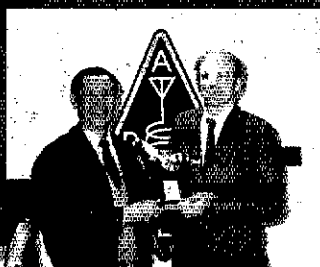


QST

January 1988 \$3.00

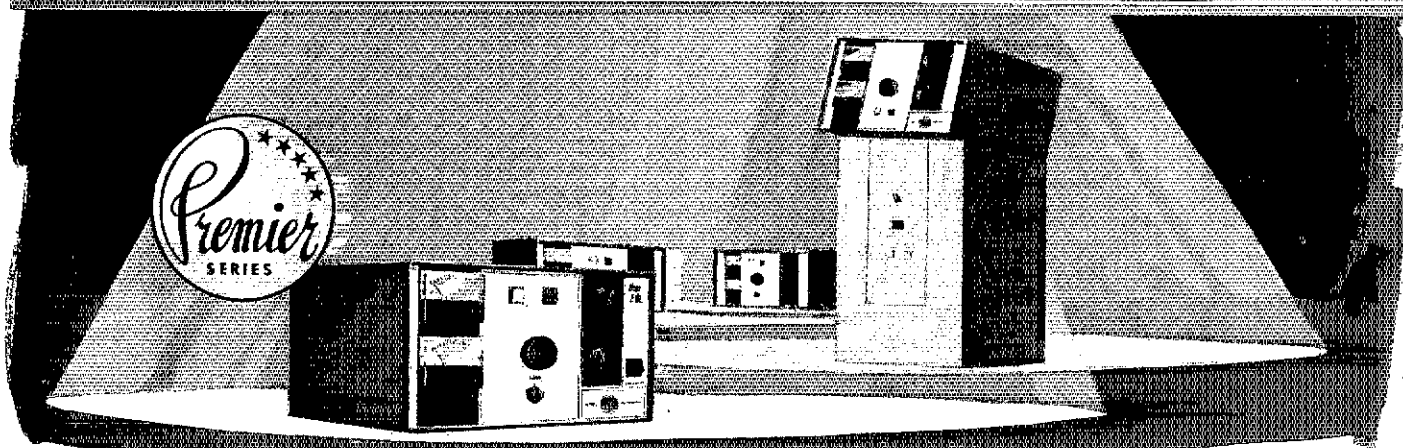
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Chinese hams visit the US!
Page 50



ANNOUNCING A NEW LINE OF SUPER STARS..HENRY RADIO'S PREMIER SERIES



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

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

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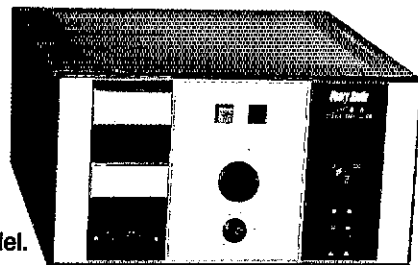
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TH-315A
Full-featured HT

full-featured HT covering 220–225 MHz. Ten memory channels and 2.5 watts of power. (5 W with PB-1 or 12 V DC.) Uses the same accessories as the TH-215A for 2 meters or TH-415A 440 MHz. For truly "pocket portability," choose the TH-31BT, a thumb-wheel programmable, 1 watt unit. For mobile use, select the TM-321A or TM-3530A.

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

TM-321A
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TH-31BT/31A
Pocket-held HT



TM-3530A
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A complete line of accessories is available for all models.

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

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IC-3AT Handheld



IC-03AT Handheld



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IC-37A Mobile

IC-38A Mobile

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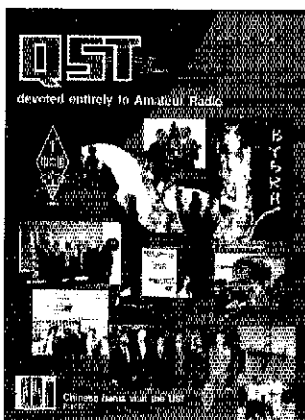
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OUR COVER

It's one thing to work BY1PK or another BY club station on 20 meters, but it's quite another to have an eyeball QSO with three high-level officials of the Chinese Radio Sports Association. Some US hams had just that opportunity recently, as Mr Wang Xun, Mr Tong Xiao-Yong and Mr Liu Wen-Bin traveled to Newington, New York City, Washington DC, Chicago and San Francisco for two weeks during October and November. An article describing their historic visit, including a guide to the photos on the cover, begins on page 50.

