then disappear into the night. Part of our job is to become acquainted with these delegates, to get to know them on a personal basis, so that we can readily and easily discuss problems with them. They come to identify us with the IARU and Amateur Radio. Thus, when a conference comes up with a real Amateur Radio problem, we have already established ourselves as representatives of the amateur services and we already have a working relationship with *many* of the delegates.

All of this is on *your* behalf, so that the

next time there is a conference with Amateur Radio matters on the agenda, *your* interests will be protected. Who pays for this? You do, through your membership in the American Radio Relay League, or whatever national Amateur Radio society you belong to. Of course, it goes without saying that practically everyone reading this page is a member of ARRL. Right? □

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 1988, p 86
Considerate Operator's	
Frequency Guide	Jan 1988, p 13
Constitution Bicentennial	
WAS	Sep 1987, p 14
DXCC Annual Listing	Dec 1987, p 58
Element 2 Question Pool,	
New and Revised	
Questions, Answers	Apr 1987, p 23
Frequency/Mode	
Allocations	Jan 1988, p 77
Hamfest Calendar Rules	Apr 1988, p 73
License-Renewal	
Information	Jan 1988, p 77
Major ARRL Operating	
Events and	
Conventions—1988	Jan 1988, p 78
Packet-Radio Frequency	
Recommendations:	
Below 225 MHz	Sep 1987, p 54
Above 225 MHz	Mar 1988, p 51
QSL Bureaus	
Incoming	This issue, p 74
Outgoing	Sep 1988, p 71
Reciprocal-Operating	
Agreements	Oct 1988, p 63
Rules, ARRL 10-Meter	
Contest	Nov 1988, p 89
Rules, ARRL 160-Meter	
Contest	Nov 1988, p 90
Rules, ARRL International	
EME Competition	Sep 1988, p 96
55th November Sweepstakes	
Announcement	Oct 1988, p 106
First ARRL	
RTTY Roundup	
Announcement	Nov 1988, p 88
Tech and General	
Written Exams	Apr 1987, p 29
Third-Party-Traffic	
Agreements	Oct 1988, p 63
VUCC Annual Listing	This issue, p 85
What is Amateur Radio?	This issue, p 88

1989 Worldradio DXathon

The calendar year 1989 marks the inception of this new single operator challenge (which exempts contacts made during the time frame of any DX competition). Bands: 80, 40, 20, 15, 10, satellite/moonbounce frequencies. Modes; phone, CW, digital (includes RTTY, AMTOR, packet, visual (SSTV), satellite (includes

moonbounce). Five bands/five modes equals DXathon.

Contact as many nations on as many modes as possible. For this award, a nation is defined as an entity with enough sovereignty to issue its own postage stamps. A nation may be worked but once, on each mode, regardless of the frequency band. Final score will be the total number of

nations contacted on the various modes. (Your own nation doesn't count.) The highest possible score would be about 900. Trophies, medals and certificates will be offered. Entries (to be received by Feb 1, 1990) and requests for additional information go to *Worldradio*, 2120 28th St, Sacramento, CA 95818 USA.

WORKED ALL BRITAIN AWARDS

The WAB Awards group is an independently financed one, with the aim of interesting radio amateurs in working stations in Great Britain and Northern Ireland. Membership is via a one-time payment of \$10 for a WAB record book with full details on the awards program.

Recently the group awarded its premier award (the WAB Diamond Award) to a station outside Europe—Malik Webman, 4X4JU, who worked 2100 of the 4000 WAB areas—a remarkable achievement as only a moderate percentage of those areas actually house hams! This achievement follows hard on the heels of that of Jan Galicia, ON6JG, who became the first non-G station to qualify for a Diamond Award. (Jan has subsequently been awarded trophies for working 3000 and 3500 WAB areas.) Full details are available from Brian Morris, G4KSQ, 22 Burdell Ave, Sandhills Estate, Headington, Oxford OX3 8ED, England. (Thanks G4GEE)

“DXing—our unique ability to foster and enhance international good will.” Join hands across the world, via our Amateur Radio bands, and help spread the holiday words of peace and brotherhood.

**Merry Christmas (English)
Joyeux Noel (French)
Feliz Navidad (Spanish)
Gloedelig Jul (Danish)
Buon Natale (Italian)
Frohe Weihnachten (German)
Wesolych Swiat (Polish)
Gelukkig Kerstfeest (Dutch)
God Jul (Swedish)
С Н О В Ы М Г О Д О М
(Russian)
Mele Kalikimaka (Hawaiian)
MX/HNY (CW)—de W1YL/4**

and 2210Z (a contact was also reported with W5UWB in Texas). Dust off your 6-meter rig and listen to the 6-meter liaison frequency on 28.885 MHz.

THE CIRCUIT

□ **LA6VM:** The LA DX Group treasurer for last year's highly successful 3Y1EE/3Y2GV Peter I DXpedition recently met with NCDXF Trustees to review the operation and return \$10,000 to the Foundation as seed money for future DXpeditions. (This editor had the opportunity to meet the Peter I QSL Mgr, LA6VM, enroute to his home [see photo]. Erling and his delightful family are a credit to Norway, as well as to Amateur Radio.)

□ **XF4C:** Socorro (Revilla Gigedo) should be QRV Dec 15-20, 160-10 meters, using beams and a linear, heavy on sideband, some CW, RTTY, packet. Operators will include XE1BEF and XE1IAK. QSL Box 231, Colima, Mexico.

□ **LU7DZ:** On September 8, from 2048-2148Z, Ed worked 8 English stations on 6 meters.

K4IF RETIRES FROM CQ

John Attaway has retired from the CQ staff, after a 21-year stint as DX editor (and later as chairman of the CQ DX Award's Advisory Committee). During John's tenure the CQ awards program expanded, and the DX Hall of Fame was introduced. Now, with more time at his disposal, he hopes to participate as DX in future contests. Good luck, John!

FALKLANDS ON 6 METERS

50 MHz has been exhibiting DX long-haul conditions as Transequatorial and F2 propagation modes improve. On October 16 Fred, VP8TG, worked KP4EOR at 2220Z, PT9FH at 2230, K1FJM/4 in (a “first” to North America at 2238 and W400 at 2243. The next day Fred worked 9H1CG at 1635 and again into South Florida between 2142



LA6VM, see Circuit. (W1YL photo)



Bert, SP6RT, operator of 5A0A. Thanks DK7PE



Magi, SU1MR. (Thanks DK7PE)

□ **HC2FG:** Hard on the heels of above, on September 12 6-meter receiving conditions permitted good copy on signals from Arkansas, Georgia, Texas, Oklahoma, Tennessee, Alabama and Florida. (Thanks to 6-meter local K1FJM for the above 6-meter DX reports.)

□ **9J2EZ:** Ezio, IK4BDZ, finished up his Zambia operations mid-August, after close to 20K contacts, returning home to Italy. He doesn't know his next destination, but hopes for a rate DX spot. I4FGG remains the manager for the 9J2EZ operation, expect for the 9J0A operation which goes to Ezio's home: Ezio D'Andrea, via Padova N 36, 44100 Ferrara, Italy.

□ **Rotuma:** Although received a month too late for our November deadline, the Rotuma, Fiji (formerly Grenville Island) operation by K3NA/VK9LT, VK8XX/3D2XX, W6SZN and KN3T/VK9NT stirred up interest at this QTH, as did the impressive country documentation by K3NA. Stay tuned!

□ **T28RK:** K8JRK's Tuvalu operation during CQWW sideband via the *Callbook* QTH. Jim hoped to operate from Bora-Bora as FO0SSJ until late Nov. (He prefers full calls tailed, with good timing.) Delay your cards about a month to coincide with his return home.

□ **Beacon:** During mid-summer, the NCDXF W6WX beacon was stolen. However, other 14.1-MHz NCDXF beacons still remaining in the network include 4U1UN, KH6O, JA2IGY, 4X6TU, OH2D, CT3B, ZS6DN and LU4AA.

□ **PY0T:** Karl, PS7KM, handles cards for all bands/modes. (Thanks NE8Q)

□ **4K0F:** "North Pole 30," a drifting polar station, gets confirmed direct via Boris G. Surov, UA0QBO, Box 9, Chersky, Yakutia, 678830, USSR. (Boris notes for a quick reply please enclose an SASE)

□ **CN8DX:** Note to our JA readers—K8SWZ is *not* the manager of this station.

□ **7 HK 7:** Awarded for confirming 7 contacts with Radio Club Santander

Ode to KH1

The beam was firmly on Howland
The keyer was ready to go
The mike was poised in position
The electrons were ready to flow.

Then suddenly it happened
A weak sign on 195
Caused an explosion of major proportions
As the DXers came alive.

Now two VFOs are a major improvement
Making split an easy delight
But use the wrong one accidentally
And others are ready to fight.

"Up, up," the policemen shouted
"Lid, lid," said others with glee
"What a dope," I said smugly
Oh God, it might have been me!

"QRZ" said the weak island station
And everyone screamed, "ME, ME"
And kept right on calling
That's how it works, don't you see?
"The station with X-ray only

Please call again for goodness sake"
But everyone added his call to the bedlam

In case there had been a mistake.

All at once out of the splatter
Came an answer to my fervent plea
I replied as crisply as possible
Now certain that they had called me.

I turned to my wife and said calmly
"I worked Howland, isn't that fine?"
"What did they say?" she questioned
And I had to reply, "Just five nine."

It's a small and simple dimension
That separates hams from others you see

What to some is bland and ho-hum
Is darned important to me.

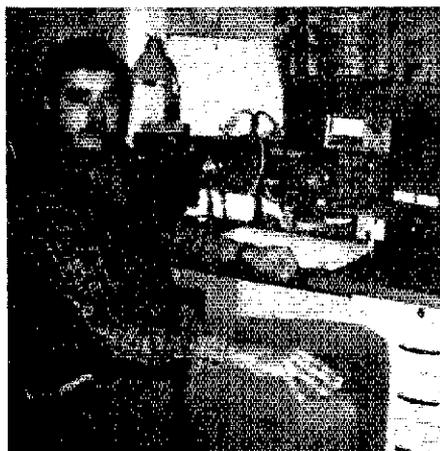
So, I had cracked the pileup for Howland

When everything was up for grabs
But, I learned naught about its weather

Its flora, fauna or crabs.—*de W4BAA*



JT1BG, who recently made 5BDXCC. (Thanks W3AZD)



5B4MF is a good catch on any band.

members, any mode/band/mixed. Submit cards to the Radio Club Santander, Box 222, Bucaramanga, Colombia. No fee.

□ **Routings:** KH200JHM via KH6BZF. 9H3EH (Sep 22-Oct 20, 1988) via Claus Floesser, DL2GBT, PO Box 1447, 7550 Rastatt, West Germany (or via the bureau). OK8AFT via G3VTT.

□ **3A0FC:** G4IUF (ex-G3YDV) notes to NM2Y that his QSO was with this pirate who, according to several Italian stations, is in Italy.

□ **UM8:** Need help with that Kirghiz QSL? Check with Alex A. Lavrenchenko, UM8MRG, PO Box 392, Frunze 55, Kirghiz 720055, USSR. (Thanks WK6E)

□ **HC1MD:** Rick, NE8Z, spent a hectic three weeks Oct 14-Nov 4 as NE8Z/OA4 from Lima (with a side trip to Machu Picchu as NE8Z/OA7 or OA7MP), HC1MD from Quito, HD9OT (a contest multiop, cards via Box 8455, Quito), HC1MD/HC5 from Cuenca, and HC1MD/HC8 or HC8MD from San Cristobal Island, Galapagos. Cards via John Kroll, K8LJG, 3528 Craig Dr, Flint, MI 48506; SASE or IRCs for direct return.

□ **Awards:** The K1BV Directory of DX Awards is offering a free set of complete rules for about 15 awards which relate to 1988 operation. Write Ted Melinosky, 525 Foster St, South Windsor, CT 06074-2936; enclose SASE (or SAE and 1 IRC if overseas).

□ **5BWAZ:** If you're chasing this one, be sure to contact Bob Wessel, K4PR, 40 Jones Circle, Old Hickory, TN 37138.

□ **Volunteers:** NW2J is volunteering his services as a QSL manager, as is KA7NOC.

QSL Corner

Administered By Joanna Hushin, KA1FO

The ARRL DX QSL Bureau System (Incoming)

Within the US and Canada, the ARRL DX QSL Bureau System is made up of call area bureaus that act as central clearinghouses for QSLs arriving from foreign countries. These "incoming" bureaus are staffed by volunteer workers. The service is free, and ARRL membership is not required.

How It Works

Most countries have "outgoing" QSL bureaus that operate in much the same manner as the ARRL-Membership Overseas QSL Service. Members send cards to their outgoing bureau, where they are packaged and shipped to the appropriate countries.

A majority of the DX QSLs are shipped directly to the individual incoming bureaus, where volunteer workers sort the incoming QSLs by the first letter of the call-sign suffix. One individual may be assigned the responsibility of handling from one to three letters of the alphabet.

For detailed information on the operation of the bureau serving your district, please send an SASE for a prompt reply.

Claiming Your QSLs

1) Send a 5- × 7¼-in SASE to the bureau serving your district.

2) Neatly print your call sign in the upper left-hand corner of the envelope.

3) A preferred way to send envelopes is to affix a First Class stamp. If you expect to receive more than 1 oz of cards, please affix postage accordingly.

4) When requesting *any information* from the bureau serving your district, always include an SASE for a prompt reply.

Some incoming bureaus sell envelopes or postage credits in addition to the normal handling of SASEs. They provide the proper envelope and postage upon prepayment of a certain fee. The different stages of presorting and sorting cards take time. It may be six to eight months, or longer, before you receive your cards.

Helpful Hints

Good cooperation between the DXer and the bureau is important to ensure a smooth flow of cards. Remember that the people who work in the area bureaus are volunteers. They are providing you a valuable service. With

that thought in mind, please pay close attention to the following DOs and DON'Ts.

DOs

Do keep self-addressed 5- × 7¼-in envelopes on file at your bureau, with your call in the upper-left corner, and affix at least one unit of First Class postage.

Do send the bureau enough postage to cover envelopes on file and enough to take care of possible postage-rate increases.

Do respond quickly to any bureau request for envelopes, stamps or money. Unclaimed card backlogs is the bureau's biggest problem.

Do notify the bureau of your new call as you upgrade. Please send envelopes with old call. Please put only one call on an envelope.

Do include an SASE with any information request to the bureau.

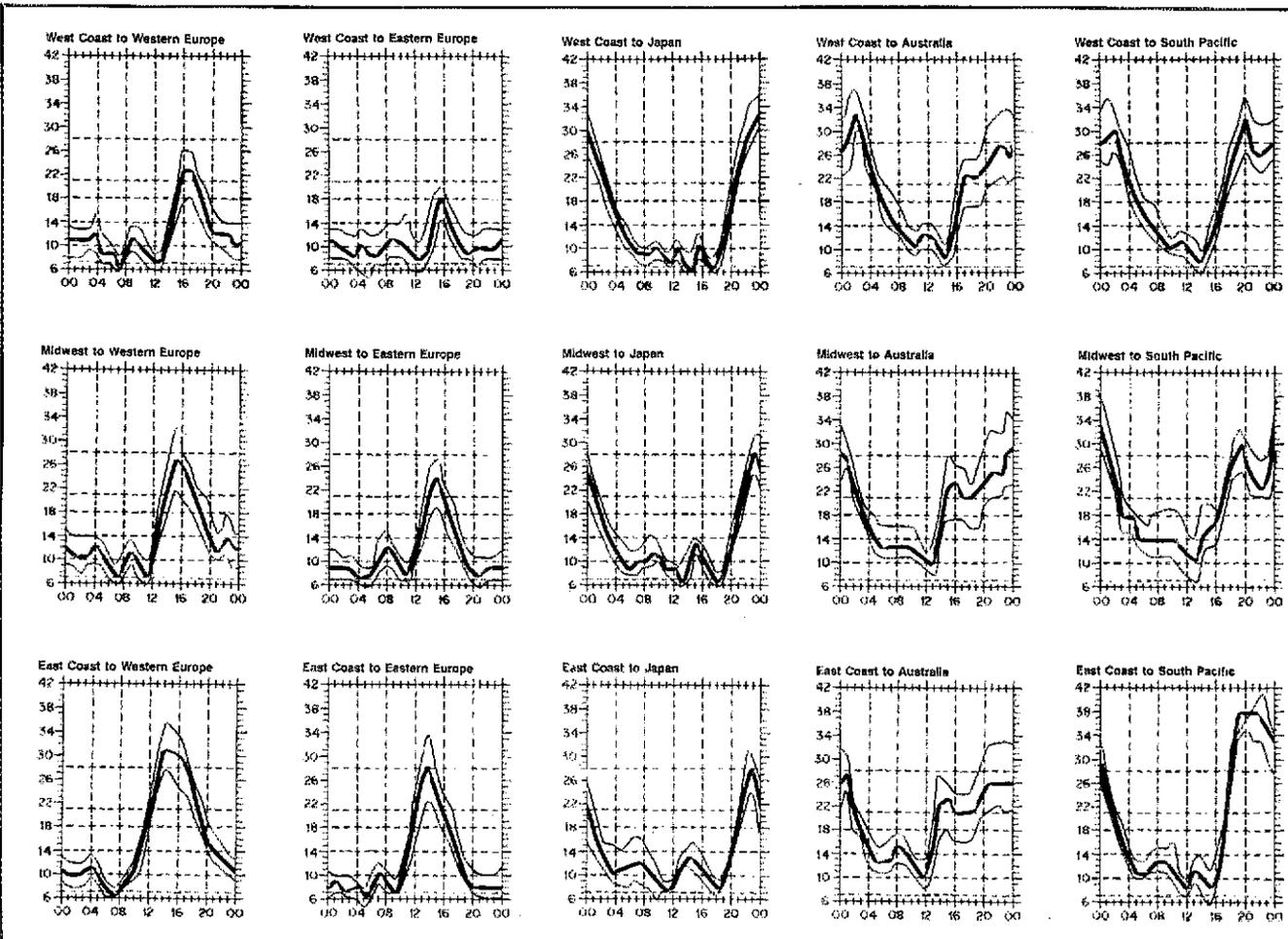
Do notify the bureau *in writing* if you *don't* want your cards.

Do be appreciative of the fine efforts of these volunteers.

DON'Ts

Don't expect DX cards to arrive for several months after the QSO. Overseas delivery is very slow. Many cards coming from overseas bureaus are over a year old.

Don't send your outgoing DX cards to this bureau (see "ARRL Membership Overseas



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

QSL Service" in this column in September 1988 QST).

Don't send envelopes to your "portable" bureau. For example, K9CH/4 sends envelopes to the W9 bureau, *not* the W4 bureau.

ARRL DX QSL BUREAU SYSTEM

First Call Area: all calls*—W1 QSL Bureau, Mt Tom Repeater Assn, Box 216, Forest Park Station, Springfield, MA 01108.

Second Call Area: all calls*—NJDXA, PO Box 599, Morris Plains, NJ 07950.

Third Call Area: all calls*—C-CARS, PO Box 448, New Kingstown, PA 17072-0448.

Fourth Call Area: single-letter prefixes—Mecklenburg ARS, PO Box DX, Charlotte, NC 28220.

Fourth Call Area: two-letter prefixes—Sterling Park Amateur Radio Club, Call Box 599, Sterling Park, VA 22170.

Fifth Call Area: all calls*—ARRL Fifth (5th) District DX QSL Bureau, PO Box 44246 Oklahoma, OK 73144.

Sixth Call Area: all calls*—ARRL Sixth (6th) District DX QSL Bureau, PO Box 1460, Sun Valley, CA 91352.

Seventh Call Area: all calls—Willamette

Valley DX Club, Inc, PO Box 555, Portland, OR 97207.

Eighth Call Area: all calls—8th Area QSL Bureau PO Box 182165 Columbus, OH 43218-2165.

Ninth Call Area: all calls*—Northern Illinois DX Assn, Box 519, Elmhurst, IL 60126.

Zero Call Area: all calls*—W0 QSL Bureau, Ak-Sar-Ben Radio Club, PO Box 291, Omaha, NE 68101.

Puerto Rico: all calls*—Radio Club de Puerto Rico, PO Box 1061, San Juan, PR 00902.

US Virgin Islands: all calls—Virgin Islands ARC, GPO Box 11360, Charlotte Amalie, St Thomas, VI 00801.

Hawaiian Islands: all calls*—John H. Oka, KH6DQ, PO Box 101, Aiea, Oahu, HI 96701.

Alaska: all calls*—Alaska QSL Bureau, 4304 Garfield St, Anchorage, AK 99503.

Guam: AH2, KH2, WH2 and KG6 calls—MARC, Box 445, Agana, GU 96910.

SWL—Mike Witkowski, WDX9JFT, 4206 Nebel St, Stevens Point, WI 54481.

CRRL DX QSL BUREAU SYSTEM

QSL Cards for Canada (VE, VO and VY)

may be sent to CRRL Central Incoming QSL Bureau, Box 51, St John, NB E2L 3X1. Or, QSL cards may be sent to the individual CRRL Incoming QSL bureaus.

VE1*—A. McLellan, VEIASJ, Box 51, St John, NB E2L 3X1

VE2—A. G. Daemen, VE2IJ, 2960 Douglas Ave, Montreal, PQ H3R 2E3.

VE3—The Ontario Trilliums, PO Box 157, Downsview, ON M3M 3A3.

VE4*—Larry R. Lazar, VE4SL, 30 Bathgate Bay, Winnipeg, MB R3T 0L2.

VE5—B. J. Madsen, VE5FX, 739 Washington Dr, Weyburn, SK S4H 3C7.

VE6*—Norm F. Waltho, VE6VW, PO Box 1890, Morinville, AB T0G 1P0.

VE7*—Alex Ivisic, VE7CNE, 8922 148 St, Surrey, BC V3R 3W4

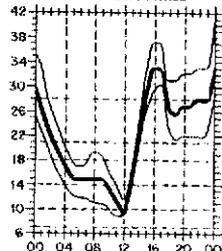
VE8*—Rolf Ziemann, VE8RZ, 2 Taylor Rd Yellowknife, NT X1A 2K9.

VO1, VO2—Roland Peddle, VO1BD, PO Box 6, St John's, NF A1C 5H5.

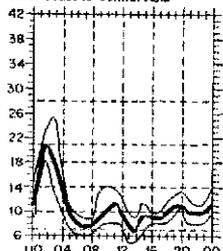
VY1—QSL Bureau, Yukon Amateur Radio Assn, PO Box 4597, Whitehorse, YT Y1A 2R8.

*These bureaus sell envelopes or postage credits. Send an SASE to the bureau for further information.

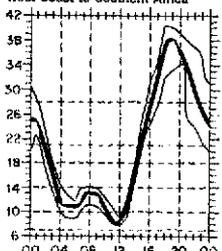
West Coast to South America



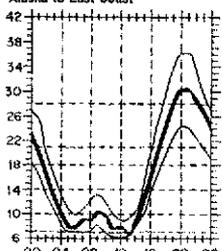
West Coast to Central Asia



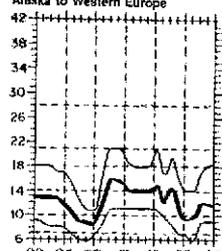
West Coast to Southern Africa



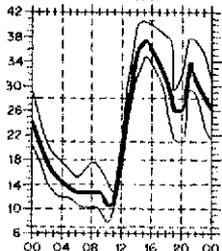
Alaska to East Coast



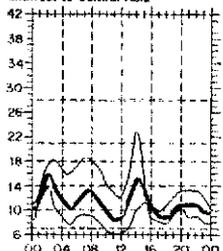
Alaska to Western Europe



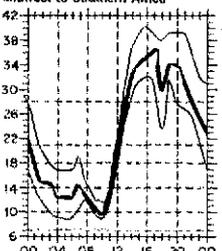
Midwest to South America



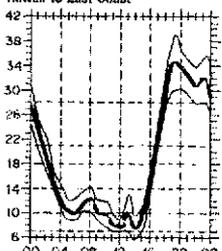
Midwest to Central Asia



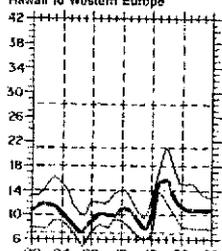
Midwest to Southern Africa



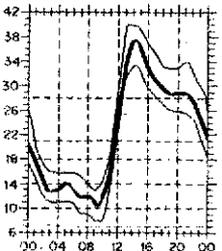
Hawaii to East Coast



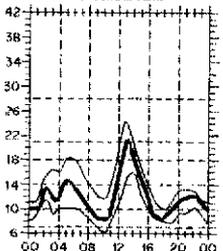
Hawaii to Western Europe



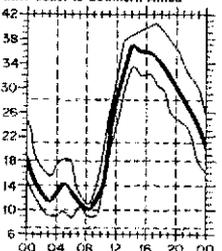
East Coast to South America



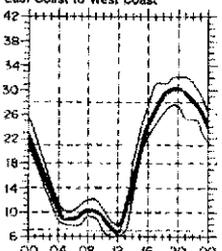
East Coast to Central Asia



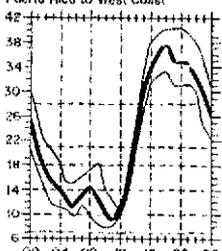
East Coast to Southern Africa



East Coast to West Coast



Puerto Rico to West Coast



Universal Time (UTC); the vertical axis, frequency in MHz. See April 1983 QST, pp 63-64, for a more-detailed explanation. The 3rd edition of *The ARRL Operating Manual* contains similar charts for a range of sunspot numbers and times of the year. Data provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for December 16, to January 15, 1988, assume a sunspot number of 141, which corresponds to a 2800-MHz solar flux of 184.

DX Century Club Awards

Administered By Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmation for contacts with 100 or more countries on the official DXCC Countries List. You may also endorse your award in 25-country increments through 250, 10-country increments through 300, and 5-country increments above 300. The totals shown below are exact credits given to DXCC members from August 15 to August 31, 1988. An SASE will bring you the rules and application forms for participation in the DXCC program.

New Members

Mixed								
DF5TS/105 DJ2FL/102 DJ9IR/109 DL4UL/108 IK0FEC/124	JJ1PGO/109 JS1LPG/136 LA6LDA/213 LA7EU/107 OE2OWM/120	OE5EQW/125 PY2CPQ/100 SM5ODI/128 SV1ADG/303 VK6IR/163	VS6UW/100 4X6UO/140 K1ZZI/226 KA1RRL/126 KB1CM/274	N1DYI/115 NG1I/103 KD3IY/135 N8BI/109	WB3FSB/239 AA4VN/108 AB4N/255 K4RSB/311	N4PKL/111 W4XD/105 WA4CMS/125 KD5R/115	W5RWB/105 K6VFN/100 N6ENT/101 K8KJN/285	W8QAX/102 K9CI/101 KA9IRS/101 WA8OZP/106
Phone								
DL1BFY/104 EJ7DJ/102 F3TC/150 FM5DN/272	GM4ELV/108 HC1PF/100 I2WXX/109 IK2FDM/105	IN3HQ/151 JY5EC/104 LA6LDA/206 LX1WC/238	OZ1KKH/108 T8ZB/114 YCVX/107 4X6UO/140	4X6UV/108 7P8DX/114 N2CA/110 ND3A/173 K3GYS/129	N3BI/109 N3CDA/110 ND3A/173 WB3FSB/152	KJ4GK/202 N4PKL/110 N4PYD/138 W4LOR/108	N5JPJ/122 W5BWA/124 K6YB/100 WO6R/105	KA7RRU/104 W7SNY/103 W8DN/151
CW								
DK5WL/145 DL4UL/101	G2AKK/102 JJ1PGO/109	JS1LPG/109 SM5ODI/125	NC1E/105 W3FX/102	N4QQI/113	KD5R/107	K6JAD/104	K6YT/107	WA9AEA/100
RTTY								
OE2OWM/107	YB5QZ/120	K6WZ/182	WK6E/106	W8SEY/176				
5BDXCC								
JH1RES	WA1WMS	JT1BG	W8SEY	HB9AZO	WA4CTA	K9QFR	DL8YCN	
						160 Meters		
						G3BRD/104	JR1EBE/104	

New Honor Roll Members

Mixed		Phone	
311	310	306	306
W7HR/319	WA4CTA/316 W6CRE/315	JA6GXP/320	W1GL/310

Endorsements

Mixed								
DJ9UM/299 DK5WL/301 F6BFH/324 G3KEC/176 HB9BY/267 HB9MX/354 HL1SX/270 I2MQP/315 I3BLF/288 I8TOH/225 IK8DO/1281 IK8DUB/200 I0TIC/251 I0ZUT/271 IK0FV/226 JR1XIS/214 JA3DY/351 JA5BSQ/312 JA6GXP/323 JA8QR/292 JA8XJF/323	JA9AA/345 JA9BJ/332 JA0DXG/321 OE3EMN/233 OK1ZL/324 ON4FZ/331 ON6BC/320 OZ2RS/228 OZ5EDP/177 PA0LRK/299 PY1APS/339 PY1YF/137 PY2DBU/297 PY3EM/310 SM3CXG/338 SM0AGD/308 U5WF/358 UB5WE/330 XE1OW/303 XE1VIC/301 XE1VV/298	YU3FW/251 YU7BCF/228 ZL4LZ/320 9Y4VU/325 K1QPM/175 K1RH/306 KA1ERL/222 KC1DQ/124 NC1E/139 W1BIH/366 W1DGC/311 W1GL/329 W1HEO/305 W1JJ/318 W1SP/351 WB1GEX/128 K2BK/358 K2QEY/292 K2VM/150 KB2HK/302 KB2XJ/268	NI2Z/230 W2NY/315 W2TQC/357 W2UE/359 W2VP/295 WA2PPV/292 WA2UXC/310 WA2YMX/256 WB2BNJ/324 WB2QMU/322 WB2YQH/333 K3GYS/156 K3RT/311 K3SKE/227 K3YGU/230 KE3A/313 KQ3S/225 KS3L/290 KX3Q/232 N3US/320 ND3A/238	W3ENL/151 W3HXI/147 W3MZG/305 W3YX/326 WA3EBA/174 WB3AVN/279 WB3JRU/299 AA4AR/316 AA4M/317 AA4UJ/308 AA4VB/204 AE4X/354 K4CEF/333 K4ELV/256 K4EZ/358 K4GJD/325 K4IKR/342 K4JEX/315 K4MG/330 K4XH/327 KA4S/322	KE4HX/300 KJ4VH/204 KR4F/310 KZ4V/290 N4AVB/314 N4BSN/295 N4CC/331 N4LA/272 N4QF/314 N4WF/335 NE4F/280 W4NL/339 W4UX/276 WA4DPU/312 WB4FLB/280 WB4HSA/286 WB4YD/131 WC4B/290 WC4K/211 WN4KKN/263	AG5X/305 K5HYB/308 K5FZ/179 K5QY/315 KD5RO/305 KF5MY/290 W5JE/300 W5NJ/317 W5QN/306 AG6Q/366 K6CJ/366 K6XZ/157 KE6GM/260 WA6HU/317 W6ALQ/302 W6AUG/281 W6CTL/310 W6JD/310 W6NNV/341 W6OAT/330	W6TXL/344 WB6RSE/314 W7BCT/315 W7DX/352 W7EKM/330 WA7BEV/333 K8PYD/332 KB8IZ/313 N8AQV/310 W8DN/250 W8MFW/307 W8CZS/294 WA8MOA/295 WA8SMJ/250 WB8Y/176 K9AB/357 K9JPI/225 K9LJN/287 K9MK/316 K9QFR/312	K69Y/275 KW9K/316 N9CHN/262 W9DE/330 W9GU/353 W9JI/222 W9MCR/320 W9TX/312 W9YX/356 W8DN/250 WA9AEA/283 WA9AQN/244 K0KTP/297 KA0CPY/297 WA8SMJ/250 WB8Y/176 K9AB/357 K9JPI/225 K9LJN/287 K9MK/316 K9QFR/312
Phone								
CP1FQ/292 CT1TM/274 CT4NH/294 DJ7AX/231 DJ9UM/299 DK5WL/294 DL1OAC/154 EA5AT/282 F6BFH/324 HC1OT/275 HL1SX/270 I2MQP/315 I4YNO/306 I5CRL/290 I8TOH/225	IK8BMW/223 IK8DO/1281 IK8DUB/199 I0TIC/240 I0ZUT/206 JI1WLL/233 JA3DY/324 JE3FCT/131 JA8XJF/322 JA9AA/321 JA9BJ/328 JA8DXG/264 LA9SN/226 PY1APS/336 PY3EM/306	U5WF/342 XE1OW/303 XE1VIC/300 XE1VV/297 ZL4LZ/320 9Y4VU/324 AE1Q/215 KA1ERL/219 KB1CQ/150 N1EBT/218 W1BIH/342 W1DO/332 W1HEO/299 W1JJ/318	W1SP/350 WB1GEX/127 K2BK/323 K2EWB/263 KB2HK/302 KB2XJ/263 KX3Q/247 W2HN/295 W2VP/292 WA2RLO/202 WA2UXC/310 WA2ZLK/182 WB2BNJ/324 WB2QMU/318	K3RT/278 K3SKE/225 K3YGU/183 KB3P/327 KE3A/312 KS3L/286 KW3X/203 KX3Q/226 N3US/315 W3YX/292 WB3JRU/276 WA4AR/316 AA4M/301 AE4X/332	K4BWU/250 K4CEF/327 K4GJD/325 K4IKR/337 K4MG/329 K4RSB/311 KE4HX/300 KJ4VH/177 KZ4V/248 K5RMK/172 KA5BOA/132 W5LQN/317 W5MUJ/176 AG6Q/275 KE6GM/260 N6AHU/316	N4WF/335 W4SKO/357 WA4CTA/309 WA4DPU/307 WA4MQ/312 WB4HSA/286 WC4B/262 K5RMK/172 KA5BOA/132 W5LQN/317 W5MUJ/176 AG6Q/275 KE6GM/260 N6AHU/316	W6ALQ/220 WB6DD/125 W6CRE/315 W6TXL/315 WB6RSE/295 W6NR/279 W7BCT/314 W7DX/349 W7EKM/329 K8PYD/330 KC8AF/152 N8AQV/305 WA8CZS/292 WA8MOA/276	K9AB/339 K9LJN/271 K9QFR/311 N9CHN/261 W9DE/304 W9GU/332 W9TX/303 W9YX/355 WA9AEA/261 WA9CDY/219 K0KTP/320 KA0CPY/297 KJ0Y/270 W0YU/288 N0RR/325
CW								
I3BLF/253 IK0FV/189 JR1XIS/192 JA3DY/306 JA8DXG/212 LA9SN/126 OZ2J/236	VE6JO/230 9Y4VU/290 K1RH/306 W1AX/250 W1WAI/250 K2BK/271 NG2U/150	W2TQC/293 WA2CDD/226 K3YGU/190 KQ3S/203 ND3A/170 W3GG/286	WB3JRU/287 AA4AR/305 AA4M/294 AA4NG/128 AA4UJ/237 AA4BW/250	K4CEF/291 KJ4VH/132 KR4F/282 KZ4V/270 NE4F/264 WA4CTA/290	WA4DPU/281 WB4CSK/283 WB4ZBI/201 WC4K/200 NG5F/132 W6ALQ/154	W6AUG/250 W6JD/282 W6JTI/200 WB6RSE/310 W7EKM/275 K8PYD/309	K8SW/273 K9WW/314 KB8DB/191 WB6RSE/281 W8DN/158 K9AB/310	K9BIL/280 K9LJN/261 W9CA/274 W9TX/227 N0RR/318 W0YU/158
160 Meters								
9Y4VU/117	W1AX/123	W2TQC/186	W3GG/138	WB3AVN/127	N4KG/174	K9AB/131	K9UWA/160	

DXCC Notes

Golden Jubilee of DXCC Reminder

Last call for applications for this award (for DX contacts made during 1987). December 30, 1988 is the last day for receipt of Golden Jubilee applications. The DXCC Annual Listing will appear in the January 1989 issue of QST.

Season's Greetings

FROM THE ARRL/IARU HQ STAFF

Nao Akiyama, N1CIX/JH1VRQ
Chrissy Arel
Jo-Ann Arel
Vicky Armentano
Bob Atkins, KA1GT
Richard Baldwin, W1RU
Sheldon Ball, N1EOZ
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Mary B. Basch
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Jon Bloom, KE3Z
Fran Bramon
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Jim Clary, WB9IHH
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Chuck Dorian, W3JPT
Ruth Doucette
Bernice Dunn, KA1KXQ
Dennis Dzierzawski, K9EIS
Steve Ewald, WA4CMS
Sue Fagan
Kathy Fay
Kimberly Fay
Mark Forbes, KC9C
Mark Gamble, N1FOZ
Chetty Ganci
Scott Gee, WB9RRU
Joan Gibson, KG1F
Alison Halapin
Bruce Hale, KB1MW
Gerald (Jerry) Hall, K1TD
Bob Halprin, K1XA

Ed Hare, KA1CV
Penny Harts
Rus Healy, NJ2L
John C. Hennessee, KJ4KB
Jacqueline Hernandez
Stan Horzepa, WA1LOU
Berta Hould
John Huntoon, W1RW
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Christy Hushin
Joan Hushin, KA1IFO
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Debbie Jahnke
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Jeff Kilgore, N1FGB
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Kirk Kleinschmidt, NT0Z
Ginny Koza
Geoffrey H. Krauss, WA2GFP
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Bill Olson, W3HQT
Helen Pacyna
Paul K. Pagel, N1FB
Richard "Bones" Palm, K1CE
Linda Pfister

David Pingree
Ann-Marie Pinto
Steve Place, WB1EYI
Sal Prado
John Proctor
Michael Riley, KX1B
Paul Rinaldo, W4R1
Vern Riportella, WA2LQQ
Kimberly H. Rochette
Dianna Roy
Phil "Pip" Sager, WB4FDT
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Frank Vesci, NG1J
Tom Vesci, WB1CRH
Bill Webb, KX1A
Lori Weinberg
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Rosalie White, WA1STO
Bruce O. Williams, WA6IVC
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Jean Wilson
Mark Wilson, AA2Z
Larry Wolfgang, WA3VIL
Gerrie Wood
Barbara Zaleski

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

220 MHz AND CORPORATE AMERICA

□ Among all of the recent FCC decisions which have given me cause to reflect on the viability of the Amateur Radio Service, given the volatile rule making and the uncaring response to the electorate of this nation by the FCC, none has shaken me more than the reallocation of the 220-222 MHz amateur band to the Land Mobile Service. It is my opinion that the FCC has acted in a manner in which any right-thinking person must suspect impropriety on the part of the FCC. Commercial interests have long labored under the concept that the amateur allocations are "easy pickings" because we amateurs are "a fragmented group of individualists who are incapable of a concerted action." Perhaps this is true. For argument's sake, I will concede that we amateurs present an ineffective group response and therefore can be safely ignored as any minority group is when legislation for a special interest group is drafted.

I would like to see a Congressional committee formed to determine the validity and appropriateness of the procedures used by the FCC [in the 220-MHz reallocation]. The people of this nation need to be reassured so that full confidence in these government appointees may be restored. —Richard Z. Plasencia, WØRPV, Cedar Rapids, Iowa

□ The next time that a hurricane rips through the Gulf of Mexico, or a tornado wipes out a town in the Midwest, or there is an earthquake on the West coast, I hope that the United Parcel Service has a well-organized emergency system up and running on 220 MHz to cope with the situation! —Julian N. Jablin, W9IWI, Skokie, Illinois

HURRICANE GILBERT HITS GULF

□ This is a sweet and sour letter to our fellow hams. First, I congratulate the operators who are, at this writing, spending endless hours on the emergency hurricane net. Whatever reward they receive, including personal gratification, will never be adequate. Like legions of other hams, I have been listening and feel a great sense of personal pride in belonging to this fraternity. Again, my hat is off to the many amateurs who were and are working to relieve the ravages of Hurricane Gilbert.

Now the other shoe. Carriers, rig tuning and snide comments are making the job difficult, to say the least. One guy, right in the middle of a station's weather report, commented that "weather reports are not emergency traffic." I would strongly recommend that he use his brain for uses other

than keeping his chair seat warm! He kept repeating this every time the station was asked to repeat and it took about six transmissions to get the information through. These antics are enough to cause me to reconsider putting my HF station back on the air.

It is a sad commentary that a few people receive personal gratification by causing interference and displeasure for their fellow man. If only they realized that if they expended their energy in helping those in need, much human discomfort and human suffering could be eased.—David L. Williams, N3FNW, Glenside, Pennsylvania

□ When Hurricane Gilbert struck the Gulf of Mexico a short time back, I monitored the emergency communications provided by radio amateurs for the National Weather Service on 14.325.

Two of the net control operators I listened to were effectively and professionally providing communications and gathering data from the areas affected by the storm. The operators I heard were Don, KØIND, and John, NJ7E. I couldn't believe my ears when I heard a couple of phone stations yelling for the net control to "get off the frequency." Other stations were maliciously tuning up on the net frequency while emergency traffic was being passed. The net control remained calm, courteous and professional.

Both Don and John performed incredibly well, conducting emergency communications in the face of this blatant, mindless harassment. Must we begin insisting on psychological testing as well as technical testing for amateur licenses? —Stephen F. Steverson, N8BTB, Cleveland, Ohio

□ A week has gone by since I received a call from a ham radio operator relaying a message from Merida, Mexico that my son and his wife were "safe in Cozumel." The purpose of this letter is to convey my thanks to amateurs for all of their wonderful work during this disaster. I know nothing about the intricacies of ham radio—only the end result. I know that it is a great hobby, but it is much more in an emergency situation. Man, with all of his sophistication, is helpless when pitted against the strength of natural disasters. Even now, during communication during an emergency, we must rely on the basics—man's humanity and goodness—and, of course, the radio.

My sincere thanks to all ARRL members who participated in the trauma of Gilbert—you really eased many minds.—Jean M. Stoehr, Cincinnati, Ohio

TOGETHER—WE CAN WIN

□ [On page 67 of June *QST*] a brief news

announcement was published about the enactment of a tower ordinance in Newport Beach, California. Among other things, it provides for a maximum extended height of 75 feet. The ordinance embodies the latest tower innovations which can be used in a densely populated metropolitan area where amateurs are asked to compromise in order to obtain a reasonable tower height.

The effort to obtain passage of this ordinance was a result of work begun years ago by Jack Croul, N6HVZ, Bob Williamson, KF6LF, and myself. Besides having the active support of most of the amateurs in the Newport Beach area, a major contributing factor to the success of our efforts was due to the involvement of Wayne Overbeck, N6NB, ARRL Vice Director of the Southwestern Division. Wayne joined in our initial discussions, helped to rewrite the ordinance and attended the numerous planning commission and city council meetings. His expertise in the field of telecommunications lent credibility to our technical data and to the need for the requested tower height. Thanks to the League, Amateur Radio has scored another victory.—Ed Karagozian, K6JGN, Newport Beach, California

HXG?

□ I agree with what Bob Weinstock, KNIK, says [in his article "A Public Service Opinion" which appears] in the Public Service column of August 1988 *QST*. In my opinion, a message should not be serviced back to the originator unless: (1) the content of the radiogram violates some FCC rule; or (2) it cannot be delivered either by hand, telephone or US Mail.

The cost of an occasional toll call or postage stamp is minimal, and Amateur Radio deserves this much dedication from anyone who would call himself or herself an NTS traffic handler.—Robert C. Becker, N3FM, Oil City, Pennsylvania

[HXG will be familiar to amateurs involved in traffic handling. It is used in the preamble (heading) of messages and its meaning is "Delivery by mail or landline toll not required..."—Ed.]

RST—"INADEQUATE"

□ It seems to me that the current RST system is no longer adequate for reporting signals.

Actually, the RS(T) system is not always used in phone contacts. Many operators use only an S-meter reading without the "R." With the increasing use of preamplifiers at the higher frequencies, especially in satellite communications, even an S-meter reading becomes ambiguous.

In most setups, adding a preamp will

generally raise the "zero signal level" of the S-meter to S4 or S5. It is fairly common to hear stations giving good S-meter level reports and then adding that copy is poor due to the ambient noise level. This is quite common in satellite operation where signal levels are usually only 5 to 10 dB above the ambient noise level.

A more meaningful report would be "you are (fill in the number)-units above the background level." Most S-units have an approximate calibration of 5 or 6 dB per S-unit. This would supply the station receiving the report with quantitative information about the received signal-to-noise (S/N) ratio of his transmission. In the final analysis, the S/N ratio is usually the best indication of how well one's transmissions are being copied.

I could go on in detail about this, but I think the point is clear. How I long for the bygone days when I used a "two tube blooper" for receiving and RST really meant something.—*Albert Weiss, K6VU, Salem, Oregon*

DON'T MARK THAT LICENSE!

□ Never "take a pencil to" your license or any other official document (September 1988, *QST* p 67). A copy kept for your own convenience could be marked, but always have a few "clean" copies (as well as the unmarked original) put aside for modification or renewal of your license.

Also, if you get a license with an unreadable call sign, don't throw away the front of the self-mailing envelope! The call sign is printed there too, and it should be readable regardless of the condition of the carbon inside.—*Charles E. Sudranski, W2XY, Brooklyn, New York*

A WORD OF THANKS

□ I would like to take this opportunity to say a sincere "thank you" to all of the people who contributed to the Barry Goldwater Scholarship Fund. I was this year's recipient of the scholarship and it will be a tremendous benefit in financing my education. I hope that amateurs continue to contribute so that young hams can continue to receive this scholarship. My hat goes off to both the contributors and to The ARRL Foundation.—*Shawn Wakefield, WK5P, Norman, Oklahoma*

COVENANTS AND THE RADIO AMATEUR

□ I would like to express my appreciation for the ARRL action with respect to FCC Docket 88-138. Reading that "real estate developers have reached a consensus that outdoor antennas should be prohibited" made my blood boil for two reasons.

First, I do not want to be compelled to subscribe to cable service in order to obtain satisfactory television reception. A small one-time investment in an outdoor TV antenna will provide equal or better quality of reception in most locations than that which can be obtained from the continuing,

usually escalating, costs of cable service.

Secondly, the implications to the Amateur Radio Service of seriously limiting our ability to communicate are quite obvious. I happen to own a tower for which city approval was obtained years ago, but I am disturbed to see other amateurs limited by proliferation of these outrageous covenant restrictions.—*John L. Kennedy, W5DJ, Dallas, Texas*

[Restrictive antenna covenants have become amateurs' biggest problem in recent years. PRB-1 has effectively dealt with overly restrictive local zoning ordinances governing amateur antennas, but covenants are excluded from PRB-1.—Ed.]

NTS AND PACKET—REPLIES TO KR7L

□ This is my reply to KR7L's September 1988 *QST* article "Future Shock in the NTS—An Opinion" which appeared in the Public Service column.

I do not believe we have found such a perfect transmission mode yet (ie packet) that we can discard all other modes. Perhaps we will never find one that perfect. There is depth in variety, and a certain security. I do not see it as a fault at all that we retain a network linking hundreds of cities and towns together daily by the "last resort" mode—CW. We should use packet radio, sure. At the same time, we would be wise to retain older modes of proven value which can "get through" when all else fails. Each mode has something unique to offer, from packet on down to CW, and should be supported and encouraged.—*Dana Knight, WZ5N, Arlington, Texas*

□ Maybe Brad is right, maybe this time there will be a revolution, maybe this is the development that will relegate all previous modes to obsolescence, but I am not yet ready to accept this and I doubt that most NTS people are. Packet—consider it, use it, nurture it, yes, but abandon the long tried and true NTS structure? No! Not yet. Maybe not ever. Personally, I hope the day never comes when the need for manual skill in Amateur Radio no longer exists—because that's the first step in eliminating the need for mental skill as well. When that day comes, we'll all be dead from the neck up! —*George Hart, W1NJM, Newington, Connecticut*

[George is the retired ARRL Communications Manager at ARRL HQ.—Ed.]

WHERE ARE THOU GOOD EARS?

□ You can add my nod to the long list of CW hints by Chuck King, KX9S, in September 1988 Correspondence. I am addressing this to all those brass pounders who are good senders, but lousy listeners. These are the ones sending CQ till the cows come home, never stopping long enough for a reply. And there is the station who begins with a "QRL" a few times and then begins his long string of CQs right on top of a QSO, never even stopping to see if the frequency is busy. Oh, where is that rare

breed—a combination of a good fist and good ears?—*Howard Dutkin, N4EBT, Miami, Florida*

LOST SPECTRUM AND A NO-CODE VHF LICENSE

□ The loss of the 220-222 MHz band is regrettable, but it was entirely predictable.

Let us take our soon-to-be exclusive allocation of 222-225 MHz and learn a valuable lesson from the experience—the amateur service in the United States needs more operators, particularly in the VHF/UHF spectrum. The best way to accomplish this is to follow the lead of nearly every major nation of the world and create a restrictive, VHF/UHF only, no-code license.

Novice Enhancement has been a step in the right direction, but it's not enough. Knowledge of Morse code does not guarantee a good operator. Listening to the often rude behavior found in DX pileups on 20-meters and to the foolishness on 75-meter SSB is proof of that. The thought of having to pass an exam to obtain an amateur license—even an exam without CW—will be enough to weed out the not-so-serious from serious potential amateurs. After all, isn't that the real goal of licensing?

You'll find me much of the time on the CW bands because I like Morse Code, but it's obvious to me that the future of our hobby does not rest with CW. I'm 34 years old and have been licensed 20 years. I just hope that the amateur service hasn't lost all of its allocations by the time I'm an old man. The pressures from other groups who want our bands will not diminish, particularly since there's been a successful challenge to another frequency band. Let's follow the lead of other nations and establish a reasonable no-code license before we lose another portion of an amateur band.—*David Greer, WE4K, Bardstown, Kentucky*

OPERATIONS ABOARD THE EAGLE

□ Reading Rick Booth's article "The Eagle Is QRV" in September 1988 *QST* brought back memories of my Third Class Cadet cruise to Europe aboard the Eagle during the summer of 1975.

I recall that we used a Yaesu FT-101E transceiver and a Heath SB-200 amplifier as our rig. The antenna was a doublet strung between the fore and main masts. With the antenna and the amplifier, we put out a respectable signal. Due to time and training constraints, our air time was dedicated mostly to phone patching, although we were occasionally able to "run the pileups." There were four licensed amateurs aboard and we used the call sign of the Coast Guard Academy Amateur Radio Club—W1CGA.

I still go to sea, and am presently sailing as Chief Mate aboard a tanker which loads crude oil in Alaska for US West Coast ports. My work schedule while aboard limits free time, but I occasionally am able to get on the air, albeit from a far less majestic vessel than the Eagle!—*Paul V. Hoban, N6JY, Jamul, California*

TCC—The Long Distance Connection

By Brad Wells, KR7L, SM Washington, ARRL

The Transcontinental Corps (TCC) is to the National Traffic System what the American Telephone & Telegraph is to your local telephone company. Both provide for message handling over long distances between regional exchanges. We know about the smooth progression of traffic from local nets to section nets, region nets, and finally, to area nets. Traffic flows up and down through these nets for destinations within the Pacific, Central, or Eastern Area. [For further information on the proper flow of NTS traffic, write to ARRL HQ for a free copy of the *Public Service Communications Manual*—Ed.]

But what about those messages going from one coast to the other? There is no higher net than an area net to handle such traffic. Obviously, we can't mail these messages, so they end up being handled by the small cadre of operators belonging to the TCC. In much the same manner that ATT provides linkages between various regional telephone companies, the TCC operator provides for the linking of area nets.

The TCC operator is unique among traffic handlers. It is primarily an individual effort within a group, where teamwork is standard operating procedure. Additionally, TCC operators have the greatest flexibility in their scheduling, but operate under some of the tightest time constraints in the National Traffic System. Finally, these operators tend to be the cream of the crop in both operating expertise and station equipment.

Basically, a TCC operator picks up out-of-area traffic from one of the area nets and relays it to another operator within another area for delivery. There are two basic scenarios for the movement of this traffic. In one case, an individual checks into an area net to receive traffic destined for another area net. This traffic is relayed, on an out-of-net schedule, to another individual TCC station, who in turn lists it on another area net. For example, I could pick up eastern traffic from the Pacific Area Net, transmit it to a station on the East Coast, who would in turn, list it on the Eastern Area Net.

In the second scenario, the receiving TCC operators do not list such traffic on their area net, but go directly to region and section nets to unload these messages. This is done when the scheduling and time zone differentials do not allow TCC operators to move between area nets. During the normal course of events, stations handling

westbound traffic move exclusively between area nets, while stations receiving eastbound traffic check into any net which will handle their messages.

There are 22 different TCC stations involved with the daily operation of the National Traffic System. They are designated by a single letter, Alfa through Victor. Each of these stations have specific functions and a particular time frame in which to operate. For example, in Cycle 4, Station Romeo is normally located in the Pacific Area and keeps a schedule with Station Papa between 2130 UTC and 2230 UTC. Station Papa has picked up all Pacific Area traffic from the Central Area net and transmits it to Station Romeo. Then, Station Romeo reports into the Pacific Area Net at 2330 UTC to distribute this traffic under the direction of the PAN Net Control Station.

Another example of TCC operation (under Cycle 2) is the function of Station Delta. This operator is normally located in the Eastern Area and keeps a schedule with Station Juliet (located in the Pacific Area) at some time between 0530 UTC and 1930 UTC to receive traffic for the Eastern Area. These messages are then taken to the appropriate section, region or area at the first opportunity. This TCC function places a heavy emphasis on the capability to check into a wide variety of nets across the Eastern Seaboard in a relatively short period of time.

What are the recognized requirements for a TCC station? The *Public Service Communications Manual* states, "TCC stations must have the following qualifications: (1) Adequate signal power to perform the job to be done; normally inputs of under 100 watts can not accomplish it unless a very efficient antenna system is used. (2) The highest caliber of operating ability and NTS net savvy. (3) Capability, both personally and equipment-wise to keep the required schedules." Let's take a look at each of these individual requirements.

"Adequate signal power to perform the job to be done." Any operator interested in maintaining a TCC schedule must be able to consistently deliver a strong, readable signal into his target area. The TCC operator is to traffic handling as a "big gun" is to contesting. These schedules must be kept regardless of the phase of the solar cycle, season of the year or daily Boulder A index. This type of operation generally rules out the operator whose station consists of a transceiver running barefoot into some low dipoles. Linear amplifiers become a fact of life. The minimum

amplifier is one which will run 1000 watts input and has the capability for extended operation without overheating.

A directional gain antenna for 20 meters is a must, and something similar for 40 meters is a real plus. In reality, the TCC operator must have a variety of antennas, those which work well for the region and section nets and those which perform best on long-haul paths. The former require high angles of radiation, while the latter require that RF be radiated at low angles to the horizon. The low dipoles, inverted vees or horizontal loops, which work so well for the region and section nets, are poor choices for TCC schedules because of their high-angle radiation. Good low-band TCC antennas include slopers, delta loops and verticals with extensive ground systems. Excellent advice on the construction of these types of antennas may be found in *Low-Band DXing* by John Devoldere, ON4UN (published by the ARRL). The station I use to keep TCC skeds has been a Yaesu FT-757 and Yaesu FL-2100 amplifier. The antenna system consists of a 5-element triband Yagi at 45 feet, an inverted V for 80 and 40 and sloping delta loops for both 80 and 40 meters. While time has proven the adequacy of this station, I do not consider it optimum for TCC operation.

"The highest caliber of operating ability and NTS net savvy." The choice of transmission mode is entirely up to the TCC stations involved. Therefore, a TCC operator must have a minimum capability of two modes. He should be proficient at sending messages by either phone or CW. Efficient traffic handling by phone is as much a speciality as is the proper handling of messages on CW. This is particularly true for those TCC stations who go to all levels of nets to unload traffic. In addition, many TCC stations now send messages by digital modes—RTTY, AMTOR or packet. The use of these modes can minimize the amount of manual writing to be done, increase the speed at which messages may be sent and provide almost error-free transmission. They are particularly suited to handling the large volumes of traffic normally generated during Christmas and Mother's Day. Multimode capability also increases the ease in handling messages during times of poor propagation or crowded band conditions.

NTS net savvy is something that only comes with operating on traffic nets over an extended period of time. It should be seen as a never-ending learning process with the ultimate goal of handling traffic faster and more efficiently. For example, an

experienced TCC operator should be able to second-guess the actions of a Net Control Station. However, he should not forget that the NCS is the boss of the net and that he must follow his directions. This developed ability does not allow him to offer on-the-air suggestions to the NCS on how to expedite the flow of traffic.

TCC operators should always have their traffic sorted by delivery area when checking into a net and be able to give the NCS an accurate traffic count at the start of the session. Barring some unforeseen disaster, the TCC operator must be on frequency at the very beginning of the area net session. Likewise, a good Net Control Station realizes that the TCC operator's time is limited and expedites the movement of that traffic. This is particularly true on region and section nets, where the TCC operator may be racing from one net to the next, trying to unload all of his traffic.

"Capability, both personal and equipment-wise to keep the required schedules." Handling a TCC schedule is similar to performing a net liaison function. You will be expected to do this job at the same time and same day, each and every week. Reliability is the byword of TCC. You won't be much good to anybody if you show up on a hit-and-miss basis. You must be willing to set aside the required specific times and adjust your personal life around it. The National Traffic System only functions because traffic operators are willing to regiment a bit of their personal life, so that they can be on the correct frequency at the required time.

Station equipment reliability is the other hallmark of the TCC operator. It must operate every time you turn on the power. In putting your station together, design for maximum endurance, rather than occasional outstanding performance. This means using the highest quality components that you can afford. For example, I use a rotator rated for an antenna of 25 square feet and have it turn a beam with only 12 square feet of wind-loading surface area. Likewise, I use Belden RG-213 coax and silverplated Amphenol connectors. Sure, I know that I could use less-expensive cable and connectors—and definitely a smaller rotator. However, I know that this system is going to work come rain, snow or whole gale. Additionally, the amplifier and transceiver are protected by surge suppressors in the event of lightning. The power supply ac mains are similarly protected. I never operate during electrical storms, but I don't want to lose the rig due to some transient voltages induced on either the antenna or ac mains.

One item, often overlooked even by experienced operators, is an adequate ground system. For many, it consists of a metal rod driven into the most convenient piece of dirt. Mine is constructed of several ground rods, at various locations, bonded together with copper braid. Several hundred feet of buried radial wires are then

run out from each of the ground rods. A good ground system will minimize your capability for creating RFI and will actually improve the performance of both your rig and antennas.

Most TCC operators, like good DXers, have a backup rig. Most of the time, it is an older piece of equipment saved, and not traded-in, on the current rig. It's simply cheap insurance in case something does go wrong with your primary radio. Many operators use this backup rig on a regular basis for checking into the local 80-meter Section nets.

Serving as a TCC station on a regular basis is one of the most fulfilling jobs within the National Traffic System. It is the only position that puts a premium on both individual accomplishment and team operation. You must be able to operate independently, and at the same time, integrate yourself into a smoothly functioning area, region or section net. It is being a net liai-

son operator, but on a national basis. Your operating horizons are expanded well beyond the immediate needs of an individual area net. The maintenance of a weekly TCC schedule also places a high premium on reliability, both in your personal life as well as your on-the-air operation. Thirty years ago, being recruited as a TCC operator was considered the ultimate compliment to your skill in handling traffic. While the number of TCC positions has grown since 1958, the total number of active traffic operators has remained constant. However, the same high standards continue for these positions. They are the essential and vital links between area nets which provide for the cross-country flow of messages.

Today, more than ever, the NTS Transcontinental Corps is looking for a few good operators—people with the interest, ability and equipment to handle messages on long-haul circuits. How about you?



As traffic handlers, we pride ourselves in being ready for any emergency. Each and every time that we handle a message, check into a net, or perform some liaison function, it is practice for the time when disaster strikes and "the chips are down."

But there is a problem with this concept. We may be well-prepared and trained in the skills to handle emergency traffic, but will we be "on the air?" How many of the 1357 Official Relay Stations nationwide can relay anything when the local power company shuts down?

This lack of stations capable of operating on some form of emergency power is most acute in the urban areas of the nation. Those of us who live in rural areas expect the power to go off several times a year. For a number of reasons, rural power lines are more subject to breakage than those in the cities. Conversely, since urban areas are less affected by power outages, the consequences are more severe and traumatic because of a lower level of preparedness.

The capability to operate independent of ac power mains means more than having a 2-meter handheld with a couple of battery packs. Traffic handlers would do well to look at the requirements for the Official Emergency Station appointment. While generally aimed

at and applied for by those active in ARES, the rationale for this field appointment holds true for those of us in NTS.

I would suggest that any traffic handler should be able to operate a 2-meter rig, capable of ten watts or more output, on battery power for a minimum of 48 hours. I am NOT talking about sitting in your car for two days, but transmitting from the comfort of your shack. Actually, this goal is relatively easy to accomplish. Deep cycle marine batteries and inexpensive trickle chargers are available from any auto parts store. In many cases, the cost of a battery and charger is less than buying the matching power supply for your rig. In addition, 12-volt accessories, such as clocks, can be run off this battery.

Likewise, thought should be given to running your HF rig off a 12-V supply. Here, we should shoot for the maximum battery capacity that we can afford. Again, batteries and trickle chargers are a viable alternative to buying the matching power supplies. A simple trick to extend battery life is to run your rig at less than its rated maximum output power. There is little difference in the reception of a 50-W signal versus a 100-W signal.

Of course, the ultimate would be a portable generator capable of running all your equipment. While this is the most expensive solution, it provides the greatest long-term capability for staying on the air.

Let's work at equipping ourselves with emergency power. It would be a shame if all our training and expertise went for naught each and every time the commercial power went out.—Brad Wells, KR7L

Field Organization Reports September 1988



ARRL Section Emergency Coordinator Reports

Thirty SEC reports were received, denoting a total ARES membership of 19,946. Sections reporting were: CO, EPA, GA, IA, IN, LAX, MDC, MI, MN, MO, NFL, NH, NNJ, NM, NV, OH, OK, ORG, PAC, SD, SDG, SJV, STX, VA, VT, WA, WMA, WNY, WPA, WV.

2RN	30	126	4.20	.322	93.3	50.0
3RN	29	58	2.00	.216	94.3	100.0
4RN						83.3
8RN						96.6
ECN						90.0

Cycle Four

Area Nets						
EAN	30	1336	44.53	1.232	96.2	
CAN	30	726	25.20	.858	100.0	
PAN	30	769	24.83	.899	97.2	

Region Nets

1RN	41	173	4.22	.477	64.0	93.3
2RN	30	173	4.22	.477	64.0	100.0
3RN	60	191	3.18	.332	100.0	100.0
4RN						100.0
RN5	60	470	7.83	.600	81.4	100.0
RN6	59	471	7.98	.900	87.0	96.6
RN7	57	354	6.21	.755	90.0	100.0
8RN	53	250	4.72	.359	81.0	96.6
9RN	59	335	5.67	.410	92.5	100.0
TEN	60	362	6.03	.532	75.8	100.0
TWN	54	204	3.77	.405	98.1	95.0
ECN						90.0
ARN	30	276	9.20	.243	100.0	90.0

* PAN operates both cycles one and two.

ARRL Section Traffic Managers reporting: AL, AR, AZ, CT, DE, EMA, EPA, GA, IL, IN, MDC, ME, MI, MN, NC, NFL, NLI, OH, OK, OR, ORG, SB, SC, SD, SFL, SJV, SV, RI, TX, UT, VA, WA, WMA, WNY, WPA.

71	W1PEX	KA2ZNZ/T	60
W4ZJY	67	W2FR	WB0WNJ
N6EQZ	WA4RUE	63	WB1BTJ
K9ANV	KD8KU	KD8YL	KB4OPR
KJ9J	NBHC	K9ZBM	N1DHT
K2ZVI	W4TZX	KA9RNY	59
N4KSO	N1CVE	K4BR	KA6TND/T
NC9T	68	KK4FV	56
W1KK	WB6QBX	62	N2HSP/T
70	NO8A	N0BDG	53
WA3YLO	NW8M	NS9Q	KA2UIU/T
WB4PNY	KB4LB	K3GHH	KB8CTW/T
N2HLZ	WC4D	W8UMH	KA1QFV/T
KA1MDM	K4IWW	A160	52
WA1TBY	KP4DJ	81	N2EVG/T
KA9RII	K2TWZ	NBHW	52
69	N8FWA	N4QRZ	49
N9EFB	65	K5JDI	N8JPR
WB2QMP	KC3Y	WB8KWC	47
NJ3V	KF8J	WB9PFZ	KB2BNW/N
68	WD8KBW	WA8DH	KA2VX/T
KD0NH	WB2FTX	WB4TZR	KA1HPO/T
	KA2JMA	W8QUD	46
		N7APC	N8HRW/T

The following stations qualified for PSRR during the month of August, but were not listed in last month's column. WGH7 101, VE7BN1 92, VE7EJW 75, VE7EJU 74, VE7ANG 65.