CONTENTS

January 1988
Volume LXXII Number 1

TECHNICAL

- 16 A New Breed of Receiver Gary A. Breed, K9AY
- 24 An Optimum Design for 432-MHz Yagis—Part 2 Steve Powlishe, K1FO
- 31 Accessories for Your VFO Doug DeMaw, W1FB
- 34 Measurements—How Big is That? Julian Macassey, N6ARE
- 38 Amateur Radio and the Blind—Part 4 Butch Bussen, WA0VJR
- 41 Product Review: AEA PK-232 and Heathkit HK-232 Multi-Mode Digital Communications Terminals
- 47 Technical Correspondence

NEWS AND FEATURES

- 9 It Seems to Us: Challenges for the 1990s
- 12 Upfront in QST
- 50 Official Visit Strengthens US-China Amateur Radio Link David Sumner, K1ZZ
- 52 Happenings: ARRL Election Results
- 55 Washington Mailbox: PRB-1—The Radio Amateur's Tool in Antenna Cases
- 74 Public Service: The Day the Pope Came to Town
- 77 License Renewal Information
- 77 US Amateur Frequency and Mode Allocations, Power Limits
- 78 Major ARRL Operating Events and Conventions—1988

OPERATING

- 79 Results, 1987 September VHF QSO Party Billy Lunt, KR1R
- 83 1988 Novice Roundup Announcement
- 86 Club Competition Rules and Contest Disqualification Criteria

DEPARTMENTS

Amateur Satellite Communications	61	League Lines	15
Canadian NewsFronts	62	Mini Directory	69
Club Spectrum	71	New Books	46
Coming Conventions	69	The New Frontier	63
Contest Corral	87	New Products	37, 44
Correspondence	60	QSL Corner	58
DX Century Club	73	Section News	89
Exam Info	68	Silent Keys	70
FM/RPT	67	Special Events	88
Ham Ads	150	The World Above 50 MHz	64
Hamfest Calendar	69	W1AW Schedule	72
Hints and Kinks	45	YL News and Views	68
How's DX?	57	50 and 25 Years Ago	72
Index of Advertisers	174		



Handheld DX with the DX Handy™

The idea of handheld DX seems far-fetched, but it's actually very simple. The DX Handy is a battery powered (six penlight AA drycells included) SSB/CW transceiver with two watts output. DX Handy can also use nicad rechargeable batteries, or be powered with 9 VDC.

Two variable crystal oscillators (VXOs), each with 50 KHz range, can be selected with a top panel switch. Crystals for 28.250 to 28.300 and 28.300 to 28.350 Mhz are included, and other crystal ranges for the 10 meter band are also available at a nominal cost.

CW operation can be by either the built-in push button or with an external key or keyer. External speaker and microphone jacks are also provided, and the telescoping antenna is included. The DX Handy also has a top panel S-meter/ output power meter and an effective noise blanker circuit. DX Handy is housed in an attractive gray metal case comparing in size to popular VHF FM handhelds.

Ten meters is coming back strong. With DX Handy all amateurs, novice to extra class, can enjoy the thrill of working handheld DX.

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Specifications

General

- Frequency Coverage: Any two 50 KHz segments in the 28.0–29.0 MHz Amateur Band (28.25–28.30 and 28.30–28.35 MHz supplied)
- Frequency Control: VXO provides 50 KHz of continuous tuning with a single crystal
- Frequency Stability: Within ± 500 Hz from a cold start
- Antenna: 50 Ohms Unbalanced, BNC connector
- Power Requirement: 8.4–9.0 VDC
(Included): 6-AA Dry Cells (1.5 volt/cell) = 9.0 VDC
(Optional): 7-AA NiCads (1.2 Volt/cell) = 8.4 VDC
- Current Drain: Receiving - Approx. 70 mA
Transmitting - Approx. 620 mA
- Dimensions: (W) 66mm \times (H) 39mm \times (D) 142mm
- Weight: 710 Grams (1 lb. 9 oz.) with batteries and antenna