Transcontinental Corps

Area	Successful Functions	% Successful	TCC Function Traffic	Total Traffic
Cycle Two				
TCC Eastern	108	90.00	535	1084
TCC Central				
TCC Pacific				
Cycle Three				
TCC Eastern	58	96.67	38	76
Cycle Four				
TCC Eastern	115	95.83	575	1158
TCC Central	89	89.60	273	568
TCC Pacific	112	93.30	310	596
Summary	296	89.57	1158	2320

TCC Roster

Eastern Area Cycle 2: KW1U Director. WA1FCD KA1MDM, KT1Q W1QYY KW1U WA2FJJ W2FR NN2H KA2JBD N2XJ W3ATO N3AZW N3EMD K13F NC3V NJ3V AA4AT WD4FTX N4GHI WB4PNY N4SS W8PMJ KA8WNO WB8YDZ VE3ORN.

Eastern Area Cycles 3 & 4: KN1K Director. KB1AF W1CE W1EFW WA1FCD W1NJM W2FR W2GK NN2H NO2H KB2HM W2LWB WB2QJX W2RO WA2SFL K2VX N2XJ N3AZW N3EMD N3FM W3GL WB3GZU W3OKN W3PQ KQ3T NJ3V AA4AT N4GHI KB4N N4SS W4UQ K4ZK W8BO W8PMJ K8TPF KA8WNO N8XX VE3FAS VE3GSQ.

Central Area, Cycle 4: K5GM Director. W4ZJY K5GM WB5J K5MXQ W25N W8SO N5TC K5TL W5TNT KB5W W9CBE WB9UYU A160 K6BU.

Pacific Area, Cycle 2: K0DJ Director.

Pacific Area, Cycle 4: ND5T, Director. W5JOV KU6D N6LHE KB0YK WF6O WA7CBN KF7R W7TGU W7IGC N0HFZ N8IA VE6CHK.

National Traffic System

Net	Sess	Tic	Avg	Rate	% Rep	% Area
Cycle Two						
Area Nets						
EAN	30	867	28.90	.729	93.9	
CAN	30	497	16.56	.406	100.0	
PAN*	51	341	6.88	.422	83.3	
Region Nets						
1RN	60	552	9.20	.499	94.0	100.0
2RN	60	276	4.60	.347	91.0	93.3
3RN	30	136	4.53	.460	95.0	100.0
4RN	57	461	8.09	.340	75.8	100.0
RN5	60	502	8.37	.417	88.0	100.0
RN6	51	146	2.86	.275	—	98.0
RN7	59	403	6.83	.562	86.1	100.0
8RN	60	305	5.08	.298	96.6	100.0
9RN	60	207	3.45	.291	86.0	97.0
TEN	68	337	4.95	.273	82.0	100.0
TWN	58	203	3.50	.286	83.1	96.0
ECN						70.0
Cycle Three						
Area Net						
EAN	30	245	8.17	.541	77.6	
Region Net						
1RN	30	123	4.10	.343	85.7	83.3

Public Service Honor Roll

This listing is available to amateurs whose public-service performance during the month indicated qualifies for 60 or more total points in the following nine categories (as reported to their SM). Please note maximum points for each category: (1) Checking into CW nets, 1 point each, max 30; (2) Checking into phone/RTTY nets, 1 point each, max 30; (3) NCS CW nets, 3 points each, max 12; (4) NCS phone/RTTY nets, 3 points each, max 12; (5) Performing assigned NT8 liaison, 3 points each, max 12; (6) Delivering a formal message to a third party, 1 point each, no max; (7) Handling an emergency message, 5 points each, no max; (8) Serving as Emergency Coordinator or net manager for the entire month, 5 points max; (9) Participating in a public-service event, 5 points, no max. This listing is available to Novices and Technicians who achieve a total of 40 or more points. Stations that qualify for the Public Service Honor Roll 12 consecutive months, or 18 months out of a 24-month period, upon sending notification of qualifying months to ARRL Public Service Branch, will be awarded a special PSRR certificate from HQ.

380	118	99	82
KC9CJ	K4ZK	N6NLW	K6UYK
280	WX4H	N3EMD	KV5X
VE7EJU	116	N9BDL	N3COY
264	WB2QWO	AA4AT	WB0WNJ
W77A	N2EIA	N2DXP	WB0TAX
246	WA0HTN	NQ1P	K9C9J
N4JRE	KANLK	K2VX	KA1IFC
195	WG3H	KB1AF	WB2IBO-4
WB7VSN	114	97	WA4JDH
191	K5UPN	NBFOO	KB4N
W7VSE	112	W4PIM	W2NIP**
181	WA4JDH	K4BGZ	KT9I
KA0ARP	KW1U	WB6DOB	KT1Q
174	111	96	WF6O
WD8V	W4JLS	WB8R	W3IWI
161	N2IMP	WB8SYA	NQ1P
KA1GW	K9CNP	KA8WNO	WA8VND
155	NG1A	95	N2GPA & K2JLD***
KA7EEE	109	W5YQZ	K5UPN
145	WF6O	WA1JVJ	KA1KML
KD7ME	WB5SRX	ND2S	WX4H
138	WA4PFK	78	N2AKZ
NM1K	WB4KSG	75	W7TGU
N4GHI	KA2UJD	92	KW1U
W2QNL	107	92	N3AZW
W12G	WB7WOW	77	
136	WB8KQC	77	
KA1FVY	WB2VJK	77	
132	106	N4SMB	
VE7ANG	AG8G	91	
130	N9BDL	90	
AA4ZV	105	90	
128	K5MXQ	89	
WA4QXT	KA3DLY	88	
WA2SPL	KA1KML	88	
127	104	88	
WB0ZNY	W3FA	87	
126	W7LNE	86	
W2MTA	W7LBR	86	
124	N2XJ	84	
W2RRX	103	84	
KA1KP	KT1Q	84	
122	102	84	
AA4TE	N2HIF	84	
121	KJ4VT	84	
K5CXP	WA9VLC	84	
K2YQK	101	83	
119	K8TVG	83	
WB2ZJF	KI4YV	83	
KF5BL	W2AHW	83	
N4EXQ	WA2ERT	83	
100	100	83	
N1CPX		83	

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, i.e. it is not issued more than once. It is not necessary that the three months involved be consecutive. Any three months will qualify an operator. Stations that qualify for the BPL medallion, upon written notification of the qualifying months to the ARRL Public Service Branch, will be awarded the call-sign-engraved BPL medallion.

Call	Orig	Rcvd	Sent	Divd	Total
W3CUL	771	1445	1601	127	3944
WA2SPL	7	1265	1334	34	2640
WB9YYP	—	1145	101	720	1966
KK4WR	21	842	845	12	1720
W1PEX	0	1222	301	14	1537
W1WP	0	75	1561	6	1646
K2MT & KA0HDJ*	780	0	790	0	1570
WA9UXP	0	1255	0	0	1255
N4GHI	51	560	314	22	947
NM1K	12	424	430	21	887
W3VR	314	219	299	24	856
WB0WNJ	214	65	557	1	838
WB0TAX	0	409	409	0	818
K9C9J	7	432	82	288	809
KA1IFC	10	389	400	10	799
WB2IBO-4	0	389	389	0	778
WA4JDH	1	359	376	11	747
KB4N	0	349	393	0	742
W2NIP**	0	352	352	0	704
KT9I	0	466	226	9	701
KT1Q	1	376	310	2	688
WF6O	2	316	320	13	651
W3IWI	0	326	318	0	644
NQ1P	43	296	272	18	629
WA8VND	2	315	294	15	626
N2GPA & K2JLD***	19	289	303	5	616
K5UPN	0	232	358	2	592
KA1KML	0	293	252	40	585
WX4H	0	295	280	9	584
N2AKZ	12	287	277	11	577
W7TGU	—	—	—	—	576
KW1U	5	310	203	11	529
N3AZW	34	229	238	20	521

BPL for 100 or more originations plus deliveries:

WD4IQ	126
WA1VXW	106

*Multi-operator station from Jamaican Consulate (NYC) with WB2BTJ, NB2D, K2DKR, KB2EWL, KB2FSY, N2GMD, KA0HDJ, N2HIT, N2IMP, W2JUP, NK2W, KA2KNP, KA2LCC, WB2LFI, K2MT KA2RGI, N2RQ, KA2TMU.

**Multi-operator station with WB2IBO, W2NIP.

***Multi-operator station

Independent Nets

Net Name	Sess	Tic	Check-Ins
Amateur Radio Telegraph Society	27	150	320
Central Gulf Coast Hurricane Net	32	188	4587
Clearing House Net	30	320	358
Golden Bear Amateur Radio Net	30	171	1420
Great Lakes Emergency & Traffic Net	30	61	1118
IMRA	26	749	1371
Mission Trail Net	30	87	817
Northern California Net	90	402	1330
NYSPTEN	30	75	468
Southwest Traffic Net	30	321	1547
West Coast Slow Speed Net	30	112	479
75 Meter Interstate SB Net	30	446	1227
7290 Traffic Net	52	436	3818

VUCC—A Worldwide Award

Since its announcement in January 1983 *QST*, the VHF/UHF Century Club, or VUCC, has become one of the League's most popular operating awards. It is issued upon presenting QSL proof of working a prescribed number of Maidenhead grid squares on the bands above 50 MHz. For 6 and 2 meters, the number of grids required is 100, hence the "century" in the name. Sound reminiscent of the famous and sought-after HF-band Century Club? I can assure you that the similarity was not accidental. For the higher bands, the required number of grids is reduced commensurate with the degree of difficulty presented by the particular band. Unlike many specific awards such as WAC and WAS, VUCC is not a dead-end street. It does not stop when the basic award is attained. Like DXCC, endorsements can be earned, keeping the challenge alive. For each of the bands, attaining the basic VUCC represents a significant-but-not-insurmountable operating challenge. This is borne out by the annual listing which appears on page 85 of this issue. From this list, it is apparent that VUCCs have been issued for every band from 50 MHz through 24 GHz—with nearly one thousand awards issued so far. I don't believe that it will be long before 47 and 300 GHz (laser) join the VUCC list. It can also be observed that many listings have totals exceeding the basic requirement, representing endorsements. It is clear that VUCC can be obtained on any of our VHF or UHF bands. And, with the burgeoning microwave activity we are witnessing in many parts of the US, it is certain that we will see more VUCCs issued for these bands soon.

A closer examination of the list will reveal another fact that may have escaped many. The VUCC is not an award intended only for US participants. Obviously, some have realized that fact and worked to achieve this significant VHF operating challenge. Of these, 42 have been earned by operators outside of the US and Canada. Canadians account for a total of 16 VUCCs. To date, however, all but one of the DX certificates earned has been via moonbounce, and so far all but two of the non-US and Canadian stations gaining VUCC are Europeans. Two Japanese have recently joined the ranks of VUCC holders. One is JA4BLC, who earned his VUCC on 70 cm with help from EME, while the other is JO1HQQ, who is the first outside of North America to gain VUCC on 6 meters. In doing so, he submitted cards showing proof of working stations in 33 different Maidenhead fields including some familiar

to us like CM, CN and DM and far-flung ones such as AH, AJ, AK, BH, BK, BL, BP, OF, OH, OI, OJ, OK, OL, QF, PH, and PK. What other foreign VHFers seem to have missed is that there is nothing in the VUCC rules, which appear on the application form, that limits participation to US hams. There is also nothing that says that the grid squares worked must lie in any particular country. Therefore, there is no reason why a JA or VK, if he or she can work the necessary number of grids, even if they lie entirely within his or her own country, cannot qualify for a VUCC award. The so-called Maidenhead Grid Locator System, on which VUCC is based, is worldwide in its coverage—and VUCC has always been intended to be so as well. Thus, stations anywhere in the world can participate in the grid chase on any of the bands above 50 MHz. The coming F2 propagation on 6 meters should provide a particularly fine opportunity for producing a lot more endorsements for current VUCC holders as well as adding many new ones, including foreign operators, to the ranks. The more the merrier in both categories. Whether accomplished via moonbounce, sporadic E, meteor scatter, F2 or tropo, chasing grids for a VUCC award is a lot of fun and it has significantly increased the activity level on the bands above 50 MHz here in this part of the world. It can do so in other areas as well. I believe that VHFers throughout the world are missing out on a lot by not going after VUCC.

One provision of the VUCC award procedure may have been responsible for holding down foreign participation. I can assure you that it was not intended to. That provision is that the VUCC applications

and accompanying QSLs are not to be sent to ARRL HQ but, instead, are submitted to VHF Awards Managers at the local level. These people then check the cards and, if all is in order, certify to HQ that the individual has qualified for VUCC on a particular band or bands, or has reached a specified number of additional grids for an endorsement sticker. Upon receipt of this certification, HQ then issues the applicant a numbered VUCC certificate or endorsement sticker. This procedure, which has worked well for US and Canadian stations, has not been particularly convenient for overseas operators. Those who have qualified so far have sent their applications and cards, along with return postage, to one of the VHF Awards Managers in the US, Canada or to one of the few European Managers. However, efforts are underway to come up with a better method. It involves having the various IARU societies in each country, or their designated Awards Manager appointees, check the cards. So, those DX stations interested in applying for VUCC should first contact their national society about checking cards and determine if they have VUCC applications available. If they are not properly set up to participate in the VUCC award program, first write ARRL Headquarters for an application and then forward it along with the cards to me. I will see to it that the cards are checked and the proper information provided to ARRL Headquarters. Be sure to include sufficient US postage or US currency to cover return of the cards. It would be best to hold off a month or two before sending VUCC applications and QSLs to me, as I will be moving soon and will have a new address. More on this next month.

ON THE BANDS

6 Meters—Tales of F2 DX to come reminds one of the old joke about how good it's going to be! While most of us wait in anticipation, some other parts of the world are already experiencing daily openings. Notable are the Pacific Basin and the Europe to southern Africa path. It's frustrating to listen to 28.885 and hear the rest of the world describing what they have been working. Occasionally, though, a fleeting shred of propagation breaks through to our part of the world from one of these hot areas. Reports of such incursions are just frequent enough to keep the rest of us on the edges of our chairs. One instance involves the weak reception of K1JRW at 1815Z September 20th by ZS3AT and ZS3DM. Another, also involving the Atlantic, was reported by KA0NNO. Lisa said that beginning about 1630Z October 5, she began hearing video buzz in the band.

Then, after about a half hour, she started to receive the GB3SIX beacon, very weakly. Nevertheless, it was strong enough and lasted long enough, about 30 minutes, for her to make a recording. A small chunk of the West Coast has experienced such tantalizing snatches of what is supposed to be about to break for most of us. The first of these was reported to this conductor by N6CW of San Diego. Terry says that about 0217Z October 1, he and K6STI were able to work VK4RO with signals running about 339. VK4RO was in again on the 6th, from 0200 to 0230, working N6CW, K6STI, N6XQ and KI6MS. This time signals ran as high as S8 and VK4RO was able to hear the WD7Z beacon just across the California/Arizona border.

A sample of what has been going on in southern Africa is provided by ZS3E via K8EFS. Since getting back on the band, in



Well known 6-meter DXer Gus, HC2FG, Guayaquil, Ecuador. Look for his beacon on 50.100.

mid-March, Kosi had many openings to 9H1, CT, SV and 5B4. These stopped abruptly April 30th and he did not hear anything until September 9th. From then on, it has been almost daily propagation to the Mediterranean and southern Europe. As a sample, ZS3E's contacts for September 22nd included GJØICD at 1659Z, F1DQK at 1713, GJØJSY at 1715, SZ2DH at 2002 (with S9-plus-20dB signals) and 9H1BT at 2024. Enough to make one's mouth water!

On the other side of the globe, JA1VOK reports openings from Japan to the rest of the Pacific. Hatsuo says that they had their first JA-to-ZL opening this fall on September 13 when JE1BMJ worked ZLs 1TWR, 2KT, 2AGI, 2AQR, 2BGJ and 2TPY between 0440 and 0630Z. Hatsuo says that he worked 3D2TS on September 15 with S9-plus signals. He also notes that 5B4AZ is back on the band after receiving a rig that JA1VOK donated. Remember that Cyprus counts as Asia.

Despite the fact that we think of it in terms of a summer propagation mode with a lesser peak in December, sporadic E put in a few appearances during September. N4LBJ Bowling Green, SC reports on one such opening on the 20th. Drayton says that signals were particularly good, with KVØO EN21, NØLL EMØ9, WDØG EM27, W5JME and N5NDV EM15, WØDRI DM79, WAØJYJ DM68, WØPVL DM97 being worked between 0013 and 0300Z. He says that it was particularly gratifying to work N5NDV who is a young Oklahoma City lad who had just received his upgrade. It was his first E_s contact on 6 meters.

Just as this column was in its final preparation, the rest of the country got a taste of the kind of DX that the far southern states have been experiencing for some months. About 1930 on October 10, the HC8SIX beacon began to be heard in the eastern US followed by the HC2FG beacon and HC2FG himself plus HC5K. These two stations were worked by this conductor and many others from the eastern US and Canada to the south-western states. Coming on the heels of an aurora, the opening followed a classic pattern of north-south path enhancement. In any case, it was the first F2 which this conductor has heard since the past cycle and it was most

welcome. Just a few hours before that, around 1630Z W5IYX and W5FF worked KP4EOR for one of the first east-west F2 openings so far reported.

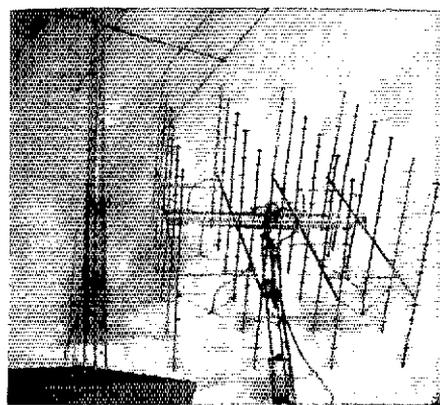
VK6RO writes that he has obtained an experimental license to transmit on two spot frequencies, 35.810 and 41.750 MHz, in order to carry out propagation studies. He is now looking for suitable equipment. Can anyone help? If so, write Graham Rogers, 22 Grace St, Ferndale, WA 6155, Australia.

2 Meters—As might be expected this time of year, news for this band was dominated by tropo. There were also a few auroras to keep things lively. As an example, the spokesman for the WØUC/9 contest station characterizes conditions in the upper Midwest during the September VHF QSO Party as "outstanding, not likely to be repeated for a very long time." Three separate aurora openings, one with simultaneous tropo, kept all of the bands hopping. The first aurora began about 2320Z Saturday September 10, with stations worked as far east as western New York and Pennsylvania from their EN44 location in Wisconsin. The following morning, about 1100Z, the buzz appeared again, along with excellent tropo. Worked on the latter mode were the likes of WBØDRL Kansas and WD8ISK Ohio on all of the bands up through 23 cm. The tropo also netted many contacts from West Virginia to Texas on 2 meters, 1¼ meters and 70 cm, with 1¼ meters particularly active. The third aurora, beginning about 2100Z, was the best of all, producing about 50 contacts on 2 meters.

N8HNS EN73 says that the opening that occurred the evening of September 21 produced some very good signals for him and brought new grids in the form of KA4GCI EM84, KB4WM EM63, KSTF EM73. When he ran out of new stations to work, a switch to an 146.235/835 repeater in West Virginia brought a fine QSO with KB4KTH, who was running 300 mW to an HT. N4LBJ, EM95, apparently caught the same opening but does not report signals as strong. Nevertheless, Drayton worked W9JGV EN61, AA9D, WB9YDR and KF9D EN52, K9MRI EN70, N9BW EN71, KA8IFC EN80 and WA9KRT EN61. September 28th was a big day for WB4SLM EM82; he made contact on 23-cm with K2SMN FN20. Nearby station WW4T, EM83, also made the grade with K2SMN on 2 meters, although he was using just 6 W. He then attempted to repeat the contact from his 100-W mobile with a single Yagi. That too, was successful.

According to the *2 Meter EME Bulletin*, W2RS has provided another example of how well W5UN's array of 48 M² long Yagis works. Ray has worked him again with his single 32-19 Yagi, this time running just 50 W. The fact that W2RS's station works well also is attested to by the fact that he has now had 22 QSOs with 8 different EME stations using his single Yagi and a solid state brick. Ray's latest contact is with DL8DAT. Incidentally, the *2 Meter EME Bulletin* is now published by R. E. Turner, 14826 Daisy Ln, Tampa, FL 33613. Annual rates are \$18 North America and \$25 overseas for air mail delivery.

The Higher Bands—The West Coasters have again been up to one of their favorite pursuits—extending microwave records. This time the site was a peninsula jutting out into



The 70-cm array at VK3UM is made up of 24 16-element 12.5 foot Yagis spaced 4 feet 8 inches horizontally and 4 feet vertically. Claimed gain is 29.2 dB, with sun noise measured at 16.5 dB. The antenna mounted preamp measures 0.26 dB NF. Power is supplied by a K2RIW-style PA with 1 kW at the antenna feedpoint.

the Pacific from Baja California, about 400 miles south of Tijuana, grid-locator DL27vl. N6XQ/XE2GFH and WA5LIG/XE2GBO made the arduous trip south of the border and set up their wideband Gunnplexer equipment along with gear for 6 meters through 23 cm. Power output on 10.280 GHz was about 50 mW to a 4-foot dish which produces an estimated gain of 39 dB. For the initial attempt, N6CA set up on Palos Verdes, a few miles southwest of Los Angeles at Grid-locator DMØ3ts. The unit at that end ran 10 mW to a similar dish. Success over the 498-mile path came almost immediately and soon AA6Q, WA6CGR and WA6MEM arrived on Palos Verdes with their 10-GHz gear. They too were successful in completing contacts with XE2GFH. Thereupon, N6CA took his equipment to the hills overlooking Beverly Hills and made another contact at 522 miles. An attempt to further extend the record to NN6W, set up near Santa Barbara in Grid-locator CM94xm, took a little more effort, but that contact was also made using MCW for the now current North American 10-GHz record of 595 miles. The equipment at that end ran 15 mW to a 30-inch dish.

While XE2GFH was busy racking up microwave records, XE2GBO was handing out the rare grid to all takers on 6 meters, 2 meters, 1¼ meters, 70 cm and 33 cm. In the process, a new West Coast 33-cm record of 599 miles was established with K6LMN in CM94. His 200 W was S9 plus 40 dB in Mexico.

More fascinating and worthwhile work from the West Coast.

ARCOS Founder Passes From the Scene

Most VHFers are familiar with the fine high power amplifiers and components for building such amplifiers that were marketed a few years ago by Fred Merry, W2GN. ARCOS equipment has contributed a great deal to the excitement and success of VHF and UHF operation. It is with sadness that I announce that Fred recently passed away at the age of 81 at his home in Florida.

185	K4RWP	11	WB3LJK	63	N4WWM	23 cm (1296 MHz)	21	WA5TKU	
186	KB4CRT	12	W5RCI	64	KC8OG	25	G3XDY	15	
187	K5IS	13	WB2NPE	65	KA8ABA	1	KD8GT		
188	AA2Z	14	K5UR	66	K8UC	55	KB8BSW		
189	W3WFM	15	WA4PCS	67	K8ZVW	2	VE3LNX		
190	YU3OV	16	N2WQ	68	N8EKT	3	W1RIL		
191	N6QW	17	KF8M	69	WB9UQE	4	K8KE		
192	WA4SBC	18	WB8ART	70	K3QM	5	W5ASH		
193	DELETED	19	W84F	71	W0FY	6	W1JR		
194	WB5ROR	20	K0TLM	72	W8MIL	7	W2VC		
195	W5AL	21	W2DRZ	73	G4NBS	8	W2SZ/1		
196	KD7Y	22	K2GK	74	K5WE	9	W5HN		
197	K7CW	23	K3HZO	75	WB9OJR	10	WB0DRL		
198	N5HHS	24	WB8KAY	76	WB8DGF	11	WA5TKU		
199	WA8EQU	25	VE3LNX	77	W5DFU	12	W0RAP		
200	K4HJE	26	W4GJO	78	KM8A	13	VE3BFM	3.4 GHz	
201	NI4Z	27	WB9MSV	79	K9VGE	14	WA8TXT	5	
202	KD9IV	28	K0FL	80	K3HZO	15	VE3LNX		
203	KI3W	29	KC8QR	81	N2AHN	16	WB2NPE		
204	G11JUS	30	K4LHB	82	W0JRP	17	KD5RO	10	
205	N2BJ	31	WB9OJR	83	W8YIO	18	K3YTL		
206	N6CW	32	KB8ZW	84	W2GU	19	G4PRJ	10	
207	K6CH	33	WB8PAT	85	WS4F	20	WB5AFY	10	
208	N4MM			86	W2DRZ	21	WA0TKJ		
209	DK2LM			87	W5ASH	22	KE5EP		
210	WC4G			88	WA0NOK	23	WA5DBY		
211	WB4TBF	1	W1JR	89	W5HUQ	24	K0NG		
212	K0QZ	2	KB8WW	90	W0VU	25	WB9SNR	10	
213	KD5RO	3	WB3ESS	91	K9DZS	26	WB4NXY		
214	KB8JI	4	WB8BK	120	KB2CS	27	N0BY		
215	GM4LS	5	W4GJO	130	WB9CAS	28	W7CNK		
216	N5CTE	6	W2VC	70	KD5RO	29	W5RCI		
217	W6LUM	7	WA9JFM	90	W5HN	30	W5DFU		
218	WA5PUP	8	KB5MR	100	W9HAD	31	W5NZS		
219	W7RV	9	K4NXY	90	KA9SPD	32	N180		
220	AA7A	10	K4CAW	80	N8BJN	33	K0SMI		
221	N8GWG	11	W2SZ/1	70	DF8ZW	34	G4NBS	5.7 GHz	
222	N4HB	12	KD8S	90	N0LL	35	K3HZO	5	
223	WB8HUO	13	WB0TEM	100	WA5TKU	36	N8DJB		
224	WB5NAA	14	VE3CRU	75	KI4CI	37	K2TXB	35	
225	N4VC	15	W9JUD	70	W3WFM	38	W2DRZ	30	
226	N8CGY	16	WB9MSV	70	W0YPT	39	W5ASH		
227	AA0TJ	17	WB5AFY	150	KA9LDS	40	WA5VJB		
228	WA8EQP	18	W5RCI	120	K0FL	41	KD8GT	20	
229	NU5F	19	K0TLM	90	G3XDY	42	W4GJO		
230	WA1VRH	20	SM3AKW	100	N0PFO	43	N5WS		
231	G6JIM	21	K5YV	120	N2WQ	44	KC8QR		
232	DL4OL	22	WB8ART	100	K9BZQ	45	K0RZ	10	
233	KX4R	23	K1FC	220	W7HAH	46	WD5AGO		
234	WD9HC	24	W3ZZ	60	N4VC	47	N0EKT	10 GHz	
235	W4FF	25	W0RAP	190	WA0TKJ	48	K0TLM	5	
236	WB4MJ	26	KF9M	80	WB2DNE	49	WA1OUB		
237	KA5DWL	27	K8TL	70	WABOXG	50	G3XDY		
238	W2HRW	28	WB0DRL	120	KL7WE	51	WA1JOF		
239	KB5RF	29	N180	100	WA4OFS	52	KD8SI		
240	W5ASH	30	KC4EG	118	G1EHJ	53	W3KWH	10	
241	YU7CV	31	KC8QR	70	WA4PCS	54	K5UR		
242	WBBCCL	32	VE3BFM	120	N5HVJ	55	AA2Z		
243	WD4FAB	33	W8LSC	60	WB5ROR	56	KF5PE		
244	K9MK	34	KR9G	60	WD4FAB	57	W2GU		
245	KA8JGH	35	AF9R	122	WB8PAT	58	W0OHU		
246	KE9I	36	WB8KAY	70	WD4AHZ	59	N2WK		
247	WA4MJD	37	NZ5W	125	WA4VCC	60	K0FQA		
248	W1AJR	38	NC9F	70	WB4OOJ	61	KD5RO	10	
249	KC4IS	39	WB2NPE	127	KD8GT	62	G6DER		
250	WB8CPW	40	W1XXZ	128	K0RZ				
251	WA2SLY	41	W5NZS	129	G4FRE				
252	WB0HYV	42	K2GK	130	KB3PD				
253	KD6JQ	43	K5UR	131	KC4IS	1	WB5LUA	2.3 GHz	
254	WB8PAT	44	W0RT	132	K2OS	2	WA5DBY	70	
255	W4ENB	45	G5JNS	133	G6DER	3	WA3XV		
256	KA0KUY	46	N9KC	134	KD9IV	4	WA3JUF		
257	W4T	47	G8DZH	70	KB9QC	5	WA5VJB		
258	KA2WKA	48	G8HKM	136	K0SMI	6	W5HN		
259	WB8YFE	49	KE5EP	70	AA2Z	7	W2SZ/1		
		50	K3YTL	138	JA4BLC	8	WB5AFY	15	
		51	WA5DBY	139	KB4CSE	9	KD5RO	15	
		52	KB3GM	140	KX4R	10	W7CNK		
		53	WB3LJK			11	W5UC		
		54	WB9SNR			12	W8YIO	20	
		55	N5BHO			13	W5DFU		
		56	N8DJB	1	AA2Z	14	K7AUO		
		57	W0FRY	150	2	VE3LNX	15	WB2NPE	
		58	N4AVV	3	WB8BK	16	W4HHK		
		59	K0US	4	W1JR	17	N3CX		
		60	K0LJA	5	WB2NPE	18	WB8BK	24 GHz	
		61	AA4FS	60	VE3CRU	19	WB8TY8	5	
		62	VE3LNX	60	N3CX	20	K0RZ		
				7	KD5RO				
				8					

Strays



QST congratulates...

the following radio amateurs on 60 years as ARRL members:

- Hugh D. Avary, W6CD, Los Altos Hills, California
- Walter H. Kozacko, K4NS, of Cape Coral, Florida
- Raymond F. Kramer, W6ALF, of Fullerton, California

I would like to get in touch with...

- anyone who has a manual for a Johnson kW Matchbox. Ragnar Otterstad, OZ8RO, Vejdammen 5, DK-2840 Holte, Denmark.
- anyone using an Exidy Sorcerer computer. What is involved in getting one "on the air"? Dan Leonard, KA0ZLK, 700 W Ridgeway (512), Waterloo, IA 50701.
- anyone who leads Boy Scouts or Explorers in Amateur Radio. Jim Moore, WD5BNY, 4707 Rhea Rd, Wichita Falls, TX 76308.

- anyone who knows of a packet program for the Commodore 64 that will work with an AEA CP-100 interface. Jeff Baker, KB4YKQ, 209 Maywood St, Blacksburg, VA 24060.
- any hams experienced with practical electric street vehicles for hobby or commuting. Tom Blair, WA2RUG, 1120 N Maple Ave, Maple Shade, NJ 08052.
- any hams who are technical writers, editors or illustrators by profession. Bill Thomas, WA0BND, 9074 Hoyt St, Westminster, CO 80020.

New World DX Record on 47 GHz

During the ARRL UHF Contest (August 6-7, 1988), Tom Hill, WA3RMX/7, worked K7AUO (Tektronix Employees' ARC) on 47 GHz, setting a new distance record of 65.37 miles (105.44 km). This record nearly doubles the old record of 34.1 miles (55 km), set by Erich Zimmerman, HB9MIN/P, and Arnold Sporbeck, HB9AMG/P, on January 13, 1985. The equipment used in setting the new record was a pair of linear transverters built from new, surplus and home-brew parts. The transverters were designed and constructed by Tom Hill.

The record path is located between Crater Lake (grid locator CN28VW) and Mt Ashland, Oregon (CN82PB). WA3RMX/7, at Crater Lake, and K7AUO (operated by Roger McCoy, W7ADV, John White, K7RUN, and Rick Bremmeyer, WA7GFP), on Mt Ashland, were part of a special microwave DXpedition organized for the ARRL UHF contest. Both stations were positioned at approximately 7300 feet above sea level. The weather conditions at Crater Lake were clear, with temperatures near 70°F. Conditions on Mt Ashland were cloudy with temperatures near 60°F. The contact was made at 2:45 PM PDT (2145 UTC), just after the cloud cover lifted above the peak of Mt Ashland, making the path visually clear. K7RUN, operating K7AUO, started the QSO on CW, switching to SSB W7ADV operating once the signals rose above the noise to approximately S3. The frequency was 47.040025 GHz.



Fig 1—Tom Hill, WA3RMX/7, making the record-breaking 47-GHz two-way contact from a roadside position on Rim Drive, Crater Lake, Oregon. Shown among Tom's collection of UHF goodies is the 28.5-inch dish and 3.5-mW transmitter used to make the contact.

WA3RMX/7, Fig 1, used a 28.5-inch dish and a transmitter power of 3.5 mW while K7AUO, Fig 2, used an 18-inch dish with a 4.3-mW transmitter. Tom informs me that a bigger dish and other system improvements are now in the works. I will, I'm sure, be reporting more record-breaking contacts made by WA3RMX/7 and company in the near future. Congratulations to all those involved in this record-breaking QSO!

New North American 10-GHz DX Records

Jack Henry, N6XQ/XE2GFH, assisted by Dennis Grove, WA5LIG/XE2GBO, continues to be very busy on 10 GHz. On September 10, 1988, they set three consecutive North American 10-GHz DX records, their final effort beating the old 414-mile record by 181 miles.

Using an 80-mW wideband-FM Gunnplexer system and a 4-foot dish, Jack and Dave made the contacts from Guerrero Negro, Baja California (DL27VL). The first QSO was at 8:45 AM PDT with Chip Angle, N6CA (10 mW and a 4-foot dish), in Palos Verdes, California (DM03TS) for a distance of 497.9 miles. N6CA then traveled to Beverly Hills and made another contact with N6XQ at 3:00 PM PDT for a distance of 521.7 miles. The final record-breaking contact came at 5:04 PM PDT when Gary Field, NN6W (using 15 mW and a 30-inch dish), near Santa Ynez Peak (CM94XM), contacted N6XQ at a distance of 595.3 miles.

Jack, N6XQ, reported that the path was outstanding for most of the day. Signals were 30 to 40 dB out of the noise with some QSB. On the first contact, Jack and Chip, N6CA, were able to chat for over a half-hour without any difficulty. Additional 10-GHz Palos Verdes contacts were made with John Klewer, AA6Q, Dave Glawson, WA6CGR, and Gary Lopes, WA6MEM.

Lightwave News

A new lightwave distance record is now in the books. The contact was between Terry Wilkinson, WA7LYI (on Mt Lemmon, Arizona, near Tucson), and Dave Chase, KY7B (on South Mountain, Arizona, near Phoenix) at a distance of 95 miles. Both stations used 20-mW helium-cadmium lasers, 19- × 22-inch Fresnel lenses, and MCW as the communications mode. I will report on the specifics of this contact as soon as more information is available.

In an earlier column, I mentioned what I thought to be the previous lightwave DX record: 15 miles, made in 1979. Bob Legg, W6QYY, kindly reminded me that I neglected to mention a much earlier, and



Fig 2—Shown in this picture is the Mt Ashland, Oregon, side of the 47-GHz contact. Roger McCoy, W7ADV (left), listens intently for the WA3RMX/7 signal while John White, K7RUN, aims the 18-inch dish. Roger and John are associated with the Tektronix Employees' Amateur Radio Club. Not pictured, but also involved in setting the new record, is Rick Bremmeyer, WA7GFP.

considerably longer, *one-way* contact, made in 1963!¹ Members of the Electro-Optical Systems, Inc Radio Club transmitted a voice-modulated lightwave signal 118 miles across the California desert from Grassy Hollow in the San Gabriel mountains to a point 12 miles south of Ballarat in the Panamint Mountains. A 125-mW helium-neon laser was used as the transmitter (operated by Jack Pattison, W6POP) and a 12-inch telescope with a photomultiplier tube was used as part of the receiving system (operated by W6QYY).

Lightwave communication seems to be gaining enthusiasts. Bruce Hildesheim, VE3LPP, has written me describing his lightwave activities. Bruce has used infrared LEDs and phototransistors to cover 1-km paths using 2-inch diameter lenses. Bruce now has a 2-mW helium-neon laser and is patiently looking for another lightwave enthusiast to work (a problem reminiscent of the early microwave days). Bruce mentioned that a 1-mW helium-neon laser at 35 km is very visible; he has photos to prove it!

Another lightwave experimenter, Steve

¹J. Pattison, "Operation Red Line," *QST*, Jul 1963, p 66.

Noll, WA6EJO, who was at one end of the previous 15-mile lightwave two-way-contact DX record, has recently been working with a Hamamatsu R647 photo-multiplier tube. Supplying high voltage to the tube was a problem, but Steve reports that a 12 V dc to 1 kV dc conversion kit is now available. This kit, the model MFL-PSK power supply, can be ordered from Allegro Electronic Systems, 3 Mine Rd, Cornwall Bridge, CT 06754, tel 203-672-0123. Steve adds that a photoDarlington transistor, such as the Motorola MRD360, makes a good, inexpensive (about \$2 each) detector for a lightwave receiver.

Laser Source

Surplus lasers suitable for lightwave communications (as discussed in the September 1988 New Frontier), are available from MWK Industries. MWK's August 1988 price list shows a 1-mW helium-neon unit for approximately \$20 and an 8- to 9-mW helium-neon unit for \$150. Power supplies for these lasers are available for approximately \$45 to \$85. MWK's August price list also shows 35-mW (!) argon lasers and power supplies for considerably higher prices. For more information, contact MWK Industries, 9852 W Katella Ave, Suite 340, Anaheim, CA 92804, tel 714-956-8497. 

Exam Info

ARRL/VEC
225 Main St, Newington, CT 06111

POTPOURRI

Form 610s: Many people get their 610s from ARRL HQ. A lesser used source of blank applications is the FCC itself. Write the FCC at PO Box 1020, Gettysburg, PA 17326. If you should need *more than 200* applications in the package (please request only what you *really* believe you'll need), send your written request to FCC, Services and Supply Branch, Room B-10, 1919 "M" St NW, Washington, DC 20554. Allow a few weeks for delivery. (Peelable, self-adhesive return address labels would help to expedite your order.) Incidentally, instructions for completing the application are supplied by both the ARRL/VEC and the FCC.

Until the FCC advises otherwise, all versions of the Form 610 dated June 1984, and after, may be used. (The ARRL/VEC supplies all of its VE Teams with the latest version: September 1987, at the time this was written.) Certain modifications must be made to 1984, '85 and '86 versions to comply with current test administration standards; refer to "Novice Enhancement: New Test Procedures Start Now!", April 1987 *QST*, pp 21-23, for the needed changes.

Advanced class VEs: If you're an Advanced class ham (or about to be!), contact the ARRL/VEC for information on how to become an accredited Volunteer Examiner with the most active VEC in the country. A lot of folks have gotten the (wrong) idea that an Advanced class licensee is ineligible to be a VEC-accredited examiner. This is perhaps because some VECs do not consider Advanced class licensees for accreditation. Even more people believe that an Advanced ham's VE services are limited to the point of being unusable. Wrong again!

In the ARRL/VEC's program, we urge the Advanced class contingent to participate. FCC has authorized Advanced class VEs to administer Elements 1A, 2 and 3A—everything necessary for the Technician class license. And if that doesn't convince you, consider the statistics: During the first nine months of this year, the ARRL/VEC processed more than 10,000 upgrade 610s; 5500-plus (52%) were for Technician class alone—more than the number of 610s for General, Advanced and Extra Class combined!

610s on Hold: The most common reason for the VEC to hold an applicant's Form 610 is because an eager candidate upgrades before the FCC has a chance to issue an earlier license. For example, the ARRL/VEC is currently waiting for literally hundreds of such upgraded license applicants to submit copies of their licenses. These applicants will not get their permanent licenses until the FCC's requirements are satisfied.

If you have a 610 on hold by any VEC because they need a copy of your new license, do yourself a big favor. Send that needed copy to the VEC as soon as you get the pending license. Your one-year temporary operating credit is not extendable!

Special Tests: Candidates who require special assistance, equipment or tests because of physical disability must attach to the application a signed and dated physician's statement certifying the nature of the disability [see Section 97.26(g)], plus a *brief* letter explaining what special accommodations are needed to conduct the examination. If you need additional assistance, be sure to contact the VE Team that will administer your exam well in advance of the session, so that they may better plan the details. Some VE Teams have additional equipment on hand that they offer for the applicant's use, but most teams will need a little time to prepare. (A thorough discussion of giving license exams to persons with disabilities appears in Washington Mailbox, elsewhere in this issue.)

The ARRL/VEC can provide its VE Teams with tape-recorded written tests and/or code test tapes that have any audio pitch needed or character spacing (using the Farnsworth method) that may be helpful. If a special pitch is needed, please tell us a frequency or range of frequencies that should be used. (Telling us you need a "low tone," for example, is some help, but your applicant may not be able to hear *all* low tones.) Further questions about testing persons with disabilities should be addressed to the ARRL's Program for the Disabled at HQ.—*Jim Clary, WB9IHH, Manager, ARRL/VEC* 

Strays



I would like to get in touch with...

anyone who has a manual for a Hickok Model 800 tube tester and/or schematics for the SA-4, SA-6 and CA-5 adapters for this tube tester. William N. Richmond, WD4CPQ, 521 Rawlings St, Louisville, KY 40217.

What is Amateur Radio?

Amateur Radio, also known as "ham radio," is communicating. Hams, who must be licensed by their governments, operate two-way equipment from their homes and cars. They communicate with other hams across town or across the world on special sets of radio frequencies, or bands, that are set aside for Amateur Radio use.

Who are hams?

Just about anyone can be a ham—there are no age limits. Many people with disabilities find a door to the world in Amateur Radio. Some famous people are hams, but most are just people from all walks of life who like making new friends around the world.

How can I become a ham?

Getting a ham radio license is easier than you may think. In the US, the Novice (beginner's) license requires only passing a 30-question written exam on basic electronic theory and FCC rules and regulations, along with copying and sending Morse code at five words per minute.



The American Radio Relay League (ARRL) offers a wide variety of information for persons interested in radio communication. We can also provide you with a list of clubs and instructors in your area. Many local Amateur Radio clubs offer licensing courses several times a year.

For a prospective ham packet, contact the ARRL, Dept Q, 225 Main St, Newington, CT 06111, tel 203-666-1541.

How the Grinch Stole 220

By now, you all are aware that the Grinch, in the person of the FCC, snatched our 220-222 MHz band on August 4 and handed it over to the land mobile service. The Report and Order announcing this larceny was published in the *Federal Register* on September 19 and anyone wishing to file a petition for reconsideration should have had it delivered to the FCC by October 19. As this is being written, it is difficult to predict what the situation will be by the time you read this because there are Amateur Radio forces in motion, both inside and outside of ARRL Headquarters, that are attempting to change the FCC's plans for our band.

This is a call for your support for the effort to get back the 220-222 MHz Amateur Radio band. Without it, the lower 2 MHz of the band will surely be lost and, as a result, the upper 3 MHz will probably

become overcrowded. How such an adjustment would be accomplished remains to be seen. Some have suggested reducing the number of repeater channels in order to provide space for the modes of Amateur Radio operation that occupied the lost portion of the band. Others have suggested reducing the space between repeater channels (to 15 kHz, as on 2 meters) to accommodate the same number of repeater channels in a smaller bandwidth. Whatever adjustments might be made, they would have a negative effect on all 220-MHz Amateur Radio operations. Everyone loses, so let us hope that it never gets to that point.

In the August installment of this column, I discussed the booming of the 220-MHz FM band and I suggested that one reason for the boom may be that hams no longer

felt that they were investing in a lost cause by purchasing 220-MHz equipment even though the desire of outside forces to take over our 220-MHz band had not abated. Some of us were confident, based on our past successes, that Amateur Radio will always be able to fight back the forces that are trying to conquer us... that our cause is just and that the FCC will always see it that way. I added that we should never get too complacent and let "Hiram" fight back those forces alone; we all have to pitch in when such a battle looms on the horizon.

This time our cause was again just and there were plenty of troops to support the effort including support from some influential outside allies. However, we lost the battle—but not the war—and your continued support is critical in the effort to make the 220-MHz Amateur Radio band safe for Amateur Radio again.

THE FINE ART OF TRANSMITTER-HUNTING

The following letter concerning the fine art of radio direction-finding, also known as transmitter-hunting, comes from Joe Moell, K0OV, ARRL Technical Advisor for radio direction-finding (RDF).

I have been intending to write to you for some time, ever since I ran across the October 1986 FM/RPT column, in which you discussed your friend's idea for an automated packet-linked RDF system to help locate jammers and other QRM sources of repeaters and other VHF communications. I would like to know if your friend ever got the system up and running? [No, he did not.—Ed.]

I doubt it, because I have kicked around such an idea and corresponded about it with two West Coast hams for over a year. Nothing has happened yet due to site problems, technical difficulties and just plain procrastination. Yet the jamming problems in urban areas continue on many repeaters and the users demand solutions. What to do?

My answer is to get lots of hams interested in mobile fox-hunting (here we call it T-hunting, short for transmitter-hunting). In the 10 years that I have been involved with competitive T-hunting, a rather large base of competent T-hunters has evolved. As a result, the repeaters with regular T-hunters among their users tend to have the fewest jamming problems.

Sure, it would be great to have an automated RDF system in place, but the most it could do is give the mobile T-hunters a good start because a hilltop triangulation system cannot pinpoint the perpetrator. There will always be a need for mobile T-hunters to go out and find the exact house or car containing the jammer and to gather the physical evidence when prosecution is necessary.

So, I would like to acknowledge the mobile T-hunters that are out there working to keep the bands clean. Most of the Amateur Auxiliary members do their work in secrecy with no fanfare at all. They want to preserve their anonymity and avoid jeopardizing the prosecution of severe cases.

Of course, more T-hunters are needed and I encourage anyone who is interested to join the hunt. Besides the serious hunts for enforcement purposes, there are competitive hunts (about a dozen per month in my area) that are just for fun. You would be amazed at what T-hiders have done to foil the T-hunters!

(For more information on T-hunting, read Joe's book, *Transmitter Hunting—Radio Direction Finding Simplified*, which he coauthored with Thomas Curlee, WB6UZZ. The book is TAB Books #2701 and is available from your Amateur Radio bookstore or directly from ARRL HQ. Use the order form elsewhere in this issue.)

MOBILE SPEAKER SOURCE

When installing a mobile transceiver in your car, do not overlook the car's AM radio speaker. Often, when a car stereo is installed, the AM radio speaker is simply disconnected and is available as an excellent external speaker for mobile transceivers.—Leonard J. Popyack, Jr, WF2V

REPEATER LOG

According to August 1988 reports received, repeaters were involved in the following public-service events: 759 vehicular emergencies, 37 medical emergencies, 32 fire emergencies, 20 weather emergencies, 12 drills/alerts, 17 public-safety events, 7 criminal activities, 7 weather emergencies, 4 power failures, and

2 public safety events.

The following repeaters were involved (followed by the number of events): K1UN/K1ISR/WA1UCO 6, W2VL 43, WA2ZWP 3, W3LIF 8, WA3BXW 17, W5FC 68, WA6BJY 9, W6FNO 434, WD6DIH/KA6EEK 137, N6ME 125, WA7RPS 3, K8DDG 5. Correction to the September QST Repeater Log: W5FB should have read W5FC with 55 total events. □

Strays

QST congratulates...

□ The Rev Gordon Stenning, WA1HXK, of Portsmouth, Rhode Island, on being selected for a pastoral position with the national Episcopal Church in New York City.

I would like to get in touch with...

□ anyone who has a B&K model 1077B Television Analyst made by Dynascan. Marvin Moss, W4UXJ, Box 28601, Atlanta, GA 30358.

□ anyone using a Hewlett-Packard HP-86 computer for Amateur Radio use. John L. Sorel, N5L-LM, 2506 Knox St, Gulfport, MS 39503.

□ anyone who has a packet BBS that will run on a Tandy 2000 computer. Bert Gadlewski, KA4SBE, HHC 593rd ASG, Box 66, Ft Lewis, WA 98433-5410.

Using the New OSCAR

Lesser-Known Operating Modes

The launch and commencement of operations of AMSAT OSCAR 13 last summer have stimulated a new wave of satellite users to join the veteran enthusiasts. In recent columns and articles, I've described the overall picture of the most familiar satellite landscape. For the benefit of newcomers and veterans, now is a good time to review some of the lesser-known operating modes and natural phenomena encountered when using the satellites.

There are several satellites currently in operation. The ways these satellites are used varies considerably. Some, like AO-13, AO-10, FO-12 and RS-10/11, are for general use by radio amateurs. Others, like UO-9 and UO-11, lean more towards experimental and scientific use by specially trained and equipped amateurs. Both AO-13 and FO-12 are equipped with digital as well as linear transponders. UO-11 has a Digital Communications Experiment by which messages can be stored and forwarded to addressees around the world.

The orbits of these satellites vary substantially within the earth's ionosphere and magnetosphere. Because of the wide spread of communications frequencies employed, and the orbits of these satellites, signals to and from them are subject to fascinating, occasionally bizarre, effects of natural phenomena.

First, let's look at the modes used. Having one-on-one QSOs through an OSCAR is the most common use of the satellite. SSB operation is most popular, followed by CW, packet radio, RTTY and SSTV. OSCAR QSOs often involve more than two stations; group discussions and round tables are popular. Roundtables on OSCARs differ from those of terrestrial QSOs in that everyone can hear everyone else at just about the same level. It's quite like terrestrial repeater operation in that regard, except it is often accomplished on an intercontinental scale.

There are many other interesting and varied ways users have found to enjoy OSCAR operation. Mobile OSCAR operation has a long and fascinating history. Some of the earliest excellent mobile QSOs were accomplished by the late Fred Merry, W2GN, using AO-7 Mode B in the late '70s. Mobile Mode A operation continues to be popular. Frank Kennedy, K2TTI, recently mounted a cross-country mobile expedition using RS-10/11 Mode A to keep in touch with friends.

Mobile use of AO-13 is quite difficult because the satellite's higher altitude means

more path loss. That generally requires more ERP (effective radiated power) on the uplink and more antenna gain on the downlink. Nevertheless, there have been reports of successful mobile operations via AO-13.

Another less frequent, but highly effective, mode of OSCAR operation involves using a gateway. An OSCAR gateway is a station that connects a terrestrial repeater with an OSCAR station. Most often, the interface is quite elementary—amounting to simply a cross-patch in the audio lines of the repeater transceiver and the OSCAR station. Signal conditioning (amplitude, frequency response, impedance matching) is easily accomplished, and results are generally very satisfactory. Manual control of the OSCAR station as well as the repeater transceiver, though inelegant, is simple and error free.

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.

More exotic, fully automatic gateways with automatic antenna pointing exist. Even linear translators are operated as gateways. Here, a whole 40-kHz slice of spectrum at a convenient frequency is translated to an OSCAR uplink frequency. Signals appearing in the 40-kHz passband all appear in the satellite passband as if they were individually uplinked instead of being uplinked en masse.

No major equipment investment is necessary to try OSCAR gateway operation. Gateways allow amateurs equipped only with a hand-held transceiver to try out satellite communications. It's like tasting the wine before buying the bottle. But to use the gateway, you often have to queue up and wait. And you don't have the frequency agility to go romping around the OSCAR passband to find an interesting DX catch. So, gateway operation may be great for getting a taste of the action and it's fun for the occasional dabbler, but those seriously smitten by OSCAR use soon try every possible means to establish their own earth stations.¹

¹Notes appear on page 91.

One of the other lesser-known technical problems associated with OSCAR use is a product of equipment capability and mode of use. Mode J satellite operation means you uplink to the satellite on 2 meters and the satellite downlinks to you on 70 cm. Occasionally, the 2-meter uplink signal is sufficiently strong to swamp your 70-cm preamp. It was once thought that third harmonic interference was at fault here, but experience has shown it's fundamental overload that's the problem in most cases.

The solution to the fundamental-overload problem is straightforward: Reduce the level of 2-meter RF energy getting into the 70-cm preamp. This can be done by any combination of several techniques. First, and most obviously, you can reduce the 2-meter transmit-power level. Or, you can increase the spacing between the 2-meter and 70-cm antennas. You can replace a conductive boom supporting the antennas with a nonconductive one. You can rotate the antennas on their axes so they are not in the same plane, thus reducing coupling.

Other effective overload reduction measures include filtering. A very effective Mode J cavity filter, easily home-brewed, is described in the literature.² Interdigital filters for 70 cm are more expensive, but offer much less insertion loss. These filters can be purchased from Amateur Radio suppliers.³ Finally, a well-designed GaAsFET preamp in a well-shielded box is generally more resistant to 2-meter-induced overload than preamps employing MOSFETs or bipolar transistors.

Effects of Natural Phenomena

Let's look now at some natural phenomena that affect OSCAR operations. I'll restrict the discussion to simply naming each phenomenon and briefly describing its effects. I'll leave more detailed explanations to subsequent column installments.

Doppler shift is a phenomenon experienced in daily life as well as satellite operation, so its effects and cause are well known. When you stand at a roadside listening to passing vehicles, the pitch of the sound of an approaching vehicle first increases, then decreases as the vehicle passes you and moves into the distance. Radio waves from OSCARs also exhibit Doppler shift (often referred to merely as *Doppler*). Doppler shift on satellite signals depends on the relative velocity of the satellite and the operating frequencies involved. The amount of Doppler shift can vary from zero to several tens of kilohertz for fast-moving UHF or SHF satellites.

Table 1
Path Losses For AO-13 at Various Ranges and Frequencies

Frequency (MHz)	Path Loss at 2,500 km (dB)	Path Loss at 40,000 km (dB)	Remarks
145	144	168	Mode J up and Mode B down
435	153	177	Modes B and S up; Modes J and L down
1269	163	187	Mode L up
2400	168	192	Mode S down

Path loss is another phenomenon encountered by OSCAR users. The longer the path, the lower the signal amplitude at the receiver. What's different between satellite communications and HF ionospheric propagation is that the path losses experienced by satellites are usually quite predictable, and are fairly constant. What may be surprising is the degree to which path loss changes with satellite altitude. For instance, AO-13's altitude varies from 2,500 to 36,000 km. Its slant range can be anything from 2,500 km (when perigee occurs directly above you) to just over 40,000 km (when apogee occurs just at your horizon.) Thus, path loss can change as shown in Table 1.

Note that for a variation in distance of 40,000 to 2,500 (a ratio of 16 to 1), the difference in path loss for a given frequency is consistently 24 dB. (The exact value is 24.08 dB). A ratio of 24.08 dB (256:1) is equal to the square of the distance ratios (16:1, where 16 squared = 256). A signal-strength variation of 24 dB is an enormous amount in satellite work because we often are working with signal-to-noise ratios of 10 dB or less. To work AO-13 with its highly variable altitude, you need to cope with path losses that differ by many S units.

An often-voiced complaint concerning AO-13 is that when it gets close to perigee, the polarization of its antennas changes from, say, right-hand circular (RHC) to left-hand circular (LHC). Untrue. The polarization of the signal at the satellite remains constantly right-hand circular.⁴ What *does* change is your perspective of the satellite. Specifically, the closer the satellite is to perigee, the more the satellite antennas point away from you. Because true RHC polarization exists only fairly close in to the boresight of the satellite antennas, when the antennas are off-pointed you get further and further away from RHCP. Sometimes a better signal can be had by switching your receive antenna to LHCP. The reason is not that the source antenna has changed polarization, but that the polarization of the wave depends on where you are in the beam. If you're well off the center, the polarization may be distinctly non-RHCP. For example, when the satellite gets near perigee, is using its RHCP antennas and there's lots of signal amplitude to work with, try off-pointing *your* antenna. You may find an off-pointing angle that will compensate for the satellite's

off-pointing. If you do, you may find that spin modulation is reduced substantially.⁵

Antipodal propagation is a natural phenomenon seen on HF satellite links, particularly during periods of elevated solar activity. When a satellite is well above the F2 layer of the ionosphere and radiates into it, the ionosphere tends to absorb and refract RF energy, especially when sunspot numbers are high. Normally this occurs only up to about 10 meters.

Occasionally, energy gets trapped in ionospheric layers and travels half way around the earth through the ionosphere, exiting at the magnetic antipode of the point it entered the ionosphere. Observers of AO-8 and RS-1 and 2 during the solar maximum of 1978-1979 had a great deal of fun watching for antipodal propagation. With RS-10/11 now operating with 15- and 10-meter links, the upcoming solar maximum period should rejuvenate these observers.

Another relatively rare OSCAR phenomenon has to do with interference patterns established in radio waves when they arrive at the antenna from slightly different paths. The *interference rings*, or *fringes*, are familiar in optics, but are equally evident in OSCAR work.

In particular, when an OSCAR rises above a distant mountain or ridge on your horizon, some of the energy reaches your antenna directly, while other energy may be slightly diffracted by the phenomenon known as *knife-edge diffraction*. Or, energy can be easily reflected from the ground, especially when the angle of incidence is a very shallow, oblique angle.

In either case, energy taking slightly different paths to reach your antenna combines in one of two ways. When the direct energy and the diffracted energy reach your antenna with a constructive phase relation, the signal strength will be increased. When the phase relation is destructive, you may not receive any signal at all; the trough of one wave cancels the crest of another.

As the satellite rises farther above the horizon, the interference pattern varies constantly. If you carefully observe your S meter, you can detect the interference rings as they change in size and position. I suspect there is some polarization-selective diffraction going on, too; there is a similar selective refraction and reflection in optics. All in all, the ringing is a most fascinating phenomenon to observe, and it

does serve to remind us how easily we can get immersed in radio physics using just our OSCAR stations and some savvy.

There are more activities and natural phenomena that have been reported, too. Satellite-to-satellite cross links are extremely fascinating and not all that difficult to plan using the advanced satellite-tracking software now available. A communications package built by students in Alabama, and flown on the space shuttle, successfully linked through AO-10—a landmark achievement!

The message of this survey is that aside from the normal, everyday QSO via OSCAR, there are a sufficient number of interesting threads to pull on if one cares to investigate some fascinating operational and natural phenomena using OSCARs.

Next month, I'll focus on Doppler shift.

Notes

¹Use of OSCAR gateways for emergency communications is a very important subject to be covered in a subsequent column.

²*Satellite Experimenter's Handbook*, (Newington: ARRL, 1984, p 7-3).

³One supplier is Spectrum International, PO Box 1084, Concord MA 01742, tel 617-263-2145.

⁴Except for those occasions when the omnidirectional antennas are used; these produce linear polarization.

⁵What you may find is that the ellipticity of your antenna's pattern when off-pointed from the incoming elliptically polarized wave may actually improve reception. It's worth some experimentation. □

NCJ NATIONAL CONTEST JOURNAL

NCJ features articles by top contesters, letters, hints, statistics, scores and much more. Big gun or small, the NCJ provides you with a valuable source of information on the exciting world of competitive radio.

The November/December issue includes:

- Sleep—A Contest Prescription
- A Simple Preset Antenna Rotator Control
- Goodwill Games Update
- Contest Cuisine
- NCJ Profiles—DK3GI and K1TO

Other features are columns on propagation, clubs, VHF/UHF and West Coast contesting.

National Contest Journal is edited by Randy Thompson, K5ZD, PO Box 11439, Pittsburgh, PA 15238, and is published by the ARRL. Subscription rate for 6 issues (one year) is \$10 First Class mail, \$11 First Class to Canada or Mexico and \$12 elsewhere by air mail. NCJ subscription orders and changes of address should be addressed to the ARRL and be marked NCJ Circulation. Letters, articles, club newsletters and other editorial material should be submitted directly to the NCJ Editor.

New: 1988-89 ARRL Club President's Workbook

This new book is designed to help develop the leadership skills of one of the key leaders of the ARRL Field Organization—the club president—by providing club program ideas and a planning calendar leading to an active, interesting and productive club year. Every club president understands the need to plan and implement a year-long program that will not only maintain the interest of club members, but serve to attract new members as well. This

book will help him convert dreams to reality.

The first few chapters present overviews of the League's dynamic club program, the role of the Affiliated Club Coordinator and others in the Field Organization/club connection, sources of club program activity ideas and how to work with club members. These chapters are followed by the 1988-89 *Club President's Workbook*, a set of monthly calendars for the months August

through July. There are notes with suggestions for activities appropriate for each month and ample space for the president's own personal notes. The blocks for the days are large enough for highlighting action items.

Copies have been sent to all Section Managers, Affiliated Club Coordinators and ARRL-affiliated club presidents. Copies are available from HQ to others for \$5 plus \$2.50 shipping/handling charge.



A happy Technician class in San Carlos, CA, sponsored by the Redwood City-San Carlos ARES group. (Thanks to N6PGM)



The Bloomington (IN) Amateur Radio Club donated the ARRL Library package to the Monroe County Public Library. (l-r) Millard Qualls, K9DIY, President; Robert Marshall, KA8GIC, Secretary/Treasurer; and Cass Owens, Librarian. Any club interested in donating a set of League publications to their local library should contact the ARRL Publications Sales Department for information on discounted prices. (photo KA9IPQ)

Club Front: News and Views of the Nation's Finest In Action



"It's endless the good you can do" with ham radio, says Henny Picaud, KA7LYO, a member of the Rogue Valley (Medford, OR) ARC. Henny is 81 years young. The club helped Henny receive her Novice license in 1982. (photo Mark Pynes, Daily Tidings)



Club Project Night! Delmont (PA) Radio Club members recently built W1FB's "Traveler's 2-meter Ground Plane Antenna" (May 1987 QST) as a club effort. Standing (l-r) KT3H, W3NCW, K3MQR, N3DSS, WA3FAA and W3FB, seated KA3EBQ and WA3IFQ. Simple projects such as this help develop members' technical prowess.



The Bethel (CT) Educational Amateur Radio Society operated KZ200Z in celebration of the Bicentennial of the US Constitution. The BEARS made over 1000 contacts during Connecticut's week. Contacts were made using SSB, CW, RTTY and HF and VHF packet radio. (Thanks to KZ1Z)

WA8EBS Brings Amateur Radio to YLs at Cleveland Hamfest

Eila Russell's memorable journey through West Germany in 1976 became the inspiration and subject of a presentation for the Cleveland Hamfest. "My theme was the friendship we can enjoy worldwide through Amateur Radio," said WA8EBS. Eila can attest firsthand to that friendship. As a former president of YLRL, WA8EBS realized how important Amateur Radio could be to global understanding and friendship. In 1976, DL1RA and DL3LS visited the US, and Eila couldn't resist the opportunity to return with them to Germany. Hospitality and friendship awaited her. "This was my first chance to realize the true happiness that one can derive from radio amateur friendships."

The Cleveland Hamfest featured a women's activity program, set up in hourly divisions, with a variety of interests. "Many of the women were not radio amateurs, but they attended because they had been exposed to Amateur Radio or were connected with it in some way. Otherwise, they would not attend! I was asked to present the joys and opportunities of being an Amateur Radio operator to this group," recalls Eila. "I told them that often a new approach will provide a stimulating vision to some person who has never before considered the hobby as a possible field for their enjoyment. I was married 40 years to an Amateur Radio operator



WA8EBS at home with her rig, her Buckeye Belle doll and YLRL President's plaque. (photos courtesy of WA8EBS)

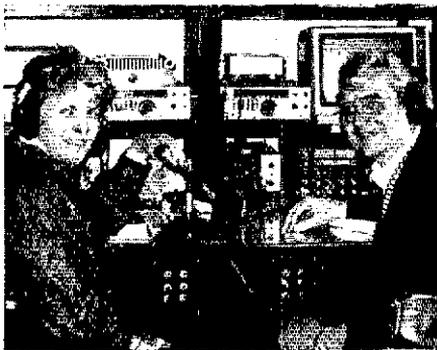
before I became licensed. I had considered it 'his interest,' and I developed my own! After I was licensed, I spent six years content with the privileges of the Technician class. However, people influence others without realizing that they have kindled a significant spark. In 1968, at the YLRL



Eila Russell gives a pep talk at Cleveland Hamfest to YLs with the hope of turning them on to Amateur Radio.

convention in Denver, my good friend, KL7FJW, inspired me to upgrade, and I shall be eternally grateful to her."

At the Cleveland Hamfest, Eila set up two displays of her QSL cards. One display contained over 125 DX cards; the other exhibited her cards confirming QSOs with YLs in every state in the US. "Some of the younger generation who saw this exhibit probably took all of this for granted, but I still marvel at the wonder of talking with others anywhere on this great earth."



Joe Mehaffey, K4IHP, thinks his XYL, Celia, N4KVG, may be the first foreign YL to operate in China since Amateur Radio was reauthorized. "The BY1PK staff did not remember any earlier visit by a YL," said Joe. Celia and Joe visited Beijing during 1987 and were granted permission to operate BY1PK for a two-hour period. Despite this unusual DX experience, Celia's primary interest in Amateur Radio activities is 2-meter operation for family communications and emergency assistance. (photo courtesy K4IHP)

ARIZONA YLs ORGANIZE THE CACTUS KEYS

After meeting informally for several years, Arizona YLs decided it was time to form an official organization. Thanks to the able assistance of K7SEC and W2GLB, the club's constitution and bylaws were put together, a nominating committee was formed and the first slate of officers was presented to the group on September 17, 1986. During the first year, the Cactus Keys established a net on 147.36 MHz, which now meets every Tuesday at 7 PM MST. Their HF Coffee Cup Net meets on 3.933 MHz every Tuesday at 8 AM MST.

The Cactus Keys, under the direction of N7GLQ, established the precedence of being represented at every swapfest and hamfest throughout the state of Arizona. At the Fort Tuthill Hamfest, WB7USZ was the lucky winner of the Cactus Key quilt, made collectively by the membership.

Certificate hunters looking for wallpaper can earn a 2-meter certificate by working at least 20 members on a minimum of eight different repeaters or on simplex frequencies. For an HF certificate, Arizonans must work



Cactus Keys first slate of officers (l-r): W2GLB/7 Vice president; KA7VYF, Secretary; N7DFH, Treasurer; WB6UJJ and W7JZA, Board members, N7GLQ, President (photo courtesy of KA7VYF)

12 members, stateside stations outside Arizona work eight members and DX stations including Alaska and Hawaii work four Cactus Key members. For more information send an SASE to KB8RT/7 at the Callbook address.

It is with deep regret that we record the passing of these amateurs:

N1DDN, Ron C. B. MacIntyre, Amesbury, MA
W1GXU, Francis Beebe, Niantic, CT
W1JEP, Wendell H. Campbell, Wenham, MA
W1JGE, Charles L. Norton, Meriden, CT
W1LGD, Donald Brand, Oxford, MA
W1NSI, Richard C. Storrs, Niantic, CT
W1NTX, Harold S. Nagle, Marblehead, MA
K1SRP, Frederick M. Grindle, Bar Harbor, ME
W1TAM, Clifton G. Locke, Berwick, ME
W1YLO, J. Roy Wolfskill, South Hamilton, MA
WB2BDX, John Adams, Rensselaer, NY
WB2DVC, Charles Curtis, Hamburg, NY
W2FZV, Edwin M. Smith, Point Pleasant, NJ
W2HDR, Salvatore Milone, Rensselaer, NY
W2HHB, Louis Goetz, Delran, NJ
K2IJL, Lawrence J. Moreno, Long Beach, NY
K2KYM, Vincent G. Terenzio, Pleasantville, NY
K2LFR, Sidney Feyder, Rochester, NY
K2RRM, Theron L. Phillely, Windsor, NY
WB2TJY, Herbert C. Lounder, Rochester, NY
W2TOE, Gerald W. Ideman, Churchville, NY
K3CJL, Lester H. Gilbert, Bethesda, MD
N3EAD, Conrad J. Sandusky, Connellsville, PA
WA3GNS, George P. McKnight, St Marys, PA
W3JOS, Richard G. Gillen, Phoenix, AZ
WB3KKL, Geraldine N. Thomas, Washington, DC
W3LMZ, Lorence W. Fraser, Silver Spring, MD
KA3MSW, James Geddes, New Paris, PA
*W3OS, Donald E. Smith, Hatboro, PA
W4AKN, Walter G. Walker, Newport News, VA
N4ARC, Robert F. Crocker, St Simons Island, GA
W4BJE, William W. Neely, Columbia, SC
KA4DEW, Robert Lankford, Lagrange, KY
*W4DFA, George W. Schreech, Jr., Dahlgren, VA
K4DOQ, Ralph K. Middleton, Norfolk, VA
W4HA, John McCaa, Sr., Anniston, AL
W4JL, James L. Dixon, Boone, IA
N4JRN, Charles T. Johnson, Chattanooga, TN
W4KQG, Edgar M. Hamper, Miami, FL
W4KUB, William R. Kimble, Louisville, KY
W4LOU, Edwin A. Holman, Altamonte Springs, FL
N4PL, Clyde F. Lee, Holly Hill, FL
K14RK, Robert G. Fisher, Tallahassee, FL
N4RPU, George J. Carrier, III, Douglasville, GA
K4TVQ, Thomas S. Engle, Zephyrhills, FL
WA4UWK, Maxine L. Harris, Falls Church, VA
KA4VWO, Leonard S. Becker, Spartanburg, SC
W4WXH, Joe D. Etheridge, Selmer, TN

N5AMK, Joe C. Teaster, Benton, MS
W5BGC, Harry C. Wilson, McAlester, OK
KA5BY, William L. Mott, Cheneyville, LA
W5CLU, Charles A. Ray, Jr., Meridian, MS
K5DGE, Thurmond B. West, Columbus, TX
N5DGN, James R. Gainer, Lubbock, TX
N5EQN, Theodore Greer, Mansfield, LA
W5GJA, Clarence W. Boswell, Jr., Leander, TX
W5LSU, Jess L. Mitchell, Houston, TX
W5MQB, Fred W. Dowdy, Thibodaux, LA
W5MY, George B. Bean, Little Rock, AR
W5NH, Preston H. Perry, Jr., Rockdale, TX
AK5U, Herschel H. Cain, Jr., Tyler, TX
W5YOK, Frank Lee, Weatherford, TX
W6AMD, Jerome R. Sullivan, Walnut Creek, CA
W6LKL, Donald W. Truax, La Mesa, CA
KH6CMS, William T. Raposa, Waianae, HI
W6CWC, Emile A. Collins, Walnut Creek, CA
N6EUS, Francis L. Stevens, Alta Loma, CA
KH6EJU, Joyce O. Roberts, Honolulu, HI
W6GID, Ralph E. Wells, Inglewood, CA
WA6IVN, Steve Eichman, Manteca, CA
K16JA, M. F. Gregg, Fountain Valley, CA
W6VB, Roger L. Chandler, Hacienda Heights, CA
K6ZV, Orville T. Cooper, USN, San Diego, CA
WA7DPB, Benny H. Wendt, Camano Island, WA
*W7LF, Ralph E. Gillette, Fairbanks, AK
W7GU, Harry A. Moore, Port Oxford, OR
W7IOW, Fan Liebman, Tucson, AZ
W7KOR, Cecil S. Copping, Jr., Holden, UT
W7KXA, Frederick E. Williams, Boise, ID
W7LYA, Winslow W. Taylor, Pinehurst, NC
K7CNT, Tressa June Campbell, La Grande, OR
K7PQ, Eugene V. Holzenberg, Lincoln City, OR
KE7QS, James E. Mulvihill, Seattle, WA
WB7UYP, Charles F. Payette, Cochise, AZ
K8DBU, Paul S. Segi, Akron, OH
W8ECK, Marcus C. Kronauer, Menominee, MI
WA8GZH, Stan Skaza, Brecksville, OH
W8MWP, Vincent P. New, Alliance, OH
W8OXF, Henry H. Robson, Lancaster, OH
WA8OZV, William G. Washington, Flint, MI
W8UOP, James L. Lumadue, Shelby, OH
KA8YGI, Zoltan B. Dudevsky, Sr., Bratenahl, OH
KA9CSG, Walter H. Scholz, Grafton, WI
KA9CWN, Gerald A. Kihl, Plainfield, IN
KC9ED, Carroll J. Kraus, Bedford, IN
N9EFT, Elbert C. Zeh, Paragon, IN

W9FAJ, Harold E. Robinson, Monticello, IN
W9HGZ, Eldridge C. Koppen, Burbank, IL
K9JTD, Ralph M. Adelman, Gurnee, IL
W9NXG, Ward E. Bayless, East Alton, IL
K9PHJ, Richard E. Kuonen, Sr., Crawfordsville, IN
N9AHF, William R. Terry, Canon City, CO
WB0EEP, Edward J. Miller, Camdenton, MO
*K0ICM, William Miller, Jr., Des Moines, IA
WA0KEC, Leman D. Prater, Plainville, KS
*W0OOT, Nelson L. Bell, Anderson, MO
KX0U, Gene F. Bauer, Rapid City, SD
W0UPX, John B. Prince, Sioux City, IA
WA0VRD, Milton E. Habeger, Ideal, SD
WA0YCF, John Paul Jones, Johnston, IA
KD0YV, Mel Schouten, Sioux Center, IA
OK1CG, Jindrich Pichl, Praha, Czechoslovakia
JA1SR, Kohzo Yokoyama, Kawasaki, Japan
J1UJK, Yasukazu Watanabe, Zushishi, Japan
JA1VZ, Yowan Takao, Tokyo, Japan
VK2AZX, O. G. Oliver, Tahmoor NSW, Australia
JA3AF, Ichiro Sakurai, Fujiidera, Japan

*Life Member, ARRL

Notes: 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.

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 page 9.

Many hams have remembered a Silent Key with a memorial contribution to the ARRL Foundation. Should you wish to make a contribution in a friend or relative's memory, you might designate it for an existing youth scholarship, the Jesse A. Bleberman Meritorious Membership Fund, the Victor C. Clark Youth Incentive Program Fund or for the General Fund. Contributions to the Foundation are tax-deductible to the extent permitted under current tax law. Our address is: The ARRL Foundation, Inc., 225 Main St, Newington, CT 06111.

50 Years Ago

December, 1938

□ A piece of quartz labeled just inside a band edge is no assurance that circuit constants and temperature changes won't cause drift over that edge, says the Editor, who points out F.C.C. monitors can measure as close as ten cycles and are sending "pink tickets" to violators.

□ A feature of the Commission's complete overhaul of the amateur regs is provision for emergency communications procedures, including restriction of 160 and 80 meters to relief work when an F.C.C. district engineer so decrees.

□ W1JPE's crystal-controlled two-tube rig with single-control tuning is a simple transmitter for portable and emergency work; it is a companion piece to the receiver George Grammer described in August QST.

□ Regular TV programs are scheduled to start with the opening of the New York World's Fair, and this issue includes design considerations, the circuit, and some constructional details of a practical television receiver for the amateur.

□ Responding to League request, based on the results of a membership poll, F.C.C. will expand the 160-meter voice band by 50 kc. when the new international conference edges of 1800 and 2050 kc. become effective about the first of the year.

□ But the Commission has turned down the League's request that selected amateurs be deputized as special additional inspectors for the amateur bands, saying the Communications Act prohibits the acceptance of voluntary services.

□ New two-letter prefixes will identify amateurs on smaller island possessions. K4 will still be Puerto Rico, K6 Hawaii, and K7 Alaska, but (for examples) the Virgin Islands will now be KB4, and Guam will be KB6.

□ More than 1,000 participated in the 1938 Field Day, an event challenging the DX and Sweepstakes Contests for total interest. The Egyptian Radio Club's (Illinois/Missouri) W9AIU/9 established an all-time high with 317 contacts and a score of 3708, operating on four bands simultaneously.

□ D. K. Oram, Hammarlund's chief engineer, shows us a new filter circuit providing full-range selectivity with 455-kc. quartz crystals. One knob controls continuously variable i.f. selectivity.

□ If your plate tank condenser flashes over now and then, read W1LJI's treatise on circuit arrangements to minimize the potential across the plates, and how to figure the spacing necessary for any amplifier.

25 Years Ago

December, 1963

□ A high order of frequency stability is required for effective sideband operation, and K8QVY discusses commonly-used methods of reducing drift by temperature compensating capacitors.

□ Three pages of pictures take us on a tour of the new League headquarters building, where some 65 staffers provide numerous and varied services to members, as well as coordinating efforts of several thousand administrative and field appointees.

□ W1ICP tells the newcomer what an image is, why

it is a problem in amateur communication with low-cost receivers, and how to get around the difficulty with a simple trap circuit.

□ More than 15,000 took part in the 1963 Field Day. W5KPI/5 was top scorer in the one-transmitter class, making 1,004 contacts, while W7HZ/7 used ten rigs to garner nearly 3,000 QSOs.

□ The Editor praises the FD activity as not only a fun weekend but also a strong factor in implementing the overall ARRL program for improvement of the amateur service, in this case primarily emergency communications planning.

□ FCC's Chief of the Amateur and Citizens Radio Division, Ivan Loucks, W3GD, in an address to the QCWA in New York, underscored the importance of such planning and organization, warning that the CBers are getting together and could become the primary emergency communications resource if we falter in our own amateur efforts.

□ V.h.f. transistors are becoming available at reasonable prices and make it economically feasible to build the 144-Mc. handie-talkie described by W1EBW.

□ The international conference on Space Communications in Geneva, with IARU admitted as a participating organization in observer status, has approved space satellite activity in the 144-146-Mc. band, thus "legalizing" the Oscar programs.

□ After the League intervened in the hassle, the Post Office Department agreed that the operation of a QSL Bureau does not violate its "private express statutes" monopoly, since a card seldom contains new information but only confirms an event which previously occurred. Thus bulk mailings of cards will not require first-class postage (thank goodness!) as first decreed.

□ W1FH remains at the top of the DXCC, with 332 countries total. — W1RW

Results, 1988 June VHF QSO Party

Plaques initiated for top ten single ops, multiops, and top five QRP portable entries.

By Billy Lunt, KR1R and Mark Gamble, N1FOZ
Contest Manager Assistant Contest Manager

Maybe the wild 6-meter openings in the June 1987 contest spoiled us. Or perhaps it was the good E opening into Europe all the way to Nebraska, the day before the contest, that raised our expectations. N4KCM aptly described 6-meters as a "tease with several short but good openings." WA5S liked the "good conditions on 6 to California at the beginning of the contest." While KS9J observed: "Six-meter openings were weird this year. Most stations were not extremely loud, but workable." In short, it was good, but not great, with West Coast stations seemingly having the best of it.

In reviewing 6-meter activity, a tip of the hat to all contesters on 50 MHz. The contest announcement plea for sanity in protecting the DX window from 50.100 and 50.120 MHz (centered on the DX calling frequency of 50.110 MHz) was met with almost universal acceptance. Almost everyone recognized that exercising common courtesy helped everyone, including yourself. Band plans evolve through common use, and this one is still in the metamorphosis stage. But things are a lot better than they were a year ago, eh? With 50.125 MHz seemingly acquiring all the trappings of a domestic calling frequency, domestic contest activity *up* from that frequency is fast becoming in vogue. Of course, DX—contest or not—is fair game on 110, plus and minus. K2SMN rogered with: "Six meters was well behaved, but where were those Gs from the previous weekend?" WB8PAT added: "50.110 was so quiet! I didn't hear any locals or DX there." While ZF2BL was thankful: "The DX window from 50.110 to 50.125 really helped."

With changing operating habits on 50 MHz, some Sunday morning devotees of random scatter have become bewildered, to wit: Where do I look for random scatter contacts? Well, guys and gals, it's looking more and more like 50.125 is the hot seat (formerly claimed by 110) and it's up in 2½ kHz increments from there. Let's keep those 15-second "go ahead, go aheads" a comin'.

Somewhat unfortunately, as goes 6

meters, so goes the June contest. There was simply nothing spectacular about conditions on 2 meters and above, as indicated by reports from all parts of the country. That's one of the interesting facets of VHF contesting. It is oh so different from June to September.

And now for something completely

different—grid expeditions: "I worked six bands from eight grids, a total of 600 miles, and was exhausted."—K6LMN. "Working from a rare grid square on 6 meters sure was a blast. We tried to get to the top of Abejo Mountain, elevation 11,680 feet, but ran into snow at 10,300 feet."—WA6LJZ/7. Snow, in June?

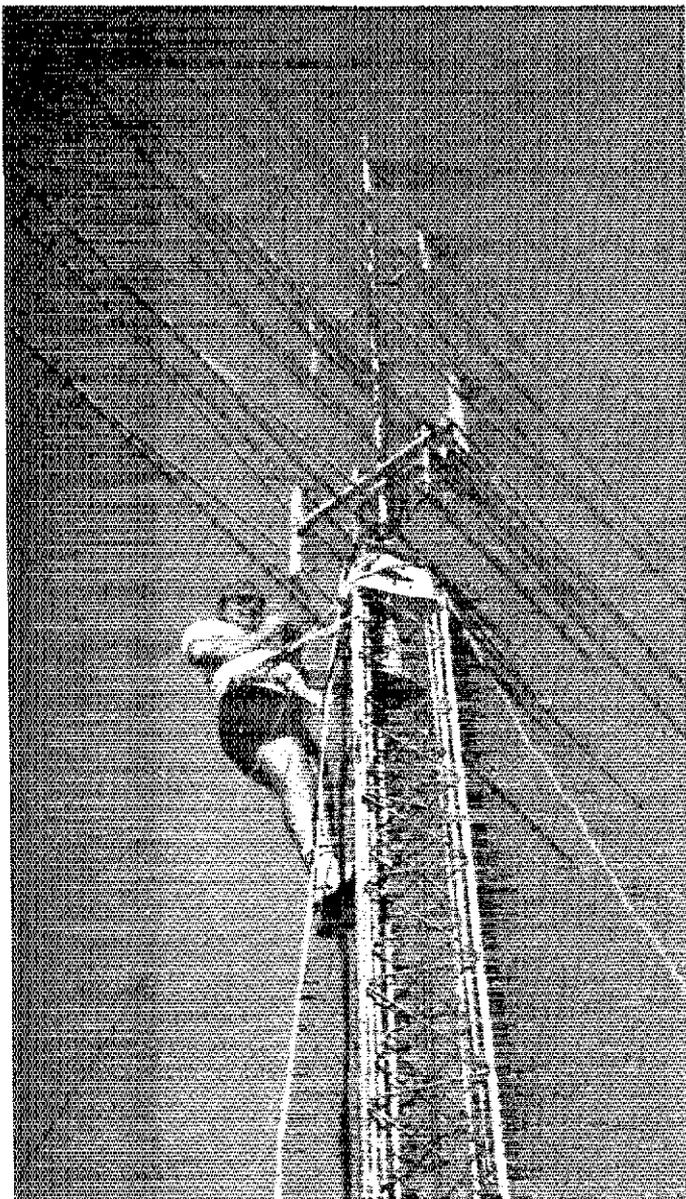
Scorewise, in the single-operator category, K2LNS had the WA2FGK station humming to edge our last year's winner

Single Operator QSO Leaders by Band

50 MHz		432 MHz	
KN5S	503	K1FO	189
K5CM	495	K2GAL	101
(N5CG,op)		K2SMN	87
N0LL	462	K1RZ	86
K1LL/0	458	W3ZZ	78
WD4MGB	400	K4QIF	78
K0TLM	388	K1JX	72
K1FJM/4	385	K1PXE	70
KA0JGH	357	WA2FGK	69
W2CRS	354	(K2LNS,op)	
K5UR	350	WB8K	69
W3EP/9	320	KD6QE	68
WA2FGK	317	K2JWE	66
(K2LNS,op)		AA2Z	65
K1TOL	308	KB3QM	65
NJ0X	294	K5UR	63
W9IP	293	K2OS	63
144 MHz		902 MHz	
K3NXH	280	K2SMN	20
K2SMN	278	KD5RO	19
KA1KRJ	262	VE3ASO	13
KB1RP	259	AA2Z	11
WA8B	242	N2WK	11
AA2Z	228	WA2FGK	10
K1JX	224	(K2LNS,op)	
K2GAL	217	W6CPL	10
W1QK	212	N2BFJ	9
WA2FGK	200	WA1JOF	9
(K2LNS,op)		W1JR	8
K3TC	200	WB1FKF	8
K5UR	198	K9MK/5	7
K1RZ	194	W3IP	6
WA4VWV	188	WA1MBA	6
KD6QE	182		
220 MHz		1296 MHz	
W6CPL	77	K2SMN	46
KD6QE	76	WA2FGK	31
N8DGN	67	(K2LNS,op)	
AA2Z	63	K2GAL	31
K1JX	63	WA1OUB	30
WA2FGK	59	K2JWE	27
(K2LNS,op)		W6CPL	25
K2SMN	54	KD5RO	22
W3ZZ	54	AA2Z	22
WA1HYN	53	WD5AGO	22
K1PXE	50	W1JR	21
KB1	49	K1RZ	21
N1DPM	48	K2UOP/4	21
N2WK	48	N1DPM	21
W1JR	46	W3IP	20
W1GXT	43	K4QIF	20
K1LPS	43		
KB3QM	43		

Multioperator QSO Leaders by Band

50 MHz		432 MHz	
WB0DRL	688	4U1UN	198
W1TKZ	577	N6CA	187
K5JL	539	W2SZ/1	178
W0KEA	536	K3YTL	167
AA9D	529	WC2F	146
W2SZ/1	499	N8DKL	138
N4EJW	474	W3CCX	137
WA7JTM	460	K1TR	115
N6CA	446	AA9D	102
KC2PX/4	431	W1TKZ	101
N8DKL	428	WB8BKC	99
K1TR	423	K3LNZ/8	94
4U1UN	406	K5JL	94
W0JC/9	394	WB0DRL	91
K3YTL	381	N2GHR	91
144 MHz		902 MHz	
W2SZ/1	673	K3YTL	36
K3YTL	554	W3CCX	26
W1TKZ	497	VE3LNX	25
K1TR	490	4U1UN	21
N6CA	450	W2SZ/1	21
N8DKL	448	K1TR	21
WC2F	400	W1TKZ	18
W3CCX	394	N6CA	14
4U1UN	392	WB0DRL	13
N8FMD	368	W2DRZ	12
N2IWM	353	KC2PX/4	11
KC2PX/4	331	N2CEI	11
W3KWH	284	WB2PSI	10
W2DRZ	283	AA9D	9
VE3LNX	282	WB8BKC	9
		K5JL	9
220 MHz		1296 MHz	
N6CA	395	K3YTL	59
W2SZ/1	146	N6CA	58
K3YTL	134	W3CCX	57
K1TR	127	WB0DRL	53
W3CCX	126	4U1UN	47
4U1UN	102	W2SZ/1	46
N8DKL	78	K1TR	41
W1TKZ	77	KC2PX/4	35
WC2F	71	WC2F	34
N2CEI	70	W1TKZ	31
KC2PX/4	67	N2GHR	29
N2IWM	56	AA9D	28
K3LNZ/8	55	K1WHS	27
K1WHS	55	WB8BKC	26
AA9D	44	K5JL	26
K2BWR	44		



Rich, WB2OTK, putting the finishing touches on the UHF array at KC2PXJ4.

Division Leaders

Single Operator

Call	Score	Division
WA2FGK (K2LNS,op)	249,320	Atlantic
VE3ASO*	132,870	Canada
WB9MSV	91,580	Central
K1LLØ	71,906	Dakota
K5UR	235,521	Delta
KC3CL	64,090	Great Lakes
N2BFJ	61,446	Hudson
KØTLM	129,285	Midwest
AA2Z	167,232	New England
K7TM	37,884	Northwestern
KD6QE*	68,016	Pacific
KN5S	104,520	Rocky Mountain
K2UOP/4	110,047	Roanoke
WD4MGB	70,924	Southeastern
W6CPL	89,112	Southwestern
K5CM (N5CG,op)	214,225	West Gulf

Multioperator

Call	Score
K3YTL	672,540
VE3LNX	222,387
AA9D	446,028
KØALL	41,844
WB4LHD/5	35,346
WB8BKC	269,466
N2WM	225,600
WBØDRL	588,072
W2SZ/1	859,382
KC7IJ	32,103
WA6PWW	62,622
WØKEA	154,800
N8DKL	522,351
N4EJW	101,010
N6CA	631,296
K5JL	377,010

*denotes new division record

Plaque Winners

Single Operator

Position	Winner	Score	Donor
1st	WA2FGK (K2LNS,op)	249,320	John Kanode, N4MM
2nd	K5UR	235,521	Bald Knob VHF Contest Group
3rd	K2SMN	226,335	MO-KAN Council of APCs
4th	K5CM (N5CG,op)	214,225	Terry Netzley, W8NJR
5th	AA2Z	167,232	Delaware Valley VHF Society
6th	KB3QM	166,089	Ken Kreis, WD9ACA
7th	W3ZZ	161,452	2-Meter EME Bulletin
8th	K1RZ	156,585	"Q" Products
9th	N2WK	135,072	Central States VHF Society
10th	VE3ASO	132,870	Telex Communications Inc (Hy-Gain)

Multioperator

Position	Winner	Score	Donor
1st	W2SZ/1	859,382	Randy Stegemeyer, W7HR
2nd	K3YTL	672,540	PHD ARA
3rd	N6CA	631,296	In Memory of Dudley Watts, N4KEU—WB4FDT
4th	WBØDRL	588,072	Frank Potts, NC1I
5th	N8DKL	522,351	Mt Airy VHF Radio Club
6th	W1TKZ	481,086	"Q" Products
7th	W3CCX	477,620	Mark Wilson, AA2Z
8th	AA9D	446,028	Cushcraft
9th	K1TR	402,210	Central States VHF Society
10th	4U1UN	382,998	W1XX (+K1GX,KB9NM) Contest Team

QRP Portable-Single-Operator

Position	Winner	Score	Donor
1st	K1JX	137,509	K2OVS and K2RIW
2nd	NOØY/5	67,125	Peter Putman, KT2B
3rd	K3ONW	61,984	Contest Committee—LIMARC
4th	WBØZKG	27,819	West Coast VHFer
5th	W7JXU	23,940	Sunnex Radio Club—W2SV

K5UR, 249k to 235k. Also topping the prestigious 200k mark were K2SMN and K5CM with N5CG operating. The top ten finishers, representing five different call districts, qualify for handsome new plaques sponsored by generous individual donors this year. See boxes.

In the multioperator category, the W2SZ/1 boys did it again with their well-organized machine, beating back the K3YTL gang for the top spot. Score: W2SZ/1 859k, K3TYL 672k, both very nice efforts. California was not to be taken for granted however, as the N6CA bunch on Mt Pinos was not far behind with 631k; oh, for just a bit more 6-meter enhancement! Making the top ten was a struggle, but for those who persevered, the end result is a handsome new plaque. Note that the top ten finishers represent entries from six different call areas and one foreign

country. Who says that VHF is confined to the Northeast?

QRP portable is a more mixed geographic bag, with the top ten made up of entries from no less than seven different call areas. The top five earn plaques, but as competition in this category heats up, shouldn't we consider expanding this to ten for next year? K1JX earns top honors this time again, with 137k points. Clarke utilizes equipment suited to portable operating and erects his modest antennas on the edge of an 800-foot precipice that overlooks the Connecticut River Valley. He's a pretty fair operator too! Kudos to NOØY/5 and K3ONW who finished second and third with over 60k points. We'd like some further suggestions on how this category should be structured. Should the power be increased to 25 watts? Permit second operator assistance? We need some

guidance, particularly from those experienced in QRP portable operating on how to best set up this category to maximize these efforts. Please write.

Your Contest Desk is now pleased to unveil all the plaque winners, QSO and multiplier boxes, and most important, all the individual scores. Without each and every entrant, there would be no contest. We also thank everyone for their patience in awaiting this report. With QST copy schedules moved up and other contest reports demanding equal attention, we can no longer prepare this report and verify the logs to the degree required in time for an earlier issue. Your understanding of this has been gracious.

Stand by for the September QSO Party report in next month's issue—another dandy—and then it's make-plans-time for the January VHF Sweepstakes,

Single Operator Multiplier Leaders by Band

50 MHz		432 MHz	
K5CM	198	K1FO	49
(N5CG,op)		K4QIF	42
KNSS	188	K5UR	39
N0LL	167	K2SMN	34
K1LL/0	157	WA3FYJ	34
W2CRS	155	WA2FGK	33
K5UR	154	(K2LNS,op)	
N5HHS	153	K1JX	33
K0TLM	146	K1RZ	33
KA6JGH	143	K2GAL	33
W9IP	142	W3ZZ	32
N6CW	142	WA3DJG	31
W8CM	132	W8BK	31
WA2FGK	131	K2OS	31
(K2LNS,op)		KB3QM	30
WA4GPM	131	WB9MSV	30
WD4MGB	128	W0RPK	30
144 MHz		902 MHz	
K5UR	60	K2SMN	16
WA8B	53	KD5RO	16
WA3FYJ	49	VE3ASO	11
K3NXH	48	N2WK	8
VE3PCW	48	W6CPL	8
WA4VWV	47	WA2FGK	7
W9JGV	45	(K2LNS,op)	
WA2FGK	44	N2BFJ	7
(K2LNS,op)		AA2Z	6
K1RZ	44	WA3DJG	5
K2SMN	44	KB8ZW	5
WB9MSV	44	W3IP	5
VE3FGU	43	WA1JOF	5
NSWS	42	WA1MBA	5
VE3ASO	41	WB9MSV	4
K2GAL	41	W1JR	4
KMBU	41	WB1FKF	4
AA8Q	41	W1GRW	4
		WB2JLR	4
220 MHz		1296 MHz	
WA2FGK	32	K2SMN	22
(K2LNS,op)		WA2FGK	19
N8DGN	32	(K2LNS,op)	
W3ZZ	30	WD5AGO	18
K5UR	27	KD5RO	17
KB3QM	27	K5UR	17
K2SMN	26	K2JWE	17
N2WK	26	K2GAL	16
K1JX	26	K1RZ	15
WA3DJG	25	W3ZZ	15
WA3FYJ	25	N2WK	13
K3ONW	22	K2UOP/4	13
K4LHB	22	WA1OUB	13
AA2Z	21	K4QIF	12
W3IP	21	KB3QM	12
K2UOP/4	21	K0SMI	12
K1PXE	21	K0RZ	12

January 14-16, 1989. As established for certain last year, that's the weekend before the Super Bowl. See you all then—W1XX.

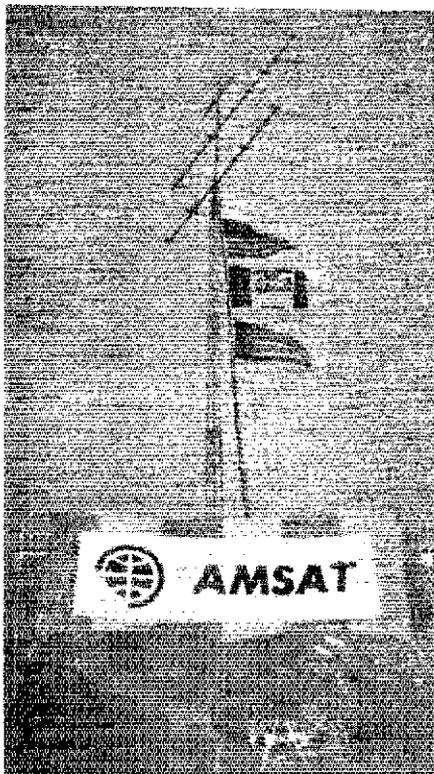
SOAPBOX

My first VHF contest in many years. It was nice to have 6 meters open up on Saturday. See you again in September (W1NU). I had fun operating from a mountaintop this time. It was quite a relief from lugging along a heavy kW amp and power supply. The transverter (Microwave Modules) worked great! (W1QK). Did "E" skip in this contest? (W1NLD). This was my first VHF contest. I had a lot of fun. I feel that I did well, using only 10 watts to a 9-element yagi at 30 feet. I'm looking forward to September and an improved antenna system (WB3JJO). Where are all these stations the rest of the year, 2-meter SSB always seems dead! (KE1A). Heard a lot, yet worked few! I don't know if I like working QRP. Thank you, to my fiancée, Maria, for putting up with the contest during our vacation (N1FOZ). Conditions seemed to be flat, but I was glad to make my first 3456-MHz contacts (WB1FKF). My first week on VHF; it was fun, but not inspirational (K1CLN). The 1-call area did a commendable job avoiding the 6-meter "DX window" (WA1CRE). 50 MHz worked well, but we had lots of trouble with 5-8 to 5-9 line noise in our most active directions. There were many over-driven amplifiers during E_s openings. The strength of the opening is directly related to the mic gain and

voice level applied. Best QSO—4U1UN on 2304 MHz! (K1WHS). I made my first 2304-MHz contact from my home station, after trying for almost two years (N11W). We apologize to all our friends for the failure of our 902- and 1296-MHz gear. We are working on repairs. The feedline and relay switches are giving us trouble. We would like to see a "standardized" activity hour for all bands beyond 432 MHz (K1DS). It was super weather for mountaintopping. There was a small opening on 6 meters on Saturday evening. No enhancement, however, on any of the other bands in this location. CU in the next one (K1LPS). We were blessed with good weather and a high score again this June, but we'd sure like some of those 6-meter enhancements to move up the bands! (W1TKZ). This was my first solo effort (N2HIG). Contacts were slow for June, I hope other stations weren't able to catch up on lost sleep (WA2MJP). There was no propagation. The only saving grace was 6 meters, which I got on the air, for the first time (K2KM). Conditions on 2 meters were very bad, with severe overload from 4U1UN. Six meters was fun, however, especially when I worked Colorado with my QRP rig (WA2SLY). I wish band conditions were as good as the weather (WB2ZSY). A contest is when you operate and log with one hand, and burp your newborn with the other, while your wife goes shopping (WA2YEI). Nice contest, good openings, great beer and excellent weather conditions. Did I win anything? (WA2CWA). Low power, no preamp, and lousy coax all add up to a low score. Not to mention that the little one thought my log sheet was a coloring book (WD2AHD). This was our first time on 1296 MHz. We used a home-brew transceiver and antenna. I was very pleased with their performance and can hardly wait till September (N2WM). Where was all the DX? (W91P). This was the first time in years that I ran a single op from my home QTH (W2CNS). Murphy took out the rotor 3/4 through the test. Luckily, I fixed it before the contest ended (KA3KHZ). Running line of sight from a multiop station makes it impossible to get near a calling frequency. It sure was great to have 50 MHz open, but a shame to let 6 other bands sit idle. Highlight for me was hearing KC2PX/4 on 2304 MHz. Lowlight was to find out that they had no receiver (K2LNS). What great fun it was working

Multioperator Multiplier Leaders by Band

50 MHz		432 MHz	
WB0DRL	216	N8DKL	61
K5JL	213	WB0DRL	53
W0KEA	205	AA9D	52
AA9D	183	K5JL	47
N8DKL	178	K3YTL	42
W0UC/9	178	W2SZ/1	41
WA7JTM	175	WB8BKC	41
N6CA	174	K3LNZ/8	39
KC2PX/4	161	4U1UN	39
N4EJW	161	W1TKZ	36
W1TKZ	156	W3CCX	36
W9UD	145	WC2F	36
W2SZ/1	144	W2DRZ	35
WB8BKC	144	W3KWH	35
WB8IFP	141	W9UD	35
		N8FMD	35
144 MHz		902 MHz	
N8DKL	82	VE3LNX	17
AA9D	73	K3YTL	15
N8FMD	66	WB0DRL	13
WB0DRL	65	W2SZ/1	12
W2DRZ	61	W3CCX	12
K3YTL	60	4U1UN	11
W3KWH	58	N6CA	11
K3LNZ/8	58	K5JL	9
W4BFB	56	W1TKZ	9
W1TKZ	53	W2DFZ	9
KC2PX/4	52	K1TR	9
WB8BKC	51	N2CEI	9
VE3LNX	51	AA9D	8
K5JL	50	WB8BKC	8
W9UD	50		
N4EQT	50		
220 MHz		1296 MHz	
N8DKL	44	WB0DRL	40
K3YTL	39	K3YTL	23
WB0DRL	33	AA9D	22
K3LNZ/8	33	W2SZ/1	19
W1TKZ	31	W3CCX	19
W2DRZ	30	VE3LNX	17
W2SZ/1	30	K5JL	17
W3CCX	30	WB8BKC	17
WC2F	29	4U1UN	16
N2WM	28	WC2F	16
AA9D	27	W3KWH	15
KC2PX/4	26	N8DKL	15
WB8BKC	26	N6CA	14
K1TR	26	K1TR	14
N2CEI	26	W1TKZ	13
		KC2PX/4	13
		W9UD	13



Multiop station, W0RPK operated from Mt Ayr in Iowa.

"coast to coast" on only 10 watts (N3EXA). After four years of taking W3CCX on the road, we returned to our own backyard only to discover that Murphy had followed us home. By the end of the contest, every station had a warmed-up soldering iron and a couple of burned out preamps, etc. strewn about the bench (W3CCX). Conditions on 2 meters were not too good, but 6 meters was cranking. I would like to know how Roger, K2SMN, hears all those little 2-meter signals (KA3PLC). We lost 1/4-kW amp 30 seconds into the contest. We ended up running the rest of the time with 25 watts (KA3NAM). Only one tenth last year's score due to the band conditions (WW4T). Enjoyable! We're looking forward to September. Should Murphy be listed as an operator in a multiop effort? (W4CMA). I rebuilt a tower and rotor for the contest, only to have terrible band conditions (KB4XK). Band conditions were horrible! (W5HUQ). Nothing great, but it was a lot of fun (WA4JNE). There was very poor tropo all weekend due to a storm front across the state (K1FJM). Thanks for trying to keep 50.110 open for DX. I hope to have more time for next year's contest (N4TL). Conditions appeared to be average to below average in key directions like the NE (WD4GXN). This was my first try at mountaintopping (KB3HH). My vintage Clegg Venus Six Meter Transceiver failed one hour into the contest... just as the band was opening! (WA4MMP). Setting up for a QRP portable operation was a lot harder than I anticipated. I didn't get the 144-220-432 yagis up until 15 minutes before the start of the contest (NO9Y/5). It's not easy operating under K5UR's shadow. Rick is just 15 miles away! (WB5IGF). Six-meter conditions were fair, but 144/432 were dead (K5YY). Everyone should operate a contest QRP. Hearing many stations that couldn't hear me was extremely frustrating. Putting a rare grid (EM33) on was

enjoyable though (K4RWP). Let's call them "squares." It makes more sense, and "SQ?" is easy on CW (KN5S). Forty-one new grids on CW! (K5MAT). With the sunspots increasing, 6 meters is more time consuming than ever, but worth it (K9MK). First VHF contest for the North Texas High Frequency Club. It was a great time (N05X). This was my first time operating this contest. It was nice to get a VUCC on 6 meters (WB5AZI). Because the band was open, the yard work wasn't finished (KA6SNY). I operated from Palos Verdes in the car with an "armstrong" rotor on my antenna. The biggest thrill was working NS6X in the Bay area and receiving a 59 signal report (K6JEY). I could hear stations from California to Kansas, but they couldn't hear my kW. Spread out and maybe you too will work KH6 (K6GSS/KH6). Very good backscatter this year; however, tropo was very poor (WB6AAG). I enjoyed this contest very much, I haven't had this much fun on 2 meters since my last VHF QSO Party in June of 1956. In those days a 90-mile contact was considered very good for 2 meters (WA6HRK). I had a lot of fun and worked some new grid squares for VUCC! (N7CFC). Tropo conditions were bad! We had a great time even with the strong winds (NW7O). While searching for the right mountaintop, I slid off a mud road and bashed in the side of my new truck! Naturally, the best tropo opening to California started a few minutes after the contest had ended. Thanks to my fiancée,



Dave, AA6RX, operated the 6-meter station at N6CA, the West Coast multiop leader.

Pam, for fending off the tourists and chipmunks (WA7TDZ). After weeks of rain, the sky opened just in time for a great contest weekend (KA7ZOI). Meteor sked helped my grid total tremendously, but I still can't beat the guys in the big cities! Still, this

year was a personal best for me (WA7VHW). I sure was glad that I caught the Saturday night 6-meter opening (K8MD). Propagation on the bands above 2 meters was very poor from Michigan this year (WB8BK). Good propagation right up until the contest time, then it went to the pits (KC3CL). This was my first year in contesting. Things were rather slow, but worth the effort and time (N8JPR). Where were conditions above 50 MHz? (WB9MSV). Two-meter conditions were flat and activity was sparse (W9JGV). Conditions on 6 meters were fair, but conditions on 2 meters and above were stinko! (AA9D). Where was everyone? The band seemed to be open pretty well, but no people (WB9SBD). I didn't hear much on (N0HAX). We can compete with the rest of the country on 6 meters, but not the other bands. We wish you had a multiop single-band category (W0KEA). Where did everyone go on the second day? (KD0BT). My first contest in over a year. I really enjoyed the fun, too bad my neighbor didn't! (VE3FGN). Biggest surprise was being called by ZF2BL on CW (VE5UF). The band wasn't open much, but I think things will improve by September (KG6DX). These were the worst conditions ever! I wish the contest was moved to the middle of July (KP4EKG). We were really surprised to arrive in Cayman Brac without our mast. Luckily, it came in on the next flight. It was a good DX-pedition along with a fine 6-meter opening on Sunday morning (ZF2BL).

Scores

Call, score, QSOs, multipliers, bands worked (A = 50 MHz; B = 144 MHz; C = 220 MHz; D = 432 MHz; E = 1296 MHz; F = 2.3 GHz; G = 3.4 GHz; H = 5.7 GHz; I = 10 GHz; J = 24 GHz; K = 48 GHz; L = Light). An asterisk before the call sign denotes a QRP-portable station; an (N) after the call indicates a Novice.

W/VE

1		
Connecticut		
AA2Z	167,232	629-201-ABCD9EF
*K1UX	137,509	656-189-ABCD
K1EM	68,338	413-126-ABCD
WA1UQC	47,725	335-115-ABCD
K1PXE	38,781	269-83-ABCD
NE1A	27,818	297-94-AB
WA1VRH	26,563	263-101-AB
KB1I	22,954	261-63-BCD
K1FO	18,562	169-48-D
KB1RP	10,101	259-38-B
W1VHL	8,258	129-64-A
W1GRW	8,098	113-46-ABCD9E
*N1ABY/I	6,655	121-55-A
W1NU	5,808	110-48-ABDE
*W1QK	5,724	212-27-B
K16CP/I	4,787	91-39-ABCD9E
WA1GTP	4,095	91-45-AB
WB1CWZ	1,258	37-17-C
WA1NLD	1,050	75-14-B
*KA1CV	1,040	80-13-B
WA1AW (NT8Z,op)		
K1OQG	936	43-18-ABDE
K1WXX	812	58-14-B
WB3UO	540	46-12-B
KA1LYF	468	36-13-B
KE1A	420	35-12-B
NE1A	254	32-8-B
N1FOZ (FN31)	207	20-9-BD
AB1U	80	10-8-B
KA1RYO	56	13-5-AB
WA1KGR (KA1s MDA, PET, N1s EFQ, E1G, ND1K, NE1T, ops)	29,403	312-61-ABCD
Eastern Massachusetts		
W1JR	61,892	321-128-ABCD9EF
WA1JOF	33,201	228-93-ABCD9EF
K1SRZ	26,292	258-84-ABCD
WB1FKF	21,380	167-66-ABCD9EFG
N1CPK	7,580	135-58-A
K1TO	6,572	100-53-ABCD
K1VZ	6,012	105-36-ABCD
AD1C	5,883	102-37-ABCD
KA1DHO	3,064	66-46-AB
K1CLN	1,204	75-29-ABD
W1GXT	1,204	43-14-C
W1JOT	814	46-11-BCDE
WA1CRE	493	29-17-A
W1ZNY	472	43-11-B
*N1EWB	451	30-11-BCD
*N1FOZ (FN51)	240	24-10-AB
WA1AYS (+AJ1E, K1IO)	60,706	584-127-ABCD
Maine		
K1TOL	35,728	308-116-A

WA1TRE	26,381	261-101-A
WB1APD/I	2,668	65-41-AB
N1BUG	2,201	70-31-ABC
W1PLX	890	56-16-B
K1WHS (+K1MNS, K1W, KY1K, WA1s NIE, TFH, W3HQT, KBZQ)	187,506	729-198-ABCD9EFG
New Hampshire		
WA1OUB	54,250	674-125-ABE
AC1J	34,200	270-95-ABCD
N1HW	19,518	174-82-ABCD9EF
W1GUA	2,014	53-38-AB
W1JSM	1,273	85-19-BD
N1DNC	140	18-7-BD
*KA1LMR	18	5-3-BC
Rhode Island		
WA1HYN	15,174	169-54-BCD
K1DS (+KA1KWE, KM1X, NO1U, WA1VPC)	65,490	445-119-ABCD9E
Vermont		
K1LPS	34,452	235-106-ABCD
*N1EWB	1,080	47-29-BCD
WA1AM	828	28-23-ABCD
W1TKZ (KA1s IU, LDV, OOD, KB1s EB, WL, N1s CPE, FOX, ND1Z, W1GCI, WB1BUM, WA2s TEO, TIF, ops)	481,086	1305-302-ABCD9E

Western Massachusetts		
N1DPM	70,056	385-139-ABCD
K9ES (KA1ODA, op)		
	40,756	368-95-ABCD
K1ISW	12,801	176-51-ABCD
NA1W	7,910	132-37-BCDE
KA1KRJ	6,550	282-25-B
W1KK	6,435	109-45-ABCD
WA1MBA	4,200	67-35-BD9EF
KA1BVM	1,968	131-15-B
WA3EEC	1,612	61-26-ABC
W1NMQ	640	37-16-ABC
K1JG	58	11-9-B
*N1EWB	40	5-5-BCD
W2SZ1 (AG1M, K1DH, KA1DZY, NC1J, WA1s UGE, ZMS, K2TR, KA2s FWN, LIV, N2s GXH, HPA, HUC, WA2s AAU, GFP, SPL, WB2s JSJ, KMY, WA0USA, ops)	859,382	1701-334-ABCD9EFGHJ
K1TR (+K1BG, N1AFQ, NR1E, W1MJ, WA1s PBU, QWF, VFJ, K3WM)	402,210	1230-246-ABCD9EFGHI

2

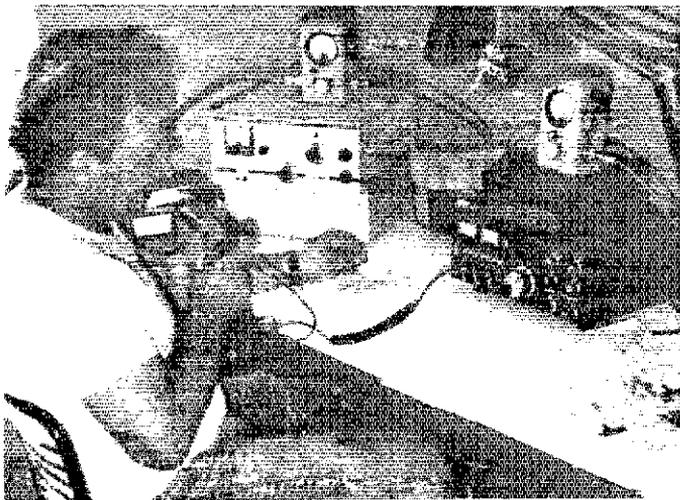
Eastern New York		
N2BJ	29,328	241-94-ABCD9E
WA2BAH	25,048	224-101-ABCD
*N2HIG	5,289	114-45-ABD
KA2JUV	4,032	126-32-B
WA2MJP	3,200	128-25-B
KD2IX	2,018	91-19-BD
KG2H	690	46-15-B

NM2J	578	34-17-AB
KA2CZ	90	15-8-B
K2C6A (+WA1RKS, WB1BTJ, K2SIG, KF2GL, N2DU, WA2WNI, WB2DST)	59,550	348-150-ABCD
W2XL (+K2s RWP, UR, KC2KX, KD2NE, N2s EIK, HWV, WA2s KPF, RUW, ZNU, WD2V)	58,800	376-140-ABCD
AB2I (+AB2J, KC2JS, N2HJH, WB2DVF)	41,509	368-103-ABD
NYC—Long Island		
N2BFJ	61,448	302-147-ABCD9E
K2KM	14,840	187-70-ABD
WA2SLY	8,892	184-53-AB
K2CVS	4,818	100-43-ABD
N2BCUY	3,744	118-24-BD
WB2T	2,700	150-18-B
WB2ZSY	2,244	102-22-B
*WG2I	1,188	73-18-B
WA2EUS	885	31-15-BDE
N2FXE	792	66-12-B
WA2YEI	189	21-9-AB
N2GHR (+KA2s HTV, MUM, W2AAF, WA2s ODO, QLL, VNV, WB2s TQE, YZV)	137,725	603-175-ABCD

Northern New Jersey		
K2JWE	47,908	293-118-ABDE
WA2CWA	25,710	260-99-A
KA2NC	22,824	200-101-ABD
KA2AYR	2,769	71-39-A
WD2AHD	1,008	42-12-D
N2WM (+K2YHY, KB2SNU, JO2Q, N2s HEB, GPD, NV2D, WE2Z)	225,830	838-230-ABCD
N2CEI (+K2NJ, N2EOC)	177,840	671-208-ABCD9EF
K2DEL (K2s AQG, LME, KT2D, KA2s BLE, QGY, PVR, ZET, KB2s CRU, DRV, N2s AAM, DXP, FHC, NJ2Y, WA2s CRF, FEH, HVF, ops)	55,920	347-120-ABCD
K2BJG (+NW2D, WA2s, WB2RFF)	15,345	193-55-BCDE
Southern New Jersey		
K2SMN	228,335	667-937-ABCD9EF
W2HRW	52,767	372-123-ABD
K2GAL	49,011	354-53-BD9E
W2EIF	24,780	202-84-ABCD9EF
WA2ONK	7,448	168-39-BD
W2PAU	6,864	114-49-ABD
N2GBY	2,016	72-28-A
NN2B	637	48-13-B



Paul, N2GHR, operated 2 meters from the NLI Section.



Jeff, K3DUA, operated the 6-meter station at multiop station, K3LZNZ/8.

WC2F (+ K2s FXB,QYH,KA2s VAD,WKA,WMO,
KY2T,N2HOX)
280,840- 895-238-ABCD9E
K2BWR (+ K2ZRFJ)
77,158- 314-173-ABCDE
WB2RFV (+ K2JING)
7,560- 135- 58-ABCD

Western New York
N2WVK 135,072- 432-224-ABCD9E
W9IP 119,880- 461-222-ABCDE
W2CNS 99,899- 402-199-ABCDE
KD5RO 83,620- 279-185-ABCD9E
KU2A 16,324- 148- 77-ABCD9E
N2CZL 14,028- 158- 94-ABD
K2OS 12,395- 116- 67-ADE
K2MQY 9,750- 130- 75-A
KD2YB 8,883- 120- 63-ABC
WB2JLR 5,816- 96- 52-ABCD9E
W2WGL 2,632- 94- 28-B
N2DM 996- 29- 24-A
N2NW 459- 27- 17-B
W2AWF 405- 27- 15-B
W2DRZ (+ KB2s CCQ,FLO,W2UCZ,N13X,NK9K)
245,145- 724-277-ABCD9E
WB2PSI (K2OEQ,N2s AJX,AJY,W2AV,W2s ZKD,
ZQN,WB2s BYP,OCJ,ops)
94,122- 462-189-AB9EFIL
KA2RDO (+ W2ONP)
37,935- 261-135-AB
W2RCX (KA2QZ,NA2O,WB3USJ,ops)
21,792- 165- 96-ABCD9E
WB2LRU (+ K2JPM)
18,768- 204- 92-A

3

Delaware

KB3QM 168,089- 573-231-ABCDE
KA3KHZ 4,650- 150- 31-B

Eastern Pennsylvania

WA2FGK (K2LNS,op)
248,320- 692-271-ABCD9E
N3EXA 9,593- 168- 53-ABCD
KB3NQ 7,781- 216- 31-BCD
N3FUJ 6,840- 202- 30-BC
K3ARR 1,885- 45- 37-A
KB3XG 1,560- 45- 28-ABCD
KD3AO 588- 49- 14-B
WA3JUF (W3HMU,op)
30- 3- 3-9EF
K3YTL (WA1MKE,NA2T,K3MKZ,KB3QI,N3FJA,
W3DZH,WA3s JWP,NVS,YON,WB3s CAI,FAA,
FYI,IWZ,ops)
672,540-1385-330-ABCD9EFGHIJ
W3CCX (WA1YHO,N2SB,WB2YEH,W2CK,
K3IMP,KA3s KSD, QYH, N3s BBI,CX,W3GXB,
WA3s AXV,JUF,NAY,NUF,WAK,WB3s DNI,
KRW,ops)
477,620-1130-286-ABCD9EFGHIJ
KA3PLC (+ K3ZLK,KA3s NJA,PKN,KQ3V,
N3EUK,WA4LFY,WB3FYL)
62,220- 510-122-AB
N3ADC (+ K2OJL)
34,874- 330- 94-ABDE
W3LP (W3s GFN,JUZ,WA3CUQ,ops)
20,202- 212- 74-ABDE
N13H (+ K3s N,NYX,W3s IGV,TI)
16,200- 200- 81-AB
K3UZY (+ N3AHF)
6,248- 142- 44-B
KA3NAM (+ WB4KFD)
2,112- 88- 24-B

Maryland—DC

W3ZZ 161,452- 554-223-ABCD
K1RP 156,585- 587-219-ABDE
W3PZ 71,100- 337-150-ABCD9E

K3ZO 64,386- 438-147-AB
*K3ONW 61,984- 337-149-ABCD
K3AKR 27,000- 220-108-ABCD
W3IFM 17,088- 178- 96-A
K3NXH 13,440- 280- 48-B
W3GN 10,140- 161- 80-ABD
K3TC 6,800- 200- 32-B
KA3QHL 3,172- 122- 25-B
KA3NTX 2,825- 113- 25-B
WA3GYV 2,574- 66- 39-AB
KA3QAC 2,184- 84- 28-B
N3AFM 1,734- 51- 34-A
W6AAX 1,817- 77- 21-B
N3FHD 886- 58- 17-B
W3MSN 782- 42- 17-ABD
KA3CXG 408- 34- 12-B
W3LMC 162- 27- 6-B
WA3NAN (K1HTV,KA1GD,KA3HDO,KM3T,
N3AKO,N3CI,N4QQ,NW5E,ops)
183,008- 669-224-ABDE
K3JVO (NG1W,N2GTE,KA3s BHP,SCY,WA3TID,
WB3EVD,KA4RHS,WB6VGI,AD9J,ops)
47,280- 341-120-ABD

Western Pennsylvania

WA3FVJ 112,710- 422-221-ABCD
WA3DUG 72,900- 326-182-ABCD9E
*KBATQ/3 11,704- 139- 77-ABCD
W3HID 9,828- 126- 78-A
WB3AIT 3,024- 72- 42-A
N3FYD 2,816- 88- 32-B
W3KJM 2,420- 55- 44-A
*AFT173 1,995- 52-35-AB9I
*W3KWH (K3TP,KD3GM,N3EQP,NG3H,W3s ANX,
HH,SVJ,WA3TTS,WB3EML,ops)
199,087- 643-239-ABCD9EHI

4

Alabama

WB4AXQ 45,218- 314-144-AB
WB4GFO 35,784- 258-128-ABC
W4CYC 8,970- 130- 69-A
KB4UPI 4,802- 98- 49-A
AA4LB 1,590- 53- 30-AB
NA4HJ 475- 25- 19-A
WA4VUG 120- 12- 10-B

Georgia

NA1K 37,250- 267-125-ABCD
W4WT 12,222- 157- 63-ABC
NA1I 7,804- 108- 87-ABC
KA4KFK 6,888- 100- 58-ABCD
WD4MBK 1,476- 41- 18-D
W4LNG 748- 34- 22-AB
W4CMA (K4s AEK,WJ3,WA4s LPA,TDY,
WB4CQA,ops) 43,136- 294-128-ABDE

Kentucky

AA4QP 30,208- 218-128-ABD
NA4KM 18,830- 151-102-AB
KC4EG 13,944- 140- 84-ABCD
W4PDZ 510- 30- 17-B
N4EQT (+ KA8SSB,NBEZY,WBULC,WGBB)
104,520- 472-195-ABCD

North Carolina

KB4XK 34,055- 202-139-ABCD
N2CJP 11,760- 124- 80-ABCD
KB4TXZ 7,874- 127- 82-A
KS4S 6,572- 105- 62-A
WA5DJJ 3,220- 91- 28-ABD
WA4CAK 2,040- 51- 40-A
N4DT (+ K4JBF,KK4NO,N4OOT,WB4s NMA,
SLM,WQ4V,N6AYD)
182,160- 608-240-ABCD9E
N4YN (+ KB4RGS,KK4PW,N4s AA,PFZ,WA4LLR,
WC4Z) 60,676- 344-154-ABCD

Northern Florida

WD4IXD 20,088- 213- 93-ABD
W5HUQ 18,308- 192- 92-ABD
WA4JNE 16,185- 188- 83-ABD
WA5IOD 2,808- 72- 39-AB
W4HJW 1,904- 50- 54-ABCD
WB5MAC 208- 16- 13-AB
WB4JEM 135- 15- 9-B
South Carolina
N4LTA 12,245- 155- 79-A
WD4JQV 4,500- 75- 49-ABCD
WB4JNE 3,030- 68- 40-ABD
NB4S 1,725- 75- 23-B
WB4IUX 684- 38- 19-AB
W4BFB (WB2NHQ,WA3DOS,AA4ZZ,G4GKK,
K4s JQU,PDY,TP,KC4s FJY,FSC,KK4s FC,L,
WA4UNZ,WB4s KOH,PCS,QCS,WD4ABZ,AJ5F,
N9CC,ops) 157,741- 685-233-ABCD

Southern Florida

WD4MGB 70,924- 458-149-ABD
K1FIM/4 56,712- 413-136-ABD
W4CO 27,878- 263-106-A
WB4BKJ 27,872- 262-104-ABC
WB2QLP 26,315- 277- 95-AB
W8HYT 18,614- 234- 82-ABD
K4SC 10,750- 125- 86-AB
N4TL 7,995- 123- 65-A
WA4PFN 2,691- 69- 39-AB
WD4AHZ 2,205- 83- 21-ABD
W4FNR 2,120- 53- 40-A
WB4MJE 2,000- 84- 20-ABD
W4FF 896- 64- 14-B
N2JS 451- 41- 11-B
N4EJW (+ N4EJV)
101,010- 537-182-ABD

Tennessee

WB4JGG 42,240- 306-132-ABD
N4VC 33,210- 227-135-ABCD
N4OYS 12,548- 135- 82-ABD
W4TZG 8,898- 134- 64-ABD
AD4F 7,308- 118- 63-A

Virginia

K2UOP/4 110,047- 419-199-ABCD
WB4BDB 75,368- 365-158-ABCD9E
K4LHB 52,244- 276-148-ABCD
K4QIF 19,350- 140- 76-SD
WC4J 13,582- 175- 69-ABD
K4FTO 12,075- 149- 75-ABD
N4RA 8,400- 120- 70-A
W4DO 5,916- 88- 51-ABCD
W4LMJ 4,224- 88- 48-A
WD4GXN 3,072- 98- 32-B
N4SCI 3,008- 64- 47-A
*KB3HH 1,344- 32- 21-D
KE9A/4 1,343- 79- 17-B
*K3YS 1,210- 55- 22-AB
N4SLR/8 742- 33- 14-ABD
N4BG 697- 37- 17-ABD
WA4MMP 434- 27- 14-ABD
KB4WVI 64- 8- 4-C
K2CPX/4 (+ K2QWR,KT2B,WA2YTM,WB2s IEY,
OTK,WIK) 361,080- 984-295-ABCD9EFGI
N4HB (+ WB4BVY)
63,336- 337-156-ABCD
W4IY (K4HWG,KA4CK,K8RL,ops)
36,380- 258-120-ABDE
KE4TG (+ K4EIQ,WA4s CBX,DFS,QYK)
26,215- 181-107-ABCD9E

Puerto Rico

KP4EKG 288- 22- 12-ABD

5

Arkansas

K5UR 235,521- 661-297-ABCD
*N0BY/5 67,125- 311-179-ABCD
WB6IGF 35,301- 259-123-ABDE
K5YV 20,394- 198-103-A
*K4RWP/5 7,920- 108- 72-ABD
N5HST 7,215- 111- 85-AB
WB4LHD/5 (+ N4FAC)
35,346- 213-129-ABCD

Louisiana

NA4ZI 22,785- 185-105-ABDE
KA4ULI 17,280- 172- 90-ABD
WA5UHF 4,838- 82- 59-AB
W5FYZ 3,325- 85- 35-B
K5TNP 2,610- 87- 30-B
N5KWB 544- 34- 16-B

Mississippi

N5JYX 10,611- 118- 81-ABD
N8HFR 5,395- 83- 65-AB
W5RCI 3,871- 52- 49-ABCD
N5KDA (+ KA5DLM,N5JZB)
8,804- 124- 71-AB

New Mexico

KN5S 104,520- 520-201-AB
W5ETT/5 42,560- 289-140-ABD
N5EPA 42,160- 310-136-AB
K13L 36,564- 277-132-AB
KB5GY (DM5) 29,016- 248-117-AB
K5MAT 13,464- 135- 88-ABCD
W5IXR 11,174- 144- 74-ABCD
KB5GY (DM74) 8,990- 145- 62-AB

W55AQC 3,395- 97- 35-AB
N5JDT (+ KA5UHF,KB5s ETW,FVL,KD5HP,
KJ0W) 19,992- 196-102-AB

North Texas

K9MK/5 55,080- 332-136-ABDE
N5WS 38,478- 259-121-ABDE
AA5AM 33,152- 242-128-ABD
W5DK 20,412- 189-108-A
KY5N 2,394- 63- 38-AB
KB5CJ5 1,804- 82- 22-B
KFSUN 1,626- 44- 37-A
KF5PE 1,587- 53- 23-BE
KG5EH 555- 37- 15-B
WB4GWX/5 (+ K5BZH)
752- 47- 18-B
NQ5X (+ K5JRN,KA5SKJ,KB5s CXN,GBN,
N5FFP) 58- 14- 4-B

Oklahoma

K5CM (N5CG,op)
214,225- 692-275-ABCD
K5SW 26,984- 182-107-ABCD
W5SAGO 24,860- 156-104-ABCD
W5NSZ 21,522- 167-102-ABCD
AB5T 14,258- 153- 88-ABD
KA5OXA 1,518- 48- 33-A
KF5M (EM05) 1,127- 26- 23-BCD9E
KF5M (EM18) 1,100- 27- 22-BCD9E
KF5M (EM15) 462- 17- 14-BCD9E
W5MXY (DM85) 312- 14- 12-DE
W5MXY (DM98) 180- 13- 10-ABDE
KF5M (EM86) 119- 8- 7-BCD9E
K5JL (+ K5CBL,N5s DDB,KFS,W5s JCW,KB5,
WA5s CTS,ETV,WDRRY)
377,010- 855-355-ABCD9E

South Texas

N5HHS 96,408- 427-206-ABD
W5SDX 43,920- 289-144-ABDE
W5UWB 36,575- 280-133-ABCD
W5S0BS 27,740- 219- 95-ABCD
W5OZI 22,785- 217-105-AB
WA5YX 12,555- 155- 81-A
N5LKC 3,198- 94- 34-B
WA5S (+ K55FP)
10,270- 128- 79-ABCD
N5MDH (+ K55FIO)
2,100- 75- 28-B

West Texas

WB5CM 61,370- 349-170-ABD
W5AL 37,674- 259-138-ABD
W5SAZI 30,807- 237-127-ABD
KF5M (DM95) 418- 18- 13-ABCD9E
KF5M (DM96) 72- 6- 6-ABCD9E

6

East Bay

KB5DE 68,018- 480-109-ABCD
N6AMG 25,392- 187- 92-ABCD9E
N6GIO 8,442- 134- 63-AB
WB6LRV 5,453- 232- 19-BD

Los Angeles

WB5CPL 89,112- 423-141-ABCD9E
*WB5ODH/6 14,480- 181- 80-A
KA5SNY 858- 39- 22-AB
*K8LMN (DM4) 854- 35- 14-ABCD9E
*K8LMN (DM14) 405- 22- 9-BCD9E
*K6JEY 399- 57- 7-B
W6PFE 84- 14- 6-AB
N6MI (+ N6OPR,WA6HXD,WB5YVP)
44,928- 353-108-ABCD

Orange

WB6FCS 29,412- 218-114-ABCD
K8CH 25,280- 244- 80-ABDE
N6NJL 16,074- 157- 94-ABCD
K6BY 11,340- 128- 70-ABCD
WB9AJZ/6 (DM13)
6,148- 189- 29-BD
N6NVF 3,977- 97- 41-AB
W6SSNN 2,142- 93- 17-SD
W6XD 1,920- 60- 32-AB
K6PFV 924- 33- 26-A
KB6NJ 690- 68- 10-B
WZAFV8 690- 69- 10-B
K1YJ 440- 44- 10-AB
*K8LMN (DM83) 352- 19- 11-ABCD9E
*K8LMN (DM13) 210- 13- 7-BCD9E
W6SX 15- 5- 3-B

Pacific

KH8HI 180- 16- 10-A
KB8SS/KH6 12- 4- 3-A

Santa Barbara

WB8AAG 18,000- 173-100-ABD
W6BCN 5,720- 89- 55-ABD
N6MA 2,992- 60- 44-ABD
*W8HDO 688- 29- 12-D
N6CA (+ AA8RX,A6E,AJ6F,K6AWO,KB8LSE,
N6s GZ,DBS,DLU,KN,LL,PRY,VI,W6s OSM,
OXX,YLZ,W6BTMJ,W6Bs EBB,KWJ,RAY,RJH,
TCR,N6KV)
631,298- 1557-274-ABCD9E
KH6N (+ K6VMN,N6s ENU,HB)
82,248- 514-154-ABCD
N56X (+ WA6FPX)
12,008- 142- 75-ABCDI

Santa Clara Valley
W6RXQ 22,104-222-76-ABCDEF
K6KLY 6,989-101-69-A
K6SLY 5,335-93-55-ABD
K6BAO 2,822-63-34-AB
K6KIM 2,580-76-30-ABCD
K6BING 1,643-53-31-A
W6TUV 918-94-27-A
K6BLJF 540-60-9-B
W6HRK 468-52-9-B
N6RER 24-4-4-BCD
K6RLZJ (+K6RKS) 2,900-95-25-BD