Transmitter

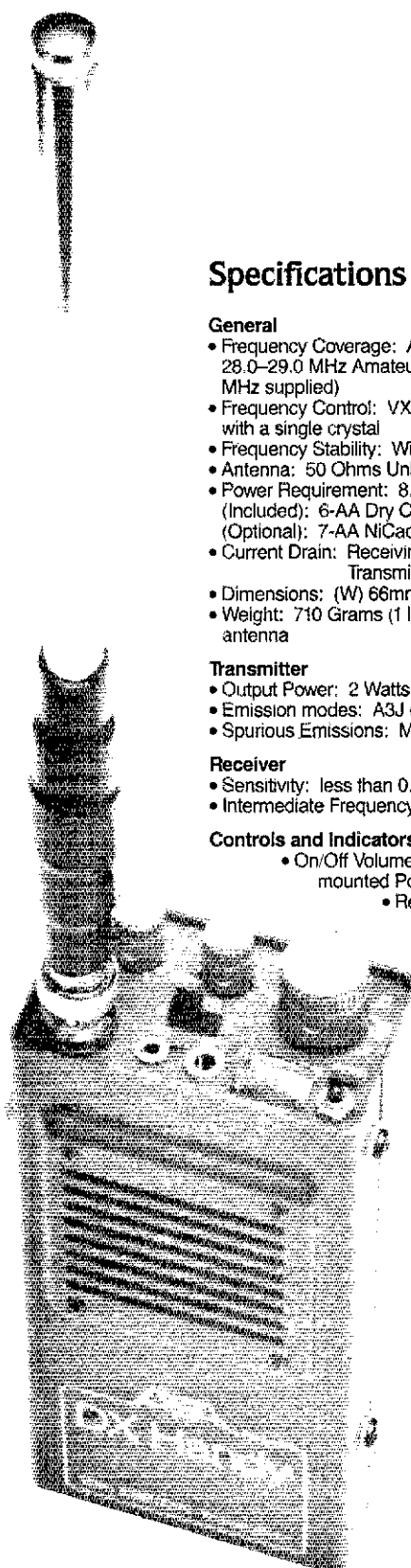
- Output Power: 2 Watts at 9.0 VDC
- Emission modes: A3J (USB) and A1 (CW)
- Spurious Emissions: More than 40 dB down

Receiver

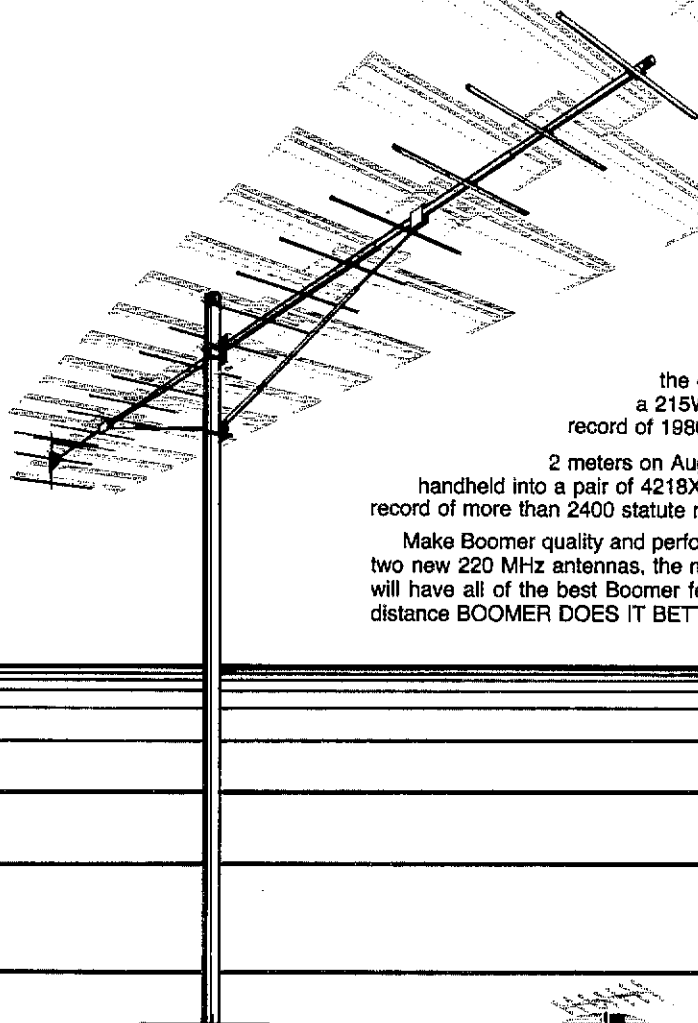
- Sensitivity: less than 0.5 μ V for 15 dB S/N
- Intermediate Frequency: 11.2735 MHz