San Diego
N6CW 39,050-275-142-A
K1CTV 17,934-173-98-ABC
W6OYJ 1,515-64-15-BCD
K6IAH 1,170-40-28-ABD
K6SG 484-39-11-BC
W68DTA (+K6IUK,K6DYD,W68BFH) 24,400-201-100-ABCD
W6TBO (+K6SMY) 17,680-193-85-ABCD
W69AJZ/6 (DM22) (+K6SIH) 1,168-53-16-BD
W69AJZ/6 (DM23) (+K6STI) 945-47-15-BD
W69AJZ/6 (DM12) (+K6STI) 8-4-2

San Francisco
N6GLI 17,447-177-73-ABCDEF
W6LLY 7,020-108-65-A
W7KYE 1,848-50-28-ABD
K6ACLB 1,537-53-29-A
W62CWO/6 132-12-11-A
W68PWW (+K6BYRK,N6LJL,W68OCV,W68s W, ZQZ) 62,822-398-142-ABCD

San Joaquin Valley
N6RE 48,376-288-124-ABCD9E
W68YV 10,385-165-83-AB
N6MCK 9,300-128-62-ABD
*K6AMDK 1,482-78-19-B
W66EXV 1,282-46-19-BD
*K6LMM (DM08) 352-14-11-BCD9E
*K6LMM (DM05) 225-11-9-BCD9E
*K6LMM (DM06) 85-7-5-ACD9E
*K6LMM (DM05) 78-6-6-ABC9E
W66QYR 72-6-6-BD

Sacramento Valley
W66VYH 7,906-117-66-A
W7UV 795-53-15-B
W6J 792-66-12-B

7

Arizona
AA7A 37,128-253-138-ABD
K1SIC 22,018-218-101-AB
W670HF 11,684-134-81-ABD
K7ZJK 1,394-41-34-A
K2DNR7 875-33-15-BDE
W67JTM (+N7AMA,W67LYI) 104,148-515-198-ABDL

Idaho
K7TM 37,884-280-132-ABD
W67FSI 32,240-248-130-AB
N7GXS 9,638-122-78-A
K7JL (+W68DYU) 32,103-261-123-AB

Montana
W7HAH 26,448-228-118-AB
*K7IDX 21,112-203-104-A

Nevada
K7CWC 30,989-215-133-ABD
W7KYT 9,300-124-75-AB
K67BCP 4,675-85-55-A
W7ABX 4,360-75-58-A
N7CFC 1,701-66-21-BD
W7LQV 280-26-10-B
NW70 (+N5TX,K67BZ,N78PA,W67JUC) 55,564-317-158-ABDI

Oregon
*W7JXU 23,940-214-95-ABDE
K67CX 18,598-201-82-ABD
W7TZ 3,952-76-52-A
W7TYR 3,900-76-33-ABD
W67TDZ 2,870-110-27-B
W7IMP 1,587-56-23-ABCD
W7VOK 1,235-50-19-ABCD
N7DB (CN85) 1,113-43-21-ABCD
K7HSJ 424-24-6-CDE
K67ZOI (+K67TAM) 2,136-89-24-AB
N7DB (CN93) (+W67EYU) 263-23-11-A

Utah
W6AGPM 31,309-239-131-A
K67WI 16,867-159-101-ABCD
K68ES 9,940-140-71-AB
K6PVS 910-47-14-ABD
N7JA 108-18-6-B
W6SIZJ7 (+N6RMJ) 45,385-299-145-ABDE
K67NS (+K67O) 43,660-292-148-ABD

Washington
NUTZ 22,288-239-76-ABD
W67UUP 13,806-171-54-ABCD9E

NFTX 12,931-191-87-ABC
W67A 12,840-194-50-ABCD
W7FI 10,082-142-71-AB
*N3EG 9,261-158-49-ABCD
W7DZ 2,028-52-39-A
K7TG 1,932-68-28-A
W67VHW 1,770-58-30-B
N7AM 1,512-72-21-B
K7ND 1,139-28-17-D9EF
W7POE 1,028-38-27-A
N7BSN (CN77) 630-38-15-ABD
N7BSN (CN78) 253-23-11-AB
W1PRT 224-24-8-BC
K67HLB 154-22-7-B
W67PEK (+K67ICT,N7COU) 23,940-237-64-ABD

Wyoming
W67KYM 53,215-344-145-ABCD
K67Z (+N7CTM,W67DKZ,W67CJO) 47,334-327-138-ABDE
W67JY7 (+W68SI) 15,300-153-85-ABDEF

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Michigan
W68Q 42,024-270-138-ABCD
K6MD 23,608-188-104-ABCD9E
N6DGN 20,732-225-71-BD
K67Z/6 16,287-183-88-AB
K6JL 14,852-144-94-ABCD
W68B 12,826-242-53-B
W68WAO/8 12,728-146-86-ABD
K6M9 6,314-154-41-B
K68BR 4,773-101-43-ABD
N6FEH 4,407-113-35-B
K6NTK 2,848-89-32-B
K6OOK 2,888-58-46-A
W68MXA 1,421-49-29-AB
N6FJL 1,242-50-23-BD
W68BKC (+K68BSW,N68EM,N68I,W68VPD, W68TG) 269,466-701-281-ABCD9E
N68S (+N68WG,W68G) 40,051-288-121-ABD
N68HS (+K68 VTK,YQY,N68 CUF,HNR,ILF, IMO,IRT,NY8D,W68s AAT,TOM,W68ZFJ) 26,555-226-113-ABD
N68X (+VE3CKU) 18,018-189-91-ABCD
K6J (+N6AS) 1,564-68-23-B

Ohio

K6CCL 64,090-330-170-ABCD
K68ZW 45,698-226-146-ABCD9E
W68PAT 28,000-178-125-ABD
W68CTX 17,066-161-108-AB
N6COC 10,744-153-68-ABCD
W68JAY 7,011-99-57-ABD
W68HG 6,960-119-48-BD
AA8Q 6,801-161-41-B
W68K 5,513-80-37-BD
W68OXK 4,720-80-59-A
K68D 4,345-70-56-ABDE
W68DCX 4,002-79-46-ABD
N68AO 3,498-108-33-B
*K6ZAP 2,730-70-30-ABD
W68R 2,360-51-40-ABD
W68JPP 2,340-66-26-ABCD
W68UD 2,138-69-31-B
K68LM 2,093-91-23-B
K68AN 2,030-50-35-AB
W68JKR 900-50-18-B
K68K 896-58-16-B
W68XT 30-10-2-BC
W68IFP (+K68GAU,K68DDG,K68s FO,YH) 117,183-625-201-ABCD
W68I (N2FRW,K68BAI,K68CF,N68 ALN,ZM, W68ILC,W68SVY,W68s MSF,N68K,ops) 41,238-306-122-ABCD

West Virginia

N6JPR 504-25-8-BD
*W6FK 198-14-14-A
N6DKL (K68s IFC,HOK,K68CO,K68COO, N68s FCJ,FWL,HTR,IQZ,IYU,W68s NJR,OGS, W68IGY,W68ISK,W68VNE,ops) 522,351-1113-381-ABCD9E
K6LZ/6 (K68s DUA,ICH,W68s EQQ,NZL, OYW,W68PSJ,ops) 167,076-571-221-ABCD9E
N68FMD (+K68s ZQP,ZXP,K68BIV,K68S, N68HON,N68K,W68L) 161,356-663-214-ABCD

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Illinois
W68MSV 91,580-361-180-ABCD9E
W68GCB 18,000-161-100-ABD
W68IIX 12,882-149-76-ABDE
W68EX 11,627-151-77-AB
K68OT 7,038-108-69-AB
W68GV 6,435-145-45-B
K68OT 5,220-87-80-A
K68M 4,248-118-36-A
KEFT 4,134-76-53-ABD
N68AQ 3,200-100-32-B
N68VS 2,904-88-33-B
W68V 2,813-97-25-B
N68HWK 1,650-66-25-B
K68HNT 1,456-51-28-ABD
K68CAI 377-29-9-B
K68DLP 261-29-9-B
A6BD (+AF6Z,K68s PW,RO,K68s CK,JYI, N68s EDT,KC,W68s WL,XA,W68SNR) 448,029-955-372-ABCD9EFGHJ

W68UD (+W68MY,AE9M,K68s AKS,CHZ,NN9K, W68QPI,N68CH) 208,290-850-265-ABD
N6JF (+K68Q,N68F,N68G,N68M,N68C,N68T) 61,464-371-156-ABD
W68Y (K68s WGN,ZKJ,K68DI,ops) 5,048-99-51-AB

Indiana

W68EP 38,720-320-121-A
N689 32,718-265-114-ABCD
K68I 32,400-229-120-ABDE
A6JC 8,570-130-88-ABDE
W68VW 8,838-188-47-B
AF9L 1,836-64-34-A
K68MRI/9 (+N68CGH,K68s DZM,W68R) 30,192-248-111-ABCD
W68CSF (K68s ET,DZE,K68BHW,K68RCP, N68N,N68H,N68Y,N68Z,W68EIX,ops) 29,348-235-118-ABCD
W68Y (K68s CCN,CCR,SBJ,K68R9G,ops) 19,044-203-82-ABCD

Wisconsin

W68KVS 9,394-122-77-A
K68HL 3,214-82-27-B
W68LZM 1,750-50-35-AB
W68NAW 1,715-49-35-A
K68TH 1,475-59-25-B
N68TD 1,383-41-29-ABD
W68YCV 364-26-14-B
W68UC/9 (+N68 BKC,BSH,W68QMX) 185,242-577-259-ABD
N68XA (+W68TAE) 14,872-150-88-ABD
W68SSO (+K68S,K68WJ) 1,100-95-20-B

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Colorado
W68CRS 92,062-448-191-ABCDE
K68Z 19,314-150-87-ABDEFGH
K68OT 10,804-138-74-AC
AAZL 7,935-105-69-ABD
N68EQ 3,840-98-40-B
N68ZA 1,230-41-30-AB
W68MY (DM87) 630-24-18-ABDE
W68MY (DM88) 418-19-13-ABDE
K68MO 234-28-9-B
N68HX 4-2-2-B
W68EA (+W68AL,AA8P,K68L,N68 BRL,DVL) 154,800-821-240-ABDE
W68IA (W1XE,K68DXM,K68U,W68J,ops) 46,916-285-148-ABD
K68ENT (+N68BA,K68TYU,K68s WIQ,ZOO, K68VOY,K68J,W68s HNP,HNQ) 36,120-374-129-AB
K68SR (+W68JAP,K68WOY,K68J,N68MH) 34,884-301-114-ABD
K68JJK (+N68TI,K68BAH,N68YB) 20,485-212-85-ABCD

Iowa

W68CQO 31,472-281-112-A
*W68ZG 27,819-287-99-ABD
W68FOY 18,788-176-102-ABD
N68FPD 17,794-204-82-ABCD
W68RAP 9,968-90-66-BDE
K68BT 8,284-143-58-A
K68TLJ 3,380-112-30-B
K68RN 3,276-78-42-A
W68I 1,323-49-27-B
W68PK (+W68WYU) 23,220-236-90-ABDE

Kansas

N68LL 124,341-546-217-ABD
W68HYV 36,680-253-131-ABD
N68FO 30,854-240-117-ABDE
W68RT 13,376-152-68-AB
K68SM 12,096-109-84-BCDE
K68J 6,208-97-64-A
W68MY (DM97) 1,785-42-35-ABDE
W68MY (DM98) 1,200-37-25-ABDE
N68IG 1,144-52-22-B
W68G 1,128-47-24-B
K68M (EM09) 838-23-19-ABCD9EF
K68VUA 476-26-14-BD
K68M (EM17) 462-19-14-ABCD9E
K68M (EM88) 434-15-14-ABCD9EF
K68M (EM18) 406-14-14-ABCD9EF
K68M (EM16) 240-12-10-ABCD9E
W68MY (DM99) 180-11-9-BDE
K68M (EM07) 162-9-9-ABCD9EF
K68M (DM97) 136-8-8-BCD9E
W68DRL (+W68VZL,N68GV,AB8S,K68HH, K68GT,K68O,W68TKI) 588,072-1089-428-ABCD9EF

Minnesota

K68ZQ 40,688-278-137-ABD
K68R 31,968-195-144-ABDE
W68BWE 26,880-208-120-ABD
N68GL 11,700-150-78-A
N68JL 2,769-71-39-AB
W68PHW/6 (+W68GGM) 21,293-178-107-ABDE

Missouri

K68TLM 129,285-504-221-ABCD
N68FQW 63,627-345-167-ABD
N68X 55,825-351-146-ABD
W68RP 29,952-207-128-ABCD

W68ZQ 12,191-187-73-A
A6BE 7,308-116-63-AB
K68BA (+K68GGI,W68Y) 77,792-497-176-ABCD
W68SKE (+W68JUC) 2,262-58-38-ABD

North Dakota

*K68R 8,704-92-62-A
K68LL (+W68ZQ) 41,844-294-132-ABD

Nebraska

K68JGH 51,051-357-143-A
W68J 30,008-243-121-ABD
N68TN 19,483-158-101-ABCD
N68ZZ 15,050-175-86-A
W68BQM 10,530-129-79-ABD
K68CR 8,909-100-59-BCDE
K68AV 7,956-117-68-A
K68LA 4,880-80-81-A
W68VMO 5,950-35-17-B
W68KB (+N68JU,W68ASD) 30,607-241-127-AB

South Dakota

K1LLW 71,908-458-157-A
W68ULX 3,922-74-53-AB

VE

Maritime-FLD
VE1MUF (VE1s BF,TE,XH,ops) 6,100-120-50-ABD

Quebec

VE2DUB 22,834-180-98-ABD

Ontario

VE3ASO 132,870-499-215-ABCD9E
VE3FGU 58,420-384-155-AB
VE3KDL 26,986-204-119-ABD
VE3FGN 16,192-170-88-ABCD
VE3JAR 14,320-161-69-A
VE3PCW 8,160-170-48-B
VE3EYR 4,888-88-47-ABCD
VE3ETQ 1,408-44-32-AB
VE3FUJ 322-23-14-A
VE3LNX (+VE3s AGD,NSO) 222,587-641-253-ABCD9E
VE3SAU (VE3s FHK,FHU,MYO,NP8,OJN,OAF, OIL,SGD,ops) 12,284-140-86-ABD
VE3QST (VE3s AUJ,GRO,ops) 10,850-175-50-BD

Saskatchewan

VE5UF 28,520-230-124-A
VE5LY 11,952-144-83-A

Alberta

VE6BJ 423-47-9-B
VE6AFO (+VE6EY) 20,284-195-98-ABD
VE6JW (+W68TMC) 6,868-99-68-ABD

British Columbia

VE7ASI 1,140-55-20-ABC
VE7PRC (VE7s ASY,BEE,DAN,GSB,RJ,TJ,ops) 2,475-71-33-ABD

Marine Mobile

VE3YRAMM (VE3s AAY,ORE,OXD,SST,WHY,ops) 7,194-103-68-ABD

DX

Bahamas
KB4CRT/CSA 20,832-217-98-A

St Pierre & Miquelon

FPK43B 184-23-8-A

Korea

HL9TM (+HL9CB) 8,658-220-39-ABD

Guam

K6GDY 532-58-14-A

Cayman Islands

ZF2BL (K6QF,W2GU,ops) 5,734-122-47-A

United Nations Headquarters

U1UN (K68RS,K1GX,K61KPH,N61I,W1s OD,OX, K68GM,NJL,W2TMM,W68ZONA,W68BQ,N4MM, ops) 382,998-1180-231-ABCD9E

Checklogs

K61CLV,K682F,N3EAX,W68AXV,W68PCD, K68AGJ,W68EEA,K68JCA,VE3DNR

Disqualification

K68NNO

Results, 1988 UHF Contest

"I'm submitting my log to show support for this contest."—WØRAP

By Billy Lunt, KR1R and Mark Gamble, N1FOZ
Contest Manager Assistant Contest Manager

The ARRL UHF Contest is an annual affair that features the bands 220 MHz and above. It offers 24 jam-packed hours of home stations, mountaintoppers and grid-expeditioners not having to worry about keeping the 6- and 2-meter stations going. Unfortunately, many who regularly populate the June and September VHF contests have forsaken this really fun first-weekend-in-August affair. Some are simply not aware that a great deal of excitement awaits them in the world above 220 MHz. For example, it's a great opportunity to test the UHF bands in preparation for the September contest.

The bread-'n'-butter band for this contest is 70 cm. It's a good place to start if you are planning on improving your present 50-MHz and/or 144-MHz station.

The summer of '88 saw an exponential spurt in 903-MHz activity, as more and more stations acquire capability on this band. As Ken, WIRIL, noted: "It was great to see 903 MHz rising up to its potential... in another year it will be exceeding 1296 MHz in QSOs and grids." There's lots of good info now out there on getting on 33 cm, so it's not difficult to keep pace.

What better way to show support for the 220-MHz band than by active participation? Or as W1JR observed: "220-MHz activity was great for an endangered species." K5UGM did this cheer-leading: "I'm trying to get my 220-MHz VUCC before the FCC gives the lower 2 MHz to UPS. Give 'em hell, ARRL!"

Featured in our rare square cubicle, we applaud WW4T in EM54, K1GX in FN53 and WB8IGY who radioactivated 10 different grids in the EN field. Out west, W6DUE (N6DLU and WA6OTU operators) did the same from four DM squares. A heap of "ataboys" for these superlative efforts.

Such activity contributes to maximizing the scores of all participants... with some more maximum than others. K2LNS was the single-op standout from his familiar WA2FGK/3 venue, putting impressive numbers on the board—119k points. Somewhat west of the population mainstream, VE3LNX made the hi-fivers (see box). Nice going Victor! W2SZ/1 made its most impressive multi-op showing to date, this time racking up 390k on all bands through 24 GHz—a new contest record. Their annual presence just about "makes" this

Single Operator Top Five

Call	Score
WA2FGK/3 (K2LNS,op)	119,364
K2SMN	84,000
WC2K (N2SB,op)	80,652
VE3LNX	66,240
N3CX	56,640

Multipoperator Top Five

Call	Score
W2SZ/1	390,195
WB5LUA	59,853
W3KWH	44,352
K1GX	31,044
WD8ISK	24,180

contest. Interestingly, the remaining multi-op hi-fivers were scattered all over the map, most notably WB5LUA with a second-place score of just under 60k. See the boxes and score listings for the true tale of the tape.

Of historic proportions, Oregon's WA3RMX/7 (running 3.5 mW) and K7AUO set a new world 47-GHz record of 65.37 miles, using SSB, no less. Using all home-brew equipment, RMX noted "signals fading up to S3 and better after the clouds lifted above the path."

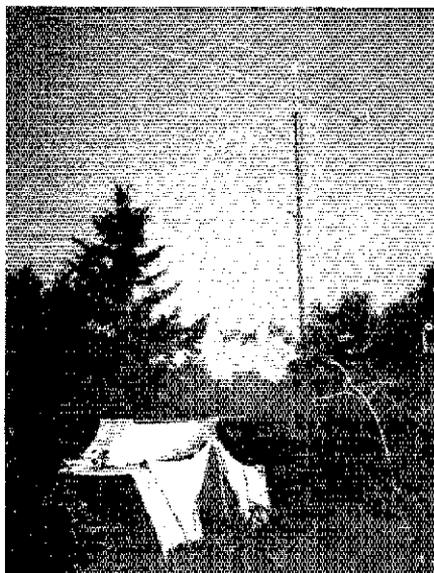
Even with the tremendous effort displayed by this year's entrants, the ARRL UHF Contest still lacks one important ingredient: more participants. To solve this, we propose to challenge all those who have already discovered the joys of UHF operating. Each and every participant is challenged to recruit a new entry for next year's contest. This is done *now* so that the new enlistees have time to gear up for at least one of the UHF bands. Fertile recruitment ground may include the many who now just operate either 6 or 2 meters. There's a lot of activity in June and September on those bands from those who don't yet have higher-band capability. You can be an Elmer to someone getting on 432 MHz, for example, for the first time. How about helping a Novice set up his 220 station? Enlighten those who don't know how effective UHF communication can be, and thus produce more contacts for everybody in next year's UHF contest. We're serious. Next year's log summary will ask you to identify your recruit-a-friend. Get started today!—W1XX



Dick, WA2AAU, takes a final look at the microwave antennas located atop Mt Greylock at record-breaking W2SZ/1's multiop site.

SOAPBOX

Would you believe a 902-MHz AM (Ancient Modulation) QSO with AF1T? I scored a personal best on 902 MHz, 1296 MHz, and 2304 MHz (N11W). I operated from home during the hot afternoons. Conditions were mediocre at best (AF1T). I was a little uncertain as to whether I should break in when stations were making skeds for other bands. Next time I'll have to, so I can have



The 220- and 902-MHz operating tent located at the multiop mountaintopping expedition to Maine by K1GX and crew.

a bit more competitive score (N1FOZ). I had somewhat of a slow start in this one. I didn't get the 1296-MHz system going until 5 hours after the contest started (K1LPS). I heard VE3ASO on 1296, but couldn't complete the QSO. Hopefully I'll have better luck next time (NA1W). This was my first single-op effort in this contest. It was a blast! I should have my tower up at my new house soon and am looking forward to next August from home (N2SB). My shack was very hot, 85 degrees

(WA2EUS). Activity a bit better on 220 MHz, but propagation was normal (K2GK). No time to operate, but I got one new grid, TNX to K1GX (K2OVS). I was surprised at what 10 watts will do on 432 MHz (KZ3X). Conditions were very poor from Southern Delaware (N2WK). Where was everyone? I spent more time on 2 meters, working tropo, than I did on 432 MHz (AA5AM). Conditions were very poor on all 3 bands (W6OYJ). Most quiet UHF contest I've ever heard. I spent most of

the time giving out rare grid DM45 on 2-meter SSB (K6LMN/7). Many thanks to John, WB8IGY, for the many grids he gave us on 220 and 432 while on his grid-expedition (WB8BKC). Poor conditions! (K8MD). WW4T in EM54 was a nice surprise on 220 MHz (WB9OJR). There wasn't enough activity. This contest needs to be talked up more, as many didn't know that it was on! (NJ0X). Conditions were only fair and the activity was very low (W0JRP).

Scores

Score lines indicate call sign, total score, QSOs, multipliers and bands operated (C = 220 MHz, D = 432 MHz, 9 = 902 MHz, E = 1296 MHz, F = 2.3 GHz, G = 3.4 GHz, H = 5.7 GHz, I = 10 GHz, J = 24 GHz, K = 48 GHz, L = Light) and ARRL Section. Example: WA2FGK/3 (K2LNS,op) 119,384- 71-34-C-EPA 94-34-D 83-33-D 25-17-9 39-22-E 12-9-F K2SMN 84,000- 51-27-C-SNJ 83-33-D 29-18-9 44-22-E 79-32-D 20-11-9 38-18-E 10-6-F N3CX 56,640- 55-24-C-EPA 71-28-D 24-15-9 15-6-E 8-7-F KD5RO 33,327- 21-16-C-WNY 34-20-D 17-13-9 20-12-E 8-8-F KB3QM (N2WK,op) 20,754- 35-18-C-DE 49-18-D 9-6-9 18-10-E 9-8-F WA3JUF 24,960- 21-9-C-EPA 39-18-D 13-7-8 27-13-E 5-4-F W2EIF 18,284- 33-13-C-SNJ 35-17-D 6-4-9 11-8-E 4-4-F WA3NUF 14,846- 22-15-C-EPA 34-18-D 13-11-E 6-5-F K2GK 14,904- 51-28-C-WNY 41-25-D WB3FAA 10,787- 32-13-C-EPA 25-13-D 11-9-9 9-5-E K2OS 8,520- 71-40-C-WNY W2CNS 6,975- 43-21-D-WNY 16-10-E WB2DQCJ 5,145- 40-28-C-WNY 9-7-D WB2YEH 4,564- 10-5-C-SNJ 13-5-D 8-5-9 9-5-E 3-2-F KAZWKA 4,050- 43-19-C-SNJ 11-6-D WA3EOQ 3,896- 18-10-C-MDC 21-13-D 4-3-E WA2ONK 2,592- 54-18-D-SNJ W3CL 2,550- 22-7-C-EPA 28-10-D KZ3X 1,134- 27-14-D-EPA K3AKR 1,050- 14-6-C-MDC 11-8-D KU2A 429- 5-5-C-WNY 4-4-D 1-1-9 1-1-E NS2P 36- 2-1-C-WNY 4-1-D W3KWH (N3EOP,W3HH,WA3TTS, WB3EML,ops) 44,352- 31-22-C-WPA 51-27-D 17-14-9 22-19-E 1-1-H 3-14

Atlantic Division

WA2FGK/3 (K2LNS,op) 119,384- 71-34-C-EPA 94-34-D 83-33-D 25-17-9 39-22-E 12-9-F
K2SMN 84,000- 51-27-C-SNJ 83-33-D 29-18-9 44-22-E 79-32-D 20-11-9 38-18-E 10-6-F
N3CX 56,640- 55-24-C-EPA 71-28-D 24-15-9 15-6-E 8-7-F
KD5RO 33,327- 21-16-C-WNY 34-20-D 17-13-9 20-12-E 8-8-F
KB3QM (N2WK,op) 20,754- 35-18-C-DE 49-18-D 9-6-9 18-10-E 9-8-F
WA3JUF 24,960- 21-9-C-EPA 39-18-D 13-7-8 27-13-E 5-4-F
W2EIF 18,284- 33-13-C-SNJ 35-17-D 6-4-9 11-8-E 4-4-F
WA3NUF 14,846- 22-15-C-EPA 34-18-D 13-11-E 6-5-F
K2GK 14,904- 51-28-C-WNY 41-25-D
WB3FAA 10,787- 32-13-C-EPA 25-13-D 11-9-9 9-5-E
K2OS 8,520- 71-40-C-WNY
W2CNS 6,975- 43-21-D-WNY 16-10-E
WB2DQCJ 5,145- 40-28-C-WNY 9-7-D
WB2YEH 4,564- 10-5-C-SNJ 13-5-D 8-5-9 9-5-E 3-2-F
KAZWKA 4,050- 43-19-C-SNJ 11-6-D
WA3EOQ 3,896- 18-10-C-MDC 21-13-D 4-3-E
WA2ONK 2,592- 54-18-D-SNJ
W3CL 2,550- 22-7-C-EPA 28-10-D
KZ3X 1,134- 27-14-D-EPA
K3AKR 1,050- 14-6-C-MDC 11-8-D
KU2A 429- 5-5-C-WNY 4-4-D 1-1-9 1-1-E
NS2P 36- 2-1-C-WNY 4-1-D
W3KWH (N3EOP,W3HH,WA3TTS, WB3EML,ops) 44,352- 31-22-C-WPA 51-27-D 17-14-9 22-19-E 1-1-H 3-14

Central Division

WB9MSV 7,722- 12-8-C-IL 42-18-D 12-7-E
WB9OJR 4,725- 22-19-C-IL 23-16-D
W8UC9 3,042- 8-7-C-WI 29-18-D 1-1-E
NN9K 510- 17-10-C-IL

Dakota Division

WB0GGM (+WA2PHW,KB0ZC) 1,104- 3-3-C-MN 12-9-D 4-4-E

Delta Division

K5UR 4,988- 10-10-C-AR 24-20-D 6-6-E
K5YY 1,296- 24-18-D-AR N4VC (+WB4KNF) 1,368- 13-10-C-TN 11-9-D

Great Lakes Division

WB8BKC 47,874- 40-24-C-MI 78-30-D 12-10-9 24-13-E 3-2-F
KB2ZW 12,900- 19-13-C-OH 23-18-D 11-11-9 11-10-E
WA8VDP 11,888- 19-12-C-MI 39-18-D 8-7-9 7-5-E 1-1-F
K8MD 10,080- 24-16-C-MI 28-15-D 7-6-9 7-5-E
WB8K 6,831- 69-33-C-OH
WB8PAT 5,760- 20-14-C-OH 20-12-D 10-6-E
WG8Q 5,022- 26-12-C-MI 38-15-D
WB8WAO/8 5,022- 30-18-C-MI 24-13-D
K8TL 2,400- 12-7-C-OH 3-2-E
WB8IGY (EN82) 1,080- 14-8-C-MI 11-6-D
WB8IGY (EN85) 627- 9-5-C-MI 10-6-D
WB8IGY (EN75) 495- 8-6-C-MI 7-5-D
WB8IGY (EN83) 495- 8-6-C-MI 7-5-D
WB8IGY (EN84) 432- 7-4-C-MI 9-5-D
WB8IGY (EN73) 297- 7-5-C-MI 4-4-D
WB8IGY (EN81) 188- 4-3-C-OH 4-4-D
WB8IGY (EN78) 144- 6-4-C-MI 2-2-D
WB8IGY (EN74) 144- 5-4-C-MI 3-2-D
WB8ISK (WA8OGS,W8VNS,ops) 24,180- 34-24-C-OH 38-21-D 12-10-9 14-10-E
NM8X (+VE3CKU) 15,120- 43-24-C-MI 62-24-D

Hudson Division

N2BJ 43,371- 63-21-C-ENY 90-20-D 14-8-9 28-12-E
N2CEI 4,752- 66-24-C-NNJ

WA2EUS 1,404- 20-8-D-NJ 8-5-E
WA2RUW 1,053- 27-13-C-ENY
K2OVS 405- 15-9-D-NJ
WA2BAH 90- 9-2-C-ENY 1-1-D
K2BJG (+WB2RFB) 6,831- 31-15-C-NNJ 24-13-D 7-5-E
W2AWX (+AB2) 6,642- 50-18-D-ENY 18-9-E

Midwest Division

WA0TKJ 10,458- 12-10-C-KS 35-20-D 2-2-9 14-9-E 1-1-F
NJ8X 3,159- 8-6-C-MO 21-16-D 8-5-E
WB8AP 1,764- 18-18-D-IA 5-5-E
WB8JP 1,056- 9-8-C-MO 13-8-D
N8BTN 189- 6-4-C-NE 3-3-D

New England Division

AA2Z 53,722- 57-23-C-CT 141-38-D 35-16-9 57-23-E 41-14-F 25-8-G 21-7-H 25-7-I 4-3-J
W1RIL 45,384- 42-16-C-WMA 54-16-D 25-12-9 33-11-E 8-7-F
WA2TEO 35,138- 64-26-C-CT 71-28-D 24-12-E 47-19-C-CT 25-13-E
K1PXE 26,208- 47-19-C-CT 71-20-D 33-15-E
W1JR 24,790- 29-13-C-EMA 37-16-D 12-9-9 20-12-E 4-3-F
KF6AJ 18,500- 30-14-C-CT 39-14-D 13-8-9
NI1W 16,320- 30-11-C-NH 15-8-9
WB1FKF 14,391- 19-11-C-EMA 28-13-D 9-5-9 14-6-E 7-3-F 1-1-G
AF1T 11,700- 38-15-C-NH 44-19-D 9-5-9
K1TR 10,656- 47-20-C-NH 49-17-D 40-15-C-RI 52-19-D
W1GRW 9,072- 20-11-C-CT 28-13-D 9-6-9
K1LPS 8,547- 36-14-C-VT 21-14-D 10-9-E
KB1I 8,532- 25-14-C-CT 54-22-D 29-12-D
K1FO 7,344- 72-34-D-CT 8-3-E
AC1J 6,080- 25-14-C-NH 29-12-D
K1ISW 5,382- 28-11-C-WMA 35-12-D 3-3-E

WA1MBA 5,328- 20-10-D-WMA 8-5-9 13-7-E 3-2-F
AB1U 4,850- 13-9-C-CT 18-8-D 8-8-9 7-5-E
NA1W 2,394- 28-14-D-WMA 7-5-E
W3HQT 2,214- 27-13-D-ME 7-5-E
W1AIM 1,933- 13-9-C-VT 14-10-D 2-2-E
K1EM 1,305- 6-5-C-CT 23-10-D
K1VZJ 1,248- 12-8-C-EMA 10-4-D 5-3-9
N1FOZ 105- 7-5-D-CT
W2SZ/1 (KA1DZV,KC1EB,N1FGY, WA1zMS,ZYV,WB1HH,KA2sFWN, LIV,ZPX,KB2s DGA,HQ,N2s BNY, SXH,HFK,HPA,ICQ,W2JVF,WA2s AAU, RKN,SCA,SPL,WB2s KMY,WHD, WA8USA,ops) 390,195- 108-29-C-WMA 141-38-D 35-16-9 57-23-E 41-14-F 25-8-G 21-7-H 25-7-I 4-3-J
K1GX (+W1X0) 31,044- 46-17-C-ME 59-17-D 15-6-9 22-9-E 5-3-F

Northwestern Division

WA3RMX 1,656- 1-1-C-OR 1-1-D 3-3-F 2-2-G 1-1-H 4-3-I 1-1-K
W7TYR 330- 5-1-C-OR 3-1-D 3-2-E 2-1-I 4-1-C-OR 2-1-D 3-2-E
W7IDZ 3- 1-1-D-WA
K7AUO (W7UDM,W7UNU,ops) 1,140- 5-2-C-OR 3-1-D 3-2-E 3-2-F 1-1-G 2-2-I
K7AUO (K7RUN,W7ADV,W7GFP,ops) 930- 2-2-C-OR 1-1-D 3-3-F 1-1-G 1-1-H 1-1-I 1-1-K
Rocky Mountain Division
W8KJY 1,521- 2-2-C-CO 9-5-D 4-3-E 2-1-F 3-2-G
Roanoke Division
K4LHB 11,868- 33-18-C-VA 33-19-D 10-9-E
K4QIF 10,320- 52-28-D-VA 17-12-E
N4HB 1,328- 17-11-C-VA 9-6-D

Southeastern Division

WS4F 4,230- 13-11-C-GA 14-11-D 1-1-9 7-5-E 1-1-F
WB4SLM 3,625- 11-8-C-GA 20-10-D 10-7-E
KX4R 1,824- 32-19-D-GA

Southwestern Division

W6CPL 5,798- 22-5-C-LAX 20-8-D 3-8-9 14-6-E 4-2-I
WA5BNH 930- 4-2-C-SDG 12-5-D 7-4-E
W8OYJ 945- 5-2-C-SDG 6-4-D 6-3-I
WA6EXV 180- 5-3-I-ORG
K8LMN/7 166- 7-4-D-AZ 2-1-E

K6TZ (W1UQU,N8KTH,WA6s MBZ, VNN,WB80B,W6ETK,WB9KMO,ops)

12,000- 91-5-C-SB 43-5-D 5-2-9 16-4-E 3-2-I 7-2-C-SDG 399- 8-3-D 2-2-E
W8UE (DM12) (N6DLU,WA8OTU,ops) 364- 1-1-C-ORG 4-4-D
W8UE (DM14) (N6DLU,WA8OTU,ops) 120- 3-1-C-ORG 3-2-D 2-1-E
W8UE (DM04) (N6DLU,WA8OTU,ops) 27- 2-2-C-LAX 1-1-D

West Gulf Division

K5UGM 510- 17-10-C-NTX
AA5AM 384- 16-8-D-NTX
WSUWB 48- 2-2-C-STX 2-2-D
WBSLUA (+AASG,K5ASZ,KF5N, N5EQT,WA6s TKU,WJ8) 59,852- 24-13-C-NTX 47-20-D 11-6-9 24-12-E 14-8-F 7-3-G 6-4-H 8-5-I

Canada

VE3LNX 66,240- 37-22-C-ON 55-25-D 23-17-9 29-18-E 11-10-F
VE3ASO 19,152- 34-20-C-ON 38-19-D 7-7-9 14-11-E
VE2DUB 5,148- 20-15-C-PQ 22-15-D 5-3-E
VE3DSS 3,915- 18-18-C-ON 17-9-D 5-4-E
WB8IGY/VE3 36- 4-3-C-ON (EN77)

Checklog

KH6CP1



Rules, 1989 ARRL International DX Contest

1) **Eligibility:** Amateurs worldwide.

2) **Object:** W/VE amateurs work as many amateur stations in as many DXCC countries of the world as possible on 1.8 to 30 MHz, excluding the 10, 18 and 24-MHz bands. Foreign amateurs work as many W/VE stations in as many states and provinces as possible.

3) **Dates**

(A) **CW**—Third full weekend in February (February 18-19, 1989).

(B) **Phone**—First full weekend in March (March 4-5, 1989).

4) **Contest Period:** 48 hours each mode (separate contests). Starts 0000 UTC Saturday; ends 2400 UTC Sunday.

5) **Categories**

(A) **Single Operator**—One person performs all operating and logging functions. Use of spotting nets (operating arrangements involving assistance through DX-alerting nets, etc) is not permitted. Single-operator stations are allowed only one transmitted signal at any given time. (Note: This does not permit multiple single-band entries from the same station).

(1) *All band.*

(2) *Single band (one only).* Single-band entrants who make contacts on other bands should submit logs for checking purposes.

(B) **Multiplexer**—More than one person operates, checks for duplicates, keeps the log, etc.

(1) *Single Transmitter.* One transmitted signal at any given time. Once the station has begun operation on a given band, it must remain on that band for at least 10 minutes; listening time counts as operating time. Multiplexer, single transmitter stations must keep a single, chronological log for the entire contest period. Violation of the 10-minute rule or improper logging will result in an entrant's reclassification to the unlimited multi-multi class (see below).

(2) *Two transmitter.* A maximum of two transmitted signals at any given time, on different bands. Once either station has begun operation on a given band, it must remain on that band for at least 10 minutes; listening time counts as operating time. Both transmitters may work any and all stations; the second transmitter is *not* limited to working new multipliers only. *Each of the two transmitters must keep a separate, chronological log for the entire contest period.* Violation of the 10-minute rule by either or both transmitters or improper logging will result in an entrant's reclassification to the unlimited multi-multi class (see below).

(3) *Unlimited.* A maximum of one transmitted signal per band at any given time. Unlimited multi-multi stations must keep a separate, chronological log for each band for the entire contest period.

(C) **QRP**—Single operator, all band only. QRP is defined as 5-W output or less.

6) **Contest Exchange**

(A) W/VE stations (including 48 con-

tiguous United States and does not include Canadian islands of St Paul and Sable) send signal report and state or province.

(B) DX stations send signal report and power (three-digit number indicating approximate transmitter output power).

7) **Scoring**

(A) **QSO Points**—W/VE stations count three points per DX QSO. DX stations count three points per W/VE QSO.

(B) **Multipplier**—W/VE stations: Sum of DXCC countries (except US and Canada) worked per band. DX stations: Sum of US states (except KH6/KL7) and District of Columbia (DC), VE1-8, VO, VY1 (Yukon is separate from VE8) worked per band. Maximum of 59 per band.

(C) **Final Score**—QSO points \times multiplier = final score.

8) **Miscellaneous**

(A) Call signs and exchange information must be received and logged by each station for a complete QSO.

(B) All operators must observe the limitations of their operator licenses and station licenses at all times.

(C) Your call sign must indicate your DXCC station location (KH6XYZ/W1 in Maine, FG0AAA/FS on St Martin, etc).

(D) One operator may not use more than one call sign from any given location during the contest period.

(E) The same station may be worked only once per band—no crossmode or repeater contacts.

(F) Aeronautical and maritime mobile stations outside the US and Canada may not be worked for QSO or multiplier credits by W/VE stations.

(G) All transmitters and receivers must be located within a 500-meter-diameter circle, excluding directly connected antennas. This prohibits the use of remote receiving installations. Exception: Multiplexer stations may use spotting nets for multiplier hunting only.

(H) The use of non-Amateur Radio means of communication (eg, telephone) for the purpose of soliciting a contact (or contacts) during the contest period is inconsistent with the spirit and intent of this announcement.

9) **Reporting**

(A) All entrants are encouraged to use official forms available from ARRL (SASE with 2 units of First Class postage or 3 IRCs) to report contest results.

(B) Logs must indicate times in UTC, bands, calls and complete exchanges. Multipliers should be clearly marked in the log the first time worked. Entries with more than 500 QSOs total must include cross-check sheets (dupe sheets).

(C) All operators of multiplexer stations must be listed.

(D) Entries must be postmarked within 30 days after the last contest weekend

(April 5, 1989). Logs not postmarked by the deadline will be classified as checklogs; no extensions, no exceptions. All stations are requested to send their entries in as early as possible. Entries received after mid-July will not make QST listings.

10) **Awards:** Plaques will be awarded in the following categories for both the CW and phone contests.

(A) Top W/VE scorer in each entry category—single operator-all band-high power, single operator-all band-low power, single operator-single band (1.8-28 MHz), QRP, multiplexer-single transmitter, multiplexer-two transmitter, multiplexer-multitransmitter.

(B) Top scorer in the single operator-all band category worldwide and on each continent. In addition, worldwide leaders in the single operator-single band, QRP, multiplexer-single transmitter, multiplexer-two transmitter and multiplexer unlimited categories will receive plaques.

(C) Additional special plaques will be awarded as sponsored. See January 1988 QST for current list.

(D) Certificates will be awarded to top single operator-all band entries from each country and ARRL Section; top single-band entries in each US call area and each country; top multiplexer entries (single, two and multi-transmitter) in each country, US call area and in Canada. Additional single-band and multiplexer certificates will be awarded if significant effort or competition is displayed. DX entrants making more than 500 QSOs on either mode will receive certificates.

11) **Club Competition:** ARRL-affiliated clubs compete for gavels on three levels: unlimited, medium and local clubs. Details will be listed in January 1989 QST.

12) **Condition of Entry**

(A) Each entrant agrees to be bound by the provisions, as well as the intent, of this announcement, by regulations of his or her licensing authority and the decisions of the ARRL Awards Committee.

(B) **Disqualification:** An entry may be disqualified if the overall score is reduced by more than two percent. Score reduction does not include correction of arithmetic errors. Reductions may be made of unconfirmed QSOs or multipliers, duplicate QSOs or other scoring discrepancies. An entry *will* be disqualified if more than two-percent duplicate QSOs are claimed for credit. For each duplicate or miscopied call sign removed from the log by ARRL, three additional QSOs will be deleted as a penalty. The penalty will not be considered as part of the two-percent disqualification criterion. If a participant is disqualified, that operator will be barred from entering the contest on that mode the following year. The calls of all disqualified participants will be listed in the QST contest results. □

Rules, 42nd January VHF Sweepstakes

1) **Object:** To work as many amateur stations in as many different $2^\circ \times 1^\circ$ grid squares as possible using authorized frequencies above 50 MHz. Foreign stations work W/VE amateurs only.

2) **Contest Period:** Begins 1900 UTC Saturday, Jan 14, and ends at 0400 UTC Monday, Jan 16.

3) Categories

(A) **Single Operator, Single Band:** One person performs all operating and logging functions. All QSOs for score listings in *QST* must be made on one band. Single-band entries may, however, submit QSOs made on other bands for credit in ARRL-affiliated club competition.

(B) **Single Operator, All Band:** One person performs all operating and logging functions.

(C) **Single Operator, QRP Portable:** Run 10-W output or less using a portable power source from a portable location. The intent of this rule is to encourage operation from "remote" locations, not to have home or fixed stations run low power.

(D) **Multioperator:** Those obtaining any form of assistance, such as the use of relief operators, loggers or spotting nets. All equipment (including antennas) must be located within a 300-meter-diameter circle.

4) **Exchange:** Grid-square locator (see Jan 1983 *QST*, p 49). Example: WIAW in Newington, Connecticut would send FN31. Exchange of signal report is optional.

5) Scoring

(A) **QSO points:** Count one point for each complete two-way 50- or 144-MHz QSO. Count two points for each 220- or 432-MHz QSO. Count four points for each 902- or 1296-MHz QSO. Count eight points for each 2.3-GHz-or-higher QSO.

(B) **Multiplier:** The total number of different grid squares worked per band during the contest. Each different $2^\circ \times 1^\circ$ grid square counts as one multiplier on each band it is worked.

(C) **Final score:** Multiply the total number of QSO points from all bands operated by the total number of multipliers for final score (see scoring example).

6) Use of FM

(A) Retransmitting either or both stations, or use of repeater frequencies, is not permitted. This prohibits use of all repeater frequencies. Contest entrants may not transmit on repeaters or repeater frequencies on 2 meters for the purpose of soliciting contacts.

(B) Use of the national simplex frequency, 146.52 MHz, or immediate adjacent guard frequencies is prohibited. Contest entrants may not transmit on 146.52 for the purpose of making or soliciting QSOs. The intent of this rule is to protect the national simplex frequency from contest monopolization. There are no restrictions on the use of 223.50 MHz.

(C) Only recognized simplex frequencies may be used, such as 144.90 to 145.00; 146.49, .55 and .58, and 147.42, .45, .48, .51,

.54 and .57 MHz on the 2-meter band. Local-option simplex channels and frequencies adjacent to the above that do not violate the intent of (A) or (B) above or the spirit and intent of the band plans as recommended in the *ARRL Repeater Directory* may be used for contest purposes.

7) Miscellaneous

(A) **Stations may be worked for credit only once per band from any given grid square, regardless of mode.** This does not prohibit working a station from more than one grid square with the same call sign. Such a roving station, however, must submit a separate entry for each grid square from which operation takes place. In this situation, the entrant may opt to waive rule 7 (C) and use a single different call sign from each different grid square. Crossband QSOs do not count. Aeronautical mobile contacts do not count.

Scoring Example

Band (MHz)	QSOs	QSO Points	Grid Squares
50	25 (x1)	25	10
144	40 (x1)	40	20
220	10 (x2)	20	5
432	15 (x2)	30	10
902	36 (x4)	144	9
1296	5 (x4)	20	3
2304	1 (x8)	8	1
5760	1 (x8)	8	1
Totals	133	295	59

Final Score = (QSO Points) \times (Total no. of Grid Squares) $17,405 = 295 \times 59$

(B) Partial QSOs do not count. Both calls, the full exchange and acknowledgment must be sent and received.

(C) A transmitter used to contact one or more stations may not be used subsequently under any other call during the contest period (with the exception of family stations where more than one call is assigned to one location by the FCC/COM Canada); one operator may not give out contest QSOs using more than one call sign from any one location. The intent of this rule is to accommodate family members who must share a rig, not to manufacture artificial contacts.

(D) Only one signal per band (6, 2, 1½, etc) at any given time is permitted, regardless of mode.

(E) While no minimum distance is specified for contacts, equipment should be capable of real communications (ie, able to communicate over at least 1 km).

(F) Multioperator stations may not include QSOs with their own operators except on frequencies higher than 2.3 GHz. Even

then, a complete, different station (transmitter, receiver and antenna) must exist for each QSO made under these conditions.

(G) A station located *precisely* on a dividing line between grid squares must select only one as the location for exchange purposes. A different grid-square multiplier cannot be given out without moving the complete station (including antennas) at least 100 meters.

(H) Above 300 GHz, contacts are permitted for contest credit only between licensed amateurs using coherent radiation on transmission (eg, laser) and employing at least one stage of electronic detection on receive.

(I) Marine Mobile (and Maritime) entries will be listed separately as "Marine Mobile" in the listings and compete separately for awards.

8) Reporting

(A) Entries must be postmarked no later than 30 days after the end of the contest (Feb 16, 1989). No late entries can be accepted. Use ARRL January VHF SS forms or a reasonable facsimile.

(B) Logs must indicate time in UTC, bands, calls and complete exchanges. Multipliers should be numbered clearly in the log the first time they are worked. Entries with more than 200 QSOs total must include cross-check sheets (dupe sheets).

9) Awards

(A) Single operator

(1) Top single operator in each ARRL Section.

(2) Top single operator on each band (50, 144, 220, 432, 902, 1296 and 2304-and-up categories) in each ARRL Section where significant effort or competition is evident. (Note: Since the highest score per band will be the award winner for that band, an entrant may win a certificate with additional single-band achievement stickers.) For example, if WBØTEM has the highest single-operator all-band score in the Iowa Section and his 50- and 220-MHz scores are higher than any other IA single op's, he will earn a certificate for being the single-operator Section leader and endorsement stickers for 50 and 220 MHz.

(3) Top single-operator QRP portable score in each ARRL Section where significant effort or competition is evident.

(B) Top multioperator score in each ARRL Section where significant effort or competition is evident. Multioperator entries are not eligible for single-band awards.

(10) **Club Competition:** ARRL-affiliated clubs compete for gavel on three levels: unlimited, medium and local. Details will be listed in January 1989 *QST*.

11) Condition of Entry

(A) Each entrant agrees to be bound by the provisions, as well as the intent, of this announcement, the regulations of his or her licensing authority and the decisions of the ARRL Awards Committee.

(B) Disqualifications: For excess duplicate contacts and call sign or exchange errors. See January *QST* for complete details. □

December

2-3

ARRL 160 Meter Contest, see Nov *QST*, p 90.

3-4

Texas State QSO Party, see Nov *QST*, p 91.

TOPS Activity Contest, sponsored by TOPS International, from 1800Z Dec 3 until 1800Z Dec 4, CW only, 80 meters. Single-op stations must take one or two breaks totaling 7 hours, multiop stations may operate the entire 24 hours. Classes are single operator, multioperator, single-op QRP (5 W or less input). Frequencies are 3.500-3.585 MHz. The lowest 12 kHz are reserved for DX contacts only. Exchange RST and three-digit serial number. TOPS members also give out their membership number. Count 1 point for QSOs with own country (each call area in W, VE, VK, PY, U and JA count as separate countries). Count 2 points for QSO with own continents. Count 6 points for each QSO with another continent and count 2 bonus points for QSOs with TOPS members (TOPS members get 3 bonus points for QSO with other TOPS members). For final score, multiply total points by the number of prefixes worked. Certificates will be awarded to the top 5 spots in each category. Send logs before Jan 31 to Bertil Arting, SM3VE, Horga 4361, S-823 00 Kilafors, Sweden.

6

West Coast Qualifying Run, 10-35 WPM, at 0500Z Dec 7 (9 PM PST Dec 6). W6OWP prime, W6ZRJ alternate. Frequency is approximately 3.590 MHz. Underline one minute of highest speed you copied, certify that your copy was made without aid and send to ARRL HQ for grading. Please include your full name, call sign (if any) and complete mailing address. A large SASE will help expedite your award or endorsement.

8

W1AW Qualifying Run, 10-35 WPM, at 0300Z Dec 9 (10 PM EST Dec 8). Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 147.555 MHz. See Dec 6 listing for further details.

10-11

ARRL 10 Meter Contest, see Nov *QST*, p 89.

11

QRP ARCI Holiday Spirits Home-brew CW Sprint, see Nov *QST*, p 91.

18

Canada Winter Contest, see Nov *QST*, p 91.

27

W1AW Qualifying Run, 10-35 WPM at 1400Z Dec 27 (9 AM EST Dec 27). See Dec 8 listing for further details.

31-Jan 1

ARRL Straight Key Night, 24-hour period UTC (from 7 PM EST Dec 31 until 7 PM EST Jan 1). This is a friendly meeting on the air using straight keys. Suggested areas of operation of 80, 40 and 20 meters are 60 to 80 kHz from the lower band edges and 10 kHz from the lower Novice band edges. When participating in SKN, use SKN instead of RST preceding the three-digit report to clue in passersby. Following SKN, send a list of stations worked plus your vote for best fist heard (not necessarily one you've worked) during that period. This is not a contest; quick contest-like exchanges are discouraged. Vote also for the most interesting QSO. Mail your report by Jan 10 to ARRL HQ.

January

4

West Coast Qualifying Run, 10-35 WPM, at 0500Z Jan 5 (9 PM PST Jan 4). See Dec 6 listing for further details.

7-8

Hunting Lions in the Air Contest, CW, sponsored by Lions Clubs International, the phone and CW contests will be held separately this year. CW will start at 1200Z Jan 7 and end at 1200Z Jan 8. Open to all amateurs worldwide 80-10 meters (excluding WARC bands), categories are single op and multiop, single transmitter. Multiop must be club or association of ham radio operators. Exchange signal report and serial number. Lion, Lioness and Leo club members will also send their club name and Lion district. Work stations once per band. QSOs with stations on the same continent count 1 point; QSOs with stations on other continents count 3 points. Bonus points: 10 points for QSOs with Leo, Lioness and Leo Club from different countries; 20 points (5 points if in Brazil) for QSOs with Rio de Janeiro Arpoador Lions Club members. 20 points (5 points if in US) for QSO with Melvin Jones Memorial Radio Club of US. 25 points for QSO with Arpoador Official Station PY1LCA or ZY1LCA. (This doesn't apply to the Rio de Janeiro Arpoador Lions Club or the Melvin Jones Memorial Radio Club). No multipliers. Mail logs by Feb 15, 1989 to The Contest Committee of Rio de Janeiro Arpoador Lions Club, PO Box 2155, Rio de Janeiro 20011, RJ, Brazil.

13

W1AW Qualifying Run, 35-10 WPM, at 0300Z Jan 14 (10 PM EST, Jan 13). See Dec 8 listing for further details.

14

Mid-Winter Contest 1989, CW, sponsored by the DYLC, from 0700Z to 1900Z, Jan 14. OMs work YLs only, YLs work YLs and OMs. 80 through 10 meters, no crossband contacts. Exchange RST(T), serial number, country. OMs start serial number with 001, YLs with 2001. All log entries must also include the date, time and band. YLs count as 5 points, OMs count as 3. Each DXCC country worked counts as a multiplier (not per band). Multiply QSO points by the multipliers for score total. SWLs may also participate by logging only the YL stations.

14-15

Hunting Lions in the Air Contest, SSB, see Jan 7-8 listing for further details.

15

QRP ARCI Fireside Sprint, sponsored by QRP ARCI International, from 2000Z to 2400Z, Jan 15. Home-brew receiver, transmitter or transceiver must be used on each band worked. Commercial-gear-only entries will be checklog. Phone only. Single band or all band. Work stations once per band. Exchange signal report, HB (home-brew) or C (commercial), state/province/country and QRP number if member. Nonmembers send power output. Suggested frequencies: 1.860 3.985 7.285 14.285 21.385 28.385 and 50.885 MHz. Count 5 points for QSO with ARCI member, 2 points for same continent and 4 points for different continent. Multiply QSO points by states/provinces/countries worked per band by power multiplier (2-10 W output \times 7; 0-2 W output \times 10). More than 10 W output counts as checklog. If 100% natural power, multiply final score by 2; if 100% battery multiply by 1.5. Include a description of home-brew equipment, commercial equipment and antennas used and indicate which equipment was used on each band. All entries must include a copy of the logs and summary sheet. If more than 100 QSOs were made then a duplicate check must also be turned in. Logs must be postmarked within 30 days following the contest. Late entries will be checklog. Mail entry (SASE for results) to QRP ARCI Contest Chairman, Red Reynolds, K5VOL, 835 Surreys Rd, Lake Zurich, IL 60047.

Mid-winter Contest, SSB, see Jan 14 listing for further details.

21-22

North Dakota QSO Party, sponsored by the Red

River RA, from 0000Z-0800Z and 1600Z-2400Z Jan 21 and 0800Z-1600Z Jan 22. Work stations once per band and mode. Exchange RST(T) and state/province/country (county for ND stations). Suggested frequencies: (phone) 3.905 7.280 14.295 21.380 28.450; (CW) 35 kHz up from band edges; Novices 25 kHz up from Novice band edges. Count 10 points per phone contact, 20 points per CW contact and 50 points per RTTY contact. ND stations add 1000 bonus points for working 5 Novices. ND stations multiply QSO points by the sum of states/countries/provinces worked. All others multiply QSO points by number of ND counties worked. Certificates and plaques. Mail logs by Feb 28 (include SASE for results) to Mike Beaton, KD0A, 2267 Flickertail Dr, Fargo, ND 58103.

Michigan QRP Club CW Contest, sponsored by the Michigan QRP Club, from 1200Z, Jan 21 until 1200Z, Jan 22. Four entry categories: A—250 milliwatts or less output; B—1 W to 250 milliwatts; C—5 W to 1 W; D—Over 5 W. Exchange signal report, QTH (state, province or country) and MI QRP number (power output if nonmember). CW only. Work stations once per band. 160-10 meters excluding WARC bands. Suggested frequencies: 1.810 3.560 7.040 14.060 and 28.060 MHz. Novices 3.710 7.110 21.110 and 28.110 MHz. Count 5 points per member QSO and 1 point per nonmember QSO. Multiply by the number of states/provinces/countries worked per band. Multiply total by 1.25 if using 100% battery power or by 1.5 for using 100% natural power. Mail logs to L. T. Switzer, N8CQA, 654 Georgia, Marysville, MI 48040.

AGCW-DL QRP Winter Contest, sponsored by the DL Activity Group CW, from 1500Z, Jan 21 until 1500Z, Jan 22. CW only, 160-10 meters. Classes are: A—less than 3.5 W input (2 W out), single operator; B—less than 10 W input (5 W output), single operator; C—less than 10 W input (5 W out), multioperator; D—QRO stations, more than 10 W input (5 W out), only contact QRP stations; E—SWL. Class C stations may operate full time of contest; classes A, B, D and E must break for 9 hours, which can be split into 2.45-hour segments. Exchange RST, QSO number and input, adding X if crystal controlled. QRO stations send QRO. Operations are limited to one class per band, VFO or crystal-controlled. No more than 3 crystals may be used on one band. Contact each station once per band. Count 1 point for QSO with own country, 2 points for QSO with own continent, 3 points for QSO with DX (outside own continent) per DXCC list. JA, PY, VE, W and ZS call areas count as separate countries. Count 1 multiplier for each country worked and 1 for each DX QSO made. Multiply points by multipliers on each band, then add band results. Submit a separate log for each band. Logs must be received within 6 weeks of the contest. Send logs (include 1 IRC for results and/or log sheets) to Sigfried Hari, DK9FN, Spessartstrabe 80, D-6453 Seligenstadt, West Germany.

Texas QSO Party

26

W1AW Qualifying Run, 10-35 WPM, at 2400Z Jan 26 (7 PM EST). See Dec 8 listing for further details.

27-29

CQ World Wide 160 Meter Contest, CW, sponsored by CQ Magazine from 2200Z Jan 27 until 1600Z Jan 29. CW only (phone Feb 24-26). Count 2 points per QSO with own country, 5 points per QSO with another country in the same continent and 10 points with another continent. Multiply by sum of US states (48), Canadian provinces (13), and the DXCC countries (including KH6/KL7). Canadian provinces are VO1, VO2, VE1-NB, VE1-PEI, VE2, VE3, VE4, VE5, VE6, VE7, VE8, NWT and VY Yukon. Exchange signal report and QTH; W/VE stations also send state/province. Exchange is mandatory. Mail entry by Feb 26 (phone March 23) to Don McClenon, N4IN, 3075 Florida Ave, Melbourne, FL 32904.

28-29

YL-SSB QSO Party, CW, coordinated by Bill

Early, WA9AEA, from 0001Z Jan 28 until 2359Z Jan 29 (phone is from 0001Z Mar 18 until 2359Z Mar 19). Frequencies are the General portions of all bands. Single operator, DX-W/K partners, YL-OM teams. Logs shall indicate 2 six-hour rest periods. Exchange call, signal report, state/province/country, name, ICSB number (if member) and DX-W/K partner. Score 3 points per member QSO within same continent, 6 points for member QSO in a different continent, 1 point per non-member QSO. Member stations only, count as multipliers. Multiply 1 each for DX-W/K partners; YL-OM teams; US, VK, ZL, VE state or province; DXCC countries. Bonus multipliers: 1 for working 15 or more members on a third band. Multiply by 5 for maintaining a dc input under 250 watts throughout the contest. Mail logs before Apr 30, 1989 to Bill Early, WA9AEA, PO Box 401, McHenry, IL 60050-0401.

UBA Contest, CW, sponsored by the Union of

Belgium Amateurs from 1300Z Jan 28 until 1300Z Jan 29 (phone is from 1300Z Feb 25 until 1300Z Feb 26). Categories: A—Single operator, single band; B—Single operator, multiband; C—Multi operator single transmitter, all bands; D—QRP 10 watts input as class B; E—SWL as class B. Suggested frequencies: 80-10 meters according to IARU Region 1 band plan. Exchange RS(T) and serial number (starting with 001). Belgium stations also must give province abbreviation. QSOs with ON, DA1 and DA2 count 10 points; QSO with other European Community member stations count 3 points; QSOs with other stations count as 1 point. The European Community is listed in multiplier list. All Belgium provinces (AN, BT, HT, LB, LG, LU, NR, OV, WV), and European communities (CT, CU, DL, EA, EA6, EI, F, G, GD, GI, GJ, GM, GU, GW, I, IS, LX, OZ, OY, PA, SV, SV5, SV9, SY, TK, ZB2) count as multipliers. Total the QSO points times the multipliers for the final score. All

logs must show the date, time (UTC), station worked and exchange. Declaration also required. Awards for country winners in each class and trophy to European Community winner in B category. Mail logs, within 30 days of contest end, to UBA HF Contest Committee, Glacia Jan, ON6JG, Oude Gendarmeriestraat 62, B-3100 Heist Op Den Berg, Belgium.

28-Feb 5

Novice Roundup

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 January 1 to make the March issue. Please include name of contest, dates, times (Z) and complete rules. Send to Contest Corral, 225 Main St, Newington, CT 06111. 

Special Events

Conducted By Mark Gambie, N1FOZ
Assistant Contest Manager

Bethlehem, Connecticut: The children of this Xmas town will operate W1FHP throughout the month of December. Suggested frequencies: 80—10 meters including the Novice phone and CW portions of the bands. For a special card and info on Worked Bethlehem award send a business-size SASE (no large envelopes, please) and QSL to W1FHP, Hard Hill Rd N, Bethlehem, CT 06751.

Flamingo, Florida: The Everglades ARC will operate W4SVI on 1400Z Dec 3 until 1900Z Dec 4 to celebrate the 41st anniversary of Everglades National Park. Suggested frequencies: (phone) 7.230 14.240 21.330 and 28.375; (CW) 7.030 14.030 and 21.130. Novice contacts on 7.130 21.130 and 28.375. Send QSL and 2 units of postage for unfolded certificate to: EARC, PO Box 113, Homestead FL 33090-0113. Novice Certificate (for those who identify as Novices) for working on 2 of 3 bands, no stamps required.

Knolls, Utah: The West Desert ARC will operate NF7I from 2300Z, Dec 9, until 0600Z, Dec 12, to commemorate the 63rd anniversary of the founding of the rail line telegraphy relay station and the community of Knolls. Operating frequencies: days 14.103 (packet); nights 7.093 (packet). For commemorative certificate, send QSL and business-size SASE to WDARC, Knolls Commemorative, PO Box 948, Tooele, UT 84074-0948.

Bethlehem, Indiana: The Clark County ARC will operate W9WWI from 1200Z-2100Z, Dec 10, and 0800Z-1400Z, Dec 11, to commemorate the holiday season. A special QSL certificate will be available to each station contacted by sending an 8 1/2 x 11-inch SASE to W9WWI, PO Box 532, Jeffersonville, Indiana 47130.

Sayreville, New Jersey: The Raritan Bay RA will operate K2GE, from 1800Z, Dec 16, until 0200Z,

Dec 19, to celebrate their 35th anniversary. For a commemorative certificate send a QSL and large SASE to RBRA inc, PO Box 173, Sayreville, NJ 08872.

Christmas, Florida: W1TRB, a single-operator station, will operate from 1700Z-2400Z, Dec 23, and 1700Z-2400Z, Dec 24, to celebrate the 151st anniversary of Christmas. Suggested frequencies 1.865 3.900 7.200 14.300 and 28.400. For a combination QSL/certificate, send an 8 1/2 x 11-inch SASE to Box 430, Christmas, FL 32709.

Albany, New York: The ninth annual Number One Christmas Carol (NICC) operation, on Christmas Eve and Day (24-25), in conjunction with the Albany Amateur RA as K2 Christmas Tree (K2CT), is on. Suggested frequencies: 1.850 3.907 7.238 14.280 21.365 and 28.480. Special QSL cards for contacting either of the stations, with certificates for contacting both stations during the period. Send QSL with SASE to John Yodis, K2YV, PO Box 460, Haganan, NY 12086.

Mt Rainier, Washington: Special Events stations KA7ASF will operate on emergency power with all tube gear at the 18th annual Tangent Science Fiction Convention. The operations will take place between Dec 26, and Dec 30. Suggested frequencies are on the lower 25 kHz of the General phone bands, 80 through 10 meters. For a certificate and QSL send a #10 SASE (folded), or large envelope (not folded), to KA7ASF, PO Box 73, Stayton, OR 97383.

Northampton, Pennsylvania: The Penn Wireless Association will operate W3SK from 1600Z to 0100Z Dec 27 to commemorate the holiday season. Suggested frequencies: (CW) 7.065 and 3.705; (phone) 28.465 and 14.267. For a certificate send an SASE to W3SK, 23 Hund Rd, Levittown, PA 19056.

Pasadena, California: The Relay Repeater ARC will operate KG6AX Dec 29 until Jan 2 each day between 1600Z-0400Z to commemorate the 100th anniversary of the Tournament of Roses Parade and the 75th anniversary of the Rose Bowl Game. Suggested frequencies: 3.885 7.260 14.260 21.335 28.450 and 28.550. For Certificate send QSL and 9 x 12-inch SASE to Relay Repeater Club, PO Box 81, Arcadia, CA 91006-5019.

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 Jan 1 to make the March issue. Please include the name of the sponsoring organization, the location, dates, times (Z), frequencies and call sign of the special-event station. Requests for donations will not be published.

QSLing Special-Event Stations: To get your QSL or certificate from any of the special-event stations listed here, follow these simple guidelines. (1) After working the station, carefully fill out a QSL card for the QSO. Show the date and time accurately using UTC. (2) Prepare a self-addressed, stamped envelope. If sending for a certificate, use a 9 x 12-in envelope if you want an unfolded certificate, or a no. 10 envelope if folds are okay. Include enough postage for return of your envelope. (3) Mail both your QSL and your SASE to the address listed, or to the address given on the air by the station you QSO. Be patient. Special-event stations will often print their cards and/or certificates after the operation is over so they will know how many to order. 

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.

Florida (Okeechobee)—December 3. Sponsor: Okeechobee ARC. Time: vendors 7 AM, public 9 AM. Place: Okeechobee Agriculture Center, 2 miles north of the city on Hwy 441, across from the high

school. Features: VE exams, nonham activities, refreshments. Talk-in: 147.795/195 and 146.52. Admission: advance \$2, door \$3. Contact: J. P. Paxton, Paxton Airport, 6333 NE 120 St, Okeechobee, FL 34972, tel 813-763-5498.

Ohio (Painesville)—December 15. Sponsor: Lake County ARA. Time: 8 AM-3 PM. Place: Madison High School, Burns Rd and Middle Ridge Rd. Features: flea market, VE exams, forums, refreshments. Talk-in: 147.81/21. Admission: advance \$3, door \$4. Contact: Lake Co ARA, 7803 Skyline View Dr, Mentor, OH 44060, tel 216-953-9784 until 9 PM.

Texas (Brenham)—December 10. Sponsor: Brenham ARC. Time: setup 6:30 AM. Place: Washington Co Fairgrounds. Features: auction. Talk-in: 147.86/26 BARC repeater. Tables: available at the door. Contact: George Wehrung, IV, W5TZ, tel: 409-836-5779. 

Coming Conventions

February 4-5
Florida State, Miami
February 25-26
Ohio State, Cincinnati

ARRL NATIONAL CONVENTIONS

June 2-4, 1989—Dallas/Forth Worth, Texas
June 8-10, 1990—Kansas City, Missouri

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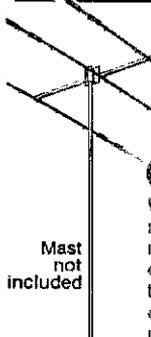


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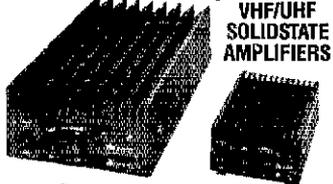
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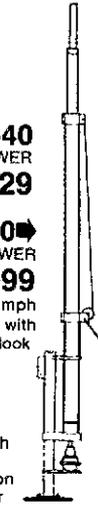
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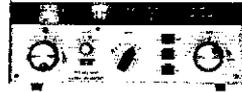
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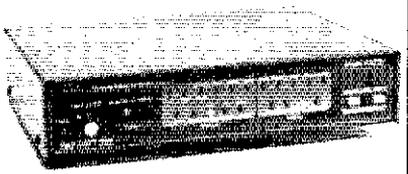
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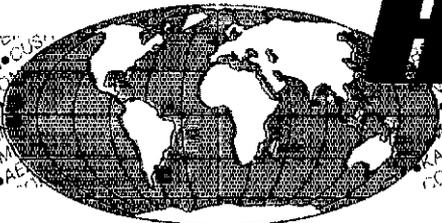
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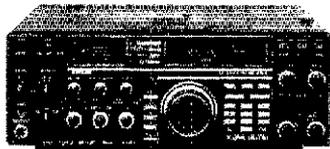
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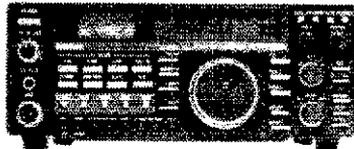
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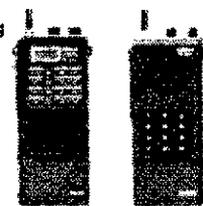
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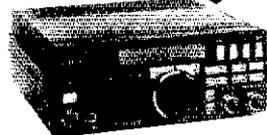
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9NFOZ, Eugene Smith 9NELH, Marvin Boetcher WA9UXP. Recruiting ORS stations was easy, just ask the people who are active on our nets. Finding PIAs and ATCs is not as easy for these should be recruited by the Affiliated Radio Club. The people are there, they just have never been asked to accept a title. Somehow the club must understand that we all fit together local, state, division, and national. DEC/EC REPORTS: W9KGE, KA9SHM, KA9DFD, KA9QME, N9FMO, N9FDS, WA9HEE, N9DUZ, KA8MRI, W9BNC, KA9DZM, KD9HB, WD9BKA, WA9DOL, KA9WCO, N9DTG, KD9ZN, WB9LRR, AND WD9AVQ. Traffic: WA9UXP 1256, KD9QB 434, KJ9J 159, W9UMH 142, WB9SYK 128, W9UEM 112, NR9K 97, KA9LQM 79, N9BS 77, W9ZGC 71, NX9J 47, W9OCL 44, N9HZ 41, KA9QME 38, K9SBW 36, KA9QMI 34, WB9QFA 33, WB9IHR 32, WB9TFD 32, WA9QCF 30, WB9PFZ 30, WA9QHX 30, K9FEI 27, W9CNE 22, WD9DWD 20, NX9U 18, K9ZBM 17, W9PPO 17, N9DUW 17, KB9HH 16, KA9RNY 16, WD9HII 16, N9DOP 15, KD9DU 15, W9BTZ 11, W9BMIK 10, W9PMT 7, KD9SU 7, N9FMO 5, W9QZJ 5, K9OUP 6, KB9GK 5, K9ZLS 5, W99OZZ 4, KA9EIV 4, W9KHK 3, N9BAC 3, KA9RTD 3, WA9QVH 3, WD9CIV 3, K9DIY 3, K9GT 3, N9ZS 3, AB9A 2, W9KMY 2, KD9ZN 1, WB9AJY 1, W9BDP 1, W9XD 1, WA6OZ 1, W9POF 1.

WISCONSIN: SM, Richard R. Regent, K9GDF—SEC: W9ZAG. STM: K9UJO. ACC: KA9FOZ. BM: WB9JISW. OOC: NC9G. PIO: K9ZZ. TC: K9GDF Season's Greetings. Congratulations to W9N2J, Fred, for 50 years of ARRL membership was presented a beautiful plaque at fall QCWA Chapter 55 meeting. Fred is also active in the Antique Wireless Association and has restored a number of classic radios. New officers Wisconsin Chapter 55 QCWA: Chairman, KE9J; Vice Chairman, W9IEM. Secretary, K9PHI; Treasurer, K9GDF; Directors W9NN, W9DU and W9VQD. New officers Greater Milwaukee DX Association: President, N9AW; Vice President, N9AU; Secretary/Treasurer, K9GS. New officers of Wisconsin Nets Association: Chairman, WA9W; Secretary, KA9KIZ; Treasurer, W9CBE; contact them with your questions and suggestions for traffic handling and net procedures. DX enthusiast K9CJ, Jim, awarded "Hog of the Year" at the W9DXCC Convention, is on DXCC Honor Roll and listening for Albania stations. Actually, Jim is a gentleman, and is known for his eagerness to help others. Rumor is that W9ZM of Madison, with 365 DXCC countries confirmed, has only missed one country. Exams will be held December 10th at Wauwatosa East High School; more information from KD9AJ. Badger Examiners December 17th exam, 1 PM at St. Nicholas Parish in Milwaukee, reservation with WA9LJK. Sorry to report Silent Keys K9GXR and W9SNK. Those who bring sunshine to the lives of others cannot keep it themselves.

Net	Freq.	Time	Net Manager
BWN	3984	6 AM	KC9CJ
BEN	3985	Noon	KA9RI
WSBN	3985	5:30 PM	K9ANV
WNN	3723	6 PM	KA9TMM
WSSN	3645	6:30 PM	N9BDL
WIN-E	3662	7 PM	W9B9CH
WIN-L	3662	10 PM	WB9NGP
NWTTN	34794	8:30 PM	NS9Q

Traffic: WB9PY 1966, KC9CJ 809, K9GDF 177, W9CBE 184, W9LKN 172, N9BDD 113, AG9G 88, WA9WYS 88, KA9RII 86, W9UCL 75, W9IEM 69, K9AKG 63, K9EP 49, K9ANV 48, K9BBD 45, N9BCX 45, W9NGP 44, K9UTQ 42, W9UW 39, KA9KIZ 37, K9JPS 35, NS9Q 34, K9GB 29, K9PHI 23, W9QDV 16, W9PVD 4.

DAKOTA DIVISION

MINNESOTA: SM, George Frederickson, KC2T—A nice upsurge in traffic handled this month. Based on SAR's, twenty two reporting stations accounted for a traffic count of 3,146 and that compared to the previous month of 2,902 shows what I mean. Congratulations to all and thanks for the good work. Along with that we had two BPL's, Judy, WB9WJ and Dale, KT9I. Both Judy and Dale have received their BPL Medallions but that hasn't slowed them down a bit. Congratulations to Lowell Swisher, W9GS, of Plymouth/Browerville as September Amateur of the Month—Nice going Lowell! It would seem about time to also congratulate all the Net Managers of Minnesota Section Nets who are all doing such a great job. The traffic summary that follows lists these managers who are doing such a great job keeping the "show on the road." Thanks to you, Net Managers! Lou, K8OGI of Wahkon, reports that the "Annual Corn-Feed," which he hosted, was a success. Some forty Hams/Spouses attended, including Dale, W9BAC, who performed his "magic act," whatever that was! And, along with that, Lou says that the Annual "POW/MIA Walk Around Lake Mills Lacs" was a great event with over 300 people taking part. This included the communications support given by KB9WV, KD9UM, KA9AJF, KD9CI, KA9EVR, KA9EXL, N9HWD, WD9BAC, N9FOO, KC9OL, and of course, Lou himself, K8OGI. Great work by all for this very special event. Just a reminder, any information you would like me to use for this column, I must receive no later than the 5th of the month - so, with that, Best Wishes for the Holiday Season and until next time, GL es 73. Jim Swisher, KA9EPY, STM, MN EMERGENCY FREQUENCY 3860 kHz BULLETINS 3860 kHz.

NET	FREQ	TIME	QNTQ/CS/ESS	NETMGR
MSN1	3685	6:30P	359/65/30	NR9S
MSN2	3685	10:00P	282/45/30	KD9NH
MSPN	3860	12:05P	388/150/30	WB9WJ
MSPNE	3860	5:30P	845/149/30	KC2T
MSSN	3710	8:00P	280/21/30	KA9SBY
MAWN	3650	8:00P	298/168/19	KD9CI
PAV	3925	9:00A	288/84/20/18	WD9BAC

Traffic: WB9WJ 838, KT9I 701, WA9TFC 328, KA9EPY 259, KA9AR 192, N9FOO 185, W9GRW 114, KA9SBY 93, N9YIE 90, KD9CI 59, K8OGI 48, KD9NH 45, KC2T 37, N9HWD 26, KA9FDM 24, K9QBE 18, WD9GUF 23, W9GS 23, W9KYG 21, K9CE 18, N9JP 16, W9BC 12.

NORTH DAKOTA: SM, Bill Kurtli, WC6M—RRRA Fargo Amateurs KD9YX, K9DYW, WD9AKO, KA9OBY, KB9ADR, KA9ZLG, KA9ZQO, KA9FSM, NKBA, KE9VN & K9BTF provided communications and support for the annual Multiple Sclerosis Bike-ATHON again this year. The bike trip generated \$16,655 for combating MS Congratulations to W9ZQJ for receiving the (Minnesota Volunteer of the year). Also congratulations to upgrades Extra WB9EMV, General KB9BSB, Technical KA9TBQ, Dennis Brunl. We are all rooting for WD9DAI to get his antenna work done before it gets cold.

TRANC had a successful picnic again this year, hams came from Sask. Mt. & several places in ND. I hope to get there some time but it didn't work out this year ago. NT9V & KA9GVJ are working mobile packet (be careful fellows) I tried trading tough times stories with some fellows from VES (and got the worst beating I have ever had. Those fellows know what hard times are all about.

NET	FREQ	TIME	SESS/QNTQ/CS	MGR
Goose River	1990kHz	8AM SU	4/7/73	WB9CO
Data	3885kHz	6:30PM DA	265/14/13	W9GFE
WX Nets	3885kHz	8AM 12:30AM		W9GFE

Storm Net 3885 As needed during storms WC6M

SOUTH DAKOTA: SM, R.L. Cory, W8YMB—ASM: N8ABE, WA9FPR. SEC: KA9KPY. STM: KD9YL. ASM: Bob Olson, WA9FPR has been elected President of the Black Hills ARC at Rapid City. Our Congratulations to Bob. LARK at Watertown reports that their call book venture was very successful with 97 out of the 125 printed sold. Law, W9JOZ, and Gladys, WB9YJB of Webster, observed their 45th wedding anniversary on Sept. 11th. Thirty-nine people attended the annual picnic of the Hot Springs ARC held at the Elk Mountain Camp Ground in Wind Cave Park on 9-18. Novice net is every Sunday evening on 3.725 MHz. S. Dakota CW traffic Net is Monday thru Friday on 3.850 MHz. All checkins welcome. Aberdeen ARC has installed another repeater near Leola on a freq of 147.12. Traffic: WB9OMF 24, KD9YL 17, W8YMB 12, KA9KPY 30, W8MZJ 39, N9DFP 297, K8ERM 214, K8AIE 111, W9HOJ 66.

DELTA DIVISION

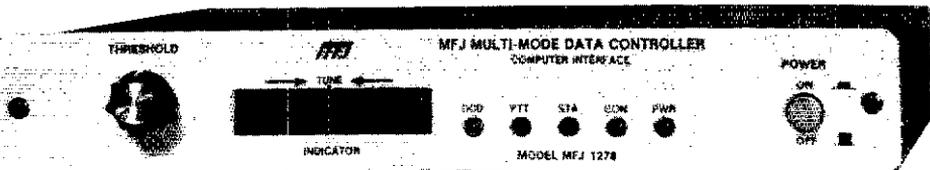
ARKANSAS: SM, Bob Harmon, W5SEP—Lots of activity throughout the state. NWAARC Beaver Lake cookout was well attended. Ft. Smith club activities: Arkansas Raft Race, MDA Bike-A-Thon, 5K Sallisaw Run. New packet bulletin board at Nebo, K5JU SYSP. Hognet packet group has DP's operating at Nebo, Mena, Springdale, and Hogeye. Chuck, KA5BML, has packet bulletin board. N6VC doing fine job as net control on state EC net. Roygene, KA5HPX had the enormous task of QSL manager for the Northwest Radio Club WD200 operation with over 500 cards mailed. The morning Arkansas phone net attracts regular check-ins from as far away as Iowa, North Carolina, Texas and Mexico. Arkansas traffic operators KF5YV, W5QFU, W5WVF, and W9YCE are well represented in CAND net, and DRN 5 nets. September KF5YV rcvd 28, sent 31, originated 5. W5QFU rcvd 79, sent 68, total 147. By this time, all ARRL members in Arkansas should have received the first of SM quarterly newsletters. Thanks to NSKKD for information for column. 73.

LOUISIANA: SM, John "Wondy" Wondergem, K5KR—ASM: KB5OC. SEC: NSADF. ACC: K5DPG. SGL: KD5SL. TC: W5RWF. OOC: KE5KQ. Packet: NE5S. Congrats to El, W5MD, Baton Rouge, on reelection to a 2 yr term as a Director for QCWA. Welcome aboard to Jerry, W64CJV, Mataire as a Public Information Assistant in the ARRL La. Field Organization. Several active clubs have not sent in their 1988 Annual Club Reports. It's a short form that takes less than 5 minutes. Lost yours? Contact me. Shir, K5OPL, Baton Rouge reports that repeater linking is becoming more of a reality in So. La. The KD5SL 145.49 repeater in Baton Rouge now has routine link-ups with the W5MCC repeater in New Orleans. The usefulness of the link was recently demonstrated during hurricanes "Florence" and "Gilbert" and during a high-speed power boat race from New Orleans to St. Louis. During "Florence" direct links were maintained between government agencies and state headquarters in Baton Rouge and New Orleans. During the power-boat race, some 62 hams participated in a link which followed progress of the boats from New Orleans to Sloucm, La. 223 miles up river. Reports from hand-heads stationed along the river were relayed by HF to race headquarters at St. Louis. A link between KD5SL repeater in Baton Rouge and the NSDHM repeater in New Roads coordinated stations up-river of Baton Rouge, La. Traffic Net urgently needs members in the New Orleans area. Traffic: DRN rpt. 502 msg, 60 sessions. Ltr to 100% by K5WOD, WA5WB, KF5YV, N5CNK, & NSLZ. LTR reports 497 msg in 30 sessions. LA 100% by KF5YV, 73 de "Wondy" K5KR.

MISSISSIPPI: SM, Jim Davis, K5KZ—ASM: W5TRD. SEC: KA4PKA. BM: W5EPW. STM: KB5W. ACC: NSCY. SGL: KA5WRX. OOC: K5K5. TC: KF5DE and PIO: W5MS. Mnl tx to following for help during Challenger Speed Boat Race from NO, LA to Mem. TN on 3/4 Sep: WB5UPN, W5RQJ, W5KAK, N5MCC, N4HHI, N5DHF, K5HC, W5B9GH, N5DOK, W5D50, N5JKO, W5HKW, N5G5, W5ART, W5PFE, W5BRPT, W5BYTR, W5B5XK, W5AEZB, N5AVN, N5KDV, N5JAT, N5AXV, W5J5P, N5MIG, N5JLJ, N5BBA, W5B5EV, N5KGA, N5JHR, W5KHBTR, to George Tweedie, of Vicksburg, who rescued crew of disabled boat. Special thanks to KA4PKA, Miss SEC, who did most of work coordinating W5KBEA in Missouri. Well done by all. Mnl thanks to those stations that helped during "Training exercise" "Hurricane Florence": KF5DE, W5TRD, KA5WRX, N5DOK, N5GRW, N5SM, AA5CB, NT9J, KB5FSV, N5LJK, N3NN, W5THT and KE5TL. Great publicity in "Oxford Eagle" concerning help given by N5SM, W5NBC, and KE5RO, during "Gilbert." A lot of worried minds were relieved by these hams for those folks w/relatives in Jamaica. We are all thankful that "Florence" and "Gilbert" stayed away from our door. 0230Z/25 Sep 88, WB5UPN reported heavy weather in Delta, which eventually became an "on the ground" tornado. NWS not aware of this until notified by hams. Well done to: WB5UPN, W5TRD, N5JXP, N5DVR, N5DOK, N5MCC, N5DHS, and W5VMT. Neshoba Emergency ARC: (N5EPP) sess 4, QNI 42. GCSSB (W5JHS) sess 30, QNI 1178, QTC 8. MSBN (KF5DE) sess 30, QNI 1951, QTC 33. Mag Sec Net (W5YTR) Sess 4, QNI 391, QTC 5. MTN (KB5W) Sess 30, QNI 139, QTC 56. CAND: sess 30, QNI 497. Miss/Lou Emerg Net (N5EZZ) Sess 4, QNI 81. RN5 Rep 100% by N5SM. Packet (KF5M) O-30, S-31, R-5, D-3, Total 69. KB5W: O-7, S-211, R-247, D-2, Total 467. KT5Z: S-38, R-36, D-1, Total 75. W5JDF: O-3, S-50, R-49, Total 102. N5SM: O-3, S-27, R-25, Total 55. K5KZ: O-2, S-3, R-2, D-1, Total 8.

TENNESSEE: SM, Harry Simpson, W4MI—Eastern Assistant SM and PIO W4TYU. Central Assistant SM WA4GLS, Western Assistant SM and ACC: K4CXY. STM: N64J. SEC: K4UVH, OOC: K4LSP. SGL: N4PQY. TC: WA4HK. The TN Phone Net is on 3860 kHz with early sessions at 8:40 AM Eastern, (continued on page 119)

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Plus you get MFJ's new **Easy Mail™** so you and your ham buddies can leave messages for each other 24 hours a day.

You'll find it the **most user friendly of all multi-modes**. It's menu driven for ease of use and command driven for speed.

A high resolution 20 LED tuning indicator lets you *tune in signals fast in any mode*. All you have to do is to center a single LED and you're *precisely tuned in to within 10 Hz* -- and it shows you which way to tune!

Plus you get 32K RAM, KISS for TCP/IP, high performance HF/VHF/CW modems, software selectable dual radio ports, AC power supply and more.

All you need to join the fun is an MFJ-1278, your rig and any computer with a serial port and terminal program.

You can use the MFJ Starter Pack to get on the air instantly. It includes computer interfacing cable, terminal software and friendly instructions . . . everything you need to get on the air fast. Order MFJ-1282 (disk)/MFJ-1283 (tape) for the C-64/128 and VIC-20; MFJ-1287 for Macintosh; MFJ-1284 for the IBM or compatible, \$19.95 each.

Packet

MFJ's new generation packet mode gives you genuine TAPR software and hardware plus many MFJ enhancements like Easy Mail™.

A new KISS interface makes the MFJ-1278 TCP/IP compatible.

Extensive tests published in **Packet Radio Magazine** ("HF Modem Performance Comparisons") prove the TAPR designed modem in the MFJ-1278 gives better copy with proper DCD operation under all tested conditions than the other modems tested.

New AMTOR model

Now the MFJ-1278 has a new AMTOR and Navtex mode, making it the only controller to feature **nine** digital modes.

MFJ-1278 transmits and receives AMTOR and includes all AMTOR modes: ARQ (Mode A), FEC and MODE S (Mode B).

Baudot RTTY

You can copy all shifts and all standard speeds including 170, 425 and 800 Hz shifts and speeds from 45 to 300 baud. You can copy not only amateur RTTY but also press, weather and other exciting traffic.

You can transmit both narrow and wide

shifts. The wide shift is a standard 850 Hz shift with mark/space tones of 2125/2975 Hz. This lets you operate MARS and standard VHF FM RTTY.

ASCII

You can transmit and receive 7 bit ASCII using the same shifts and speeds as in the RTTY mode.

CW

You get a Super Morse Keyboard mode that lets you send and receive CW effortlessly, including all prosigns -- it's tailor-made for traffic handlers.

A huge type ahead buffer lets you send smooth CW even if you "hunt and peck".

You could store entire QSOs in the message memories, if you wanted to! You can link and repeat any messages for automatic CQs and beaconing. Memories also work in RTTY and ASCII modes.

A *Tone Modulated CW mode* turns your VHF FM rig into a CW transceiver for a new fun mode. It's perfect for transmitting code practice over VHF FM.

An AFSK CW mode lets you ID in CW.

You also get a random code generator that'll help you copy CW faster.

Weather FAX

You'll be fascinated as you watch WEFAX signals blossom into full fledged weather maps on your Epson or IBM graphics compatible printer.

Automatic sync and stop lets you set it and leave it for no hassle printing.

You can save FAX pictures and WEFAX maps to disk if your terminal program lets you save ASCII files to disk.

Pictures and maps can be saved to disk or printed to screen in real time or from disk if you have an IBM or Macintosh with the MFJ Starter Pack.

You can transmit FAX pictures right off disk and have fun exchanging and collecting them.

Slow Scan TV

The MFJ-1278 introduces you to the exciting world of slow scan TV.

You can print slow scan TV pictures on any IBM or Epson graphics compatible printer. If you have an IBM or Macintosh you can print to screen and save to disk with the MFJ Starter Pack.

You can transmit slow scan pictures right off disk. If your terminal program lets you save ASCII files you can save pictures from over-the-air QSOs.

MFJ

MFJ ENTERPRISES, INC.

Box 494, Miss. State, MS 39762
601-323-5869 Telex: 53-4590 MFJSTKV

MFJ . . . making quality affordable

You can transmit and receive 8.5, 12, 17, 24, and 36 second black and white format SSTV pictures using two levels.

Contest Memory Keyer

Nothing beats the quick response of a memory keyer during a heated contest.

You'll score valuable contest points by completing QSOs so fast you'll leave your competition behind. And you can snag rare DX by slipping in so quickly you'll catch everyone by surprise.

Message memories let you store contest call, name, QTH, rig info -- everything you used to repeat over and over.

You get lmbic operation, automatic incrementing serial numbering, weight control to penetrate QRM and more.

More Features

Turn on your MFJ-1278 and it sets itself to match your computer baud rate. Select your operating mode and the correct modem is automatically selected.

Plus . . . printing in all modes, threshold control for varying band conditions, tune-up command, lithium battery backup, RS-232 and TTL level serial ports, watch dog timer, FSK and AFSK outputs, output level control, speaker jack, key paddle jack, test and calibration software, Z-80 at 4.9 MHz, 32K EPROM, and socketed ICs. FCC approved. 9x1½x9½ in. 12VDC or 110VAC.

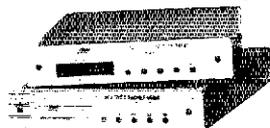
Get yours today and join the fun crowd!

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 FNC-2 give you more features than any other packet controller -- for \$119.95.

You can double your fun by operating both VHF and HF packet because you get **high performance** switchable VHF/HF modems.

You get MFJ's new **Easy Mail™** with soft-partitioned memory so you and your friends can leave messages for each other 24 hours a day.

In MFJ's new WeFAX mode you can print full fledged weather maps to screen or printer and save to disk using an IBM compatible or Macintosh computer with an MFJ Starter Pack.

A new **KISS** interface lets you run TCP/IP. They also come **NET ROM** compatible -- **no modification needed!**

You also get 32K RAM, a full one-year unconditional guarantee and you can use 12 VDC or the included 110 VAC power supply.

For dependable HF packet tuning, the **MFJ-1274** gives you a high resolution tuning indicator that's accurate to within 10 Hz -- and it's only \$20.00 more.

FOR YOUR NEAREST DEALER
or to order call toll free

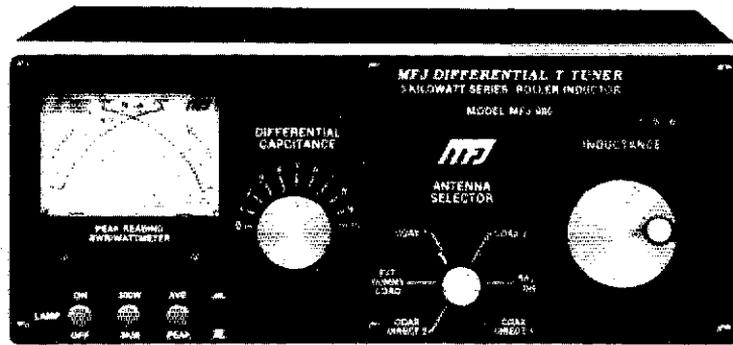
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One Year Unconditional Guarantee

MFJ 3 KW Roller Inductor Tuner

... lets you get your SWR down to *absolute* minimum -- something a tapped inductor tuner just can't do ...

... plus you get a *peak reading* Cross-Needle SWR/Wattmeter, 6-position antenna switch, balun for balanced lines and 1.8-30 MHz coverage...\$239.95



MFJ-986
\$239⁹⁵

Made in U.S.A.

MFJ's innovative new Differential-T Tuner™ uses a differential capacitor that makes tuning foolproof and easier than ever. It ends constant re-tuning with broadband coverage and gives you minimum SWR at only one setting.

The new MFJ-986 is a rugged no-compromise 3 KW PEP Roller Inductor antenna tuner that covers 1.8-30 MHz continuously, including MARS and all the WARC bands. **The roller inductor lets you tune your SWR down to the absolute minimum** -- something a tapped inductor tuner just can't do.

A 3-digit turns counter plus a spinner knob gives you *precise* inductance control -- so you can quickly return to your favorite frequency.

You get a lighted Cross-Needle meter that not only gives you SWR, forward and reflected power at a glance -- but also gives you a **peak-reading** function! A new directional coupler gives you even more accurate readings over a wider frequency range.

You get a 6-position ceramic antenna switch that lets you select two coax lines and/or random wires (direct or through tuner), balanced line and external dummy load.

A new **current** balun for balanced lines minimizes feedline radiation that causes field pattern distortion, TVI and RF in your shack. Ceramic feedthru insulators for balanced lines withstand high voltages and temperatures.

New Antenna Tuner Technology
MFJ brings you **three innovations** in antenna tuner technology: a new *Differential-T™* circuit simplifies tuning; a new *directional coupler* gives you more accurate SWR, forward and reflected power readings; and a new *current balun* reduces feedline radiation.

Differential-T Tuner™:
A New Twist on a Proven Technology

By replacing the two variable capacitors with a single *differential capacitor* you get a **wide range T-network tuner with only two controls** -- the differential capacitor and a roller inductor.

That's how you get the new MFJ Differential-T Tuner™ that makes tuning easier than ever, gives you minimum SWR at only one setting and has a broadband response that ends constant re-tuning. You'll spend your time QSOing

instead of fooling with your tuner.

The compact 10 $\frac{3}{4}$ x 4 $\frac{1}{2}$ x 15 inch cabinet has plenty of room to mount the silver-plated roller inductor away from metal surfaces for maximum Q -- you get high efficiency and more power into your antenna.

The wide spaced air gap differential transmitting capacitor lets you run a full 3 KW PEP -- no worries about arcing.

A New Directional Coupler:
Accurate SWR and Power Reading

MFJ's Cross-Needle SWR/Wattmeter gives you more accurate SWR and power readings over a wider frequency range with no frequency sensitive adjustments.

That's because MFJ's new directional coupler gives you up to an order of magnitude higher directivity and coupling factor than conventional circuits ... **plus** it gives you a flat frequency response that requires **no** frequency compensation.

The cross-needle meter lets you read forward/reflected power in 2 ranges: 200/50 and 2000/500 watts. The meter lamp is front-panel switched and requires 12 volts.

A switch lets you select peak or average power readings.

A New Current Balun:
Reduces Feedline Radiation

Nearly all commercially built tuners use a "voltage" balun. The "voltage" balun forces the *voltages* to be equal on the two antenna halves. It minimizes unbalanced currents *only* if the antenna is perfectly balanced -- not the case with practical antennas.

The MFJ-986 uses a true **current balun** to force equal *currents* into the two antenna halves -- **even** if your antenna is not perfectly balanced -- so you get minimum unbalanced currents.

The *current* balun gives superior balance over the "voltage" balun.

Minimum unbalanced current reduces field pattern distortion -- which concentrates your power for a stronger

signal -- **plus** it reduces TVI and RF in your shack caused by feedline radiation.

The MFJ-986 Differential-T Tuner™:
Get absolute minimum SWR

Get the tuner that incorporates the latest innovations by the world's leader in antenna tuner technology.

See your dealer today for the new MFJ-986 Differential-T™ 3 KW Roller Inductor Tuner. Include \$10 shipping/handling if ordering direct.

WHY CHOOSE AN MFJ TUNER?

Hard-earned Reputation: There's just no shortcut. *MFJ* is a name you can trust -- more hams trust MFJ tuners throughout the world than all other tuners combined.

Proven Reliability: *MFJ* has made more tuners for more years than anyone else -- with MFJ tuners you get a highly-developed product with proven reliability.

First-rate Performance: MFJ tuners have earned their reputation for being able to match just about anything -- *anywhere*.

One full year unconditional guarantee: That means we will repair or replace your tuner (at our option) no matter what for a full year.

Continuing Service: MFJ Customer Service Technicians are available to help you keep your MFJ tuner performing flawlessly -- no matter how long you have it -- just call 601-323-5869.

Your very best value: MFJ tuners give you the most for your money. Not only do you get a *proven* tuner at the lowest cost -- you also get a one year *unconditional* guarantee and *continuing* service. That's how MFJ became the world's leading tuner manufacturer -- by giving you your very best value.

Choose your MFJ tuner with confidence! You're getting proven performance and reliability from the most trusted name in antenna tuners. Don't settle for less.

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One Year Unconditional Guarantee

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MFJ TUNERS

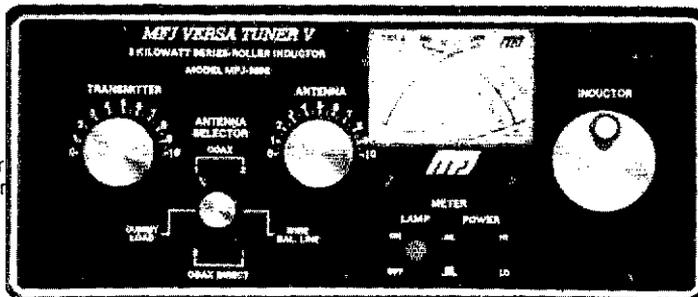
Invest in the finest 3 KW roller inductor tuner money can buy with dummy load, new peak reading Meter and more...

The MFJ-989C is a compact 3 KW roller inductor tuner with a new peak reading Cross-Needle SWR/Wattmeter. The roller inductor lets you get your SWR down to absolute minimum.

With three continuously variable components -- two massive 6 KV capacitors and a high inductance roller inductor -- you get precise control over SWR and the widest matching range possible from 1.8-30 MHz.

You get a new lighted peak and average reading Cross-Needle SWR/Wattmeter with a new more accurate directional coupler.

You get a giant two core balun wound with teflon wire for balanced



MFJ-989C \$349⁹⁵

lines and a 6-position antenna switch with extra heavy switch contacts.

You get a 50 ohm 300 watt dummy load for tuning your exciter, a tilt stand for easy viewing and a 3-digit turns counter plus a spinner knob for exact inductance control.

Its compact 10 3/4 x 4 1/2 x 15 inch cabinet slides right into your station. The MFJ-989C is not for everyone.

However, if you do make the investment, you'll get the finest 3 KW tuner money can buy -- one that will give you a lifetime of use, one that takes the fear out of high power operation and one that lets you get your SWR down to absolute minimum.

MFJ's Best VERSA TUNER II



MFJ-949C precise matches than any tuner that uses two tapped inductors. Why? **\$139⁹⁵**

Because you get two continuously variable capacitors that give you infinitely more positions than the limited number on switched coils. This gives you the precise control you need to get your SWR down to a minimum. After all, isn't that why you need a tuner.

You also get a dual range lighted Cross-Needle SWR/Wattmeter, 6-position antenna switch, 50 ohm 300 watt dummy load, balun for balanced lines and continuous 1.8-30 MHz coverage -- all in a compact 10x3x7 inch cabinet that fits right into your station.

With MFJ's best 300 watt tuner you get an MFJ tuner that has earned a reputation for being able to match just about anything -- on that is highly perfected and has years of proven reliability.

MFJ's smallest VERSA TUNER

MFJ-901B **\$59⁹⁵**

The MFJ-901B is our smallest -- 5x2x6 inches -- and most affordable) 200 watt PEP Versa tuner -- when both your space and your budget is limited. Matches dipoles, vees, random wires, verticals, mobile whips, beams, balanced and coax lines continuously 1.8-30 MHz. Excellent for matching solid state rigs to linears. Efficient airwound inductor. 4:1 balun for balanced lines.

144/220 MHz VHF TUNERS

MFJ-920 **\$49⁹⁵**

MFJ-921 **\$69⁹⁵**

MFJ's newest VHF tuners cover both 2 Meters and the new Novice 220 MHz bands. They handle 300 watts PEP and match a wide range of impedances for coax fed antennas. MFJ-921 has SWR/Wattmeter.

MFJ's Fastest Selling TUNER



The MFJ-941D is MFJ's fastest selling **MFJ-941D 300 W PEP antenna tuner! Why? \$99⁹⁵**

Because it has more features than tuners costing much more and it matches everything continuously from 1.8-30 MHz. It matches dipoles, vees, verticals, mobile whips, random wires, balanced and coax lines.

SWR/Wattmeter reads forward/reflected power in 30 and 300 watt ranges. Antenna switch selects 2 coax lines, direct or through tuner, random wire/balanced line or tuner bypass. Efficient airwound inductor gives lower losses and more watts out. Has 4:1 balun, 1000 V capacitors. 10x3x7 inches.

MFJ's Mobile TUNER



MFJ-945C **\$79⁹⁵**

Don't leave home without this mobile tuner! Have an uninterrupted trip as the MFJ-945C extends your antenna bandwidth and eliminates the need to stop, go outside and readjust your mobile whip.

You can operate anywhere in a band and get low SWR. You'll get maximum power out of your solid state or tube rig and it'll run cooler and last longer.

Small 8x2x6 inches uses little room. SWR/Wattmeter and convenient placement of controls make tuning fast and easy while in motion. 300 watts PEP output, efficient airwound inductor, 1000 volt capacitors. Mobile mount, MFJ-20, \$3.00.

2 KW COAX SWITCHES

MFJ-1702 **\$19⁹⁵**

MFJ-1702, \$19.95. 2-positions. 60 dB isolation at 450 MHz.

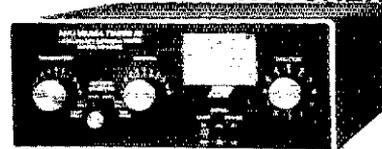
Less than .2 dB loss. SWR below 1:1.2.

MFJ-1701, \$29.95.

6-positions. Unused positions grounded.

For desk or wall mount.

MFJ's 1.5 KW VERSA TUNER III



For a few extra dollars, the MFJ-962C lets you use your barefoot rig **MFJ-962C** **\$199⁹⁵** now and have the capacity to add a 1500 watt PEP linear amplifier later.

Two continuously variable 6 KV capacitors give you precise control for getting your SWR down to a minimum. And lots of inductance gives you the widest matching range possible.

You can read both peak and average power with the lighted 2-color Cross-Needle SWR/Wattmeter. A new directional coupler gives you more accurate readings over a wider frequency range.

Has 6-position ceramic antenna switch and a teflon wound two-core balun with ceramic feedthrough insulators for balanced lines. 10 3/4 x 4 1/2 x 14 7/8 in.

MFJ's Random Wire TUNER

MFJ-16010 **\$39⁹⁵**

You can operate all bands anywhere with any transceiver when you let the MFJ-16010 turn any random wire into a transmitting antenna. Great for apartment, motel, camping operation. Tunes 1.8-30 MHz. Handles 200 watts. Ultra compact 2x3x4 in.

Great for apartment, motel, camping operation. Tunes 1.8-30 MHz. Handles 200 watts. Ultra compact 2x3x4 in.

MFJ artificial RF ground

\$79⁹⁵ MFJ-931

You can create an artificial RF ground and eliminate RF "bites", feedback, TVI and RFI when you let the MFJ-931 resonate a random length of wire and turn it into a tuned counterpoise. The MFJ-931 also lets you electrically place a far away RF ground directly at your rig -- no matter how far away it is -- by tuning out the reactance of your ground connection wire.



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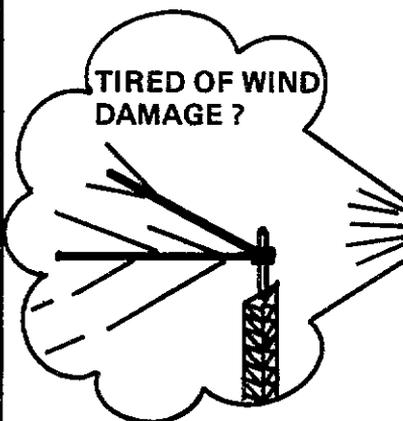
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20M646 6 elem. 20 Mtr.	\$1125.00
15M532 5 elem. 15 Mtr.	\$565.00
15M845 8 elem. 15 Mtr.	\$1065.00
10M523 5 elem. 10 Mtr.	\$385.00
10M636 6 elem. 10 Mtr.	\$785.00
2MVS814, 2 Mtr. phased	\$305.00

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Regular sessions at 7:45 AM Eastern Monday thru Friday, at 9 AM Eastern on Saturdays, Sundays and Holidays. Evening sessions are Monday thru Saturday at 7:30 PM Eastern. CW Net Sessions are on 3635 kHz at 8 PM Eastern, Monday thru Friday. As you read this column, I am approaching the end of my first year as SM of Tennessee. It has been a pleasant year for two main reasons: 1) I have renewed many friendships from years past and 2) I have made many new friends and acquaintances because of my renewed activity on the low bands. It has been a gratifying year, and I offer sincere thanks to those who made it possible. Forty-two lines doesn't allow nearly enough room to mention you individually, but I must take some space to mention some who have gone out of their way to make my work easier: Steve Ewald, Jim Clary, Luck Hurder, K4CXY, NG4J, W4PFP, WB4LAL, K4WQC, W4MII, W4TYU, W4SGI, WD4LFD, W4OVN, WB4IAW, K4DIZ, N4POY, N4GJM. That's not nearly all, but it's all I have room for - except in my heart! Thank you! As this is being written, I am trying to recover from the Memphis Area Hamfest and Computer Show. It was in a new location, the Memphis Convention Center, and it turned out to be a hit in all respects. The hams were too busy buying stuff to attend the various meetings and forums (should that be "iona?") but we did have over fifty at the Army MARS meeting. One of the high spots was meeting with W1XX, HQ's John Lindholm. I am a part of the VE Team, and we had a plethora of candidates, most of whom upgraded. Congratulations to MARA President KB4GFK and his staff for a great setup. W4HHK and XY1. W4UDQ are running beacons on two and six meter, and 432.078 MHz continuously on 50.070 and 432.078. W4UDQ/B is on 144.054.5 from near Linden, TN at 6, 7, 8, 9, 12, 19, 20, 21, 22 Central Time (Note: This beacon is solar-powered, and some transmissions are omitted if battery is low. Reports are welcomed. Traffic: W4FMR 136, W4DDK 69, W4MI 48, W4TYV 37, W4PFP 23, NG4J 20, K4SKDB 16, K4CXY 10, WB4LAL 9, KE4LS 8, WA4HKU 5, W4PSN 4.

GREAT LAKES DIVISION

KENTUCKY: SM, John Themes, WM4T—Asst. SM: KC4WN, SEC: WB4NHO, STM: KA4MTX, PIO: WA4SWF. (September) Once again ham radio did an excellent job during Hurricane Gilbert. I wish to thank N4GNL and KC4WN for their efforts in handling emergency traffic. N4GNL was rewarded with a personal phone call from the governor expressing his thanks to Amateur Radio for their support. The Louisville Hamfest was a success, and those of you who attended the forum on repeater coordination know that we now have the ball rolling on this important issue. The Mammoth Cave hamfest is set for March 4th of 1989, so see you there!

NET	QNI	QTC	SESS	MGR
MKPN	1334	185	30	WD4RWJ
KTN	759	69	30	WD4RWJ
KYN (E/L)	338	159	59	K4AVX/KZ8Q
TSTMN	440	32	30	KZ8Q
KNTN	274	93	38	WA4EBN

Traffic (Sept.): K4VHF 178, WD4RWJ 150, N4GNL 60, WA4EBN 58, K4AVX 43, KC4WN 35, WA4MTX 31, WB4LAL 28, WD4XS 24, N4PEK 19, WA4NOG 9, WD4CQC 9, KU4A 7, K4HOE 3, WA4HLW 2, PSHR: N4GNL 153, K4QH 108, KA4MTX 72.

MICHIGAN: SM, George E. Race, W8BBGY (@N8FTY)—ASM: WA1LRL (@WA1LRL), STM: WD8KQC (@NTBR), SEC: N8AYQ, SGL: N8CNY, TC: W8YZ, OOC: WA2AJQ, ACC: N8JVA. Silent keys, with deep regret: W8KI, W8OEN, W8OIM, K8EGP, W8ZSI, and W8XPJ. Please help me welcome the newest member of the MI ARRL Staff. Andy Penn, N8JVA, is now our Affiliated Club Coordinator. Andy's words sum up his goals and commitment. "As ACC, I will stress the rewards of ARRL Affiliation. In the past, I have seen clubs almost go under for lack of interest and activities. It will be my goal to insure that these clubs stay alive and grow by providing the necessary resources available to them through ARRL Affiliation. I will work for all clubs, providing assistance in any way possible." We all need to encourage the growth and development of MI clubs. Club activities are the foundation of strong leadership and training. They provide classes for new "Hams", they are the providers of VE teams, they keep our VHF repeaters and Packet Radio networks in place and operating. We need to develop new clubs in our schools and introduce Amateur Radio to our next generations. I remember back in the 50's and 60's, it seemed that almost every High School had an Amateur Radio Club. Slowly the majority of these clubs have vanished. The excuses are many, lack of a sponsor, unable to afford necessary equipment, a supposed lack of interest on the part of students, computers are more fun, learning the code is difficult. Why not take up the challenge, talk with a science teacher in your local school, arrange a demonstration at an assembly or school science day. We all have used equipment collecting dust, why not put it to good use. As far as lack of interest goes, how can anyone demonstrate interest in any area that they have never been introduced to. Computers, that seems to be holding the interest of our youngsters, can become the much needed interface to Amateur Radio in the school. A 1NC and 2-meter rig, with a simple antenna, will provide an easy entry level station into the State Packet Network. Adding a low band rig will provide the thrill of world-wide packet operation. This extension of the classroom computer could provide the challenge and spark the interest of many of our youngsters, leading to a new generation of "Hams." As far as learning the code goes, there are many very good programs available to make code fun to learn on the computer. Why not take up the challenge yourself, combine the current interest of our youngsters with new interest, introduce Amateur Radio into our schools. As I come to the end of my first year as MI SM, I am very pleased with the support you have provided me. I have thoroughly enjoyed the many meetings and hamfests, where I have had the opportunity to promote the League's programs. I have nothing but praise for the professional job being done by my Staff and all of the field appointments. As many of you have heard me say, you are the League, you are what makes it all happen. Barbara and I, and your Section Staff, wish all a very merry Christmas and a prosperous and productive 1989. 73. Please support the following MI area Nets:

NET	FREQ	TIME	DAY	QNI	OSP	SESS	MGR
UPN*	3921	5:00PM	Dy	1051	62	34	WA8DHB
MACS*	3953	11:00AM	M-Sa	297	49	29	KB0CP
MITN	3953	7:00PM	Dy	530	155	30	WB8EIB
QMN*	3683	6:00PM	Dy	572	115	60	WB8R
SEMTN	145.33	10:15PM	Dy	481	105	30	N8HSC
GLETN	3932	9:00PM	Dy	1118	61	30	K49EIZ
WSSBN	3935	7:00PM	Dy	568	28	30	WB8DI

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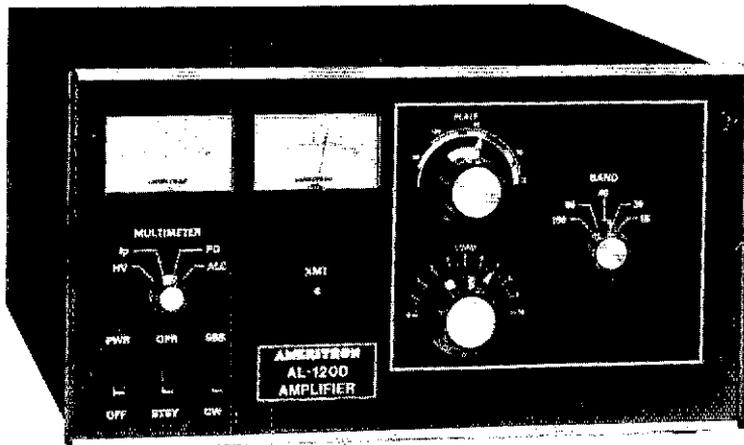


AL-80A LINEAR AMPLIFIER

The AL-80A will provide a signal output that is within 1/2 "S" unit of the signal output of the most expensive amplifier on the market—and at much lower cost.

The Ameritron AL-80A combines the economical 3-500Z with a heavy duty tank circuit to achieve nearly 70% efficiency from 160 to 15 meters. It has wide frequency coverage for MARS and other authorized services. Typical drive is 85 watts to give over 1000 watts PEP SSB and 850 watts CW RF output. A new Pi-L output circuit for 80 and 160 gives full band coverage and exceptionally smooth tuning.

Size: 15½"D. x 14"W. x 8"H. Wgt. 52 lbs.



AL-1200 LINEAR AMPLIFIER 3CX1200 TUBE

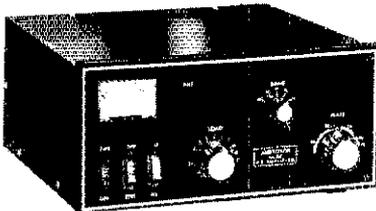
Full legal output with 100 watts drive.

AL-1500 LINEAR AMPLIFIER 8877 TUBE

Full legal output with 65 watts drive.

The cooling system in both amplifiers keeps the tube safely below the manufacturers ratings even when operating at 1500 watts input with a steady carrier. The filament supply has inrush current limiting to insure maximum tube life.

Size: 18½"D. x 17"W. x 10"H. Wgt. 77 lbs.



AL-84 LINEAR AMPLIFIER

The Ameritron AL-84 is an economical amplifier using four 6MJ6 tubes to develop 400 watts output on CW and 600 watts PEP on SSB from 160 through 15 meters. Drive required is 70 w typical, 100 w max. The passive input network presents a low SWR input to the exciter. Power input is 900 watts. The AL-84 is an excellent back-up, portable or beginner's amplifier.

Size: 11½"W. x 6"H. x 12½"D. Wgt. 24 lbs.

ATR-15 TUNER

The Ameritron ATR-15 is a 1500 watt "T" network tuner that covers 1.8 through 30 MHz in 10 dedicated bands. Handles full legal power on all amateur bands above 1.8 MHz.

Five outputs are selected from a heavy duty antenna switch allowing the rapid choice of three coaxial lines, one single terminal feed or a balanced output. An internal balun provides 1:1 or 4:1 ratios (user selectable) on the balanced output terminals.

A peak reading wattmeter and SWR bridge is standard in the ATR-15. It accurately reads envelope powers up to 2KW.

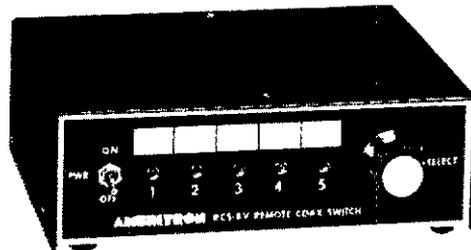
Size: 6"H. x 13¼"W. x 16"D. Wgt. 14 lbs.



RCS-4 FOR CONVENIENT INSTALLATION

No control cable required.
Selects one of four antennas.
VSWR: under 1.1 to 1 from 1.8 to 30 MHz.
Impedance: 50 ohms.
Power capability: 1500 watts average, 2500 watts PEP maximum

Remote COAX Switches



RCS-8V FOR SPECIAL APPLICATIONS

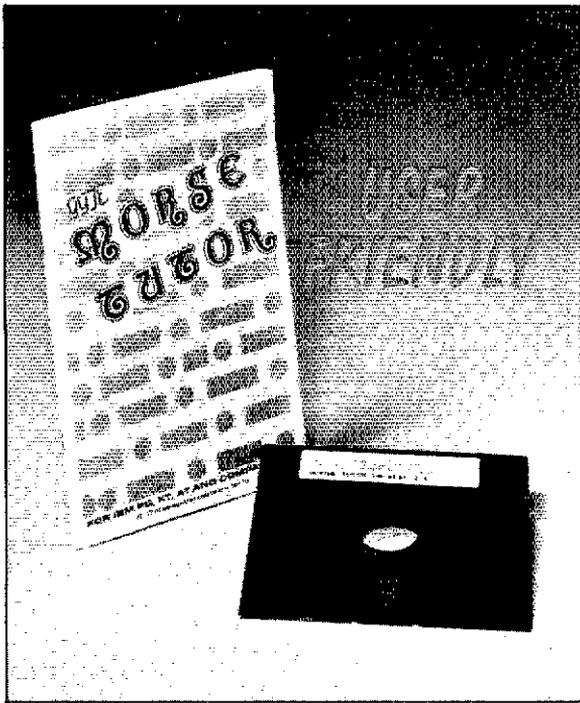
Selects up to five antennas.
Loss at 150 MHz: less than .1 dB.
VSWR: under 1.2 to 1 DC to 250 MHz.
Impedance: 50 ohms.
Power capability: 5 kW below 30 MHz, 1 kW at 150 MHz.

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GGTE

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Here's a fun way to learn Morse Code and practice for the exams. It's also a great way to keep your code skills sharp! Morse Tutor teaches all code characters in 11 lessons, using a "flash card" technique for each character which consists of letters, numbers, punctuation marks and special characters required on the code exam. You can set up each lesson to teach just the characters in that lesson, a random character drill using only the same characters just introduced or a random-word drill using all of the characters taught through that lesson. Characters can be displayed as they are sent or at the end of the lesson.

The final lesson is a random-QSO generator based on a huge pool of information that is contained on the disk. Two stations make a contact with several exchanges of information during each QSO—just like the real thing. The contacts are similar to those used on code exams. The names and call-signs of the stations match through-

out the contact, and you can interrupt the lesson by hitting any key. You can start where you left off or quit any time you want.

Morse Tutor is easy to calibrate for different computer clock speeds. You select code speeds and character spacing separately, both in WPM so you can copy regular code or use the Farnsworth method. The program remembers your choice for these variables as well as lesson duration, tone frequency and display mode.

Morse Tutor is user friendly, and has easy-to-understand menu-driven functions. Excellent error trapping and accuracy in the code speed being sent make this software even more attractive. Pickup a copy of Morse Tutor, and in no time you'll be copying the code along with the experts.

Morse Tutor is available at many dealers or directly from ARRL HQ. The Price is \$20.00 plus \$2.50 for postage and handling (\$3.50 for UPS).



THE AMERICAN RADIO RELAY LEAGUE, INC.

225 MAIN STREET
NEWINGTON, CT 06111

VHF ACTIVITY REPORT — No Report NO8Q
*Q MN Fast-6:30PM Dy; QMN Late-10PM Dy.; MACS-1PM Sun.; UPN-12PM Sun. Traffic for September: KA8CPS 429, NW8M 121, WD8KQC 118, K8GXV 88, N8HSC 73, NB8JAT/BBS 104, WB8R 100, N8FTY/BBS 59, NJ8S 56, N8CNY 47, N8FPN 45, WA8DHB 43, WB8BGY 42, N8HHH 36, K8HAP 35, W8YIQ 31, W8IHX 27, W8EOI 27, WB8SYA 26, K8UPE 26, K8OCP 23, WD8EIB 23, KA8PWM 23, NY8W 22, K18Q 19, K8ZJU 17, N8IC 13, W8RNQ 9, WA8MVH 9, WB8EZ 8, WD8MJB 8, KD8LZ 8, K8LUY 7, W8URM 6, NX8S 5, W8YZ 4, W8CUP 3, N8EXS 3, KA8QVH 2, (WB8BGY 34, Aug.)

OHIO: SM, Jeffrey Maass, K8ND (@ W8CQK)—ASM: David Kersten, N8AUH (@ K8BCI) Phone: (216) 221-6740; SEC: WD8MPV (@ K8BCI); STM: K8FBJ (@ W8HHF); BM: W8ZM (@ N8NN); ACC: K1J3O (@ K8BCI); TC: K8BMU; OOC: WB8ZCE; SGL: N8CVK.

NET	QNI	QTC	SESS	TIME(LOCAL)	FREQ	MGR
BN(E)				1845		3.577 WD8C
BN(L)	188	81	30	2200		3.577 K8TVG
BNR	204	88	30	1800		3.605 W8EK
ESSN				1900		3.873 K88FW
OSN				1810		3.708 N8AEH
OSBN	1945	919	83	1030,1615,1830		3.9725 KA8CGF
OSSN	182	85	30	0645M.F,0800S-SN		3.708 KA8GJV
OHIO SECTION ARES NET				700SUN		3.675 WD8MPV

(Net reports for several nets were not received by my deadline, presumably due to the pending change in SM administrations) Hamfests in December and January: Nonel Contact Affiliated Club Coordinator K1J3O to list your hamfest on the Section's schedule. It's not too early for 1989! Amateur Radio Examinations: Columbus 12/3; North Olmsted 12/10; Dayton 12/10; Ravenna 12/10; Maumee 12/10; Zanesville 12/10; Cincinnati 12/17; Columbus 1/14; Mansfield 1/21; Dayton 2/11. Contact new Section Manager W8STX (address and phone number on page 8 of this issue of QST) or Assistant Section Manager N8AUH (phone number above) for details on any session listed above. This will be my last column as your Section Manager. In the past four years, I have reported the events and good deeds of the Amateurs of the Ohio Section of the ARRL Field Organization. It seems like a very short time, although I can gauge the true passing of time with the changes made in the ARRL program of Ohio over that period! If you doubt it, pull out the past four years' issues of QST and read some of these columns at random. You can thank those people listed above, my hard-working Section Staff, for the improvements, and you have my permission to blame me for any movement backwards! I have often considered that tremendous good could be realized if I could have spent eight hours each day working for the good of the Ohio Section, but alas, I need to work for "them that pays the bills," too! My work as your Section Manager has reinforced my long-held belief that the programs of the ARRL Field Organization are key to the continued worth and viability of our Service, for it is through the programs like ARES and NTB that we maintain our commitment to serving the public. I am pleased to be able to count myself among those of you who volunteer your time and efforts for the betterment of our hobby! The ending of my terms as Section Manager will not end my involvement with the Field Organization: I hope to be more active than I have been in recent years in the Central Ohio ARES and the Delaware County ARES organizations, in local clubs, and in local and section traffic nets. I would like to thank those who have been especially key to my "getting out alive" (or at least with some semblance of sanity!) Larry and Joanne Solak, the dynamic husband/wife SEC/ACC duo, have shown incredible energy and imagination in building their programs. ARES preparedness in Ohio is at an all-time high, and the Affiliated Club Programs has never been so coordinated. Dave Kersten, N8AUH, has served ably as my Assistant Section Manager, handling whatever tasks have been thrown his way with good humor and adept management skills. While all in my Section Cabinet have played a role, these three have been the true moving force in the Ohio ARRL Field Organization, and I appreciate their efforts! As this is written, I understand that your new Section Manager, John Haungs, W8STX, has asked Larry, Joanne, and Dave to continue in their posts; a very fine decision for Ohio! I'm out of space, and so it's time to wrap it up: thanks to all the amateurs of Ohio who have made our Section the jewel in the Field Organization crown! See you in the pileups! The stations listed below have demonstrated their traffic-handling skills during the month of September 1988 in preparation for emergency communications: K8TVG 288, K88KU 202, K88HB 190, W8OZK 189, W8ZOL 167, N8AUH 167, W8BO 161, KA8CGF 155, WB8DPZ 140, WD8KFN 138, N9AUG 132, WD8MIO 129, K8J12 126, K8BJ 126, WA8SSI 116, W8SKP 114, W8EK 112, N8IIP 111, W8CXM 111, N8FWA 93, KA8GJV 85, WD8IRC 85, WA8HD 80, K8CVY 79, K8CMR 71, K8PFD 70, K8BCV 64, WD8KBW 63, K8DHD 49, K8ALV 45, W8LDU 41, W88JGW 41, K8BJV 40, WD8QXT 40, N8CEI 36, N8EX 35, KA8SON 35, WD8RIB 35, WD8MPV 34, N8GPI 32, KA8TXA 27, KA8BNQ 26, K1J3O 26, KA8SOM 26, W8JLW 25, N8WE 22, W88HHZ 21, W88EYQ 20, N8ISI 18, K88EJW 17, N8GOB 17, WD8JAW 17, W88VNY 17, K8ES 16, N2NS 15, N8EFP 15, W88KWC 15, W88HL 14, N8FPH 14, KA8R1X 13, KD8IC 13, N88LJ 12, N8HSE 12, N8AJU 12, W8ZM 12, WD8CTX 11, WD8JYE 10, W88LH 10, KD8XL 10, K8WZCX 10, KA8DRR 10, K8CXY 9, N8CW 8, K8VOY 8, K8EF 7, N8FB 7, K8DZX 6, W8WGB 6, W8XT 5, N8HRW 4, W88GDM 3, K8IOW 3, W8GDO 3, WA8EZN 3, W8RG 2, WA8NZE 2, WD8PWG 1, KA8OQF 1, N8IDA 1, WD8CSP 1, KA8VYT 1, N8JDH 1. (Aug.) KV8Q 221, N8AEH 65, K8EF 8, KA8OQF 7. (Jul.) KV8Q 93.

HUDSON DIVISION

EASTERN NEW YORK: SM, Paul S. Vydareny, W82VUK—ASM & STM: K2ZM. SEC: WA2ZYM. BM: W82IXR, PIO: K82TM. OOC: N2DVQ. ATC: WA2VGM. SGL: K82HQ. ACC: KV2A. ASM & NWSLTH ED: W82NHC. NET REPORTS FOR SEPTEMBER (QNI/QSP): AESN 50/5 CDN 614/40 ESS 364/83 HVN 248/72 NYPON 517/292 NYSIE 333/246 NYS/L 299/247 NYS/M 292/180 SDN 295/158. CLUB NEWS: Albany ARA had a Q & A session at the October meeting. They welcome new members K2ONP, N2HVJ, WA3RKB, AF2V, W2DAP and others not yet licensed. With deep regret, they report Silent Keys W82BDX and WA2HDR. WA2YBM reports that AARA provided communications for a cystic fibrosis walk on Sep. 11 with WA2YBM N2ENX KA2OWW WD2AJK KB2AFR NQ2H N2JS WA2QAD. Communications Club of NR

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IC-900 Remote Control

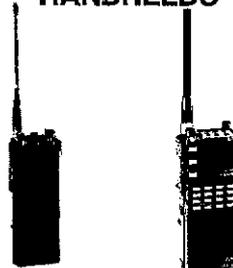
- Fiber optic cable for flexibility in installation
- Band units for 10 meters through 1.2 GHz



IC-228A/H Compact Mobile

- 2 meter transceiver with extended receiver coverage
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HANDHELDS



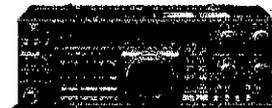
IC 32 AT

- Dual band
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TS 440S/AT

- Built in automatic tuner
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TS 140S/680S

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HANDHELDS/TH 25 AT

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TM 621A/721A

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- Crossband repeater operation
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R 5000

- Deluxe shortwave receiver
- 1-30 MHz coverage
- VHF converter available



AEA PK 232

- Six digital modes including weather FAX

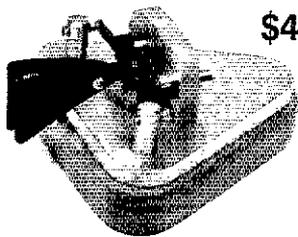
AEA PK 232 SOFTWARE

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- COM-PAKRATT™/FAX
- PK-232 Terminal programs



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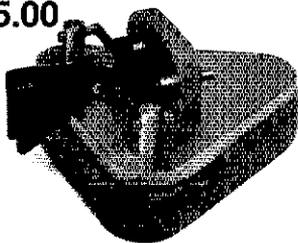
BRASS RACER IAMBIC

The newest addition to the Vibroplex family — the Brass Racer Iambic — A distinctive new design of Iambic paddle crafted from solid brass and mounted on a base of polished hardwood. No springs to fly off the middle of a contact. Superior Vibroplex quality. Always worth the difference and now a new Vibroplex look.

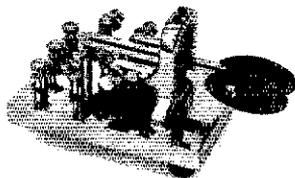
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An even more exciting step is the new Brass Racer EK-1, an electronic keyer built into the base of our new Brass Racer Iambic paddle. Using the Curtis 8044 chip, this self-contained keyer and paddle is fully Iambic with dot/dash insertion and adjustable speed control. Use on either tube or solid state rigs. The perfect unit for mobile, DXpedition, or just plain fun.



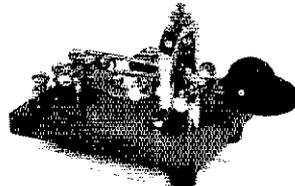
THE IAMBIC



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The distinctive look and quality of the Vibroplex Original is fashioned into the finest Iambic paddle anywhere. The dual paddles allows the operator to utilize automatic dot/dash insertion and other unique features of the modern electronic keyer. Vibroplex distinction for the modern operator.

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had nominations for officers. Overlook Mtn ARC held a Home-Brew night. Orange County ARC had a successful flea market on Sept. 24th. PEARL reports Novice grads KB2FPD KB2PPE; new Techs KB2EGV KB2FPA N2IMA and recent upgrades N2IKO N2IKP KB2CER KB2EGG KB6MUF. Congrats to all. Poughkeepsie ARC members were very active during Hurricane Gilbert handling welfare traffic. The Poughkeepsie Journal had an article which included a picture of WA2KCL. Saratoga RACES had a presentation on paging systems. They welcome new members KA2DIB KB2FSM. Schenectady ARA heard about Ham Watch—a crime prevention program. WARA saw some great slides of Australia and New Zealand courtesy of W2KFB. WECA had a talk on packet by WB2QJA. Yonkers ARC had a successful flea market on Oct. 2. The holidays are upon us. Please help out with traffic on VHF and/or HF. I extend to all, the very best for a happy and safe holiday season! Sep. BPL: N2HIF. Sep. PSHF: WB2VUK N2HIF WA2JBO KB2EPU K2ZVI WB1BTJ. Sep. TFC: N2HIF 575, WB2VUK 171, KB2EPU 168, N2FTR 111, K2ZVI 101, WA2JBO 92, K2ZM 86, WA2YBM 51, WB1BTJ 46, WA2GYY 44, KA2NGJ 11.