Controls and Indicators

- On/Off Volume control Top mounted Potentiometer
- Receiver Incremental Tuning (RIT): Top mounted Potentiometer with center off detent position
- Frequency: Top mounted 50 KHz VXO
- Frequency Range: Top mounted 2-position switch
- Noise Blanker: Top mounted On/Off switch
- S/R meter: Top mounted S/R meter
- Built in CW key: Top mounted momentary switch
- External Speaker output: Top mounted $\frac{1}{8}$ " phone jack
- External Microphone input: Top mounted $\frac{1}{8}$ " phone jack
- Antenna Connector: Top mounted Female BNC
- Transmit Indicator: Top mounted Transmit LED
- Push-To-Talk: Side mounted momentary switch
- External Power: Bottom mounted 2.1 mm coaxial
- External key input: Bottom mounted $\frac{1}{8}$ " phone jack
- Mode Selector Switch: Bottom mounted 2-position switch
- Charge/External Power: Bottom mounted 2-position switch selecting 12 VDC external power function



NEW BOOMER DISTANCE RECORDS



220 MHz on June 14, 1987 Bill Duval, K5UGM of Irving, Texas using the 220B Boomer made the first ever 220 MHz sporadic E contact with W5HUQ/4 in Florida.

2 meters on June 14, 1987 Jim Frye, NW70 using the 4218XL Boomer contacted Jim Poore, KD4WF using a 215WB Boomer to set a new 144 MHz overland distance record of 1980 Statute miles.

2 meters on August 3, 1987 Gordon West WB6N0A, using a 1/2 watt handheld into a pair of 4218XL Boomers contacted KH6HME in Hawaii a distance record of more than 2400 statute miles.

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TS-940S Competition class HF transceiver

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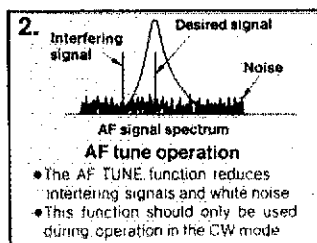
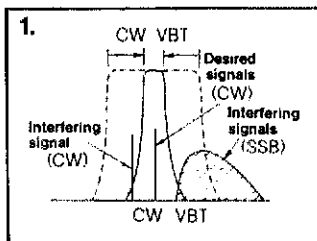
- 100% duty cycle transmitter. Kenwood specifies transmit duty cycle **time**. The TS-940S is guaranteed to operate at full power output for periods **exceeding one hour**. (14,250 MHz, CW, 110 watts.) Perfect for RTTY, SSTV, and other long-duration modes.
- **First with a full one-year limited warranty.**
- **Extremely stable phase locked loop (PLL) VFO.** Reference frequency accuracy is measured in **parts per million!**

Optional accessories:

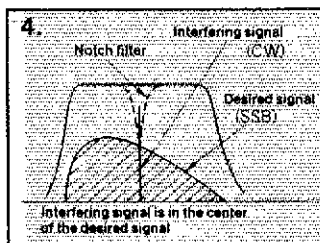
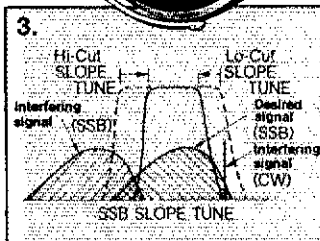
- AT-940 full range (160-10m) automatic antenna tuner • SP-940 external speaker with audio filtering • YG-455C-1 (500 Hz), YG-455CN-1 (250 Hz), YK-88C-1 (500 Hz) CW filters; YK-88A-1 (6 kHz) AM filter • VS-1 voice synthesizer • SO-1 temperature compensated

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

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



- 1) CW Variable Bandwidth Tuning.** Vary the passband width continuously in the CW, FSK, and AM modes, without affecting the center frequency. This effectively minimizes GRM from nearby SSB and CW signals.
- 2) AF Tune.** Enabled with the push of a button, this CW interference fighter inserts a tunable, three pole active filter between the SSB/CW demodulator and the audio amplifier. During CW QSOs, this control can be used to reduce interfering signals and noise, and peaks audio frequency response for optimum CW performance.