NEW YORK CITY-LONG ISLAND: SM, Walter M. Wenzel, KA2RGI—ASM: N2GQR. ASM VE: W2NL. ACC: KA2WJ. SEC: WA2UJ. STM: N2MT. OOC: N2T. TC: WA2YNH. BM: W2JUP. PIO: KA2LCC. The following are traffic nets in and around the section that handle NLI messages with the September report figures:

NET	FREQ	TIME	DAY	MGR.	SES	QNT	QTC	QSP
BAVHF	145.350R	2000	DLY	K2YQK	30	512	293	293
NOVHF	148.745R	1930	M-F	KB2BKE	...	...	NIA	...
SOVHF	145.370R	2800	S-F	KA2JMA	...	...	NIA	...
NYPON	3.915	1700	DLY	KA2UBD	30	617	337	292
NYS/M	3.877	1800	DLY	N2EIA	30	292	210	180
NYS/E	3.877	1900	DLY	KUJN	30	333	275	246
NYS/L	3.877	2200	DLY	KUJN	30	299	297	247
NLT	28.450	2100	WED	KB2BKE	...	...	NIA	...
ESS*	3.590	1800	DLY	W2YSS	31	...	NIA	...
PNS	145.01	24hr	DLY	A12C-4	...	...	NIA	...
PNS(at)	145.03	24hr	DLY	WB2BO-4	...	...	NIA	...

*Independent Net, recognized by NTS, all times are local. EXAM SESSIONS: L.I.M.A.R.C.—9:00 AM second Saturday of each month at Salton Hall, Rm. 2, NY Inst. of Technology, Old Westbury, NY—contact Joe, W2NL 516-541-2451; SUFFOLK COUNTY VE TEAM—9:00 AM second Saturday of each month at the Islip Arts Bldg., Rm. 105, Suffolk County Community College, Selden, NY—contact George, WA2NVN 516-751-0894; GRUMMAN ARC—5:00 PM second Wednesday every month at Bethpage High School, Bethpage, NY—contact Howard W2QUV 516-354-6881; GREAT SOUTH BAY ARC—12 Noon fourth Sunday every month at Babylon Town Hall Annex, Rm. 2, North Babylon, NY—contact: Walter KA2RGI 516-937-5726. If you are wondering why your group's last or next volunteer exam session has not been shown here it is because either you sent it to me too late or it was never sent to me or the ARRL with a minimum two (2) month lead time to allow for printing here in QST. I want to have all of the sessions listed here but I need your assistance to be able to do this. I want to take a moment to thank all of the many operators that participated within the section in the nets that provided emergency and health and welfare communications for the areas struck by hurricane Gilbert in September. Everyone should be commended on the professionalism displayed by all when dealing with the public and the press. Congratulations should also be given for the quickness in which nets were established to handle the messages. I was proud to be part of the NYC/LI team that worked with so much dedication that many worked around the clock to get communications into the stricken areas. While some assisted with nets on GSB from their homes linked by phones and repeaters, others were on packet and other digital modes. Some even manned stations that were set up inside the Jamaican consulate and the UN during the emergency. A complete packet station with two computers was set up inside the Jamaican consulate where there had been no station before, this included having to erect an antenna outside the consulate in lower Manhattan. The station was on line and manned for almost two weeks solid. Space within this column does not allow me to mention everyone that assisted but I must say, "A job well done" to all those that assisted. If you have some thoughts about the communications handled during and after Hurricane Gilbert please send me a copy and I will be glad to include them in my reports. We have learned from the experience that there is more we can do and more things that we should include in our tests and drills. At this time on behalf of all of the NYC/LI Field Organization I want to extend best wishes through the holiday season and the hope that the new year will be a healthy and a prosperous one for all. One last wish, please take a moment this holiday season and give thanks for the opportunities we have in our lives, and please remember that not everyone is not as fortunate as we are. Traffic: K2MT & KA2HDJ 1570, WB2BO-4 778, W2NIP 704, N2GPA & K2JLD 618, N2AKZ 577, N2IMP 440, KA2LCC 224, W12G 218, K2YQK 210, W2AHV 175, N2HSP 185, N2HLZ 123, A12C-4 100, K2PNW 86, N2D 174, KA2RGI 70, KA2JMA 69, K2MWN 61, WA2TGT 52, W2LWB 46, W2AKZ 44, K2TWZ 40, N2ZJ 24, KA2VZK 21, N2GNQ 21, WB2JUE 20, WA2LDS 20, KA2ZYX 20, K2MT 18, KF2F 18, WB2ZIE 16, KB2PCS 15, N2HOE 14, WB2BXL 14, WA2UKM 13, KA2JUJ 11, KD2CK 8, W2LH 8, W2NL 8, NF2N 4, WA2YEI 4, N2RQ 4, KA2VKW 2.

NORTHERN NEW JERSEY: SM, Robert R. Anderson, K2BJG—ASMs, N2CXX (SE), N2WM (NW), WB2NQV (SW), N2XJ (Can) and VE). SEC: N2BMN. STM: KA2F. OO/AAC: KA2BZS. ACC: WB2HBZ. SGL: W2KB. TC: K2BLA. BM: WA2UPK and PIO: NW2L NNJ Ham Radio Info Line 201-680-1585. New appointments effective 10/88 are KB2BNW EC Cedar Grove, PIA N2EA and OES KB2NW. The District Emergency Coordinator (DEC) Leadership Official appointment for Hunterdon County remains open and is needed! Any Hunterdon County amateur who is interested and thinks he or she may be qualified is requested to contact SEC Ralph Francavilla, N2BMN at 154 Redneck Ave., Little Ferry, NJ 07643, phone 641-9494. Appointment endorsements for the next two-year term starting 12/88 are OO KA2OGI, OO NA2R, NM (NJVN/E) WB2FTX and ORS WB2FTX. Dave Kelly, WA2B of Lincroft is now a HF and VHF Awards Manager for the Ocean Monmouth ARC. Joseph A. Reid III, K2JAO, was honored as "Elmer of the Year" for 1988 by the Northern New Jersey Chapter of QCWA at its Annual Meeting dinner held at Cedar Grove on October 21st. Congratulations to SNJ

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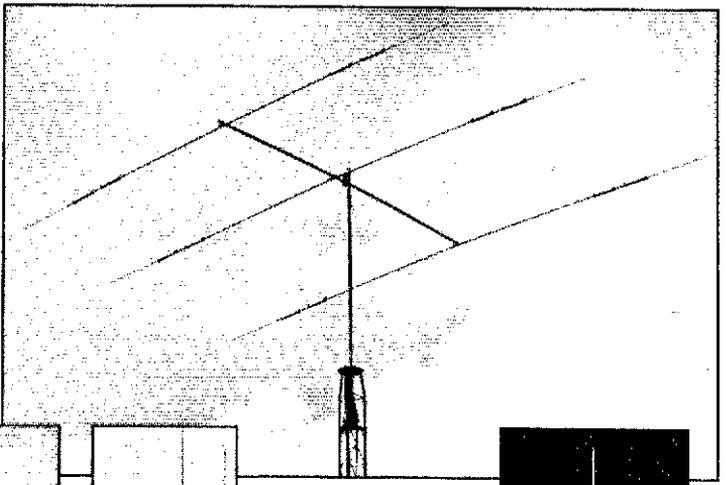
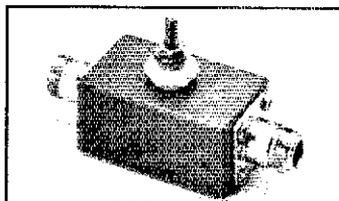
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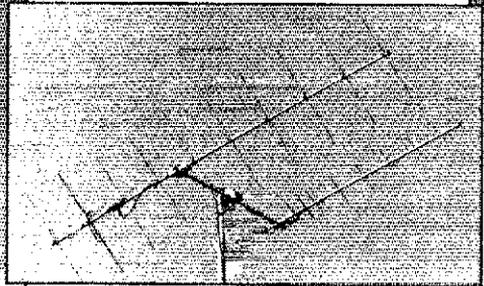
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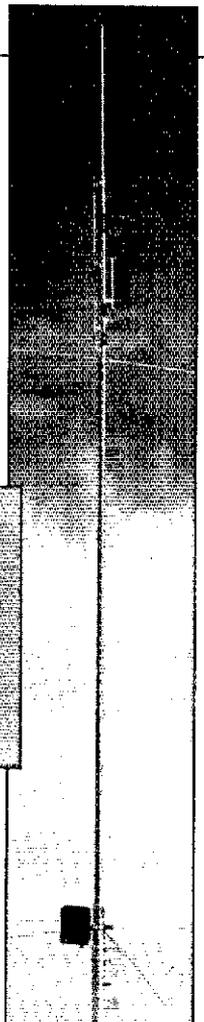
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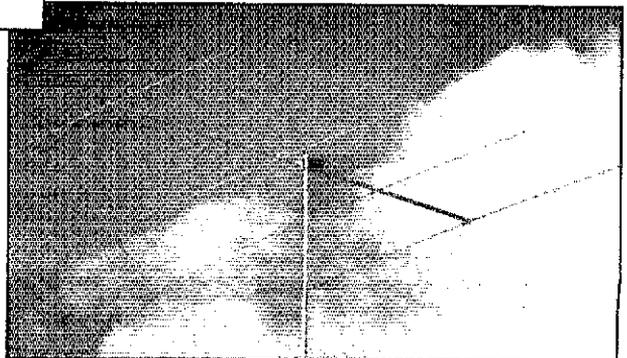


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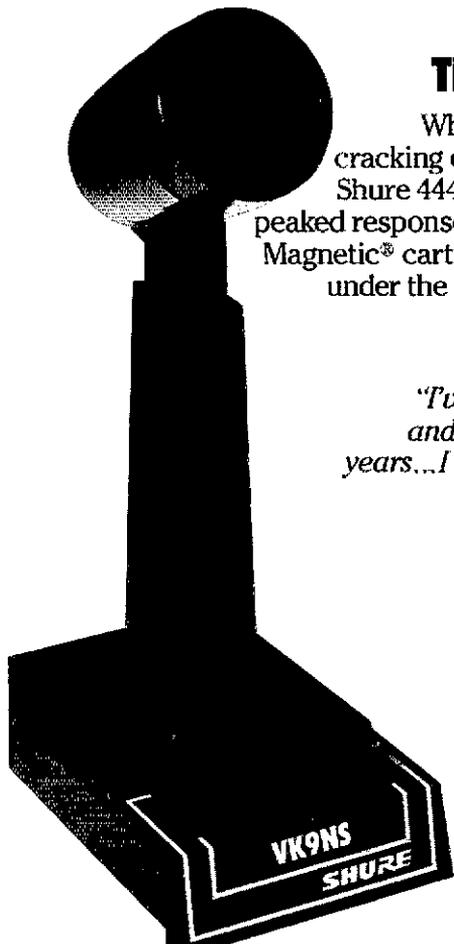
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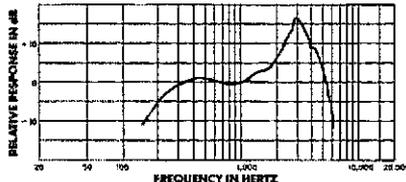
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station AB2E for achieving an all-time high score in the 29th NJ QSO Party. High score station from the NNJ section was KE2CG. Congratulations to the following who were newly licensed or upgraded during NJ Testing Assoc. (6/2). NNJ VE Board (29/13) and Bergen ARA (13/8). Novice: Kim and M Norton. Technician (13): KA2OAF, M Pellicano, KB2FKX, KB2FZG, KB2GND, KB2GDU, KB2GHP, KA2VNR, K Lee, G Mezmerian, KB2FMH, KB2GHJ and KB2GHV. General (4): KB2FCV, KB2FZH, N2IMC and F Carroll. Advanced (1): KA2FNZ. Extra (2): KE2JJ and W2QCA. Total applicants (48). Total New or Up-grade (23). 47.9% Traffic Nets and Statistics for August 1988:

NET	MGR	FREQ	TIME	SESS	SES	QSP	QNI
NJM	WB2ZJF	3695	1000 DY	31	93	254	
NJPN	W2CC	3950	1800 DY	36	98	287	
NJWE	OPEN	3695	1900 DY/P	27	123	227	
NJNL	WA2OPY	3695	2200 DY/P	31	88	38	
NJSN	KA2INE	3735	1830 DY	31	38	182	
OBTTN	KA2F	147.12	2000 DY	23	70	188	
NJTNTN	N2DXP	223.88	2100 DY	31	44	251	
NJVNE	WB2FTX	146.895	1930 DY/P	31	68	485	
NJVNL	N2FGC	146.49	2230 DY/P	—Not Available—			
NINJPL	W2QNL	145.01	24HR VIA WA2SNA				

Packet NTB activity for September, 1988: Total 217, WA2SNA-1 auto forward (98) plus liaison (121) by N2ZT (5), N2ICQ (4), W2KB (2), W2QNL (87), WB2FTX (18), N2HF (5), SAR/PSHR for August: W2RRX 83/105, W2QNL 247/116, K2VX 83/81, KB2BNW 22/45, W2KD 22/1, W2CC, N2XJ 242/98, N2DXP 126/80, KA2INE 56/50, WB2FTX 154/84, KA2F 170/106, WB2QMP 313/74 (BPL) ND2K 17.

MIDWEST DIVISION

IOWA: SM, Wade Walstrom, W8EJ—ASM: W8BAVW, SEC: KD8BG, STM: KC8XL, ACC: NU8P, OOC: WA8QMU, BM: K8IR, TC: K8DAS, PIO: W8EM. I enjoyed the opportunity to speak at the Radio Rodeo in Fort Madison. KA8YAP was awarded the Outstanding Amateur of 1988 Award by the Fort Madison ARC. Congratulations, Rick! New officers of the Fort Madison club are Pres.-KA8YAP, V.P.-W8IHC, Sec.-KE8UC, and Treas.-KA8IQ. The West Liberty Hamfest was also a fine gathering. The great weather allowed many to set up their flea-market wares outside. This was a fine way to close out the 1988 hamfest season in the section. The Cyclone RC is sponsoring a VE Exam session on December 10 in Ames. Contact K8RX at 515-292-4504. Iowa's week for celebrating the U.S. Constitution Bicentennial is December 17-23. The six stations with the commemorative call signs for that week are K200RW, AD200C, W200MLY, W200LAC, W200AK, and W200ANZ. The Fort Dodge ARC held their annual picnic on September 17. The Fort Dodge ARC also reported a 70% success rate at their recent VE test session. Net Reports for September: Iowa 75 M Noon Net-QNI 1119, QTC 40, 28 sessions; Iowa 75 M Evening Net-QNI 881, QTC 85, 26 sessions; TLN QNI 225, QTC 110, 60 sessions, West Central Iowa ARES Net-QNI 282, QTC 11, 21 sessions. Traffic: W8SS 158, KA8AD 127, K8PT 74, W8YLS 71, W8MCM 60, K8GP 58, KC8XL 50, KE8WO 48, N8XW 20, W8BAVW 26, KC8Z 9.

KANSAS: SM, Robert M. Summers, K8BXF—SEC: N8BLD, STM: W8YH, ACC/OOC: K8XF, BM: K8JDD, SGL: N8BLD. Net Mgrs: CW-W8ZNY; Voice-W8FRC; RTTY-open; Slow Speed CW-W8MYM; Wx Net-W8YVZ; PIO: W8WSG. DECA: W8AG, W8EB, W8YJT, W8FRC, N8KV, W8MDF & W8CVR. Was sorry to hear of the death of W8UJW, Bob at Waterville. I am sure he will be missed by many as he joins the list of SILENT KEYS. On the good news side, Jim, N8XR, has agreed to join the KS ARRL staff as coordinator for PACKET. We will be hearing a lot more in the near future of the results taking place. Net activity for the month of August is as follows:

NET	QNI	QTC	MGR	FREQ	DAY	TIME
K8BN	1325	123	W8FRC	3.920	DAILY	6:30 PM
KPN	367	9	W8FRC	3.920	Sat/Sun	8 AM
KPN	---	---	W8FRC	3.920	MWF	6:45 AM
K8WV	692	810	W8YVZ	3.920	DAILY	7 AM
K8WV	851	587	W8YVZ	3.920	DAILY	6 PM
QKS	262	99	W8ZNY	3.610	DAILY	7 & 10 PM
QKS-SS	35	3	W8MYM	3.735	MWF	7:30 PM
C8TN	1960	70	W8CE	7.2535	M-F	12:30 PM

KS Technical Coordinator net meets Wed after K8BN, net mgr is KA8HEP. If you have a problem, perhaps a solution can be found by QNI this net. Traffic: W8FIR 190, N2DM 175, K8BXF 150, N8BZ 122, W8FRC 101, K8BU 95, W8YH 94, W8FDJ 80, W8ZNY 70, KA8RCH 67, W8QMT 51, K8X 24, W8YXK 15, N8BDG 10, W8MYM 8, W8CHJ 5, W8RBO 3.

MISSOURI: SM, Ben Smith, K8PKC—Newly elected club officers for the Indian Foothills ARC are Pres: N8OX, VP: W8BZJ and Sec-Treas: W8BZJH. Thirty seven amateurs from the Kansas City area assisted with communications for the 8th annual Baptist Medical Center Triathlon. The amateur participation was organized by K8DB and K8JPR and K8CCL serving as Net Controls. The Jefferson Barracks ARC will hold their annual Amateur Auction Friday, March 10 at Concordia Turners Halls in South St. Louis. Contact W8BZP for more information. For myself and the other Section Leadership members we want to wish all amateurs in Missouri the best of Holidays and a great 1989. Silent Key report: W8CTP, W8AHI, N8EGP, W8GNNW, WA8JLI. Recent OO Field appointments: W8RV, K8JUS, AA8A, W8KF and W8BZJW.

NET	SES	QNI	QTC	DAY	TIME(PM)	FREQ	MGR
MON	80	212	111	D	7:00-45	3.585	A8O
MEOW	30	541	93	D	5:30	3.953	W8DELL
MOSSB	30	623	79	D	6:00	3.963	K8ORB
HARC	5	118	25	---	---	---	K8SKY
RRABN	25	280	19	D	9:00	147.79	K8BANP
HBN	22	327	12	M-FR	12:05	3.880	K8DSQ
PHD	4	101	7	M	9:00	146.43	W8AKUH
SWMSW	4	126	5	---	---	---	K8KXC
SLARES	4	221	2	M	8:00	146.91	K8WEX
MXARES	5	41	2	TH	9	147.256	K8BAGC
JCRC	4	47	1	W	8:00	147.00	W8ORI
LOZBC(AUG)	26	507	0	M-Sa	6:30a	146.73	N8HVO
(SEP)	26	496	0	---	---	---	---
LOZFM(AUG)	4	73	0	F	---	146.73	N8HVO
(SEP)	5	104	0	---	---	---	---
CMEN	5	53	0	W	9:00	146.76	K8PKC
KCARES	4	44	0	---	---	---	K8UAA
MCARES	3	26	0	Th	---	---	NZBS
JCTOM	4	21	0	Sn	---	28.350	N8OB
LOZYL(AUG)	2	7	0	---	---	146.73	N8HVO
SEDARES	---	---	---	---	---	147.03	W8ENW

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TS-940, 440, 140



TM-721

TM-721A FM DUAL BANDER

TM-22A 2M MOBILE

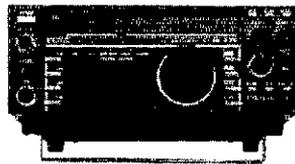


TH-215AT, 315A,
415A, TH-205AT



TH-25AT, 45AT

ICOM



IC-735, 761, 751A, 781



IC-32AT, 32 GAT, O2AT, O3AT,
O4AT, IC-μ2

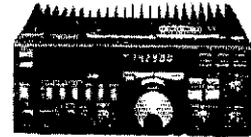
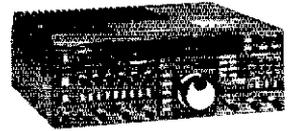


IC-228H, 28H, 38A, 48A



YAESU

FT-767



FT-767GX, 757GX, 747GX

FT-23R, 33R, 73R

FT-727R
DUAL BAND HT



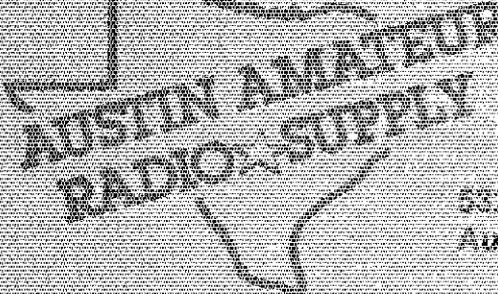
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9:00 - 1:00 (Walk-in)

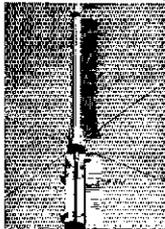
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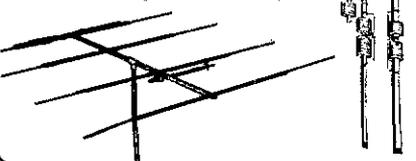
ALD 24T



ALR 22HT

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- Hustler
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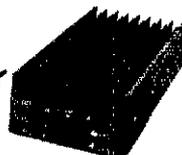
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AEA PK-232, PK-87



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MULTI BAND TRAP ANTENNAS



TRAP DIPOLES

Model	Bands	Traps	Length	Price
D-42	10/15/20/40	2	55"	\$64.95
D-52	10/15/20/40/80	2	105"	89.95
D-56	10/15/20/40/80	6	62"	114.95
D-68	10/15/20/40/80/160	6	146"	149.95

TRAP VERTICALS—"SLOPERS"*

Model	Bands	Traps	Length	Price
VS-41	10/15/20/40	1	28"	49.95
VS-52	10/15/20/40/80	2	49"	54.95
VS-53	10/15/20/40/80	3	42"	74.95
VS-64	10/15/20/40/80/160	4	73"	94.95

*Can be used without radials
*Feedline can be buried if desired
*Permanent or Portable Use

ALL TRAP ANTENNAS are Ready to use - Factory assembled - Commercial Quality - Handle full power - Comes complete with Deluxe Traps, Deluxe center connector, 14 ga Stranded CopperWeld Ant. Wire and End Insulators. Automatic Band Switching - Unusually low resistance. For all Transmitters, Receivers & Transceivers - For all class antennas - One feedline works at all bands - Instructions included - 10 day money back guarantee!

SINGLE BAND DIPOLES (Kit form):

Model	Band	Length	Price
D-10	10	18"	\$17.95
D-15	15	22"	16.95
D-20	20	33"	19.95
D-40	40	66"	22.95
D-80	80/75	132"	25.95
D-160	160	264"	34.95

Includes assembly instructions, Deluxe center connector, 14ga Stranded CopperWeld Antenna wire and End Insulators.

• Any single band, or Trap antenna with "Pro-Balun" instead of Deluxe Center Connector; Add \$8.00 to antenna price.

COAX CABLE: (includes PL-259 connector on each end)

Type	Length	With antenna purchase	Separately
RG-58 50'		\$8.00	\$11.95
RG-58 90'		12.00	16.95
RG-6 50'		20.00	25.95
RG-6 100'		33.00	39.95

ALL BAND-LIMITED SPACE ANTENNA

- Only 70 feet overall length!
- Works ALL Bands 160 thru 10 Meters
- Perfect for ALL classes of Amateurs
- Install as Flat-top, Sloper, Inverted "V", or almost any configuration
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Model AS-2 \$49.95 (U.S. Postpaid)

DELUXE CENTER CONNECTOR

- NO RUST Brass Terminals
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- PB-1 \$17.95

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NEBRASKA: SM, Vern Wirka, WB0QGM—STM: Jerry Kohn, WD8EGK, SEC: Michael Rührdranz, N8FER. Legislation will be considered in the upcoming session of the unicameral that would reduce the additional fee, currently at ten dollars, for amateur call-sign license plates in Nebraska. Please listen on the section nets for information. Contact your local state senator and let him or her know your feelings regarding the legislation. The Lincoln Amateur Radio Club will again provide communications for the annual Lincoln Salvation Army Toyathon set for December 4. The annual Lincoln Club Christmas party is scheduled for December 10 at Misty's Restaurant in Lincoln. The QCWA Lincoln Area Group meets the second Wednesday of each month for lunch at Misty's Restaurant in Lincoln. In an effort to increase the numbers of the rare peregrine falcons a group has placed several birds on top of the Woodmen Tower in Omaha. A limited number of people have been able to enjoy watching the birds on a closed circuit television system in the lobby of the Woodmen, however now, through the efforts of the Greater Omaha Amateur Television Society (G.O.A.T.S.), many more can see the rare birds. A 10 GHz link has been established which puts the video of the closed circuit system on the ATV system in Omaha. John Gebuhr, WB0CMC was instrumental in setting up the system. During a local television station interview, John, WB0CMC, explained how anyone could receive the video on their home cable-ready television set or how a converter could be obtained to enable the viewing of the rare peregrine falcons. K8GHK and WA8RDP operated a special event station, operating several bands and modes, aboard the train pulled by the historic Union Pacific Steam Locomotive 8444 during September as the train crossed Nebraska as part of Omaha's River City roundup. The Pioneer Radio Club of Fremont participated in a Nebraska Region 5 and 6 Civil Defense drill during September. The EC of Crawford County Iowa, Jack, K8CNM, reports Tim, N8GKX of Bellevue, Nebraska was the first one on the scene of a two vehicle accident which involved personal injury North of Denison, Iowa on August 10, 1988. N8GKX called on the Denison repeater and K8CNM answered and summoned law enforcement and rescue personnel. Thanks to the efforts of K8CNM and N8GKX emergency help arrived quickly at the scene of the accident. Traffic: K8DKM 264, W8AP 87, W8OTED 24, K8MZV 19, WB0QGM 7, N8QA 5, W8CO 3, K8FRU 2, W8N1K 1.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Caesar Rondina, N1DCS—ASM: KB1H, STM: K1E1C, OOC: NA1L, ACC: NK1J, PIO: WA1CMF, TC: W1HAD, SGL: K1AH. Hello once again, I am still in the process of getting my feet wet, but things are starting to fall in place. Glad to see Tri-County ARC going strong with 10 meter conversions for old CB radios. Great learning project for the newcomers. Good luck to SCARA on their Nov. flea market. WHARA had a successful ARES drill with the city of West Haven and once again proved how valuable ham radio can be in a real disaster. Congrats KB1WH, DEC. District #8, S.E.T. went well, thanks to all stations and clubs that were involved, as well as all ARRL registered nets and local nets. Congrats to KB1WH 7th in the country in the 1988 ARRL International DX contest operating multi operator, single station. N4GAA now has an up and running ham radio section on his land line BBS. Check it out. Also mail can be left there now. 932-8222. RASON will have a new Net Manager, WA1FCA. Congrats and good luck. N1ESB completed a course with FEMA on principles of disaster planning, nice job Joe. Congrats to all that participated in the Durham Fair event. It was very successful and appreciated. Remember I want to hear from you about your club activities, your views and ideas. Keep up the good work.

NET	NM	TIME	FREQ(MHz)	SESS	QNI	QTC
GN	WB1GXZ	7 & 10 PM Only	3.840	62	231	394
CPN	NK1J	8PM M-Sat 10AM Sun	3.965	30	365	185
NVTN	NM1K	9:30 PM Daily	146.880	30	772	300
WESCONN	NQ1P	9:30 PM Daily	147.180	34	461	324
RASON	KY1F	9:00 PM Daily	146.730	30	229	66
CS1N	K1CE	24 HOUR BBS	145.010			183
CSN	WB1GXZ	7:30 PM M-F	3.720	22	49	118
TMRCN	NM1K			4	108	10

Traffic: W1WP 1646, NM1K 687, NQ1P 629, KA1GWE 429, N1DMV 382, W1EWF 341, KA1JAN 249, KA1FVY 245, WB1GXZ 233, KA1KP 194, KB1ZC 129, KY1F 95, W1YOL 78, NK1N 65, KA1RVI 47, N1FJW 41, KA1B81 40, WB4FCO 22, WA1NLD 21, W1BDN 21, N1BOW 16, K1CE 10, WB2SGI 9, W1QV 5, W1CUH 4.

EASTERN MASSACHUSETTS: SM/SEC, Barry Porter, KB1PA—STM: KW1U; PIO: K1HLZ; BM: KB1AF; CO/AA: AG1F; SGL: K3HI; TC: KA1IU; ACC: Open EMass Hotline: 437-0111 Westlink: 449-2226

Net	Mgr	Freq	Time(EDT)	Day	Sess	QTC	QNI
EMRI	N1AJJ	3658	1800/2200	DY	51	143	153
EMRIPN	WA1FCD	3880	1730	DY	30	96	112
EM2MN	KA1BMD	83/23	2000	DY	26	72	333
NEEP	K1ZDZ	3945	0830	SUN	4	6	36
HHTN	NG1A	04/84	2230	DY	30	182	388
EMRIS5	N1CVE	3715	1800/2030	DY	28	14	38
C1TN	KB1AF	745/045	1830	DY	28	93	392

I hope everyone enjoyed Bobox. There was a 30% increase in attendance from 2 years ago! Kudos to Gene Hastings, Don Poulin, and the crew, which did a superb job. Those that missed the Banquet missed some of the worst coffee ever made and superb entertainment by the Jack D'John trio. Some of the attendees even were invited to perform with the trio. Congratulations to the Quapanawit Radio Association on their 40th Anniversary, and also for winning the competition for the best club newsletter in New England. QRA will be having a banquet on November 18th. To celebrate, during the period of November 1 to November 20 any ham having a QSD with a Quapanawit member is eligible for the "Indian Head Award." Send QSL's to W1UJZ. Congratulations to Jack Berman, W1BWP, on attaining 50 years as an ARRL member. Did anyone trek up to New Hampshire for the Kingston flea market on October 8? The cold and reports of snow kept me home. I hope to be at the Framingham Flea market, which is indoors, on October 23. I had a chance to speak at a meeting

of the North Shore Repeater Association. There were about 75 people in attendance. I wish all club meetings would be that well attended. At that meeting, the NSRA had on display the remains of the club sponsored 220 MHz repeater antenna, which was hit by lightning this past summer. Nature can be devastating when it wants to be. Thanks to all who helped out during the Hurricane Gilbert emergency, especially PIO Al. Carp and the Wollsey ARA. Did your group get publicity for its role? One of the lessons learned was that more hams need to be familiar with traffic handling and emergency procedures before they transmit a signal. If you were the only ham in an emergency shelter, would you know what to do? For training in traffic handling, check into the traffic nets listed above. The NCS's will appreciate the check in, and the net members will be glad to show you the ropes of traffic handling. If your club would like training in traffic handling, please contact KW1U or KB1PA. As part of the SET, there will be a CD drill on November 7th to check emergency preparedness in SE Mass. Remember, people's lives could depend on your knowing when to go. I hope all have cast their votes for Division Director and Vice Director. This is your chance to influence ARRL policy directly. Has anyone had trouble on 10 meters with CB loggers? If you have please contact KB1PA or AG1F. Thanks to all the clubs who are holding licence classes and the VE's for providing an opportunity to get a ham ticket or to upgrade. 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: KB1U 529, WA1FCD 298, KB1AF 221, KA1MDJ 217, WA1BY 189, NG1A 143, N1AJJ 129, K1GGS 102, K1ABO 74, WA1FMM 55, N1CVE 53, WA1CRE 48, W1TC 46, W1CE 41, KA1NOI 35, KA1LJH 23, W1DMH 11, KATEDY 11, N1EGN 10, KA1KCU 5, N1BNG 3, N1BGQ/PBBS 304 (NTS traffic).

MAINE: SM, Bill Mann, W1KX—An Amateur Radio booth and display were shown at the Common Ground Fair in Windsor on Sept. 23-25. Ham Radio was shown to many visitors and about 50 radiograms were sent. Participants included: N1AHH, K8LUVQ, KA1DAX, AK1W, KA1LPW, WB1CBP, W1KX, KA1MLF, KA1MVG, K1CZ and N1EUK. The Windsor Hamfest, sponsored by the Augusta Amateur Radio Assoc., was very successful as usual. New England Dir., K1KI, attended and provided an update on 220, etc. New Pen Bay ARC officers: K1EHO, Pres., WA1ZGH, V.P., WA1ZDA, Tech, V.P., KB1OF, Secy., K1CIG, Treas., and K1ALX, KX1I and W1CET, Directors. Repeater owners should get info on their repeaters to NESMC coordinators by Dec. 1 for inclusion in the next ARRL Repeater Directory. Coordinators are: 29 & 52 MHz — WA1NYR; 144 MHz — K1MON; 220 MHz — W1IFL; 440 MHz & up — W1GXT. K1MAN and the International Amateur Radio Network very active with Hurricane Gilbert traffic and received good publicity for Amateur Radio in the news media. All branches of Military Affiliate Radio Service (MARS) in Maine welcome new members. For information contact: Air Force — W1BKM (AFF1ME); Army — W1HJP (AAA1ME); Navy/Marine Corps. — NC4Y (NNN8GAV). The holiday season is here. Why not originate some holiday traffic for friends, relatives and neighbors and expose them to Amateur Radio? Silent Key: W1CFY, W1PYY, VE Exams: Dec. 3, South Portland (SMVTI), 9:00 AM (KD2EU); Dec. 11, Bath (Patten Free Library), 9:00 AM (ND10); Dec. 21, Augusta (Cony H.S.), 6:30 PM (N1BCF). Maine had 100% representation on First Region Net (Cycle 2) Seven OBS sent 19 ARRL Bulletins and 4 Maine Bulletins during Sept.

NET	SESS	TFC	QNI	MGR
AROSTOOK EMERG NET	4	3	93	WA1YNZ
CENTRAL ME EMERG NET	9	3	202	N1EUK
CUMBERLAND CO ARES	4	1	74	KA1ODT
HANCOCK CO NET	4	8	42	WAZERT
KENNEBEC CO ARES/RACES	4	2	67	KA1LPW
ME PUBLIC SERVICE NET	4	4	46	KA1BQV
OXFORD RACES NET	4	20	49	W1UJZ
PINE TREE NET	30	74	232	WAZERT
SEA GULL NET	26	20	783	K1GUP

Traffic: W1KX 147, NR1W 138, W1VEH 109, WAZERT 103, KA1DAX 64, AK1W 84, KA1JQJ 50, W1JTH 38, W1QTD 22, W1RWJ 19, N1BCF 17, W1BXM 17, N1BJW 12, WA1YNZ 9, KA1ODT 6.

NEW HAMPSHIRE: SM, Bill Burden, WB1BRE—ACC: K1M, STM: KB4N, ASM/NHARA State organization: WB1HBB. Clubs and individuals were very busy this month in the wake of the FCC decision on 220 MHz with phone calls and letters working toward establishing support for reconsideration of the FCC action. Meanwhile, many other activities kept us hopping! The response to the request for weather spotters for the SKYWARN program so far has resulted in Bush, WB1GXM, setting up a class in association with the Twin State club with a second one scheduled for Oct. It is strongly recommended that ARES members take this course! And Twin State has started a 10M net in the Novice 858 section of the band. Jeff, KA9GCE is NCS and the net is held each Monday at 7:30 PM local on 28.350 +/- GRM. IRS Pres KA1OU reports that the club "motorcycle gang" (?) did a Sunday cycling tour of the southwestern region of NH. Chan said that 12 club members and family biked and were followed by N1FVL and N1FDJ in a chase truck to pick up the pieces. A good time and good eating reported by participants. Both Novice classes and VE sessions continue without letup. Rich, N1MD, reports 8 new Novices from the latest class—KA1SMK, KA1SNH (lucky!), KA1SNI, KA1SNJ, KA1SNK, KA1SNY, KA1SNZ and KA1SOA, Michele, who is 10 years old. The next round of classes has started as part of the Derry Adult Ed. program for both Novice and Tech/General upgrades with instructors NM1D, WA1HMF, KX1I and N1AKS. Bob, W1HJT, has 20 students in his Novice class on the coast. NARC held a VE session in Sept with 15 of 23 applicants upgrading and Twin State reports their successful VE session with 6 of 9 applicants upgrading. NH Hams provided a massive communications support system for the Warbirds Airshow in Manchester again this year with over 40 operators assisting in safety and coord efforts. The success of this public-service activity is due to hard work and extensive planning by GSARA. Andy, K1VCF, coordinated the event for the club along with assistant John, N1FN. High praise was heard from the show sponsors and airport officials for the Amateur Radio community. GBRA is moving its meeting site and emergency communications setup to new quarters in the

(continued on page 128)



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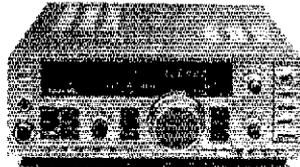
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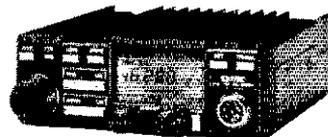
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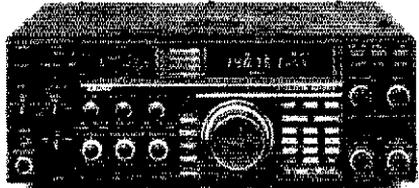
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D SIZE \$4.50 each

1.2 Vdc 1200 mah
CAT# NCB-D

LIGHT EMITTING DIODES (L.E.D.)

STANDARD JUMBO LED
DIFFUSED T-1-5/8 size
RED 10 for \$1.50
CAT# LED-1 100 for \$13.00
1000 for \$110.00

GREEN 10 for \$2.00
CAT# LED-2 100 for \$17.00
1000 for \$160.00

YELLOW 10 for \$2.00
CAT# LED-3 100 for \$17.00
1000 for \$160.00

FLASHING LED
with built in flashing circuit. Operates on 3 volts.
RED \$1.00 each
CAT# FL-1 10 for \$9.50

GREEN \$1.00 each
CAT# FL-2 10 for \$9.50

BI-POLAR LED
Light RED on one direction, GREEN on other. Two leads.
CAT# LED-4 2 for \$1.70

CLIP LITE LED HOLDER
Makes a L.E.D. look like a fancy indicator.
RED T-1-5/8 size LED. \$1.50
GREEN CAT# HLDC-L
YELLOW CAT# HLDC-Y

TRANSISTORS

PN2222	NPN	10-40	4.00	75
PN2904	NPN	10-40	4.00	75
PN2909	NPN	10-40	4.00	75
PN2907	NPN	10-40	4.00	75
PN1909	NPN	10-40	4.00	75
PN1908	NPN	10-40	4.00	75
PN1904	NPN	10-40	4.00	75
PN1903	NPN	10-40	4.00	75
PN1902	NPN	10-40	4.00	75
PN1901	NPN	10-40	4.00	75
PN1900	NPN	10-40	4.00	75
PN1899	NPN	10-40	4.00	75
PN1898	NPN	10-40	4.00	75
PN1897	NPN	10-40	4.00	75
PN1896	NPN	10-40	4.00	75
PN1895	NPN	10-40	4.00	75
PN1894	NPN	10-40	4.00	75
PN1893	NPN	10-40	4.00	75
PN1892	NPN	10-40	4.00	75
PN1891	NPN	10-40	4.00	75
PN1890	NPN	10-40	4.00	75
PN1889	NPN	10-40	4.00	75
PN1888	NPN	10-40	4.00	75
PN1887	NPN	10-40	4.00	75
PN1886	NPN	10-40	4.00	75
PN1885	NPN	10-40	4.00	75
PN1884	NPN	10-40	4.00	75
PN1883	NPN	10-40	4.00	75
PN1882	NPN	10-40	4.00	75
PN1881	NPN	10-40	4.00	75
PN1880	NPN	10-40	4.00	75
PN1879	NPN	10-40	4.00	75
PN1878	NPN	10-40	4.00	75
PN1877	NPN	10-40	4.00	75
PN1876	NPN	10-40	4.00	75
PN1875	NPN	10-40	4.00	75
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PN1856	NPN	10-40	4.00	75
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PN1801	NPN	10-40	4.00	75
PN1800	NPN	10-40	4.00	75
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PN1798	NPN	10-40	4.00	75
PN1797	NPN	10-40	4.00	75
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PN1689	NPN	10-40	4.00	75
PN1688	NPN	10-40	4.00	75
PN1687	NPN	10-4		

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12/88

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*Add \$4.00 shipping & handling, CT residents add 7% tax.

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SUPER ICOM BP-7S, 13.2 volts, 900ma, double the capacity of the Icom BP-7, 5w output.

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- Icom BP-7 (500ma) \$35.00*
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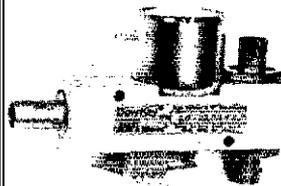
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BA282 VHF/UHF Switcher	5K1 dc -0.5 GHz	10/\$3.50	
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UM9137 400wall RF Switch	5K2 dc -0.8 GHz	5/ \$12	
UM7104 800wall RF Switch	5K2 dc -5.0 GHz	\$10 ea.	

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AND ON HAND

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- 30S-1 power transformer, 662-0351-000 \$265
- Oak on/off "AC" and switch for rotary switch repair on Collins gear \$15
- Trim Ring for 516/312 (small cabinet) plastic (609-1254-001) \$19
- KWT-6 Power transformer, 6950-679-9511 \$115
- KWS-1 Power transformer, 662-0155-00 \$175
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- KWM380 Power transformer, 662-0650-020 SPECIAL PRICE \$95
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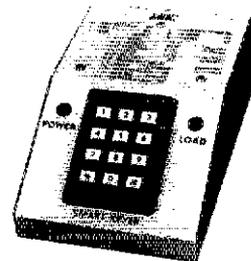
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- INCREMENT SERIAL NUMBER
- DECREMENT SERIAL NUMBER
- CHANGE SPEED
- SINGLE KEYSTROKE FOR ACTIONS SUCH AS ...
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- MESSAGE PLAYBACK
- ALTERNATE SPEED
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the flea market. Robert Service paid a visit to the Haufbrau "all we could eat" banquet thanks to Tim, KL7WE. Compared to the ARRL national convention in Portland, Alaska can be proud of the quality and quantity of gear that appeared at the flea markets. Alaska gets an "A." Remember to remind KL7SANTA that Christmas is coming and there is still time to call THE 800 number to get your new rig here on time. Happy holidays to all. Next month antenna season starts.

IDAHO: SM, Don Clower, KA7T—ASM: K7REX. OOC: WB7CYO. STM: W7GHT. ACC: N7BI. I would like to give special thanks to: W7IWU, K7CXG, KD7HZ, WG7E for giving their time & effort to go on the three-day Bike-a-thon for the Lung Association. I understand they did a super job and had a good time also, the Twin Falls ARC provided comm. for the annual Rim to Rim Run in Twin. 10 hams participated. The U of I ARC, W7UQ, has a new trustee, N7JZ. Many thanks to Ken Hungerford, W7CVJ, who has been the past trustee for 25 years. Many local hams went to Portland to attend the National ARRL Convention; most said they had a fine time.

Net	Seas	QNI	QTC	MGR
CD	22	559	27	K7UBC
NW7N	30	558	28	WB7VAD
IMN	29	246	115	KA7EEE

Traffic: W7GHT 180, WS7U 40, KB7ZO 29, 73, Don.

MONTANA: SM, Ken Kopp, K6PP—Section plagued by fires and many turned out for fire comm duty. Not enough column space to list all deserving recognition! GREAT PR for all. Thanks, YRC (Billings) has new newsletter editor (K77KN) and "new" SPLATTER format. SEC KC7HP on nat'l news with Hurricane Gilbert coverage. Seven Montana Bicentennial stations on air Nov 5-11. SM recall election result: 501 ballots mailed, 367 (73%) voted, 295 (81%) against, 72 (19%) for recall. THANKS (!) for your support and H-A-B-Y HOLIDAYS from Rose and myself. Traffic: W7UQ 576 (PSHR), K6PP 2.

NET	SESS	QNI	QTC	MGR
IMN	29	246	115	KA7EEE
MSN	4	71	0	K6PP
MTN	29	1593	92	KF7R

OREGON: SM, Randy Stimson, KZ7T—ASM: KM7R. STM: W7VSE. SEC: W7FBP. PIO: KC7YN. SGL: KA7KSK. ACC: WF7Q. RFI: AK7T. OO: WN7W. STC: N7ENI. The 1988 ARRL National Convention in Portland, Oregon is over and it was an overwhelming success. We have never had so many exhibitors or so many attending a convention. There were eleven Clubs that took part in the convention. I don't know just how many people worked on the convention but it would have to be in the hundreds. Al Berg, WB7SIC, was the director of the convention and he did just a great job in putting it all together, and I would like to thank him for all of the hard work that he put in for over a year and a half. Jack, WB7SZM, has retired as Emergency Coordinator of Jackson County. Jack has done just a great job there especially last year during the fires in Southern Oregon. Thanks Jack for all of the good work. We will miss you. Traffic (P) = Packet W7VSE 295, W7TA 256, WB7VSN 256, N7BGW 228, W7X1 118P, KA7EEE 107, W7LNE 107, WG7H 102, KV7F 63, N7APC 46, WB7EMO 44P, WB7SZM 37P, W7LRB 33, KA7SYG 25, WB7VMS 25P, KZ7T 22P, KA7AD 17. Late Aug. WG7H 164, W7ODG 39.

WASHINGTON: SM, Brad Wells, KR7L—STM: KD7ME. SEC: KA7INX. TC: WB7UN. OOC: N7DVR. SGL: KD7AK. BM: N7CAK. PIO: N7FKV. ACC/ASM: KC7PH. ASM: KD7G. ASM: KA7CSP. ASM: K7C7LL. There are a couple of contests this month at each end of the HF spectrum: the ARRL 160 Meter contest and the ARRL 10 Meter contest. The 160 Meter contest is December 2-4 and the 10 Meter contest is December 10-11. Both are competitive and offer the opportunity for new states and countries on each band. With a steadily increasing solar flux, 10 meter conditions should be the best within the past several years. In addition, the 10 meter event is open to Novices and Technicians and there should be a great deal of activity in these portions of the band. Remember that your entry can be cw only, phone only, or mixed mode. Congratulations to WJ7X, the newest Official Observer and member of the Amateur Auxiliary. W7LKR (EC Garfield) reports that the KBARA linked repeaters had their busiest month yet: 3 stranded vehicles, 1 DWI, a major accident, and one misc. activity. Asotin County amateurs are planning to issue Commemorative certificates for contacts with designated stations in that county during the Lewis & Clark Trail Run, April 8-9, 1989. The Olympia Amateur Radio Society has renewed as a Special Service Club. ARRL HQ is looking for action articles and photos for publication in their various periodicals, what they want is glossy photos and general-interest stories of hams and clubs in action at picnics, meetings, marathons, emergency scenes, parades, etc. Contact Rick Palm, K1CE, for a "QST Authors Guide" which provides information on putting your article together. Congratulations to Harry Lewis, W7JWJ, who set a new world's record for copying International Morse Code at 75 words-per-minute during the ARRL National Convention in Portland. How about one of the 1989 hamfests sponsoring a cw sending contest? Who is the fastest on a straight key, bug, and electronic keyer? Congratulations to N7DXS on becoming the Peninsula DEC and N7ING on accepting the Kitsap EC position. N7CFA is retiring as DEC Southwest after a number of years of service to the ARES community. New officers for the Northwest Single Sideband Net: Manager—KD7G; Secy—WA7LQV; Directors—KH6COY, W7ELJ, W7HFN, KR7L, WB7QAM. The 146.82 Yakima Repeater has been relocated to 146.66 MHz. K7SS has been working with other members of the WWDXC to establish a hidden transmitter hunt as part of the upcoming Goodwill Games. If you're interested, contact Danny, K7SS, at 206-328-2847. Kudos to KD7AC who was responsible for having Governor Booth Gardner issue an official proclamation declaring November 5-11, 1988, as "Amateur Radio Recognition Week." During the same time period, a number of club stations in Washington were operating with the special "200" prefixes to celebrate the Constitution Bicentennial. As we wind up another year, I would like to thank all of the clubs and individuals who have sent me their newsletters and personal correspondence. Much of that information has found its way into this column. Your continued comments and ideas would be appreciated. If you want to contact me "on the air," I monitor 145.31 (Bremerton) and 147.00 (WWDXC). I am also active on WARTS, WIN, NWSSB, WEN, NTN, and CBN. Special thanks to the members of the Washington Section Staff. Throughout this past year, each of these individuals have given freely of their time and talent to further amateur radio within our state. The Section Staff and I would like to wish each and every one of

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220 MHz Amps

- RFC 3-22, 2W in = 20 out
- RFC 3-211, 2W in = 110 out
- RFC 3-112, 10W in = 120 out
- RFC 3-312, 30W in = 120 out

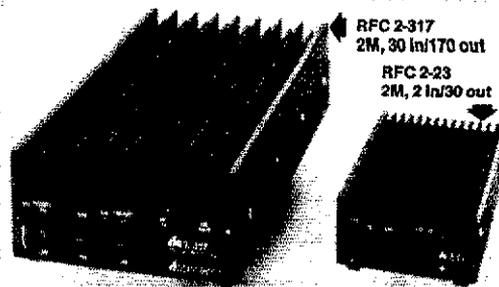
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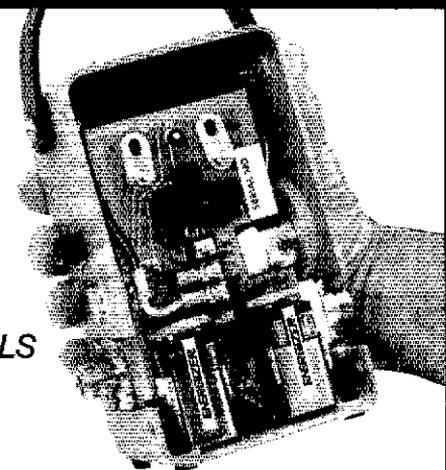
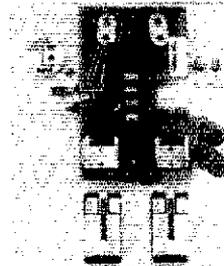
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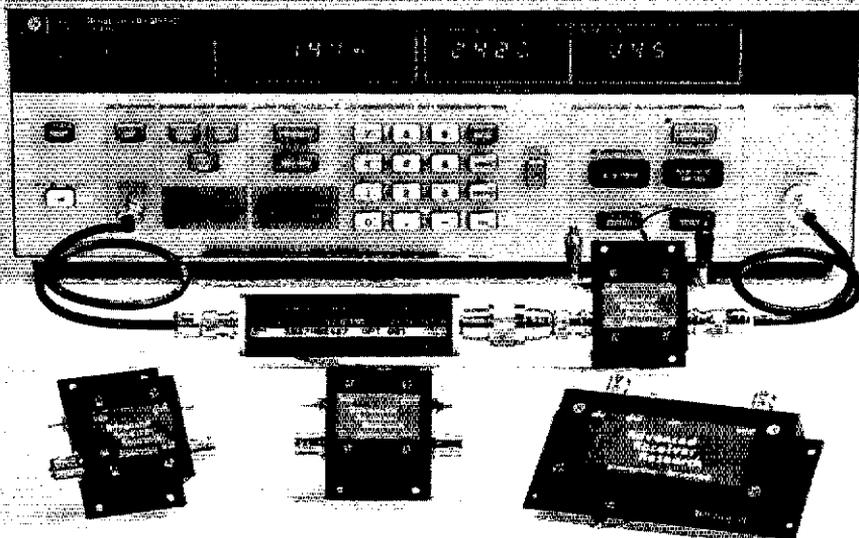
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P432VDG	420-450	<0.5	16	+12	GaAsFET	\$79.95
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SP50VDG	50-54	<0.55	24	+12	GaAsFET	\$109.95
SP144VD	144-148	<1.6	15	0	DGFET	\$59.95
SP144VDA	144-148	<1.1	15	0	DGFET	\$87.95
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PACIFIC DIVISION

EAST BAY: SM, Bob Vallio, W6RGG—ASM: W6ZF, W63FCV. SEC: W6LKE. STM: K6APW. OOC: NY6Z. TC: N6AMG. Welcome to new Amateur Auxiliary (OO) member, K6TI. W6BDOB reports that the CN Picnic near Point Richmond "was an FB eyeball get together with members from as far as Grass Valley and Merced present." EBARC is now meeting in the new Salvation Army building at 4600 Applan Way, El Sobrante. KB6OPO won their CW copying contest, at 40 WPM, at the club picnic. LARK's newsletter featured an excellent article by KF6VU on the 12 vs 20 MHz offset in different brands of 23 cm gear. HRC welcomed new member N6SQC. MDARC's "the CARRIER" featured an excellent article by editor WU6P, entitled "ARRL - ARES, The Structures, Policies, and Personalities You Should Know." They welcomed new members N6PDX, KB6WZP, W6BNVT, N6SIP, J. Vincent Neef, KB6WAG, KB6MTI, W6LDS, N6AYU, and W6EFD. (Who is their membership chairman? He sure knows his business!) BARC's "Log Book" featured an article on the VVRC's excellent job during the Miller Canyon fire. VVRC's newsletter contains this quote from President WX6F regarding their membership: "The spirit of volunteerism and cooperation is truly a model for all clubs and service organizations." Sep traffic: W6BDOB 179, WBVOM 123.

NEVADA: SM, Joe Lambert, W8IXD—ASM: K7HRW. Recently appointed OBS, Marty, K4AM, has instituted a 24-hr. ham radio hotline. For ARRL bulletins, L.V. area ham news, and upcoming events, dial 435-6765. If you have any info for this Bulletin Board, contact KK4M. Many Nevada hams enjoyed the ARRL National Convention. Congrats to FARS for winning ARRL's Club Challenge contest for the small club division. WADG operated N7RH at the Nevada State Fair. It was a big hit—over 700 stations including 50 states and 7 foreign countries. SNARS provided communications for the VORRA off-road race in Yerington during Sept. SNARS also supported races in Oct.—one at Winnemucca dry lake and another in Yerington. LVARC sponsors a Swap Meet in front of Amateur Electronics Supply-LV on the first Sat. of every even-numbered month starting at 7:30 AM. Please send your items to W8IXD for this column before the first of the month.

PACIFIC: SM, Wayne Jones, NH6GJ—Greetings to all from the land of Aloha! Public Service events were the thing of the month! The Aloha Week Parade communications support was provided by: KH6CZ, NH6GJ, KH6DM, WH6BUL, KH6HJA, WB7NTU, KH6UM, NH6IG, WH6BIU, AH6BJ, KH6GPI, N8BKS, KH6TB, N8ECG, KB6LFO, KH6BIO, AH6EN, WH6AXR, NH6LH, N4ESX, WX4J, NH6IT, NH6DC, NH6PB, NH6MH, NH6QC, WB6NCO, WD6COV, WH6BKQ, NH6PY, NH6NJ, KH6JLX. Hooloalea support was provided by KH6NJ, NH6GJ, NH6DY, WB7NCO, NH6IJ, NH6JW, WX4J, KH6CV, N4ESX. Support to the Family Health Plan runs on Guam was provided by W1YRM, KH2G, KH2CS, and WH2AEN. Partial results from the AH200 ops in Hawaii: KH200RS (Maui)-3080 contacts; KH200DLW (Kauai)-about 2700; AH200HC (EARC)-about 500. Reports from other participating stations are not available. My thanks to all! Traffic: KH6S 51, KL7IVQ 65, KH6GMP 31, KH6H 53. Aloha from all of us to all of you!

SACRAMENTO VALLEY: SM, Bob Watson, W6IEW—I have just received an outstanding report from Ron Monet, N6AUB, the District Emergency Coordinator of the Mother Lode Counties in the Sierra. It details the superb performance of hams in support of the many activities in the 49er WILDFIRE and we are hoping that at least the salient features of the report will be published elsewhere in QST. There were too many people involved for even their names and calls to be mentioned in the space permitted here. Ron must be commended for a job well done with the fire as well as for the report. While emergency activities are the subject, our Section Emergency Coordinator Deane Coates, NR6A, deserves a word of thanks for his good work in organizing the activity and attracting people to fill the slots. Also, our Official Observer Coordinator John Canaris, WY6O and some of his people are to be commended for some recent excellent work which, unfortunately, is confidential so cannot be described here. Thanks, fellows! This is the beginning of my fourth, and last, year as your Section Manager. Petitions nominating a new SM will be solicited shortly. If anyone wants the forms, contact me at the phone or address given on QST page 8 or via packet to W6IEW @ WA6NWE-1. Traffic: WA6WJZ 354, K6SRF 99, N6LUY 85, WA6ZUD 84, W6ZCF 21, W6BSFQ 2.

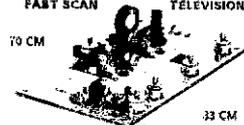
SAN JOAQUIN VALLEY: SM, Charles McConnell, W6DPD—SEC: W6SU. STM: N6AWH. TC: WA6EXV. ACC: W6DPD. Asst. SMs: W6TRP and K6YK. Congratulations to the Central California Amateur Communications on becoming an affiliated club. Congratulations to Patrick Jungwirth, W6GL, on receiving an OCWA Memorial Scholarship. WA6ZFH and WB6YAR are SILENT KEYS. WSZUJ is Extra. KB6ZJX, KB6YIV, N6SFC, and N7BHW are Advanced. KB6LEI and KB6VHO are General. KB6ZKE, KB6VOF, KB6ZNU, KB6ZNV, and KB6NJV are Tech. KB6TLC has a TS-430S. Merry Christmas and Happy New Year to all. Traffic: WA6YAB 30, N6MXG 10, K6PMG 4, K6RAU 5.

ROANOKE DIVISION

NORTH CAROLINA: SM, W.Reed Whitten, AB4W—ASM: AB4S. SEC: N4MYB. STM: K4NLK. BM: K4IWK. ACC: WC4T. TC: K4ITL. SGL: KE4ML. PIO: AB4FW. All EC annual reports, NM SET reports & EC SET reports are due. It's not too late to report your county SET. Contact N4MYB if you need forms or information. [BT] The NTS system will soon experience its annual Christmas traffic rush. This is a good exercise of the traffic system and creates a special need for outlets in all cities & towns throughout NC. Please check into an HF or VHF NTS net, help with the traffic load and get some good experience handling traffic. [BT] Where does all this traffic come from? Many groups set up "free radiogram" tables or booths with signs and an equipment display in shopping malls during the holiday season (CW is very effective in attracting a crowd). This is one of the most effective ways to contact the public. Most malls welcome this type activity since we are providing a free service. The goal of this type operation is to talk to people about Amateur Radio, NOT to set a record for traffic count. You may meet potential Novices looking for someone

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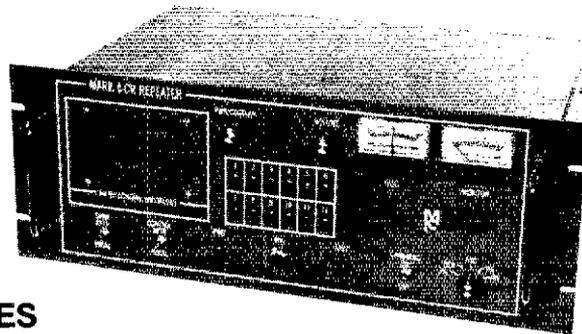
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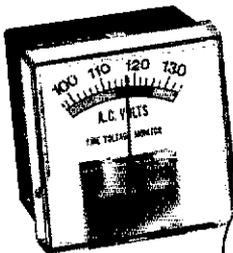
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Single-Sideband Systems and Circuits by William E. Sabin, WØIYH and Edgar O. Schoenike, has long been considered an invaluable reference for the circuit design professional and amateur with a technical background. The book was written by the staff of Collins Defense Communications division of Rockwell International many of whom are licensed amateurs. In 594 pages it covers, IF Filter, Frequency Standard, Receiver, Transceiver, Exciter, and Synthesizer Design; Solid-State, Ultra-Low Distortion and High Power Amplifiers. Two important chapters on subjects which are finding serious applications today's amateur equipment are: Digital Signal Processing and Digital Control. You will also find information on Receiver Measurement Techniques and Antenna Matching. For more information see the review on page 24 of December, 1987 **QST**. Published by McGraw-Hill in hard cover, copyright 1987. Regular Price \$49.95. ARRL Price \$42.00 plus postage and handling.

Communications Receivers: Principles and Design by Dr. Ulrich L. Rohde, DJ2LR and Dr. T.T.N. Bucher. DJ2LR has published numerous articles on the design of high-performance receivers and the co-

author designs receiving systems at RCA. In 608 pages, this book covers: Basic Design, Receiver Characteristics (such as gain, dynamic range, etc.) System Planning, Antennas and Antenna Coupling, Amplifiers, Mixers, Frequency Control including synthesizer principles, Frequency Control, Demodulation, Other Circuits, and Design Trends including digital techniques and spread spectrum. For more information see the review in August, 1988 **QST**. Copyright 1988 by McGraw-Hill. Regular Price: \$59.50, ARRL Price \$50.00 plus postage and handling.

Digital Communications, edited by Thomas C. Bartee covers recent advances in communications technology. In 406 pages, this professional reference presents such topics as Integrated Services Digital Networks (ISDN), written by Eric Scace, K3NA; Electronic Mail Systems; Digital Coding of Speech, Challenges in Communications for Command and Control Systems; Cellular Networks; Satellite Communications; Fiber Optics; Computer Based Messaging and Video Teleconferencing. Published in hardcover by Howard W. Sams & Company. Regular price \$44.95. ARRL Price \$38.00 plus postage and handling.

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to give them an exam. Amateurs who are inactive or new to your area or just get a chance to tell someone about our public-service activities. You may also get a chance to discuss a TVI problem in a friendly setting. Help out with an existing mail operation or set one up yourself. [BT] Quarterly traffic report, Jul-Sep 88:

NET	QNI	QTC	QFC	QND	QES	NM
NCEN	1580	391	344	1643	92	WB4WII
NCMN	1161	352	322	1282	92	WD4MRD
CN	1859	682	659	3437	183	K4IWW
CSN	595	112	103	1942	92	AA4MP
CNCTN	2493	239	188	1399	92	WA4MNR
PCTN	1338	370	252	1258	92	AB4EO
RARS	882	69	65	1587	91	K4ABJ
M2MEN	1461	103	94	937	84	KF4MZ
CFARS	1288	80	80	1449	92	W4EHF
PETN	842	109	90	820	79	WB4HRR
THEN	954	86	67	828	92	N4LUJ
ACAN	63	7	7	57	9	N4JRE
Totals	14,316	2,600	2,270	16,647	1,090	

Traffic for September: K4NLK 393, AA4TE 264, WD4HTE 156, K4IWW 133, AA4ZV 131, KA4EYF 118, K4YV 107, N9CGD 85, N4JRE 59, WB4WII 44, W4LWZ 39, WD4MRD 39, N4UE 37, WA4MNR 33, W4EHF 30, AB4EO 29, W4BFB 28, KA4KGZ 25, WA2EDN 22, WB4DAR 13, AB4W 11, N4CJL 8, KB4FKF 7, AJ5F 7, NT4K 6, N4SVZ 5, N4TCH 5, W8KLF 2 [AR].

SOUTH CAROLINA: SM, Jimmy Walker, WD4HLZ— Since August 4th, I have answered numerous questions concerning the FCC allocation of 220-222 MHz band to the Private Land Mobile Service. How could the ARRL let this happen? What did the ARRL do to inform FCC and Congress of the importance of this band to Amateur Radio and the public for emergency and digital Communications? What is the ARRL going to do now? Even though the handwriting was on the wall from the beginning, the ARRL, aided by skilled professional legislative lobbyists, mounted a fierce campaign to retain the band for amateur use. Amateur Radio lost a battle, but the war is not over. The ARRL will continue to fight to prevent reallocating the 220-222 MHz to Land Mobile. As primary spokesman for Amateur Radio in South Carolina, I was asked to schedule a meeting with Senator Hollings and his staff to discuss this issue. Mike Riley, Robert Weigand and I met with Ralph Everette, Tom Cohen and the Senator. Since that time many of you have contacted your representatives concerning this issue and I appreciate your effort. Even though it may not be apparent, the ARRL will use all avenues available to prevent reallocation. Don't forget to send your December reports to Ned Moeller, N4FVU, 116 Willow Winds Drive, Columbia, 29210 - this will be my last column! BEST WISHES and SUPPORT YOUR NEW SMI Traffic: W4ANK 194, N4MEJ 111, KA4LRM 44, KJ4DT 33, W4DRF 20.

VIRGINIA: SM, Glynn Coates, KB4WT—PIO: AA4VP. TC: WX4C. STM: KB4WT. SEC: N4EXQ. ACC: NT4S. OOC: W4HU. 8M AB4U. SGL: W4UMC.