- 3) SSB Slope Tuning.** Operating in the LSB and USB modes, this front panel control allows independent, continuously variable adjustment of the high or low frequency slopes of the IF passband. The LCD sub display illustrates the filtering position.
- 4) IF Notch Filter.** The tunable notch filter sharply attenuates interfering signals by as much as 40 dB. As shown here, the interfering signal is reduced, while the desired signal remains unaffected. The notch filter works in all modes except FM.

- **Complete all band, all mode transceiver with general coverage receiver.** Receiver covers 150 kHz-30 MHz. All modes built-in: AM, FM, CW, FSK, LSB, USB.
- **Superb, human engineered front panel layout for the DX-minded or contesting ham.** Large fluorescent tube main display with dimmer; direct keyboard input of frequency; flywheel type main tuning knob with optical encoder mechanism all combine to make the TS-940S a joy to operate.
- **One-touch frequency check (T-F SET) during split operations.**
- **Unique LCD sub display indicates VFO, graphic indication of VBT and SSB Slope tuning, and time.**
- **Simple one step mode changing with CW announcement.**
- **Other vital operating functions.** Selectable semi or full break-in CW (QSK), RTTY/XIT, all mode squelch, RF attenuator, filter select switch, selectable AGC, CW variable pitch control, speech processor, and RF power output control, programmable band scan or 40 channel memory scan.

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See the TS-940S product review in our February 1986 issue.

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220 MHz
TH-315A
Here Now!

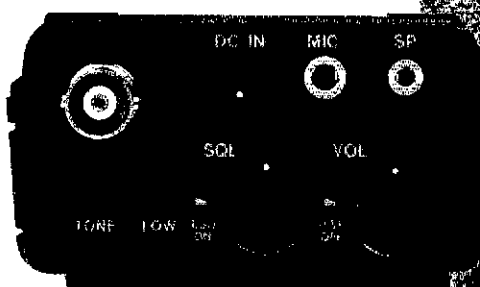
This HT Has it All!

TH-215A/315A/415A

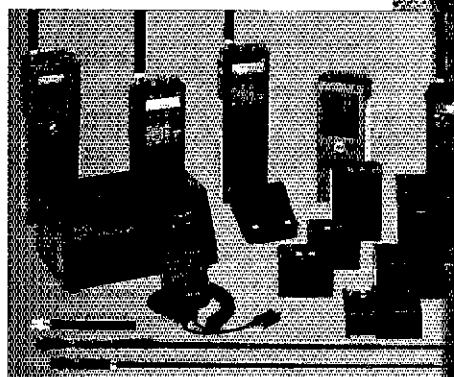
Full-featured Hand-held Transceivers

Kenwood brings you the greatest hand-held transceiver ever! More than just "big rig performance," the new TH-215A for 2 m, TH-315A for 220 MHz, and TH-415A for 70 cm pack the most features and the best performance in a handy size. And our full line of accessories will let you go from hamshack to portable to mobile with the greatest of ease!

- **Wide receiver frequency range.** Receives from 141-163 MHz. Includes the weather channels! Transmit from 144-148 MHz. Modifiable to cover 141-151 MHz (MARS or CAP permit required).
- **TH-315A covers 220-225 MHz, TH-415A covers 440-449.995 MHz.**
- **5, 2.5, or 1.5 W output, depending on the power source.** Supplied battery pack (PB-2) provides 2.5 W output. Optional NiCd packs for extended operation or higher RF output available.
- **CTCSS encoder built-in.** TSU-4 CTCSS decoder optional.
- **10 memory channels store any offset, in 100-kHz steps.**
- **Odd split, any frequency TX or RX, in memory channel "0"**
- **Nine types of scanning!** Including new "seek scan" and **priority alert.** Also memory channel lock-out.
- **Intelligent 2-way battery saver circuit extends battery life.** Two battery-saver modes to choose, with power saver ratio selection.
- **Easy memory recall.** Simply press the channel number!
- **12 VDC input terminal for direct mobile or base station supply operation.** When 12 volts applied, RF output is 5 W! (Cable supplied!)
- **New Twist-Lok Positive-Connect™ locking battery case.**
- **Priority alert function.**
- **Monitor switch to defeat squelch.** Used to check the frequency when CTCSS encode/decode is used or when squelch is on.