VTN	1 PM	3907	KB4NGO
VSBN	6 PM	3947	K44BR
VSN	6:30 PM	3680	N4KSO
VN(EARLY)	7 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	148.97	KJ4VT
DECEC	9:45 PM (3rd Wed.)	3910	KA4NWK

As I compose this part of the Section News, I do so with a measure of sadness as I am doing it because our Section Manager, Mark, NN4I, and his wife have left our Section to begin a new phase of their lives in sunny Florida. Mark, we wish the best for you, and we will miss you as a dedicated leader of the Virginia Section. In spite of that sad note, in the midst of these festive holiday seasons, I wish to express HAPPY HOLIDAYS to each of the members of the Section. May 1988 come to an enjoyable close for each of you and may you look forward to a prosperous and happy 1989. It was great to see so many of you at the Virginia Beach Hamfest; the attendance and discussions at the Section meeting, the ARRL forum, the Packet Radio forum, and the DX forum were great. Considerable local media publicity was generated for the next event because the Virginia Beach Club set up a booth for collecting health and welfare traffic for the Hurricane Gilbert disaster areas. (I understand that similar publicity was generated for similar efforts throughout the section.) The Virginia Packet Radio Association (VPRRA) contributed to the effort by passing the traffic out of its operational booth at the hamfest directly into the packet system. For those of you who were unable to come to Virginia Beach, we are looking forward to seeing you at the Frostfest in Richmond during January. WB4ZTR, an experienced NTS traffic handler, and WB9TAX, an experienced packet radio SVSOP, have recently collaborated via packet to develop a set of procedures for the proper method for handling NTS traffic via packet. The result of their collaboration is a set of procedures that will, hopefully, serve as a standard for this section as well as a model for other sections wishing to standardize the vital link between the two important systems for moving traffic throughout the country. The procedures have been circulated throughout the section via the packet BBS system and the VIRGINIA HAM. If for some reason you have failed to see a copy of the new procedures, please contact either WB4ZTR, WB9TAX, or KB4WT for a copy. Traffic: N4GHI 947, WB9TAX 818, K4MTX 307, W4JLS 278, WB4PNY 213, N4EXQ 212, WB4KSG 205, K4DOR 194, W3ATO 172, KJ4VT 135, KB4WT 134, WD4FTK 128, K4BL 92, AA4AT 90, WD4MIS 78, WB4UHC 77, N4KSO 74, N6ANQ 61, K44BR 60, WB4EDB 60, K4BGZ 55, K4JM 51, WB4ZNB 50, N4SMB 42, WB4ZTR 39, W5TZC 36, K44FV 36, NT4S 34, W4HU 33, KB4OPR 20, K4W 19, K4YU 16, K4MLO 14, W4HDW 11, W4CCK 10, N4TJT 10, K4AXF 8, WB4KIT 8, K4JST 6, N4FNT 6, K4GR 5, NW4O 4, K4VWK 3, W44TVS 2.

WEST VIRGINIA: SM, Karl S. Thompson, K8KT—SEC: KBQEW, STM: N8FXH, ACC: WA8CTO. SGL: K8BS. TC: K8LG. Rept. Coordinator WB8GDY. Charleston Area H.F. will be April 15, at Civic Center. Mark you calendars now! Contact N8AJC for details. We now have 625 active ARES members in WV. Activity for Sept., 37 nets, 478 ck ins. Thanks to KBQEW for good job. Cabell Co. ARES conducted severe WX net, working with TV and radio stations.



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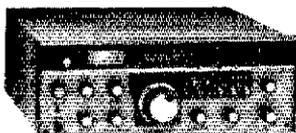
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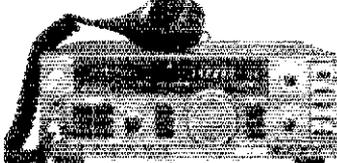
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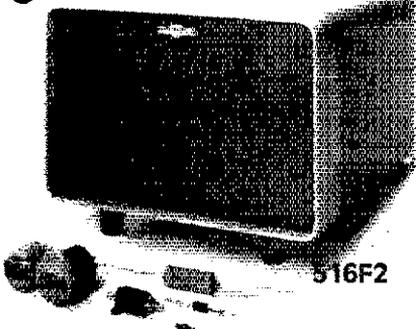
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ROCKY MOUNTAIN DIVISION

COLORADO: SM, Bill Sheffield, K0BU—ASM: KA0MOA, SEC: WB0TUB, STM: KB0Z, ACC: WB0DUV, SGL: WB0QB, TC: W8LJF, OOC: K8CDN/W8JR, PIO: N0DZA. Witnessed the last three swapfests of the year...Hi Plains Ham Roundup Swap and Campout hosted this year by NCARC. Even judged a pie bake-off here. Barfest used new facilities this year lots of room and an excellent turnout. The last swap was the Western Slope ARC in Grand Junction. I enjoyed meeting many old friends and new ones at these excellent events. Congrats to all of the organizers. Thanks to the many amateurs who participated in JOTA and working with the Boy Scouts during this two-day event. Some recent packet activity includes a Colorado Station W8LJF with a BBS on 30 meters, and NTS BBS on 80 meters with daily contact between Durango, W80Z and Denver, N0LA forwarding on their local 2-meter NTS BBS. This is the time of year that I would like to take a few minutes to wish all a very Merry Christmas & Happy Holiday Season from all the Section Leaders: 73, K0BJ NETS: CWN: QNI 71, QTC 53, QNF 308, 25 sess. Col: QNI 1105, QTC 65-119, QNF 936, 30 sess. HNN: QNI 1627, QTC 153-511, QNF 1080, 30 sess. SCTN: QNI 278, QTC 47, QNF 330, 28 sess. NCTN: QNI 76, QTC 50, QNF 330, 28 sess. Traffic: N0HFZ 472, K0HCA 290, KA0WIE 74, KB0Z 74, W80FFV 67, K80WC 57, W8NFW 6.

NEW MEXICO: SM, Joe T. Knight, W5PDY—ASM: K5BIS, SEC: K6YEJ, DEC: W5HCB, STM: ND5T, NMs: W5UONO, K5NNG, W5ONR, TC: W8GY, ACC: K5BEM. Southwest Net meets daily, 3583 @ 0230 UTC, handled 65 msgs with 160 checkins. NM Ropdrunner Net meets daily 3939 @ 0100 UTC, handled 96 msgs with 1102 checkins. NM Breakfast Club meets daily, 3939 @ 6:30 AM, handled 200 msgs with 969 checkins. Yucca 2-mtr Net, 7818 handled 14 msgs with 358 checkins. Caravan Club 2-mtr Net, 8606 with 114 checkins. SCAT Net, 6606 handled 6 msgs with 503 checkins. Info Net 12/72, with 88 checkins. Northern NM Hamfest on Sat. Sept. 24th was well attended with approximately 250 in attendance, and everyone reporting a fine time. Vv sorry to report the passing of N65S of Albuquerque and W5XL of Organ, NM. We will certainly miss them both. Traffic: W5DAD 162.

UTAH: SM/STM, Jim Brown, N47G, SEC: Rich Fisher, NS7K, John Sampson, W7OCX, passed away on September 18. A longtime Ogden resident, John contributed much to ham radio: SUN Mgr for 25 years, STM for many years, active on HF. He was also active in Army MARS. Novice class in Bountiful has a class size of 25. AC7H, NU7X, NS7K, KA7QPC teaching it. Dan, N7JCL, and Jim, N27I have their HF antennas up. 73 de N47G. Traffic: WA7MEL 64, WA7KBE 57, N7UUN 50, N7JLC 49, NS7K 23, N47C 14, N7BQE 3.

WYOMING: SM, Jim Raiser, N7GVV—ASM: Steve Cochrane, WA7H, SEC: Jim Anderson, W7IVK, STM: Dan Ransom, K7MM. We need volunteers to operate as net control for the Sunday AM ARES net, contact W7TVK. Also, Jim has requested someone to step in as SEC; how about you? Thanks to University ARC for running the WY QSO party. Did anyone pile up more points than K7MM's 203,000? Traffic: NN7H 235, W7SQT 131, W77ZK 295. Nels: K7GAR reports Cowboy Net held 22 ses/1673; W7LIL reports AREA 5 ARES held 4 ses/749 QNI/5 QTC; W7MZV reports Pony Express held 4 ses/45/0; W87K reports Albany ARES held 4 ses/29/0. Well it's the season to be jolly. May your stockings be filled with those most needed toys and the new year bring higher flux and all that good stuff...73

SOUTHEASTERN DIVISION

ALABAMA: SM, James Spann, W04W—ASM: W4XJ, SEC: KB4GDN, STM: N4RT, PIO: KB4KCH, ACC: AA4BL, OOC: KF4VS, SGL: N4FRQ, BM: KA4ZXL. On Sept. 27, a hearing was held before Administrative Law Judge Carl Evans in Montgomery on the matter of lowered phone line charges for amateur radio repeater installations (from commercial to residential). The President of the Alabama Repeater Council, Hop Hays, K4TOR, their attorney Bill Hooks, WD4BXI, and others including myself represented the Amateur Radio side, while attorneys for South Central Bell presented their side. Judge Evans will make a recommendation to the Public Service Commission on this, and we will keep you posted. Hop and the ARC have done a great job on this for all of us. Congrats to the Mobile ARC for putting a fine Hamfest on despite Hurricane Florence. Alabama amateurs did a FB job on handling necessary traffic and messages during both Hurricane Florence and Gilbert. In Huntsville, the U.S. Army is using the 420-450 MHz band for experiments, and some amateur UHF FM repeaters and digipeaters are having to comply with quiet hours. Our SEC, KB4GDN, helped to coordinate amateur communications involved in a search and rescue effort on a downed plane northwest of Birmingham. The wreckage and two bodies were found after several days of being in the wilderness. Does your county have an EC? Contact KB4GDN on how you can get involved in ARES. Traffic: WA4JDH 747, W4PIM 89, W4ZJY 64, W04W 10, W4DGH 8, WA4ZPZ 6, W84TVY 6.

GEORGIA: SM, Eddy Kosobucki, K4JNL—ASM & ACC: WA4ABY, SEC: NC4E, STM: WB4WQL, NS4T (Packet): W4QO, BM: W4ZQJ, OOC: W4TG, PIO: WB4DEB, SGL: W84UVW, TC: WD4PAH. First of all I hear of a "SILENT KEY" pse forward it (possibly with the obituary notice out of the newspaper) to ARRL HQ. They don't have to be sent to me to forward. The GA HAMFST season is over with, it u are planning one for 1989, pse write to BERNICE DUNN at ARRL HQ for forms so that u can qualify as an ARRL sanctioned hamfest. She needs dates so she can log it & tell u if there are any scheduled close on the same date. I have always tried to make as many as I can but I have to share my budget with

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(continued on page 144)

A high-performance HF rig... with a great receiver and full-power transmitter. Light in weight and low in price.

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Whether you're a novice or a veteran, it's a great way to start. And a great way to go.

DX ready. The 747 packs a full 100-watt RF punch on 160 to 10 meters, with continuous receive from 100 kHz to 30 MHz.

And its control panel is refreshingly simple. So you can hop around the band *fast* to nail those DX stations. While other guys are warming up their amplifiers, you can be working the DX!

Multimode versatility. The FT-747GX is ready to go on LSB, USB, CW, and AM. With provision for the FM-747 FM unit—great for watching 10-meter repeaters.

You get 20 memories to store frequency and mode. Dual VFOs with split frequency operation for DX-pedition work. And manual band scan plus auto-resume memory scan via the microphone up/down buttons.

Great receiver. Utilizing a directly-driven mixer, the FT-747GX receiver features superb overload protection. You also get factory-installed narrow CW and AM filters. A one-touch noise blanker. All-mode squelch. RIT. And a 20-dB attenuator for local QSOs.

Lightweight construction. Housed in a metallized high-impact plastic case, the FT-747GX weighs in at about 7¼ pounds! With the loud-speaker mounted on the front panel for maximum audio transfer. And internal heatsinking for the transmitter, rated at full power for FM, packet, RTTY, SSTV, and AMTOR when

used with a heavy-duty power supply.

Available options. FC-1000 or FC-757AT Automatic Antenna Tuners. FL-7000 500-watt Automatic Solid-State Linear Amplifier. TCXO-747 Temperature-Compensated Crystal Oscillator. FAS-1-4R Remote Antenna Selector. FRB-757 Amplifier Relay Box. FP-700 Standard Power Supply. FP-757HD Heavy-Duty Power Supply. MMB-38 Mobile Mounting Bracket.

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Reaching for the Stars with OSCAR and ICOM

Recent magazine articles and hamfest discussions continuously indicate OSCAR satellite interest is at an all-time high. Packet operators are using JO-12's flying mailbox, low power enthusiasts are communicating via RS-10/11, and amateur radio's new OSCAR 13 is creating widespread excitement among newcomers and veteran satellite operators alike.

Each day, this high orbiting spacecraft relays numerous DX QSO's in a fully dependable line-of-sight manner. Its operators enjoy friendly conversations rather than simply exchanging call signs and signal reports, and all Technician or higher class licensees can join the fun. ICOM congratulates AMSAT on OSCAR 13's success, and supports its space-age operations with today's leading line of OSCAR satellite equipment.

Setting up your own station for operating OSCAR 13's popular Mode B includes acquiring multi-mode transceivers for 2-meters and 70cm, plus circularly polarized "twist" antennas for each band. A low noise GaAsFET preamp is also used for receiving satellite-relayed signals. Station assembly usually takes less than a day's time and it opens a new world of amateur radio enjoyment.

Your combination of 70cm transceiver power and twist antenna gain should give 400 to 600 watts of Effective Radiated Power for reliable SSB and CW operations on OSCAR 13's Mode B. Since foliage absorbs UHF signals like a blotter soaks up ink, and long coax cables produce high RF attenuation, strive to erect your satellite antennas in a clear sky view area preferably within 25 feet of your shack. If trees block your antenna's view or if longer cable lengths are necessary, ERP levels upward of 2000 watts will be required for reliable operations in

those directions. Your 2-meter antenna's gain should be similar to your 70cm antenna. Mount the antennas on a six to eight-foot crossboom, and insulate their boom-to-mast plates for minimizing crosstalk. Separating their cables by one or two feet and adjusting one antenna's boom mounting angle so 70cm and 2-meter elements are not parallel with each other also reduces crosstalk.

Your transceivers are operated in a crossband fashion, simultaneously transmitting on 70cm and receiving on 2-meters. This full duplex arrangement is ideal for copying your own signals exactly as they are heard by others, and for "tweaking" antenna positions for good satellite relaying. It is a fresh new means of communication, and ICOM equipment puts you at the forefront of its enjoyment.

Since satellite-relayed signals are relatively weak in nature, top-notch receiver performance is vital to successful operations. ICOM's 2-meter IC-275A/H, 70cm IC-475A/H and 1.2GHz IC-1275A are proud leaders in this area for several reasons. Their Passband Tuning is adjustable for an optimum receive bandwidth and maximum signal-to-noise ratio and their IF Notch Filter moves a deep null within that adjusted width to further minimize band hiss. Teaming those features with each unit's Noise Blanker, selectable AGC and optional GaAsFET preamp yields totally remarkable performance in pulling signals right out of the noise. ICOM's "75 series" transceivers are absolutely phenomenal!

ICOM's IC-475H (75 watt output) and IC-475A (25 watt output) 70cm all mode transceivers are also widely recognized OSCAR favorites. Their crystal-clear audio, SSB Speech Compressor and continuously adjustable RF output control, for example, assure maximum "talk power" at any transmit level. You can also reduce power

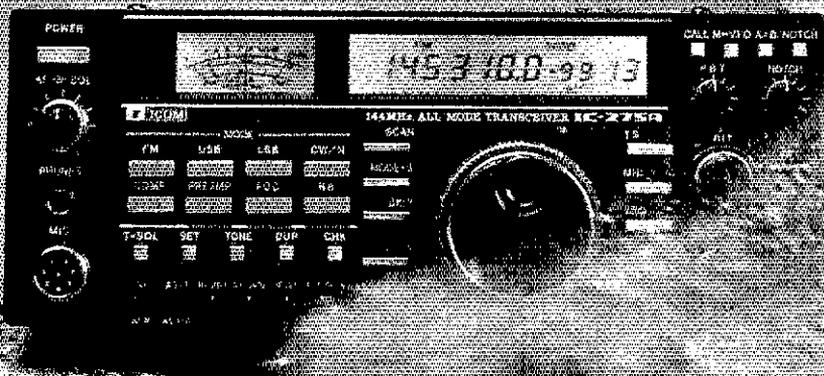
to avoid satellite overloading. The IC-475H's extra margin of high power is especially attractive when your antennas are blocked by trees, coax lengths are long and/or a low gain transmit antenna is utilized.

Interfacing your setup with ICOM's optional CT-16 Satellite Interface Unit makes OSCAR operations a delight. The connected transceivers are initially tuned to a transponder's center frequency (145.900 and 435.500MHz, for example), then the CT-16's auto-tracking is activated. As the downlink transceiver is tuned, the uplink/slaved transceiver's frequency also changes in a full transceive manner. Additionally, the uplink unit's dial can be readjusted for doppler shift compensation. It is the perfect topping for operating enjoyment.

Including Mode J operation in your ICOM setup involves adding the IC-475's optional AG-35 GaAsFET preamp for 70cm reception and switching your IC-275H for transmitting on 2-meters. Since ICOM's preamps are transmit-protected, DC-powered through their interconnected coax and activated via their mated transceiver's front panel switch, installation and mode swaps are a breeze.

Expanding your OSCAR station to include Mode L consists of adding ICOM's IC-1275 deluxe all-mode 1.2GHz transceiver to your setup and installing a high gain loop Yagi on your antenna crossboom for 1269MHz transmission. Your GaAsFET equipped IC-475 is again used for 70cm reception.

Ready to expand your amateur horizons with today's exciting OSCAR satellites? Go with top-line ICOM equipment from the start. Experience the true pleasure of being a leading modern-day pioneer in communications technology. OSCAR, ICOM and you: a winning trio in amateur radio enjoyment.



ICOM HAS ALL YOUR BASES COVERED

ICOM has your winning line-up for fixed, portable, and mobile operations on today's hottest amateur bands. Step into the winner's circle with ICOM's deluxe "75" series transceivers, with a team committed to excellence from VHF to UHF communications. Each compact all-mode unit delivers maximum performance, reliability, and ease of operation. It's a championship line-up!

All "75" series transceivers are an FMer's dream with 99 tunable memories, four scan modes, odd sets, packet compatibility, scanning mic and DDS system for data input. SSB/OSCAR delights include dual VFOs, PBT, crystal-resonant notch, noise blanker, and semi/full V break-in. The glamorous "75" units provide ultimate operating flexibility.

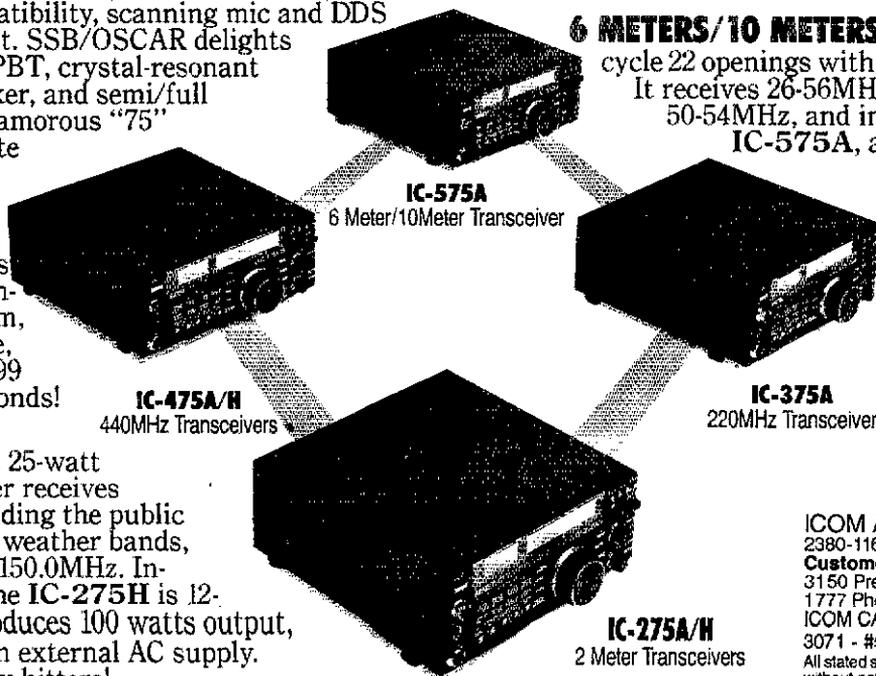
4 BAND SCANNING
Monitor all of today's bands with four scanning modes: spectrum, programmable, mode, and memory. Scans 99 memories in five seconds!

2 METER/10 METERS. ICOM's 25-watt IC-275A VHF leader receives 140.1-174.0MHz including the public service, marine, and weather bands, and transmits 140.1-150.0MHz. Includes AC supply. The IC-275H is 12-watt DC-powered, produces 100 watts output, and will operate with external AC supply. Two of ICOM's heavy hitters!

220MHz. The 25-watt output IC-375A receives 216.0-236.0MHz, transmits 220.0-225.0MHz, and includes AC supply. A genuine masterpiece!

440MHz. Enjoy top-notch 430.0-450.0MHz operation with the 25-watt IC-475A featuring AC supply, or go high power using the 75-watt, AC/DC-powered IC-475H "super rig."

6 METERS/10 METERS. Join the fun of sunspot cycle 22 openings with the superb 10-watt IC-575A. It receives 26-56MHz, transmits 28-29.7MHz, and 50-54MHz, and includes AC supply. The IC-575A, a true superstar!



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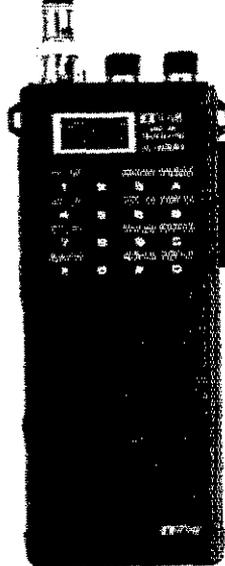
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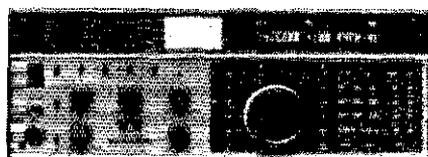
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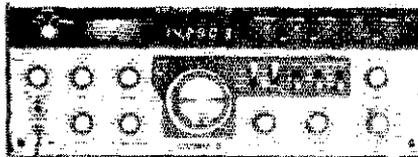
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561 9-band digital transceiver	1445.00	1249
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3130 30m mobile antenna	28.50	
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Double your operating pleasure with Icom's new dual band IC-3210 mobile and IC-32AT handheld FM transceivers. Each unit incorporates a wealth of special features and options designed to move you into the forefront of today's expanded 2-meter and 440MHz activity. Icom dual banders: the FM enthusiasts dream rigs!

Wideband Coverage. Both the IC-3210 and IC-32AT receive 138 to 174MHz including all NOAA weather channels, transmit 140 to 150MHz including MARS/CAP, and operate 440 to 450MHz. Total coverage of today's hottest FM action!

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20 Memories. Store any combination of standard or odd repeater offsets and subaudible tones.

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

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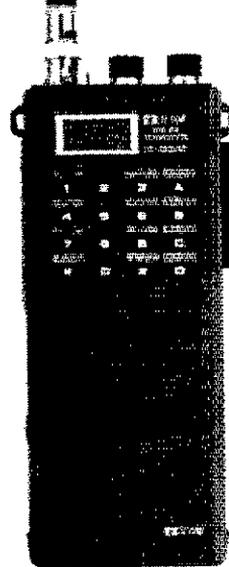
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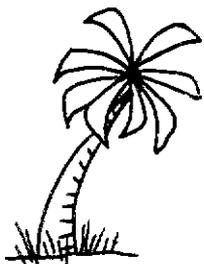
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Features Galore. The IC-900 is an operator's dream... Listen on two bands simultaneously or transmit on one band and receive on a different band when using a second speaker (**true duplex crossband operation**), 10 memories per band, independent PL tones and



Remote Controller



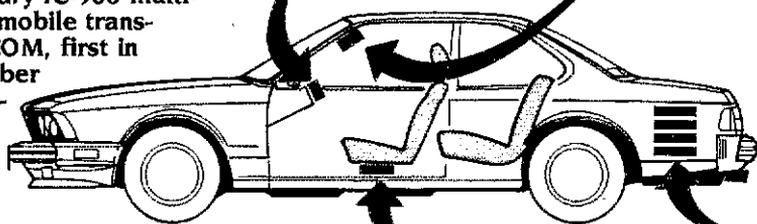
Speaker

Interface Unit A is installed in a location near the driver's seat.

Interface Unit B controls the six band units and can be installed in your car's trunk. A fiber optic cable runs from Interface A to Interface B, which transports an abundance of information through a 3/16" cable and eliminates RF feedback.

Band Units are "stacked" onto the Interface B Unit via the supplied mounting bracket. Optional band units available are:

Band Unit	Power Output	Frequency
UX-19A	10W/1W	28-30MHz
UX-29A	25W/5W	138-174MHz Rx; 140.1-150MHz Tx
UX-29H	45W/5W	138-174MHz Rx; 140.1-150MHz Tx
UX-39A	25W/5W	216-236MHz Rx; 220-225MHz Tx
UX-49A	25W/5W	440-450MHz
UX-59A	10W/1W	50-54MHz
UX-129A	10W/1W	1240-1300MHz



Band Units/Interface Unit B

Interface Unit A



Remote Controller.

offset into each memory, memory and programmable band scan, and all subaudible tones in actual Hz readout.

The IC-900 includes an ultra compact remote controller, an Interface A unit, Interface B unit, SP-8 speaker, HM-14 up/down DTMF mic, fiber optic and controller cables.

Measuring only 2 inches high by 5.7 inches wide by 1 inch deep, the remote controller can be installed on your car's dash or sun visor with the supplied velcro. And, if you want, take the controller with you when you leave your car. The controller features a super large, highly visible LCD.



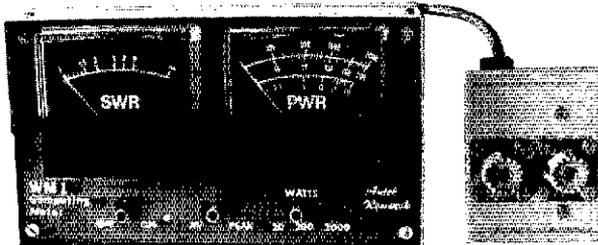
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Model QF-1A
For SSB/CW/AM
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Auxiliary Notch rejects 80 to 11,000 Hz! Covers signals other notches can't touch.

Four main filter modes for any QRM situation.

Continuously variable main selectivity (to an incredible 20 Hz!)

Continuously variable main frequency. (250 to 2500 Hz)

AUTEK pioneered the ACTIVE AUDIO FILTER back in 1972. Today, we're still the engineering leader. Our new QF-1A is the latest example. It's INFINITELY VARIABLE. You vary selectivity 100:1 and frequency over the entire usable audio range. This lets you reject whistles with dual notches (to 70 dB), or reject SSB hiss and splatter with a fully adjustable lowpass plus aux. notch. Imagine what the NARROWEST CW FILTER MADE will do to QRM! HP rejects low frequencies. Skirts exceed 80 dB. 1 watt speaker amp.

Built-in 115 VAC supply 5 1/2" x 5 1/2". Two-tone grey styling. Even latest rigs include only a fraction of the QF-1A selectivity. Yet it hooks up in minutes to ANY rig—Yaesu, Kenwood, Drake, Swan, Atlas, Tempo, Heath, Collins, Ten-Tec, etc. Just plug it into your phone jack and connect spkr or phones to the output. Join the thousands of owners who now hear stations they couldn't copy without a QF-1A! It really works! If it can't pull him out, nothing can.

members of my staff. I hope I can make yours next year. TNX to all the HAMS who devoted their time to make the "BATTLE OF CHICAMAUGA" a real success. To the 78 who were stranded at the site for three days and all the stations who helped with the "SPECIAL EVENT STATION" in a million. We couldn't have done it without you. By this time, all who worked the Special Event Station should have your certificates. If u haven't received yours, please contact: Hebo Armstrong, KJ4NK, 1306 Rio Vista Drive, Dalton, GA 30720. Congrats to the following PSHR honorees for Sept: WB4DVZ, WB4WQL, W4RWB, KB4JPN, K4ZUY, WAHON & KF4FG. Many more of u can qualify for this honor especially during this month with the Christmas traffic. Look in QST for the needed points & then send me the totals before the 5th of each month. U get a beautiful certificate after 12 continuous rpts. 1988 has once again been a very successful one for the GA section & I hope that 1989 will be even greater. When a section has over 8500 hams & all are willing to help no matter what situation arises, you have a real bunch of dedicated HAMS. Once again "THANK YOU" from the bottom of my heart, and I hope that SANTA CLAUSE brings u that new piece of gear that you have been wanting. MERRY CHRISTMAS to all. Traffic: WD4COL 220, WB4DVZ 215, KA4HHE 68, WB4WQL 61, KC4BHX 43, W4RWB 39, KJ4NK 34, WB4UIH 22, N4MWR 18, K4NM 18, N4UZ 14.

NORTHERN FLORIDA: SM, Roy Mackey, N4ADI—SGL: John, KC4N. TC: Ed, W8RA. OOC: John, AB8I. Activity has picked up with the entry into the Amateur Auxiliary of many new call signs. The reason has to be that we are beginning to recognize that it is our own action that is needed to help reduce the occurrences of amateur to amateur interference. Much credit is due to W4TAH in Sarasota who has been guiding the preparation of a Local Memorandum of Understanding in and among the 2 Florida ARRL Sections and the 3 FCC/FOB offices. His efforts, as well as help from ARRL HQ, has raised the level of interest in the Auxiliary and we all should commend him for his efforts. Further, Swade is a regular contributor to Florida Skip, using his space to promote the Auxiliary and recruit amateurs to serve. Many thanks from all in the N Florida Section to this tireless worker in our adjacent S Florida Section. Congratulations also to Nick, N4SS, who was recently appointed regional packet manager for the 4th Region. Let us know what we can do to keep the packet networks growing to assist NTB in moving messages. 73, Roy, N4ADI. Traffic: WX4H 594, KB4LB 369, WA4OXT 301, WD4HO 267, AA4HT 216, N4GMU 192, N4SS 182, WC4D 151, N4JAO 147, W7YWF 145, K4CY 114, WAJEA 78, N4DY 78, AA4FG 77, N2AOX 69, WB3AVZ 62, WB4HT 62, WA4EYU 58, WA4STZ 49, KC4FL 45, KJ4N 42, N4JHI 37, KB4FY 36, N4QYS WB4TZR 35, K4QC 34, W4KIX 33, NL7GV 33, WA4TZZ 32, KA4KAH 31, NF4O 30, WD4TS 28, AA4QC 38, W6IM 18, WB4FJY 17, WA4PUP 12, WA4SXV 16, KJ4HS 9, W4AT 7, N4OZD 6.

SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PFK—SEC: W4SS. STM: K4ZK. TC: K4AT. BM: WD4KBW. PIO: N4PBF. SGL: KC4N. OOC: W4TAH. AGC: K4EUK. WD4KBW reports 153 bulletins received and 166 sent by AA4BN 26, W4DL 84, WA4EIC 100, WT4F 37, K4IEK 30, WD4KBW 26, and AA4M 12. Congrats to N4SS who has been named the 4th Region Packet Manager. Many thanks to K44WR who handled over 750 health and welfare messages for Jamaica via packet. WT4F reported that he served as NCS for IARN on 20 meters for several hours during the Jamaican disaster. KA4YHS reports that for the 12th consecutive month the Southeast Traffic Net has had over 1000 checkins. N2AOX reported that N4PL is a Silent Key - Clyde was a very active traffic handler on the Florida Midday Traffic Net and was in charge of D4RN reps. He will be missed. KA4FZI, manager of QFN, is the extremely proud grandma of twins - a boy and a girl born September 27th. This is the second time she has become a grandma for a total of three! The Ft. Myers Modulator reports that KA4FZI's Novice class is progressing very nicely with K4KPP and others assisting. Her Novice class is actually a part of the school curriculum at Caloosa Middle School. There are eighteen students enrolled in the class. WA4PFK met some of the students on the air from the school station and relayed some traffic originated during the class this month. The Modulator also reports that both WD4CHO and N4NZI are leaving the Lee County area. They are two hard workers who are really going to be missed! Congrats to WA4NBE who has been appointed Official Relay Station and Official Emergency Station. N4PBF is really working at getting ham radio in front of the public in Dade County - he is the new Public Information Officer so if you need assistance with publicity be sure to get in touch with him. Congrats to the Englewood ARS and The Florida Gulf Coast Amateur Radio Council, Inc on being approved for ARRL affiliation. The Everglades ARC reports that they are forming plans to put up their station in the Everglades National Park the first full weekend in December. Other clubs sending bulletins were the Palmetto ARC Bug Juice, SBARC Spark, The Manasota Repeater Assoc., and the Martin County ARS Common Emitter. Congrats to WB4CKY who was one of the instructors nominated as Instructor of the Year - see page 47 of the October QST. Thanks to N4KFU who has volunteered to be the State SSB Editor for Florida Skip. The Melbourne Hamfest was excellent as always - I missed the Traffic Handlers Breakfast this year due to a change in QTH. Be sure to note the address change when sending club newsletters and other mail! The new address for WA4PFK is 12380 NW 30 Street, Sunrise, FL 33323. Telephone 305-672-3172. For the latest news be sure to check in and/or listen to the ARRL Information Net on 3840 Saturday mornings at 8AM. W3CUL 3944, K44WR 1720, W3VR 856, W6VND 626, KA4FZ 295, WA4PFK 276, K4ZK 256, K4SCL 236, WA4RUE 231, WA4EIC 210, W4NFK 167, N44HP 138, AA4BN 136, KB4KXV 126, K4IA 120, WB4WYU 118, KD4GR 101, WT4F 99, K4EUK 88, N4MML 88, N4ET 87, W3TLV 85, N4QRZ 84, K4CVK 83, K4FOU 72, KA4NXX 70, KA4YHS 67, KB4MOM 58, KY4U 56, AB4BC 58, KF4FL 55, WD4CHO 53, WD4KBW 51, K9ALX 47, W4DL 47, WD4NXX 41, W2JTT 41, WA4NBE 36, W5VZ 34, N4HAS 33, KJ4ZW 29, KA4AJR 29, KA8AKY 28, KB4JUA 27, KA4SIH 26, KJ4WJ 26, N4JY 23, KA8FY 22, W2JUR 21, N4FLG 19, W4DWN 18, N4SCY 17, AA4CH 16, K4GVI 16, WA4LGT 14, W4MFD 14, AA4M 14, KB4LPL 14, KA4AMC 11, KB4UHC 11, N4QIA 9, W4MVP 9, N4PSV 9, W44GCK 8, N4COI 8, K4Y8 8, WA4PIL 7, WA4VJH 6, N4XSO 6, N4ABC 5, K44GDU 5, KB4YBS 4, W4NSY 3, N4TZH 2, N4RHJ 2, AA4IF 1, W88REJ 1, K4EUD 1, (Aug.) K4YB 17, WA4LST 13.

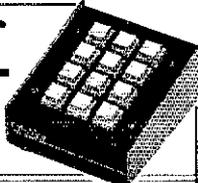
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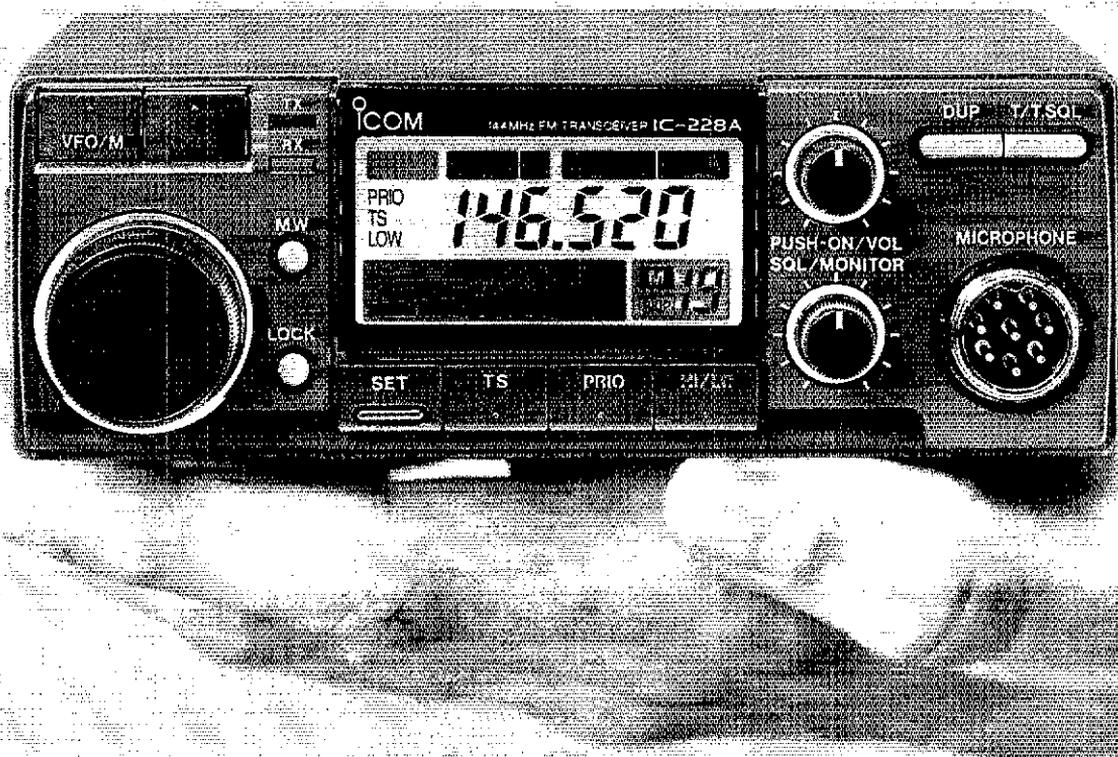
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PUERTO RICO: SM, Jose A. Purcell, Jr. KP4IG—STM: WP4FMH. PIC: NP4XM. TC: KP4ARY. SEC: KP4JV. SGL: WP4CSG. NM-PRN: KP4DJ. NM-PRNN: WP4FMH. The Packet fun is up again on 145.010 MHz, lots of stations are there on a daily basis. Thanks to KP4DGV for putting an 80-watt digipeater in Gurabo, Nick Zorn, N4SS, from Fla. is working with some stations on the island to establish a link on any digital mode for NTS traffic handling. Details will be given through the PRARC Net. Traffic: PRN-sessions 30, QND, QNI 155, QTC 16, QNI 134, KP4DJ Originated 0, Received 28, Sent 16, Delivered 7, Total 51.

VIRGIN ISLANDS: SM, Ron Hall, KP2N—Greetings from "America's Paradise." I want to thank all who supported my election to the ARRL's newest and smallest section. I shall endeavor to fulfill your trust. Lou Bean, KV4JC, has accepted the ASM position. I know Lou will do an outstanding job. Anyone wishing a section appointment should contact the SM now. A speedy recovery to Jerry, WB6RCN, after his recent open-heart surgery. VHF packet is on the increase with the installation of a digipeater on St. Thomas. Upgrades: NP2D and WB3EDO to Extra, KE6ZKI to General. Welcome to NP2B and NP2C who moved from Atlanta to St. Croix. The ARES net from St. Croix very active. An ARES net is now started for St. Thomas-St. John. VIN VP2VI Mgr. 1984 0001Z Dy Sess 25 QNI 72. We need to support our local nets. Novice classes now active on St. Thomas, St. Croix and Tortola. 73 till next month.

SOUTHWESTERN DIVISION

ARIZONA: SM, Jim Swafford, W7FF—STM: W7EP. NM: K6LL. K7POF. K6ZH. I am very pleased to announce that the Scottsdale ARC has been officially designated a Special Service Club. Congratulations. This makes them the fourth ARC in the AZ Section to achieve this distinction. I "goofed" in my August report in Oct. QST in neglecting to report that Oliver, W7WGW was also awarded "Ham of the Year" honors at Ft. Tuthill hamfest, along with W9YOY and WA0NCC. Oliver has a long record of faithful service to both ARCA and ARA, and is an Honorary Life Member of AZ Rptr. Assoc. Please accept my apology for this oversight, Oliver. Newly elected officers for W7AZ are: KB7FG, Chairman; KA7UIH, Vice Chairman; WA0NCC, Secretary; and KD6XH, Treasurer. The VE exam results for Ft. Tuthill are in: 78 pre-registered and 50 walk-ins produced: 37 new Techs, 18 Generals, 8 Advanced, and 8 new Extras. Not bad. I saw a lot of smiling faces around the VE Testing area. WB7UYP of Cochise became a Silent Key in August. 9N1MM, Father Mochan visited Tucson and gave a very interesting talk on his life and experiences in India and Nepal. His visit was sponsored by the So. AZ DX Ass'n and was very FB. Central AZ DX Ass'n also had him for their Sept. meeting. Wait, W7JJ, EC in the Prescott area had to reduce his activity, so asked to be relieved as EC. Alan, W6C7R has been appointed new EC, with AF7J as AEC. They both are doing FB job with ARES activities in Prescott. Thanks, guys. W7WGW reports new officers of AZ Chapter 16, GCWA are: W7JGL, President; W7LGB, Vice President; W7WGW, Secretary/Treasurer. W7YS attended National Convention in Portland on way up to VE7 land for vacation. He is editor of FB DX news letter form No. AZ DX Ass'n. K7RHH reports that Gert, W7KOY who is bed-ridden, now talks to the world via a 2M - 10M link via WB2WHC. Great therapy for her! By the way 10M has really been hot lately. Your SM worked 5 Europeans in 20 minutes the other morning running 60 watts to a dipole! When it's hot, it's hot. This report of September activity is being written during first week of Oct. and will appear in Dec. issue. So, you see there is almost a two month lead time. For this reason it is sometimes difficult for me to write-up current happenings and events unless I get this advance notice. Hope you all understand. So, I'll say Merry Christmas to all, even the Its Oct!

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LOS ANGELES: SM, Phineas J. Icenbice, Jr. W6BF—The outlook for DX this fall is excellent according to all forecasts. This is the good news, the other news is that we can expect some deliberate jamming. The other sure way to stop this interference is for local AMATEURS who KNOW the offender to report it! Reports to the Section Manager or the OOC (Official Observer Coordinator) are very easy. A report from any station within ten miles of the suspect is all that is needed. The phone numbers are in QST for the Section Managers, Division Directors and Vice Directors. (Always page 8 of QST). The local OOC phone number is (818) 954-1188. Action will be instigated by calling the Section Manager or any of the above ARRL Leadership personnel. Complaining about the interference over the air is usually non-productive but a good informer within five miles or so really pins down the offender. Further more, the DXCC Committee should take appropriate action if DXCC rules are violated deliberately. We do have one of the really great hobbies but it is a bit like the environment. We must take some positive action to preserve it, if we don't want to lose it.—The W6AM, Don Wallace Museum, will be a west coast repository for memorabilia, artifacts and technical displays commemorating the operations of Press Wireless and W6AM. According to Joe Locascio, K5KT (213) 541-5495, President of the Don Wallace Radio Ranch Foundation, Inc., plans call for a fully operational Amateur Radio station. Since Amateur Radio is often the only means of communications to survive major calamities, the museum station will be equipped with emergency power. Palos Verdes Amateur Radio Club operators will be scheduled to operate from this great radio location. This ideal location was selected by Press Wireless in 1938 and used by the US Government during World War II. W6AM purchased the 126 acres in 1947, from the Vandertip family.—K6JEY, Doug, is a school teacher in the Los Angeles area. Doug is developing a school program using ham radio as a teaching aid and creative attraction for students to learn new places, things and technology. So if you hear K6JEY, give Doug and the kids a call and answer a few questions for them if you can. They will appreciate it, and you may enjoy it too.—We are very happy to report that all of W6YMJ, Hank Magid's efforts to secure an ARES contract with the City of Los Angeles is now complete. The signed contract was executed for ARRL by W6BF, AK6Y, Ron

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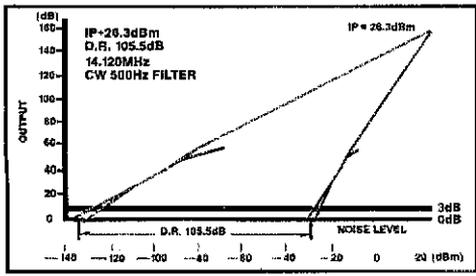
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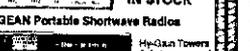


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and W6YMM. Hank, The signator for the City of Los Angeles
 Emergency Committee was Chief of Police Gates. The recent
 hurricane in Jamaica caused a flood of messages from the
 US to Kingston, Jamaica. Yours truly was very happy to han-
 dle two messages for the Salvation Army in Los Angeles. They
 were so happy with my last message delivery service that they
 offered me a uniform. My answer was that they had already
 done enough for me when I had a uniform. Anyway, they may
 still have some good coffee and doughnuts left over for the
 next ARES drill. 73. Phineas, STM News: Well, considerable
 traffic this month for the islands in the way of storm Gilbert.
 Especially lot of messages for Jamaica. Sure glad that we had
 so much help. Vacations over now and things going back to
 normal. Thank a lot for the storm help, gang. Traffic: K6UYK
 481, W6INH 208, W6TH 75, K6GA 21, W6NKE 12.

ORANGE: SM, Joe H. Brown, W6UBQ—ASM: Riv. Co.
 W6LKN, Bob (714-686-3823) ASM: Org. Co. Ralph, W6B6JI
 (714-776-9272) ASM: San Bar. Co. Tony, W6QHB
 (714-981-1826). SEC: Ken, WA6ZEF, reports the City of
 Barstow has established a RACES/ARES Unit. A commemora-
 tive pin and pictures were taken for a combination
 RACES/RACES ID card. Presentations were made by PD
 Chief Robert Sessions. Good show Blynn, W6B6NG, and a
 big TNX to Emergency Service Coordinator for Barstow,
 Shirley Hibbets. The San Bar. ARES/RACES Council is being
 formed. Start up meeting 25 Oct 88. This type group has been
 needed for a long time. ACC Sandy, WA6WZN, sez if you can
 spare a little time, give it for the club, PLEASE, give a call to
 ur club Pres. or activities director, they are waiting for your
 call. de WARA. From the VVARC, "The Amateur is balanced,
 Radio is his hobby. He never allows it to interfere with any
 of his duties he owes to his home, his job, his school, or his
 community." Amateur Radio is a hobby...keep it that way, de
 KY7CD. Elections coming up; schedule goes like this: nomi-
 nations in Oct, elections in Nov. The big bash in Dec, the next
 few meetings are very important. Your club needs you. Orange
 County ARES had 70 hams and used ATV for the first time.
 From OCCARC, Gordon West appointed chairman of the
 amateur booth at the 1989 Orange Co. Fair. STM: Dan, W6FO,
 now MARS member. N6HWH also MARS. BPL W6FO 651,
 PSHR W6FO 109 and W6Q8Z 98.

SAN DIEGO: SM, Arthur R. Smith, W6INI—PIO: N6PKY. TC:
 N6JZE. SEC: W6INI. STM: NG6W. A San Diego Section emer-
 gency drill is in planning for a date in Apr 1989. April is annu-
 ally Calif Emergency Preparedness Month. The drill will test
 ARES plans in support of incorporated cities throughout San
 Diego County and Red Cross in San Diego & Imperial coun-
 ties. Now is the time to register in ARES so you can take part
 in this drill. Contact one of the following ECs by dist:
 Eastern N6NJK (444-5465), Imperial (7DCG (748-9048),
 Central W6INI (273-1120), Northern W6K6M (344-4158). ECs
 are needed for Northern and Southern Dist. Eastern Dist ARES
 holds monthly meetings on third Tue at the Hearland Fire Dis-
 patch Facility (El Cajon FD Hq). Time: 1900. A Calif Dept
 of Forestry Red Flag training session was attended by 68 ARES
 members on Sep 18. Classroom and field training were
 conducted. ARRL affiliate clubs are reminded that ARRL
 membership renewals can benefit the club treasury.

SANTA BARBARA: SM, Thomas I. Geiger, W2WKA—
 ASM/No. Ventura: N6MA. ASM/So. Ventura: W6AKF.
 ASM/Sbar: W6B6YU. ACC: K6BAH. BM: K6KXG. STM: N6WVP.
 OOC: W6AKF. PIO: N6FOUJ. TC: W6KFW. SEC: W6B6II.
 DEC/Ventura: W66RYA. DEC/So. Sbar: K6K6GF. DEC/No.
 Sbar: K6KXG. DEC/SLO: W6B6IIY. NEW APPOINTMENTS:
 Official Observer Coordinator Mike Baugh, W6AKF, has
 agreed to act as Assist Section Manager duties for southern
 Ventura County. Paul Gagnon, N6MA, will continue in the
 northern part of the county. This will lighten Paul's heavy load
 (RACES, ARES, etc.) and give improved access to members
 "on the other side of the hill." Bill Hoover, K6BAH, your Af-
 filiated Club Coordinator, has also accepted the EC/Opera-
 tions position in southern Santa Barbara County. Thanks, Bill
 and Mike, and to all of you who are doing double and triple
 duty in the Field Org. Ventura County ARES once again per-
 formed "above and beyond the call" when major fires erupted
 in early September. While your SM was attending the
 Southwestern Division convention with many of the Section's
 Field Org. officials, the Ventura ARES troops were busy sup-
 porting CDF and County firefighters, Red Cross, and others.
 Ventura DEC, Paul Ryan, was busy himself, running Red
 Cross affairs, and none of the ECs were available. Neverthe-
 less, the "troops" did yeoman's work - a real testimony to their
 level of competence. Congratulations to all on a job Well Done!
 Mid September saw a Santa Maria ARES callout in support
 of the Sheriff's Search and Rescue team. ARES members
 were split into two person search teams to attempt to locate
 an elderly patient who had wandered away from a rest home.
 The subject was found and gladly accepted a Deputy Sheriff's
 ride home. ARES participation permitted speccier search of
 a wider area than would have been possible otherwise.
 Another "Well Done" to ARES! Volunteer testing successes
 (upgrades and new licenses) will be a regular feature of this
 column from now on. Anyone with information about Section
 hams upgrading in out-of-Section sessions please let me
 know. ARRL VEC/Santa Barbara (8/21) Novice-Jake A. Wer-
 ga. (Sherman Oaks); Tech- K66ZET, K66YTL, Alan A. Krause
 (Fontana), Richard B. Schwalb (Monrovia)/
 Santa Barbara (9/10) Tech- WA6DQK, K66YUE, K66YLH,
 K66YUG, K66HYF, Michael Cooper (Ventura), Diane Eckhaus
 (Newbury Park)/Los Osos (9/17) Tech- Robert G. Weschum;
 Gen- K66USQ, K66KZL/Camarillo (8/13) Novice- Mike Cooper
 (Ventura), Ed Dowler (Oxnard); Tech- K66ZDU, K66ZLP,
 K66YQO, K66ZQO, K66WKC, KA6TJG; Gen- K66ORY,
 N6QOK; Extra- N6PMQ/GLAARG VEC/Vandenberg AFB
 (9/10) Tech- K66OZC, K67FCA, K66UXH, K66YUM; Adv-
 KA6DKQ; Extra- K6KXG. Congratulations to all and a big
 THANK YOU to all those dedicated Volunteer Examiners. 73
 for now. Traffic: N6NLW 184 W6NOR 120

WEST GULF DIVISION

NORTH TEXAS: SM, Phil Clements, K5PC—Asst. SM,
 K5MXQ. STM: W5VMP. SEC: W5GPO. ACC: W5URJ. BM:
 W5QXK. TC: W5LNL. SGL: N1CWP. OOC: W5BJP. PIO:
 K5HGL. Congrats to our very own Joe Brown, K5UPN, of
 Longview who has been appointed new Central Area Net (Day-
 time) Manager. Joe is a very ambitious, dedicated person
 whose public service work is not only a big part of his hobby,
 but of his life. He is also District Emergency Coordinator for
 ARES District #10 in East Texas, an Asst. Technical Coord-

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73.

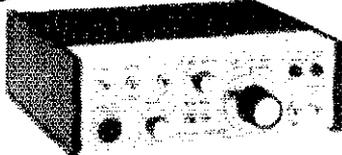


Dick Ehrhorn

Dick Ehrhorn, W4ETO

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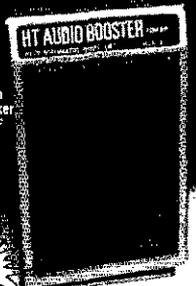
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nator, Official Relay Station, Official Bulletin Station, and founder and Net Mgr. of the Northeast Texas Tie and Emergency Net! Hurricane Gilbert was a very close call for the Texas coast. Every task that amateurs were called upon to perform was handled in a professional and efficient manner. ARES, RACES and NTS nets were activated in many areas of the State, performing a vital public service. Many amateurs handled health and welfare tie into the affected areas, which, in most cases, was the only means of communication available. Airline service to Jamaica, Cayman, and Mexico was restored in record time due to the data obtained through Amateur Radio. A job well done by all! Public Service Honor Roll for September: KF5BL K5UPN K5MXQ and W5YQZ. Season's Greetings, and all the best in '89 to all! Traffic: K5UPN 592 KF5BL 317, W5TNT 303, W5YQZ 138, W5OYL 149, K5DVF 128, K5MXQ 122, K5SFC 106, W5VMP 97, K0SNG 57, N5KCL 19.

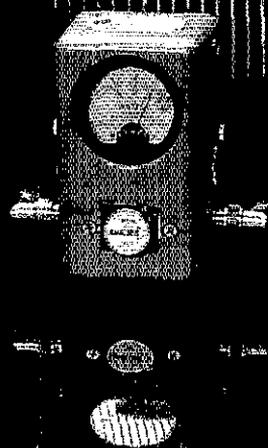
OKLAHOMA: SM, Joe Lynch, N6CL. ASM: K5CPZ. ACC: W86CDW. OOC: K5WG. SEC: W5ZTN. SGL: W5NZS. STM: K5VX. TC: W5QMJ. Congratulations to K5VX on his election to Vice Director of the division. K5CPZ is the new ASM. Carol is a high school teacher for the visually impaired. W5JJ sadly became a Silent Key. Carl was a member of QCWA Chapter 63 and will be missed by all OK hams. Many OK hams participated in activities pertaining to Hurricane Gilbert, including W8SRX, hams maintaining Tulsa and QKC Red Cross facilities and others manning EOCs around the state. Thanks to all who participated and to all who stood by to be available. The Bartlesville ARES provided necessary WX communications for area officials during a PCB chemical spill. Trx to Bob, W8SSZP, and his group for the fine job. Enid ARC provided communications for the Great Land Rush Bicycle Race. Tulsa Repeater Organization provided communications for the Great Flat Race on Labor Day. Your section leaders are looking for many good volunteers on all levels. 73 and see you on the nets. Traffic: WA5OUV 193, K5GBN 162, N5IKN 138, W8SOHK 124, K5CXP 108, KF5RD 77, W5RB 72, K5VX 43, WA5OGC 29, W5LVW 27, WA5ZOO 27, W5VOR 18.

SOUTH TEXAS: SM, Arthur R. Ross, W5KR—SEC: K5DG. STM: W85O. OOC: K5SBU. TC: N5ZU. PIO: WA5UZB. BM: K5CYD. ACC: W85YDD. SGL: K5KJN. K5SBU is newly-appointed OOC and ASM; welcome aboard, Ric. Hurricane Gilbert is the other big news for September; a special consolidated rpt will be submitted to HQ so that all those of whom we have knowledge may receive proper credit. PIA K55HQ reports Houston ECHO Society had good test session; N5ERQ went to Extra, K55WZE went to General, one previously unlicensed went to Technician; K85ECG, K85GPF, N5DIB each received CSCE for passing portions of upgrades; Pres WK5M moving to KS; W5DJLT is new Pres; of 334 auto-patches, 21 were for direct Public Service. Brazos Valley ARC also had good test session; K85GQP and K85GTB went to Technician; N5LGS and K85BRM went to General; KA5AYA passed Element 1B. PIA K5PFE reports Lakes Area ARC elected KA5ESE. Pres; W56BTU, Vice Pres; K5PFE. Secy/Treas; N5AKI, activities director; the group has upgraded the digipeater to K A NODE, with dual ports planned. Clear Lake ARC, Houston, celebrated the first anniversary of its founding, 7290 Traffic Net Secy K85DVF reports 436 messages in 52 September sessions with 3618 QNI; NM K5AZK, NTS liaison 2 per session. PIA N5ZJ, Sequin, reports K85YH has new ATU in DAL/FTW and upgraded to Advanced; local emergency net received good press for providing back-up communications to Red Cross shelters housing coastal evacuees during Hurricane Gilbert. DFNS NM W85YDD reports 502 msgs in 60 Sept sessions; South TX represented 100% by K85KQ, W5KLV, W5VX, W85BQR, N5ZU, K5CTW, W85HZO, K85ZV, W85EPA, W85FQU, N5BHQ, W85YDD. Proud papa W4ZVJ reports son KA5UUV ranks 7th in class of 393; nice going, Freddie. CAND NM K5UPN reports 497 messages in 60 September sessions; RN5 represented 100%; South TX stations helping were W85YDD, N55V, K85ZV, K85KQ, W5KLV, W85EPA, W85FQU. Austin ARC reports August test session had good results, to Extra went W85VA; to Advanced, K85GQU, WA5VRO, N5LJF, K5VZM, W85KXC; to General, K5MVR, K85FZS, K85FMF, and one previously unlicensed; to Technician, W85HNI, K85HBG, K85DAD and three previously unlicensed. ACC W85YDD reports Brazosport ARC renewed as Special Service Club. PIA N5F1X reports NW ARC, Houston, ARES members represented Amateur Radio at community fair sponsored by Chamber of Commerce; KF5OO, K5VIZ, K85AEL, W8BKQ, KF5ZL, K5AKG, K08LM, N5FD, K85IC, N5F1X and others helped out; NW ARES group will have its own "emergency shack" at new Sheriff's Department Bldg. Bryan ARC Newsletter reports their VE Team has tested 113 candidates on 176 test elements since April 1985; latest test session recorded W85IKP to Advanced, N5LAR to General, KA5YJY and K85FHQ to Technician and one previously unlicensed to Novice. That's a good record, gang; Congratulations.

WEST TEXAS: SM, Millie Wise, W5OVH—ASM: KA5PTG. ASM: WF5E. ASM: A1SS. ASM: W85EFJ. ASM: N5DO. SEC: W5MVJ. PIO: K85ZV. ACC: K5IS. OOC: K5KNC. TC: K5CU. STM: AESI. Have enjoyed visiting the various hamfests around the section. It takes a lot of work but as long as there are dedicated people to do the work, the events will be successful. Dale, K5MRR, reports improvement to the Lamesa two-meter repeater. It is now on 146.90 with improved reception to Lubbock. Bill, K5KNC, Dist 2 EC announced new ARES appointees, Bart, W85EVA, as assistant DEC. Gerry, W85R, EC for Lubbock County. Chuck, W85QQN, and Jerry, K85ARQ, will assist W85R. As I promised last month, am going to give thanks to the appointments of TC Lou, K5CU. ATC: W85FWR, K5FD, N5FLB, K85VH, N5FLB, K85ZV, W85T, N5FXX, K85RGC, now the OO under fine leadership of K5KNC—N5ANO. K5KNC, N5DWW, K85BL, K85OU, W85E, K85OV, W85T, KTSH. This list is up to date as of Aug. 1. Gary, K85FJG, upgraded to tech. News from local Osc. of the Panhandle ARC of Amarillo says Sept. was a month for severe weather, and SKYWARN was called out at least four times during the month. W85S radio class with K85OV and K5CU as instructors have 32 students registered. Kathy Funtle, K85CIG, an Army nurse from El Paso and member of W85E was in Korea during Olympics and got picture taken with Flo Jo Joiner, the runner who won the Gold Medals. QCWA Chapter 64 celebrated their 15th anniversary of the founding of the chapter, in El Paso. 73, Millie Wise, W5OVH. Traffic: N5KUC 19, K85VH 8.

How Long

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Did

THE BRICK'S OFF THE KEY

The ALPHA 86 "1.5 kW-with-a-brick-on-the-key" marathon has been completed. We can't reveal the exact key-down time until next month because this issue will reach many subscribers before the contest entry deadline.

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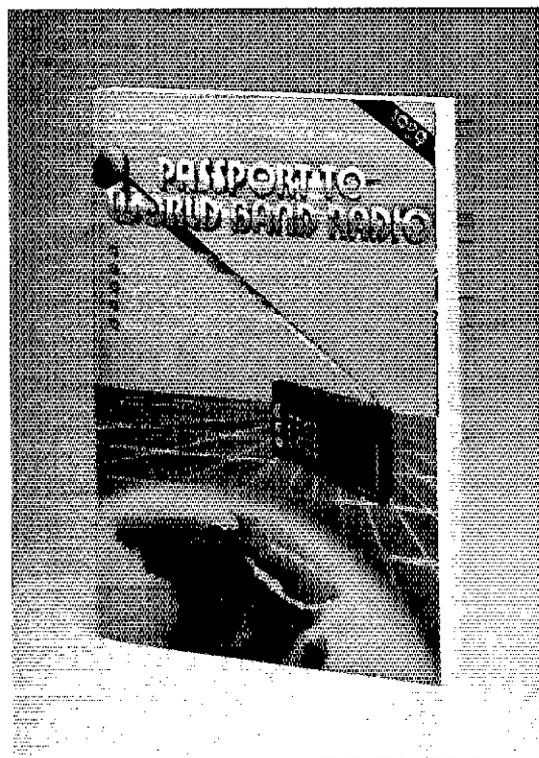
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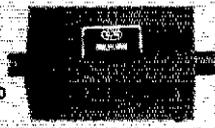
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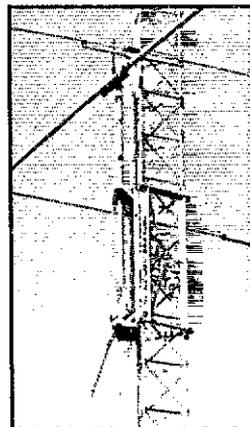
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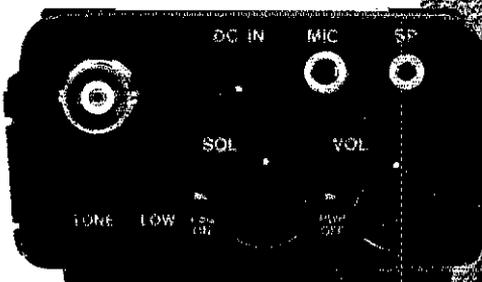
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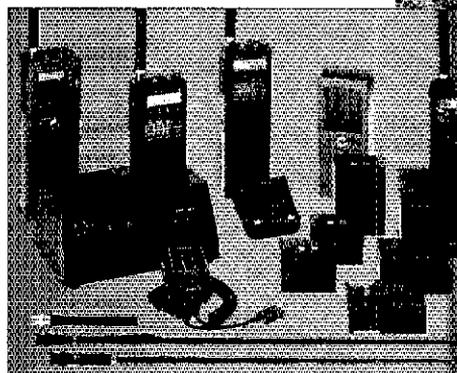
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- **5, 2.5, or 1.5 W output, depending on the power source.** Supplied battery pack (PB-2) provides 2.5 W output. Optional NiCd packs for extended operation or higher RF output available.
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- **10 memory channels store any offset, in 100-kHz steps.**
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Optional Accessories:

- PB-1: 12 V, 800 mA NiCd pack for 5 W output
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- PB-3: 7.2 V, 800 mA NiCd pack (1.5 W output)
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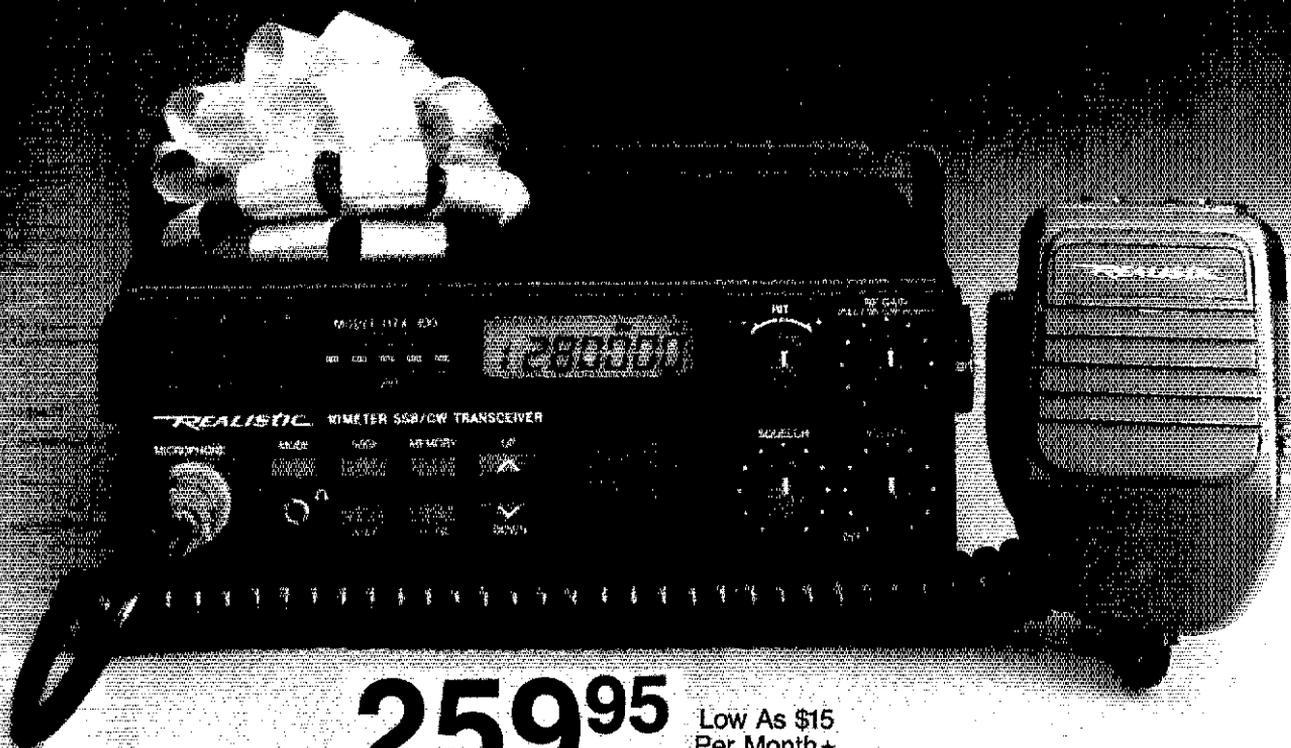
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Complete service manuals are available for all Kenwood transceivers and most accessories. Specifications and prices are subject to change without notice or obligation.

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- **Extended receiver range** (138.000-173.995 MHz) on 2 m; 70 cm coverage is 438.000-449.995 MHz; 1-1/4 m coverage is 215-229.995 MHz. (Specifications guaranteed on Amateur bands only. Two meter transmit range is 144-148 MHz. Modifiable for MARS/CAP. Permits required.)
- **Separate frequency display for "main" and "sub-band"**
- **Call channel function.** A special memory channel for each band stores frequency, offset, and sub-tone of your favorite channel. Simply press the CALL key, and your favorite channel is selected!

Optional Accessories:

- **RC-10** Multi-function handset/remote controller
- **PS-430** Power supply
- **TSU-6** CTCSS decode unit
- **SW-100B** Compact SWR/power/volt meter
- **SW-200B** Deluxe SWR/power meter
- **SWT-1** 2 m antenna tuner
- **SWT-2** 70 cm antenna tuner
- **SP-40** Compact mobile speaker
- **SP-50B** Deluxe

- **30 multi-function memory channels.** 14 memory channels and one call channel for each band store frequency, repeater offset, CTCSS, and reverse. Channels "A" and "b" establish upper and lower limits for programmable band scan. Channels "C" and "d" store transmit and receive frequencies independently for "odd splits."
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- **Automatic Band Change (A.B.C.)** Automatically changes between main and sub-band when a signal is present.
- **Dual watch function allows VHF and UHF receive simultaneously.**
- **Programmable memory and band scanning, with memory channel lock-out and priority watch function.**
- **Balance control and separate squelch controls for each band.**

- **Dual antenna ports.**
- **TM-621A has auto offset.**
- **Full duplex operation.**
- **CTCSS encode/decode selectable from front panel** or UP/DWN keys on microphone. (Encode built-in, optional TSU-6 needed for decode.)
- **Each function key has a unique tone for positive feedback.**
- **Illuminated front panel controls and keys.**
- **16 key DTMF mic. included.**
- **Handset/remote control option (RC-10).**
- **Frequency (dial) lock.**
- **Supplied accessories:** 16-key DTMF hand mic., mounting bracket, DC cable.

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TM-721A shown with optional RC-10.

- mobile speaker
- **PG-2N** DC cable
- **PG-3B** DC line noise filter
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- **MA-4000** Dual band 2 m/70 cm mobile antenna (mount not supplied)
- **MB-11** Mobile bracket
- **MC-43S** UP/DWN hand mic.
- **MC-48B** 16-key DTMF hand mic.

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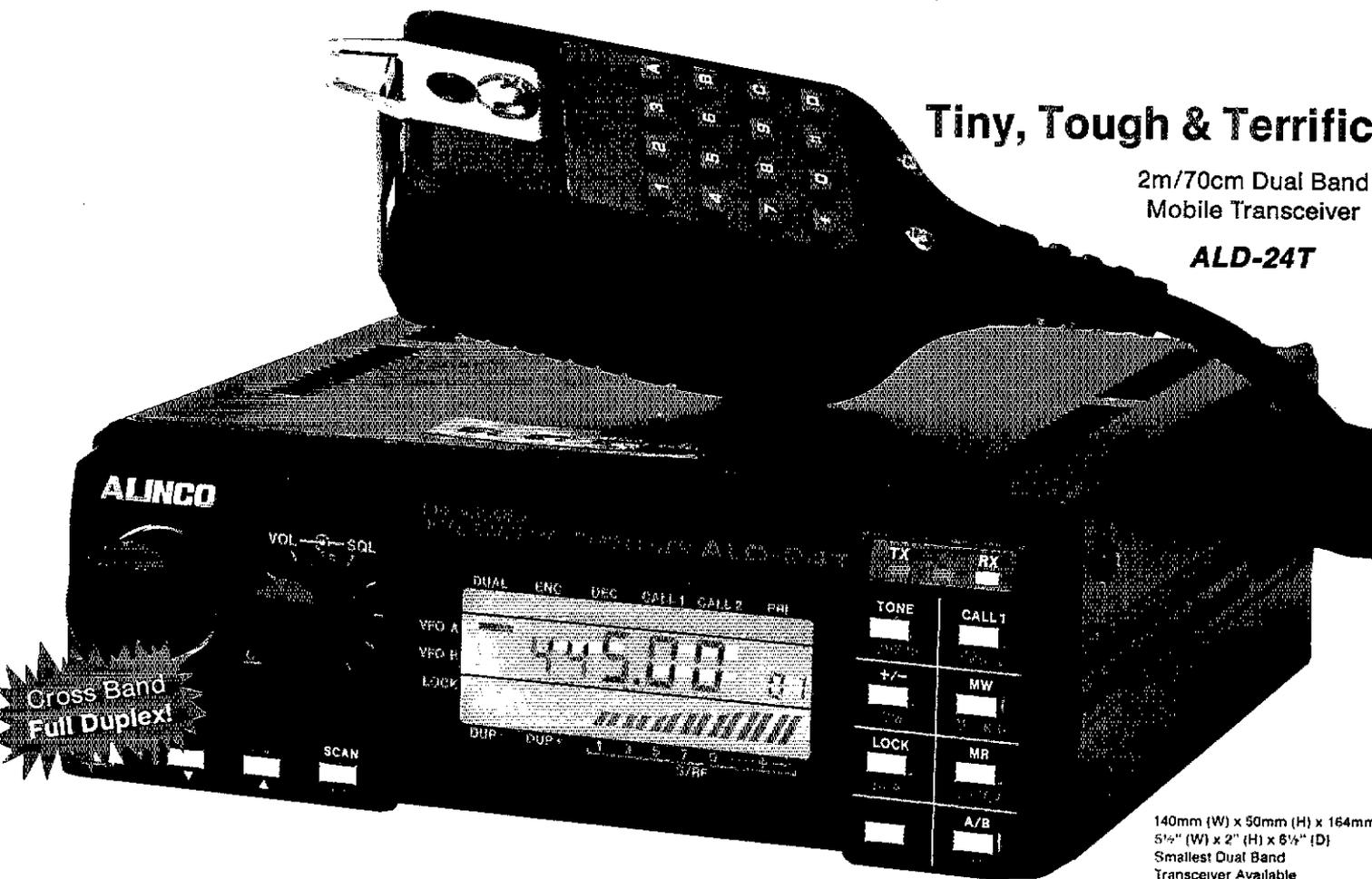
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ALD-24T



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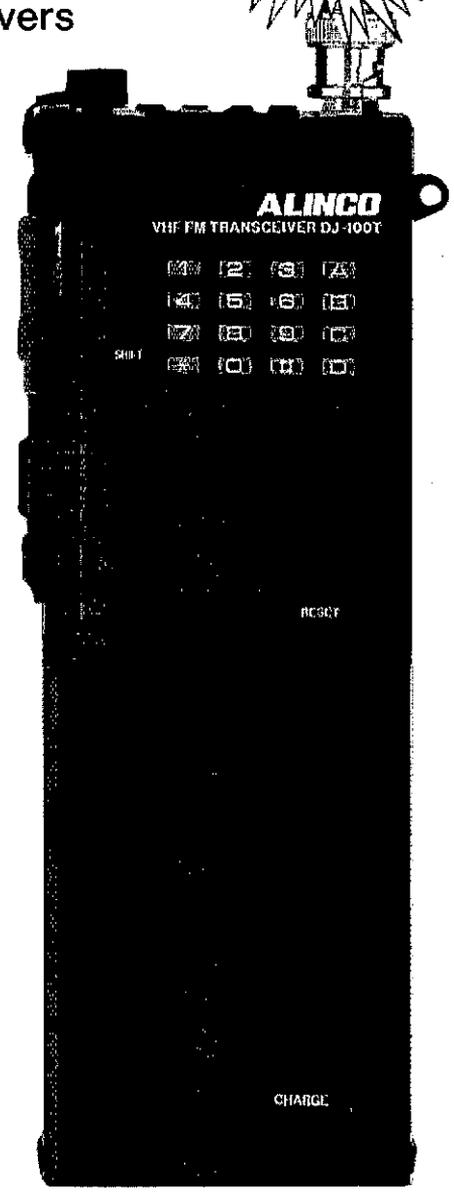
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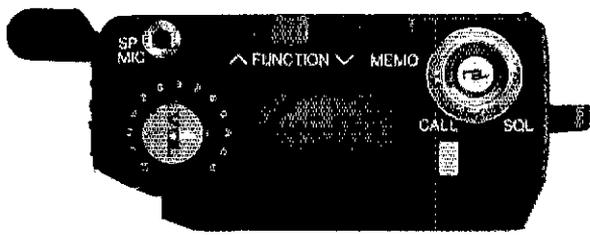
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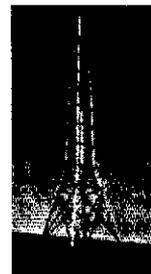
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CR-18



CR-30



CR-45

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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	5'10"	27 @ 90 MPH	39"	1,322	39	224.00
CR-45	14'9"	23 @ 90 MPH	39"	681	55	328.00
CK46	Thrust Bearing For CR-18, CR-30, and CR-45 Maximum Acceptable Mast Diameter 2 1/2"					52.00

*BUYING IS REQUIRED ON ALL ROOF TOWERS. UPS SHIPPABLE

ROHM			CUSHCRAFT		
20G	10 sect.	45.95	A4	4 el. triband	353.95
20AG	10 top sect. 9'	56.95	A3	3 el. triband	259.95
25G	10 top sect.	57.95	A5	5 band trap vert.	117.95
25AG2	10 top sect. 9'	67.95	32-19	19 el. 2mt. boomer	107.95
45G	10 top sect.	137.95	215WB	15 el. wide band	
45AG2	10 top sect. 9'	140.95		2 mt.	85.95
AS25G	access shelf	22.95	424B	24 el. 70cm boomer	85.95
AS45G	access shelf	56.95	416TB	16 el. OSCAR 435 MHz.	67.95
TB-3	thrust bearing	53.95		10 el. OSCAR 145.9 MHz.	57.95
M200	10' mast.	19.95	A144-10T	OSCAR pack 2mt. & 70cm	167.95
SR25G	short base	26.95		2mt. vert. ringo	27.95
SP45G	short base	56.95	AOP-1	2mt. vert. ringo	34.95
EF2545G	gin pole	324.95	AR-2	ranger	41.95
	AND MORE!		ARX-2	2mt. mag. mt.	214.95

HUSTLER					
6BTU	6 band trap vert.	147.95	R4	4 band vert.	214.95
5BTU	5 band trap vert.	125.95		AND MORE!	
4BTU	4 band trap vert.	95.95			
G7-144	Fix stat. 2mt				
	collinear	125.95			
	mobile masts	22.95			
	10m-15m resonator	12.95			
	super resonator	17.95			
	slid & super resonator	16.95/22.95			
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SSM-2	stainless ball mt.	16.95			
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HDT	trunk mt. w/s/wivel ball	17.95			
	AND MORE!				

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PD6040	80-40 dipole kit	33.95			
PD4010	40-10 dipole kit	31.95			
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KLM					
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KR34XA	triband 5 el.				
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2M-22C	2mt. satellite				
435-18C	70cm satellite				
435-40CX	70cm satellite				
432-30LBX	70cm satellite				
2M-13LBA	2 meter				
2M-16LBA	2 meter				

MODEL HF6V
Compare Active Element Lengths

Band	HF6V	Typical multiband (top verticals)
10M	28 ft. (78 A)	18 ft. (29 A)
15M	12 ft. (28 A)	12 ft. (28 A)
20M	26 ft. (37.5 A)	12 ft. (17.5 A)
30M	26 ft. (26.4 A)	
40M	26 ft. (19.8 A)	20 ft. (14.5 A)
80M	26 ft. (10.7 A)	28 ft. (10.4 A)

Electrical and Mechanical Specifications

Shipping weight: 17 lbs. (5.4 kg.)
Height: 28 ft. (7.9 m.)
Feedout impedance: nominal 50 ohms through included matching line (includes RF connectors for direct connection to any length of 50-ohm cable terminated in PL 250)

VSWR at resonance: 1.5:1 or less on all bands in typical ground level or above ground installations.

Bandwidth for VSWR of 2:1 or less:
10 meters - 1500 kHz
15 meters - entire band
20 meters - entire band
30 meters - entire band
40 meters - 280 kHz
80/75 m. - 40 to 100 kHz

Power Rating: Legal limit 500 and CW all bands
Wind loading: 1.0 sq. ft./120 sq. meters
Upguyed wind survival rating: 80 m.p.h./120 k.p.h. assuming no icing and precipitation

Installation: Comes complete with 2 1/2" (79 mm) tubular mounting post (1-1/8" I.D.) for direct placement in earth or into standard steel TV mast (1 1/4" I.D. with .036" in wall) or Butternut Impedance Post (1.625" I.D.). Eye level adjustment of 80, 40 and 30 meter resonator coils, length adjustment on 15 and 10 meters; 20 meter adjustment is a function of 40 and 30 meter tuning. Coils for 80/75, 40 and 30 meters are 316mm. diameter aluminum wire, all wound and well supporting; hydraulic spacing between adjacent turns is 1/2 in. or greater.

Model HF6V-X, an export/operation version suitable for surface parcel post shipment to most countries is available. Electrically identical to the standard model. Shipping weight 12 lbs. is 4 kg.

HF6V 127.00

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DXA	160, 80, 40 dipole	49.95
AP151-3G	2m on glass	36.95
UGM	1/4 lambda mag.	21.95
HB144BN	2m duck	16.95
MONR51	scanner mag.	39.95
BL1500	9:1 balun	46.95
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AR300XL	TV rotor	59.95
258XJU	25 cable	9.95
508XJU	50 cable	15.95
750XJU	75 cable	20.95
1008XJU	100' cable	25.95
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mtg. post sleeve	6.00
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CR2AM	PERM MT - CALL	41.00
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CR3A	220MHz Mag MT	37.00
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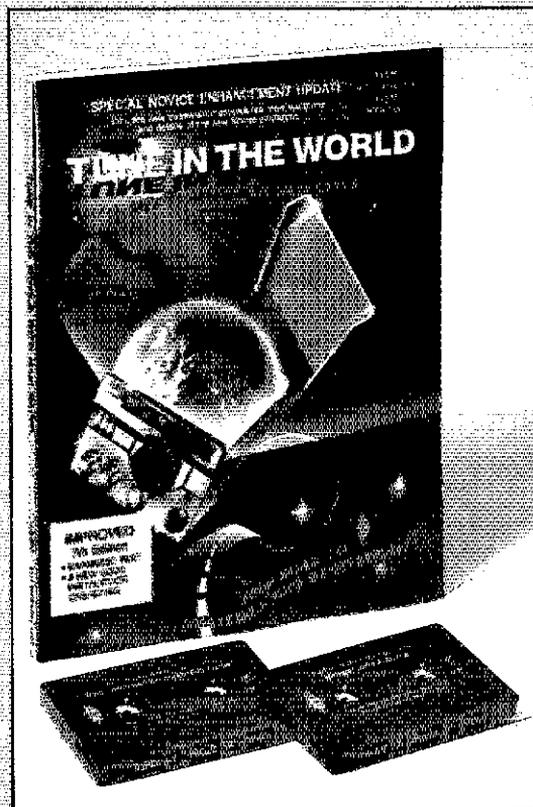
YOUR ROAD TO HAM RADIO EXCITEMENT

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.



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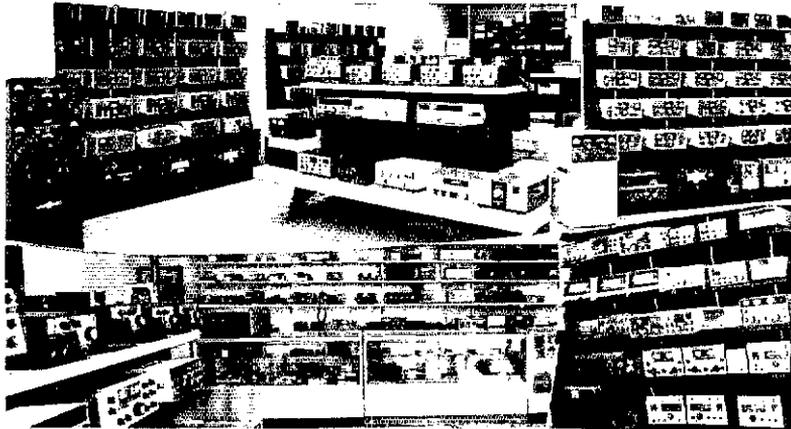
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(2) The Ham-Ad rate is 85 cents per word. This includes firms or individuals offering products or services for sale. A special rate of 25 cents per word applies to individuals seeking to dispose of or acquire personal station equipment, and to hamfest and convention announcements.

(3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied. Submitted ads should be typed or clearly printed on an 8 1/2" x 11" sheet of paper.

(4) Closing date for Ham-Ads is the 13th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received December 14 through January 13 will appear in March QST. If the 13th falls on a weekend or holiday, the Ham-Ad deadline is the previous working day.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A last name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permitted in QST advertising.

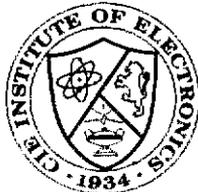
(6) New firms or individuals offering products or services for sale must submit a production sample (which will be returned) for our examination. Dealers are exempted, unless the product is unknown to us. Check with us if you are in doubt. You must furnish a statement in writing that you will stand by and support all claims and specifications mentioned in your advertising before your ad can appear.

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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.

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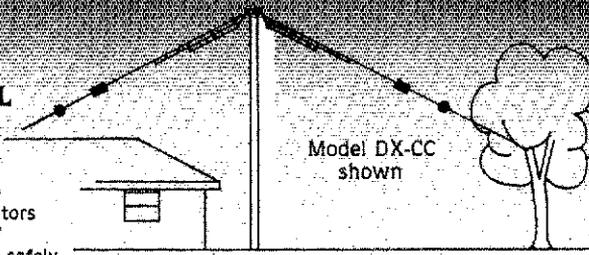


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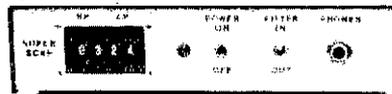
QSLs Samples—SASE. Eric, WA6FDS, Box 2275, Culver City, CA 90231.

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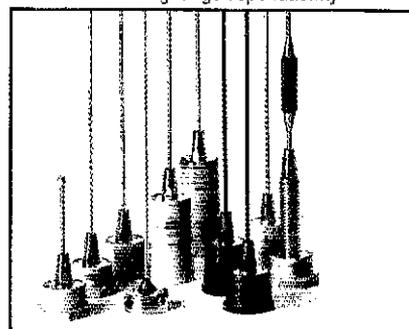
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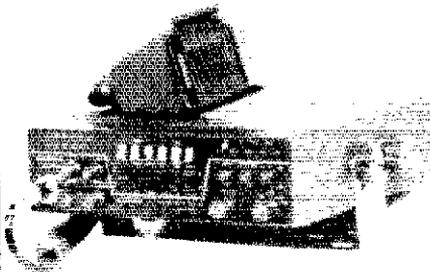
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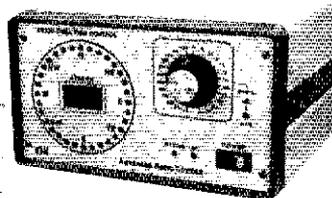
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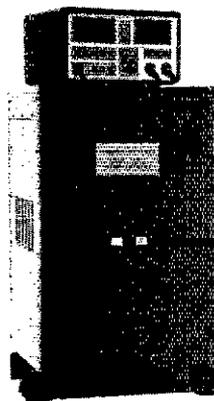
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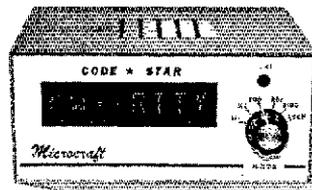
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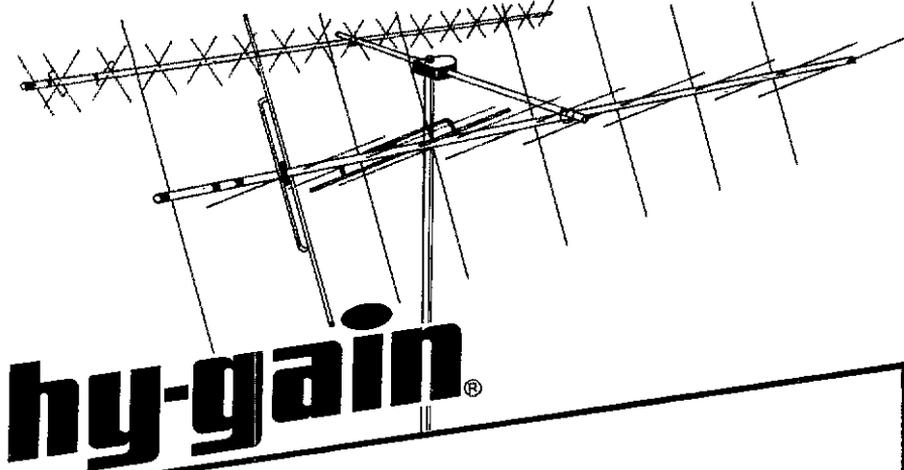
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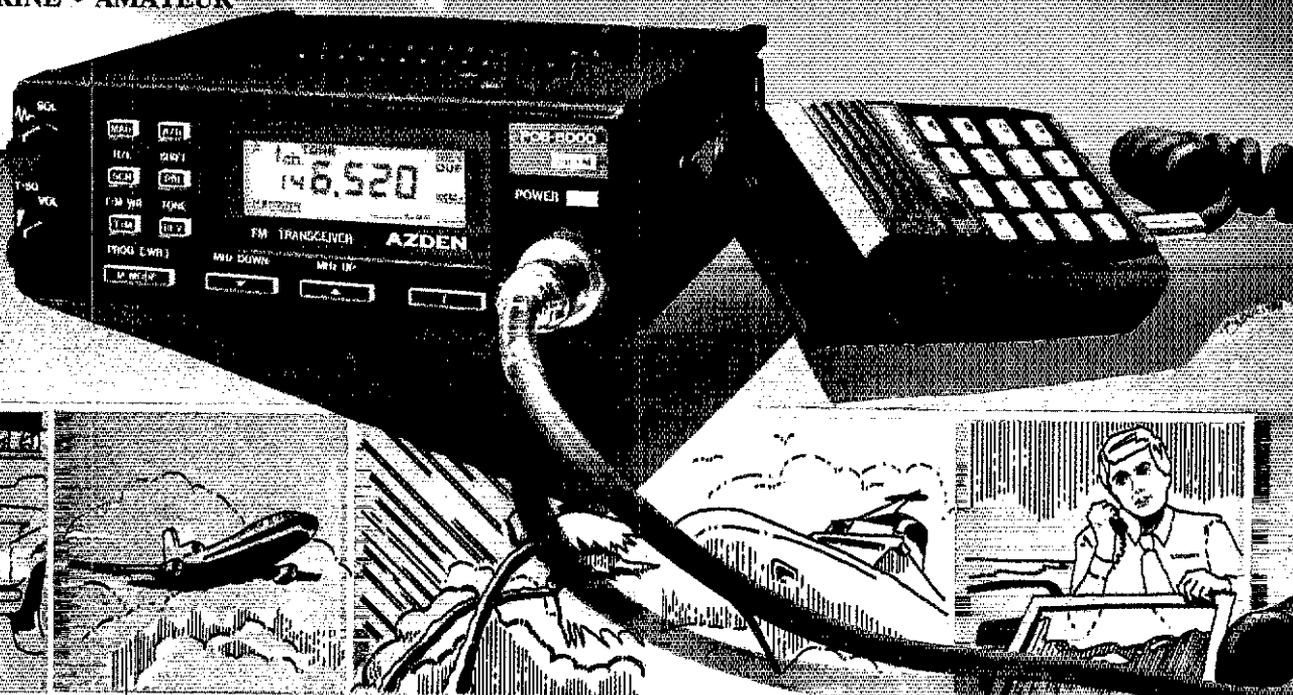
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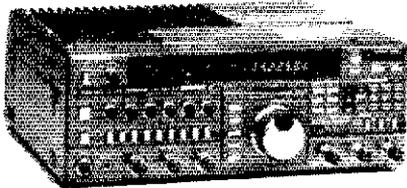
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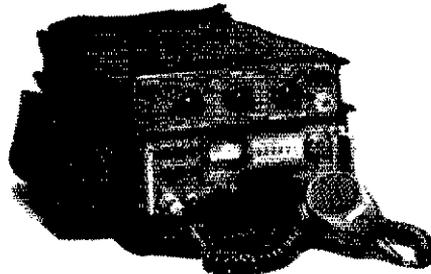
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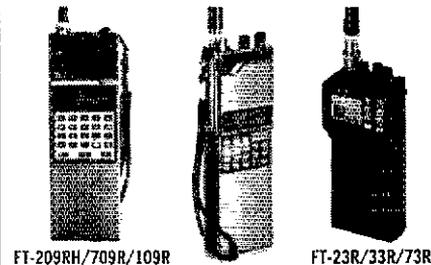
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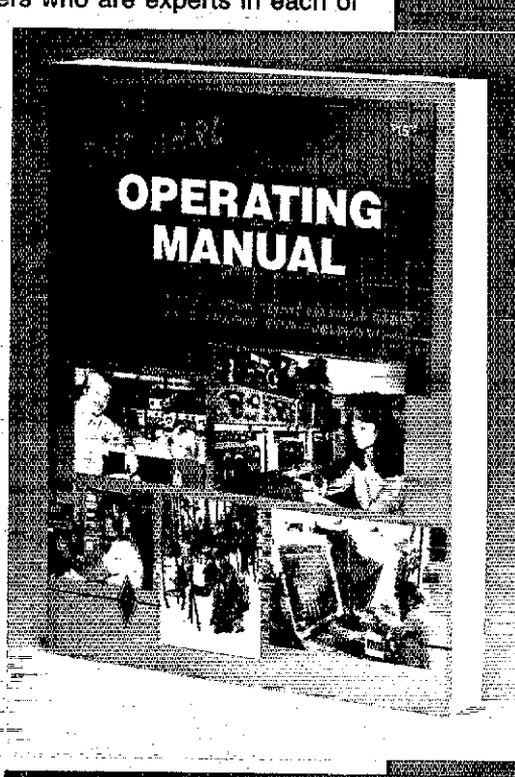
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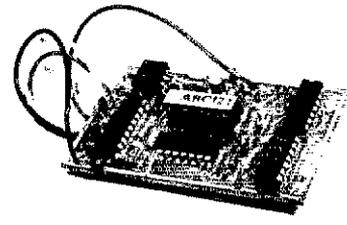
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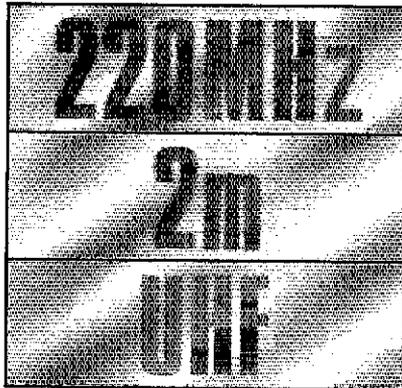


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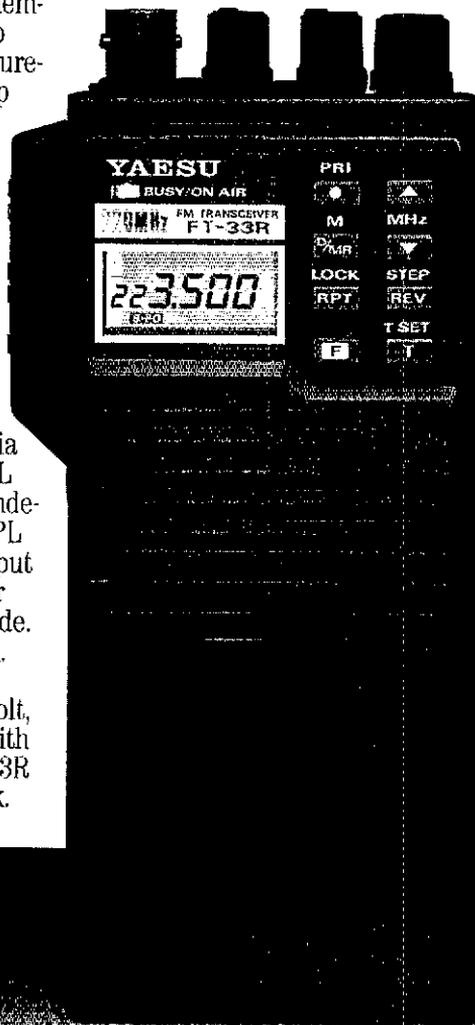
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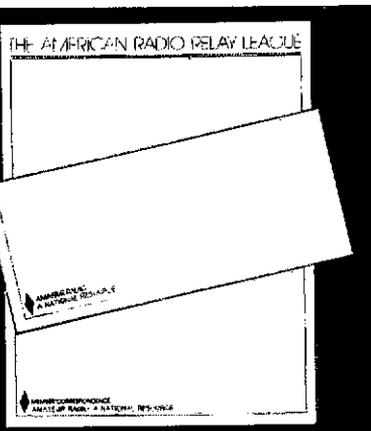
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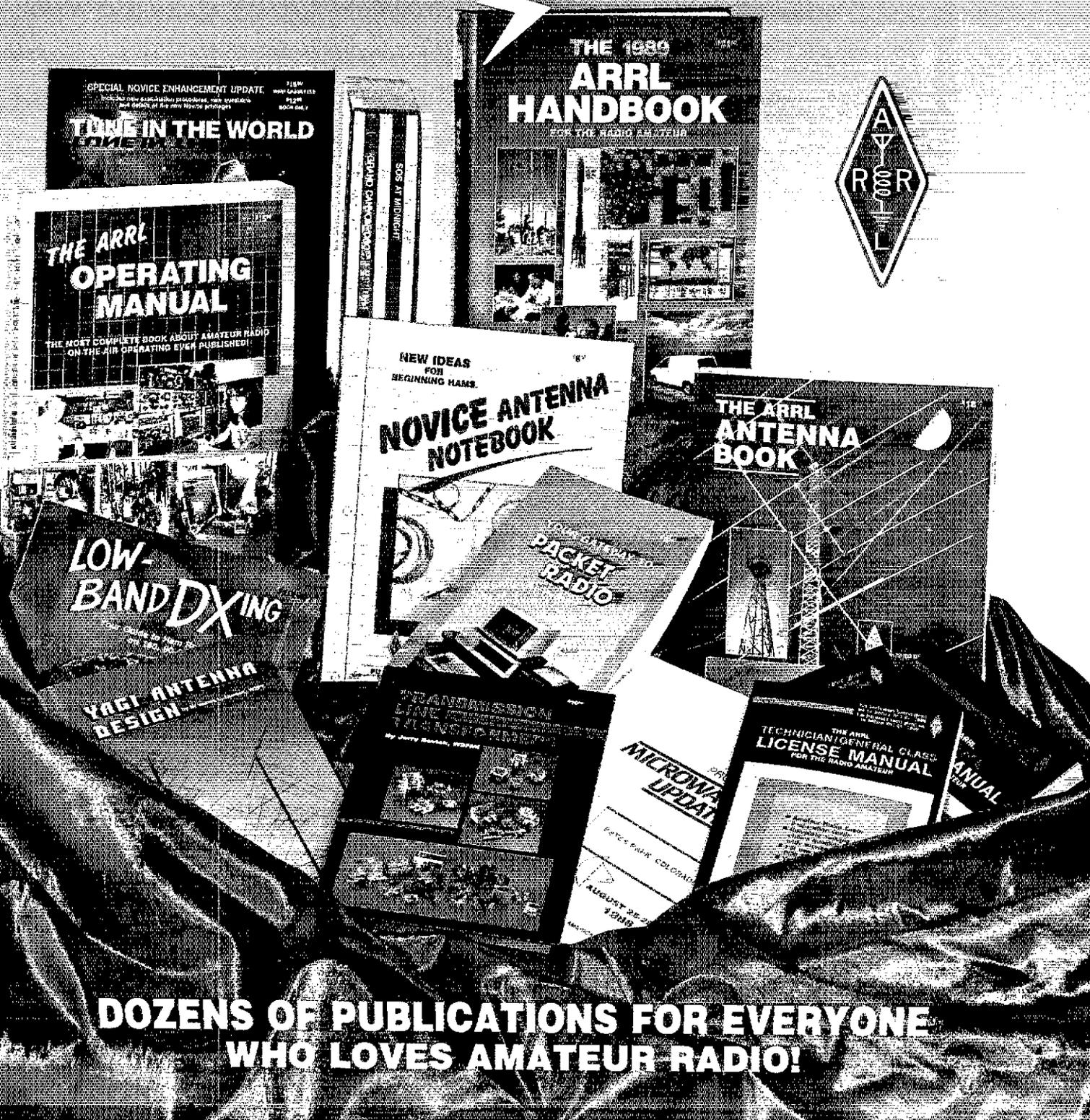
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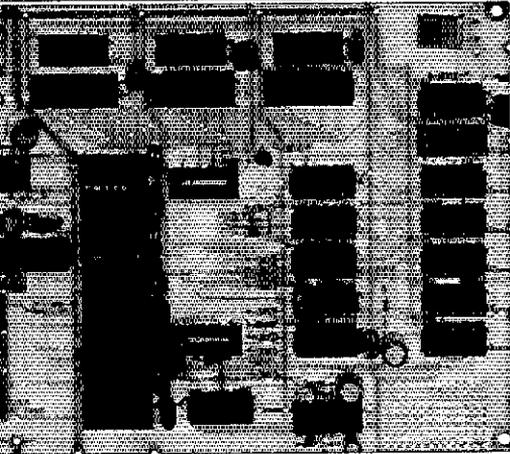
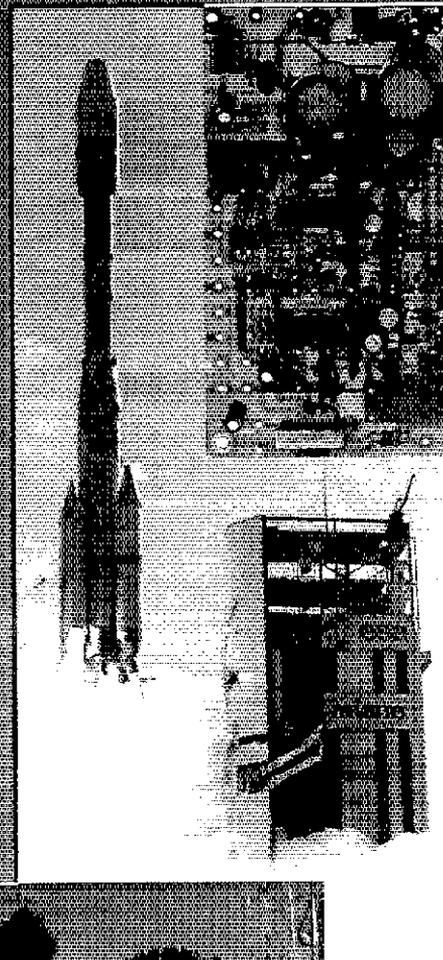
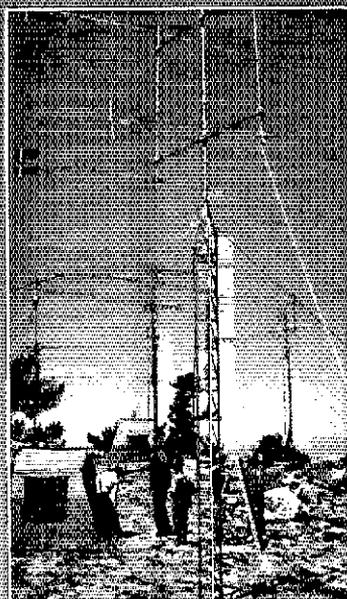
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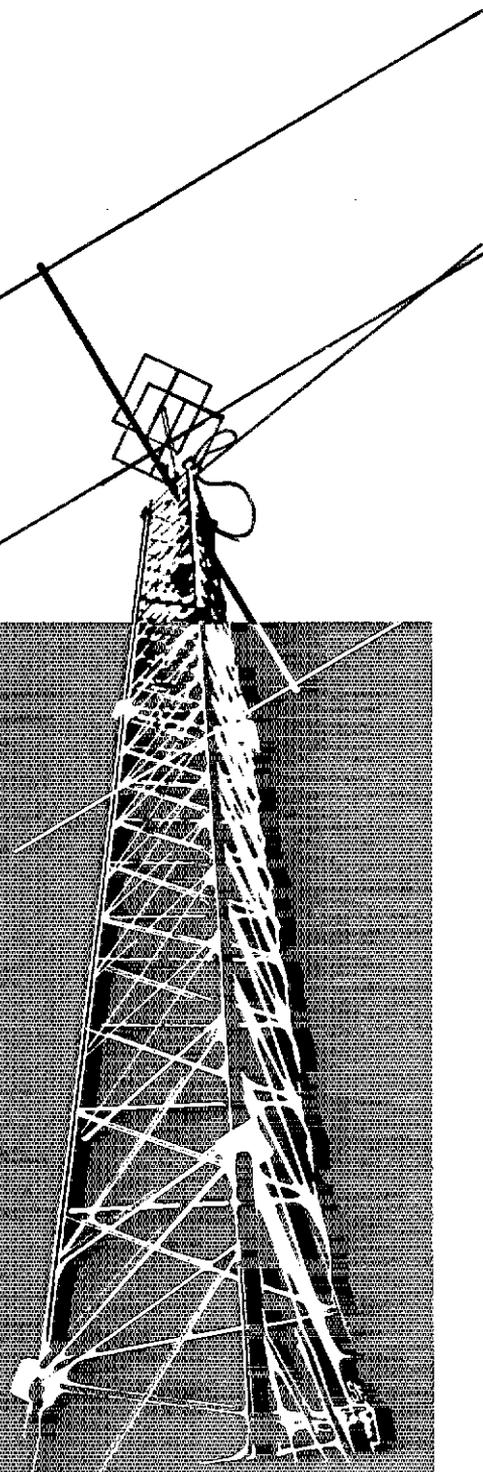
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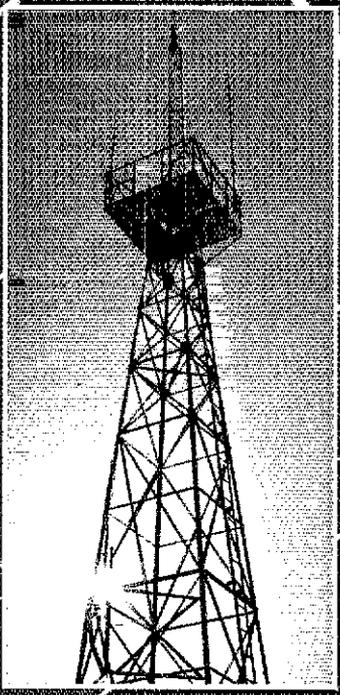
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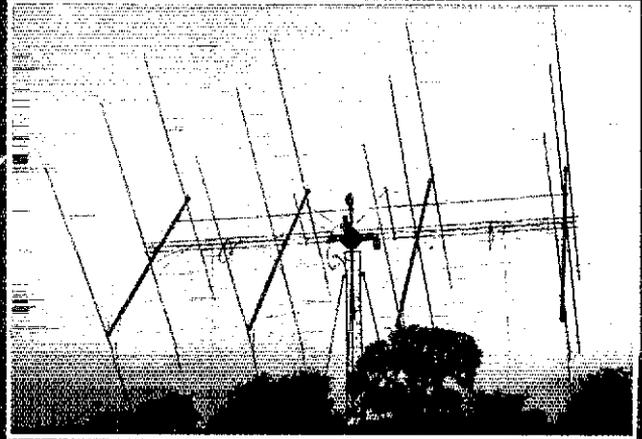
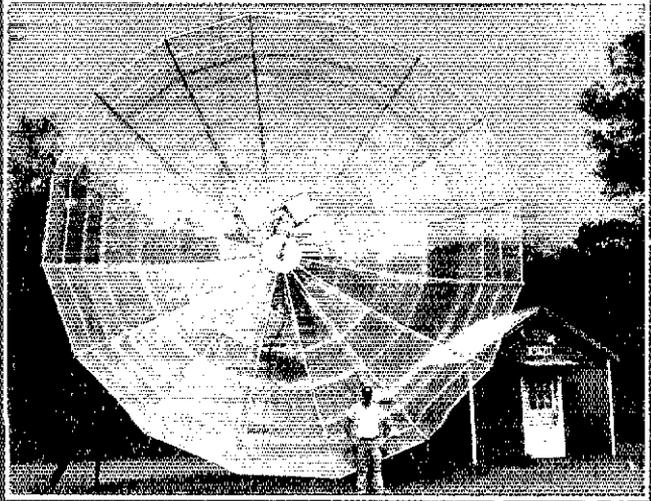


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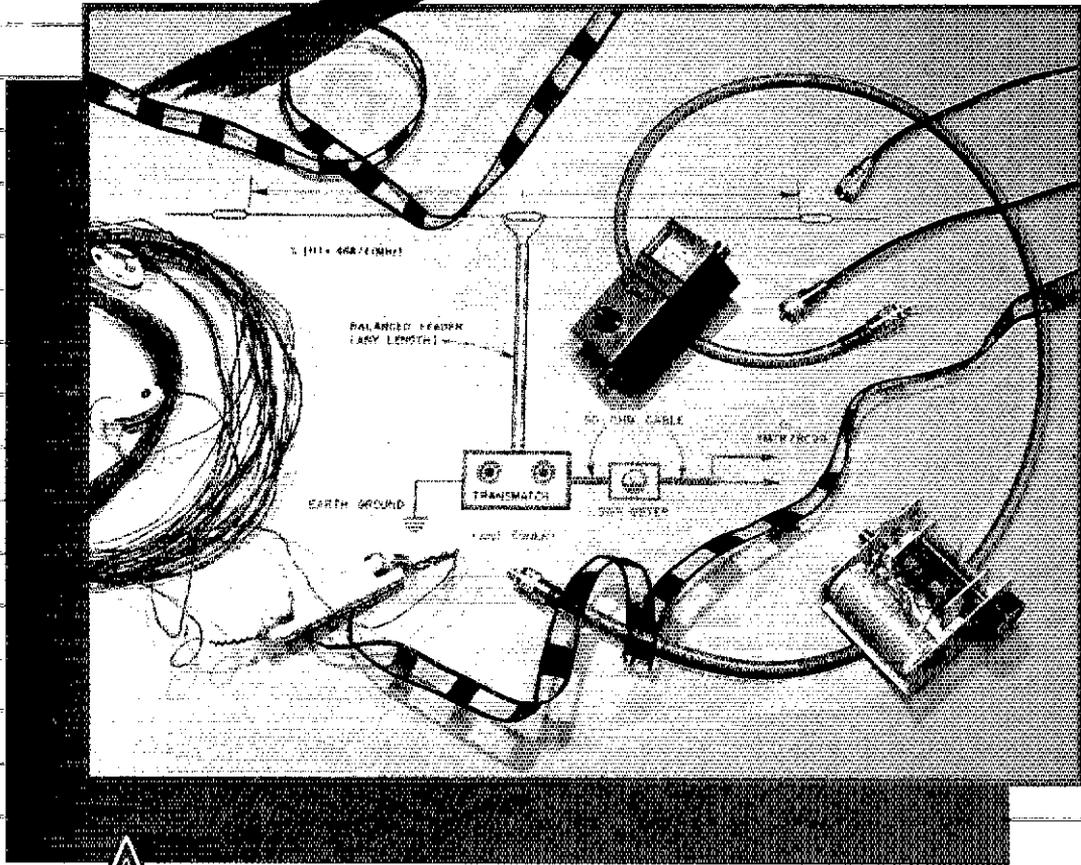
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OK710	30/40 M conv. Exp 14	
Monoband		

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155BAS	'Long John' 5 element 10 mtr.	
204BAS	'Long John' 5 element 15 mtr.	
205BAS	4 element, 20 meter.	
7-1S	'Long John' 5 element 20 mtr.	
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7-3S	'Discoverer' 2 elem. 40 meter beam.	
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14AVD/WBS	trap vertical 10 thru 40 meters
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28DOCS	trap doublet 40 and 80 meters
58DOCS	trap doublet 10 thru 80 meters

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V-2S	colinear gain vertical 138-174 MHz.	
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V-4S	colinear gain vertical 430-470 MHz.	
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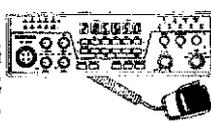
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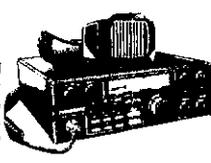
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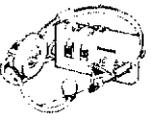
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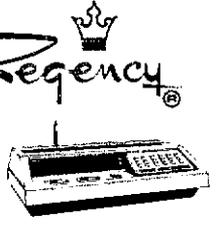
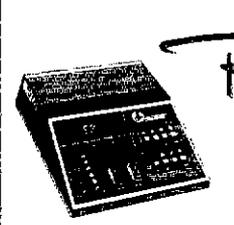
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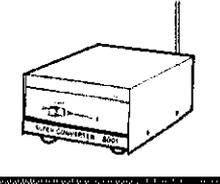
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Preprogrammed mobile, receives all 50 states police, plus instant weather, scans 40 channels per second. DC

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Will handle 10 sq. ft. antennas at 50 MPH winds.

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*MDP models complete with heavy-duty motor drive with positive pull down.

Shown w/optional MAB550 rotorbase and rotator.

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Will handle 18 sq. ft. antennas at 50 MPH winds.

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Will handle 30 sq. ft. antennas at 50 MPH winds.

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HDX-572MDPL*	72'	22'8"	4	1600	15" 25 1/2"	\$6049.00
HDX-589MDPL*	89'	23'8"	5	2440	15" 30 3/4"	\$7919.00

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Will handle 18 sq. ft. antennas at 50 MPH winds. (TMM-433HD handles 24 sq. ft.)

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TMM-433SS*	33'	11'4"	4	315	10" 18"	\$1089.00
TMM-433HD*	33'	11'4"	4	400	12 1/2" 20 1/2"	\$1319.00
TMM-541SS*	41'	12'	5	430	10" 20 1/2"	\$1429.00

*Hy-Gain and some Alliance rotors when installed inside lower will restrict retracted height by approx. 24". Most Kenpro models allow full retraction.



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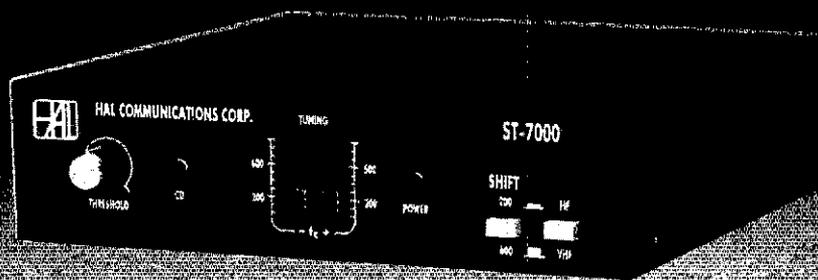
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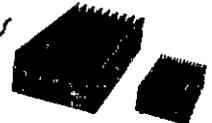
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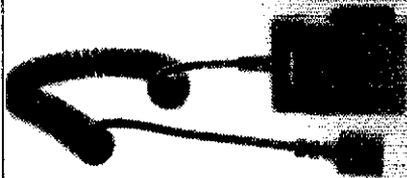


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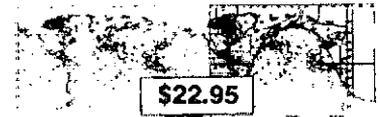
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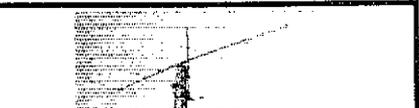
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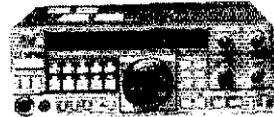
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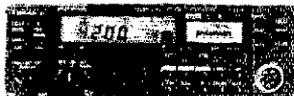
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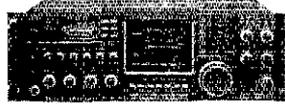
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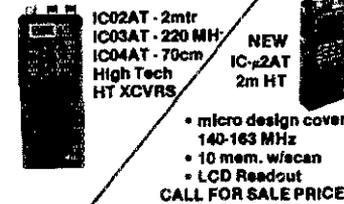
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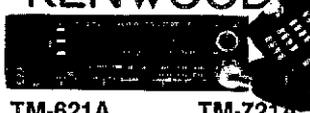


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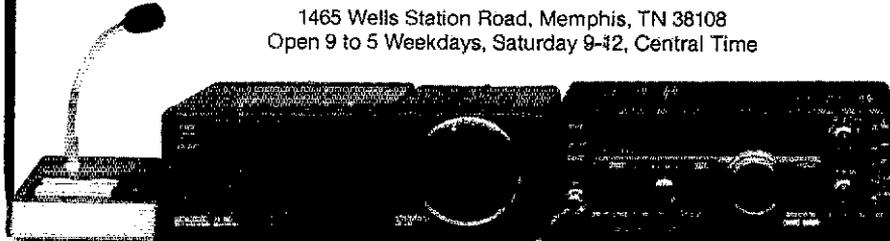
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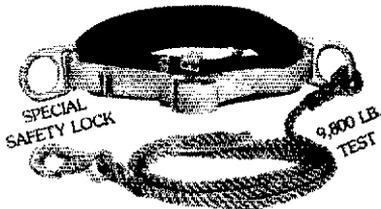
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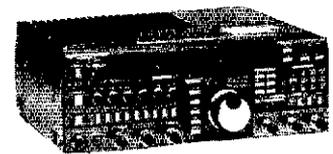
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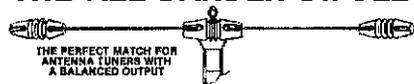
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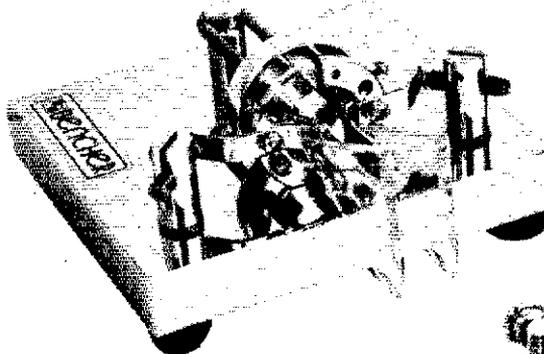
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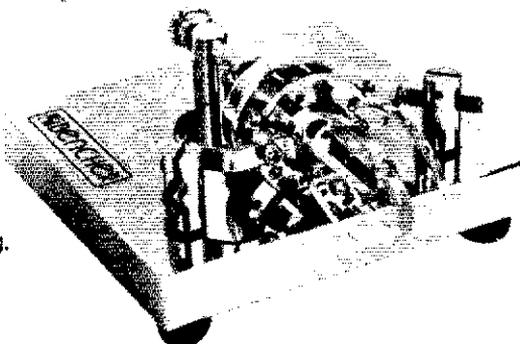
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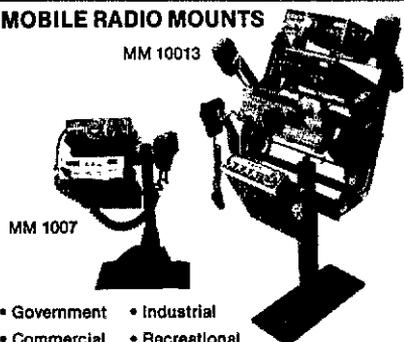
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WANTED: Drake TR7A, ICOM IC735, Bird 43 Wattmeter, Variable Power Supply 0-35 Volt, 10A or better, like HP5267B. E. Straeter, DK9QS/W1, P.O. Box 317, Dublin, NH 03444, phone 603-563-8816.

SX-101A, Speaker, Manual. Like new, \$100. Pick up. KA2SCV, Eastchester, NY 10707. 914-337-7727.

WANTED: Schematic and/or service manual for Daiwa LA-20 2 meter linear amp/power supply for MT-20 handheld. Will pay photocopy and shipping costs. N7ARO, 4525 Fir Drive NE, Bremerton, WA 98310, 202-479-2819.

GAASFET's, MMIC's, Bi-Polar, Diodes, Mixers, Johanson, ATC Chip Caps and other VHF-UHF-Microwave Components. SASE for list. N2CEI, Box 341A, Rd 1, Frenchtown, NJ 08825.

TEKTRONIX Score Plug-In Model CA \$15. Hewlett Packard DMM Model 9440A \$50. Tektronix Scope T922 \$275. Zenith Z-19 Terminal for Packet \$40. Sorenson DC Power Supply Nobotron T120-2.5 \$50. Hewlett Packard 310A Wave Analyzer \$65. Tektronix 106 Square Wave Generator \$65. Isolation/Stepdown Transformer 230/115 V 300W \$7. Dave,

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WANTED: Small sweep-tube linear amplifier (such as LA-1000A, AL-84, GLA-1000, etc.) in good operating condition. Philip Schmitt, WA8JXE, 800 S. Kendall Avenue, Kalamazoo, MI 49007.

WANTED: Hammarlund HQ-100 and HQ-110 for parts. KE8VR, Box 791, Westminster, CO 80030.

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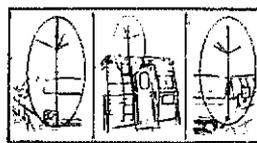
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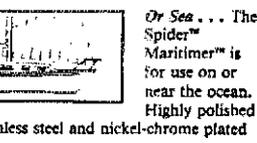
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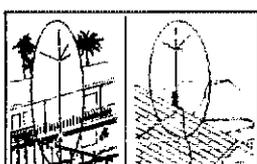


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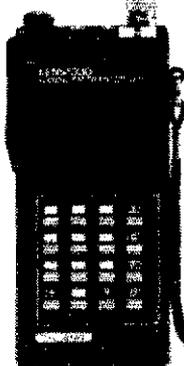
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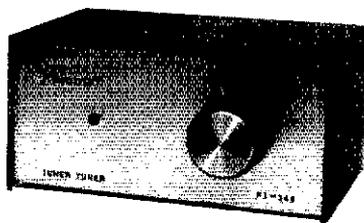
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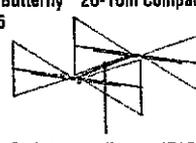
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FK2568	68 ft.	11.7 sq. ft.	1239
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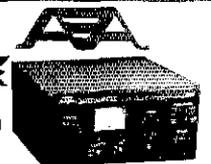
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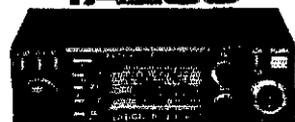


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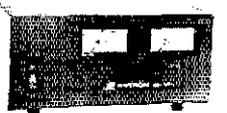


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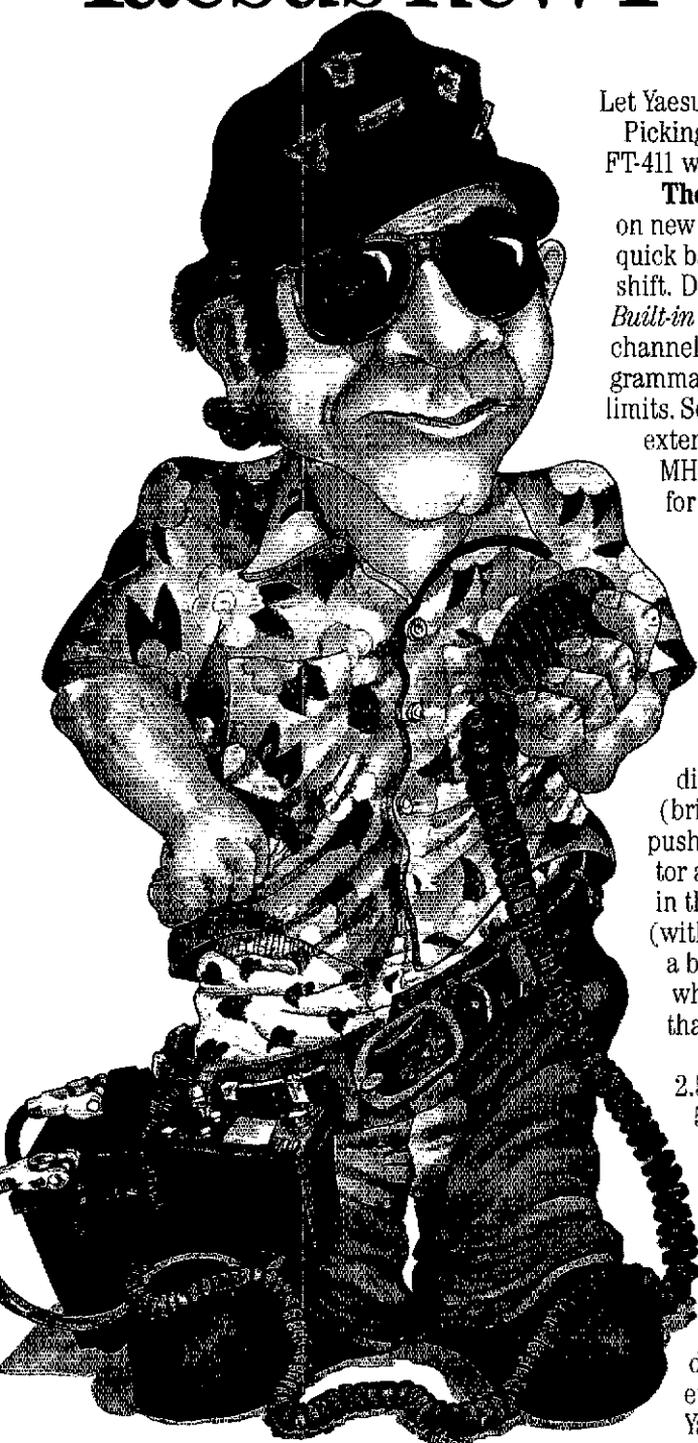
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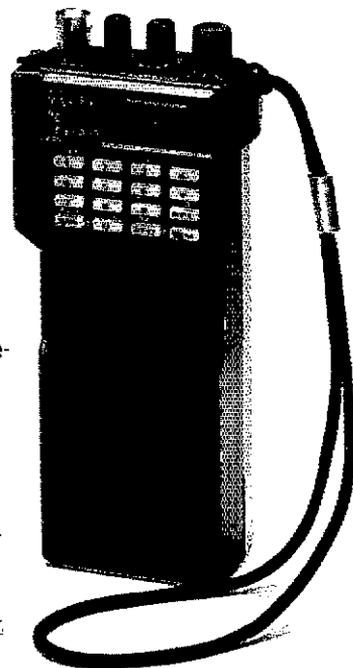
Not bad for a handheld measuring just 55(w) x 32(d) x 139(h) mm (the same size as our FT-23R Series HTs)! -

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

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

KENWOOD

pacesetter in Amateur Radio

All New Compact HF

“DX-citing!”

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

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

• **Covers All Amateur bands**

General coverage receiver tunes from 100 kHz—30 MHz. Easily modified for HF MARS operation.

• **Direct keyboard entry of frequency**

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

• **Built-in automatic antenna tuner (optional)**
Covers 80-10 meters.

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

• **Superior receiver dynamic range**

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

• **100% duty cycle transmitter**

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

• **Adjustable dial torque**

• **100 memory channels**

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

• **TU-8 CTCSS unit (optional)**

• **Superb interference reduction**

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

• **MC-43S UP/DOWN mic. included**

• **Computer interface port**

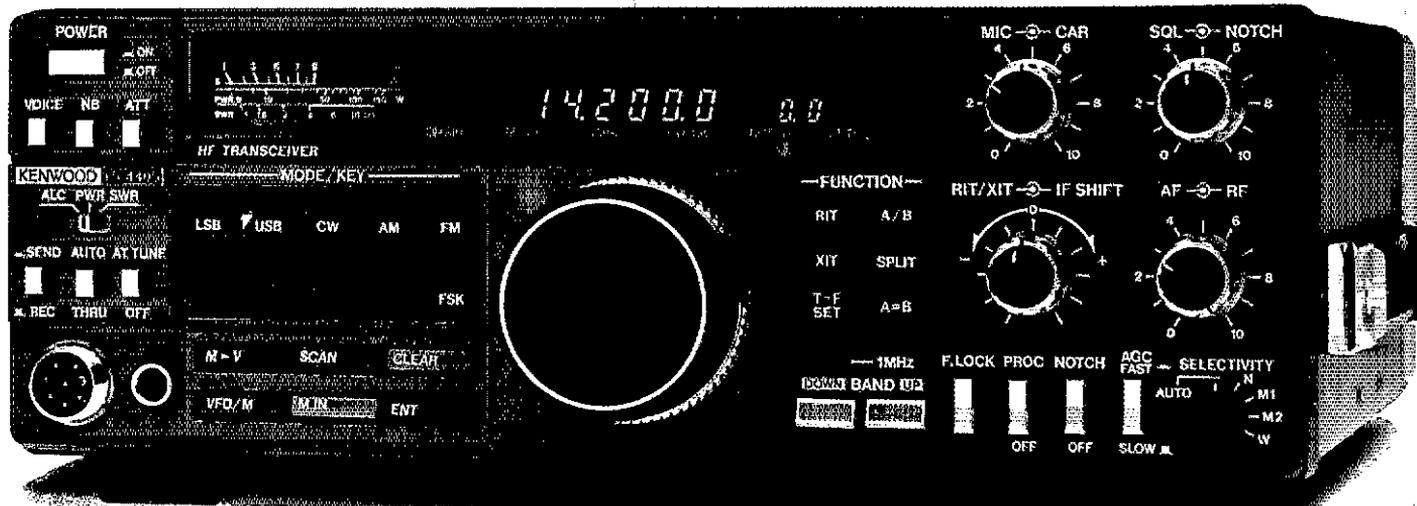
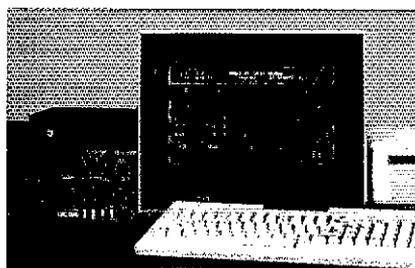
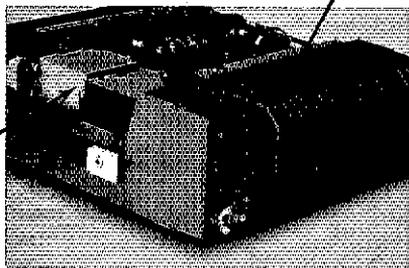
• **5 IF filter functions**

• **Dual SSB IF filtering**

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

• **VOX, full or semi break-in CW**

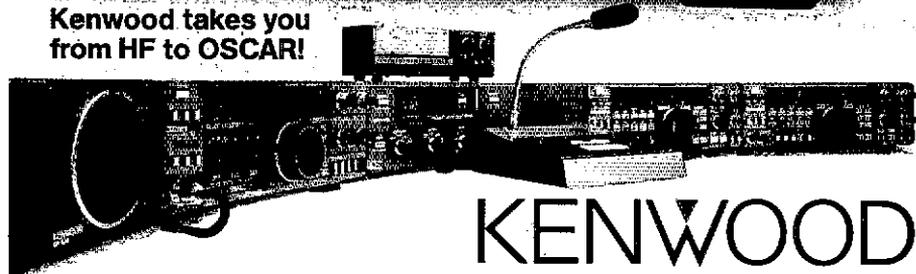
• **AMTOR compatible**



Optional accessories:

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

Kenwood takes you from HF to OSCAR!



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2201 E. Dominguez St., Long Beach, CA 90810
P.O. Box 22745, Long Beach, CA 90801-5745

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