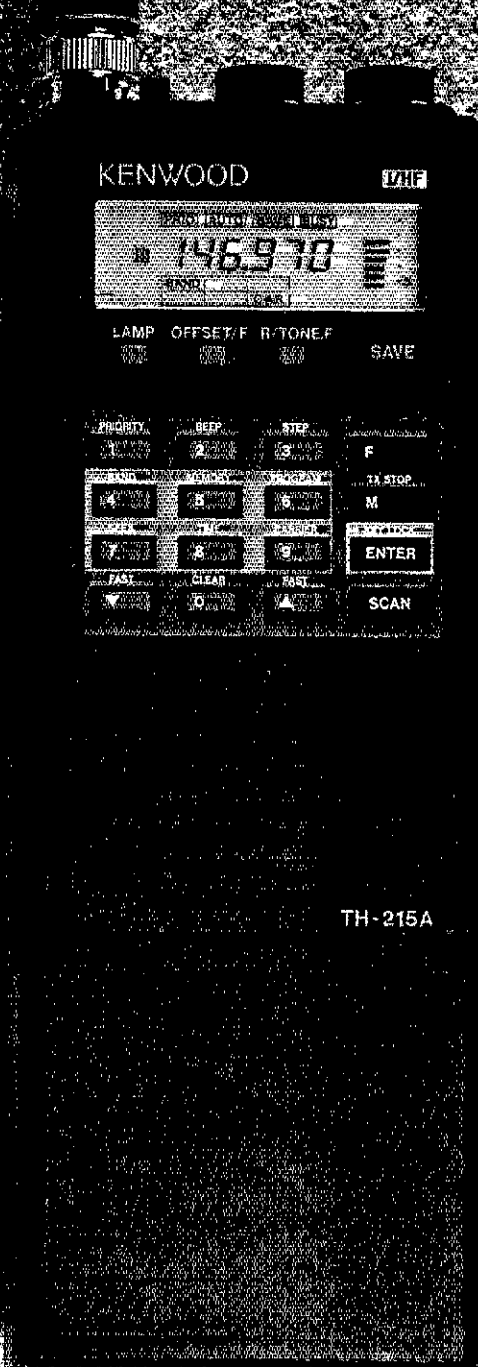


- **Large, easy-to-read multi-function LCD display with night light.**
- **Audible beeper to confirm keypad operation.** The beeper has a unique tone for each key. DTMF monitor also included.
- **Supplied accessories:** Belt hook, rubber flex antenna, PB-2 standard NiCd battery pack (for 2.5 W operation), wall charger, DC cable, dust caps.



Optional Accessories:

- PB-1: 12 V, 800 mAh NiCd pack for 5 W output
- PB-2: 8.4 V, 500 mAh NiCd pack (2.5 W output)
- PB-3: 7.2 V, 800 mAh NiCd pack (1.5 W output)
- PB-4: 7.2 V, 1600 mAh NiCd pack (1.5 W output)
- BT-5 AA cell manganese/alkaline battery case
- BC-7 rapid charger for PB-1, 2, 3, or 4
- BC-8 compact battery charger
- SMC-30 speaker microphone
- SC-12, 13 soft cases
- RA-3, 5 telescoping antennas
- RA-8B StubbyDuk antenna
- TSU-4 CTCSS decode unit
- VB-2530: 2m, 25 W amplifier (1-4 W input)
- LH-4, 5 leather cases
- MB-4 mobile bracket
- BH-5 swivel mount
- PG-2V extra DC cable
- PG-3D cigarette lighter cord with filter



TH-215A

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THE AMERICAN RADIO RELAY LEAGUE, INC



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

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

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"It Seems to Us ..."

Challenges for the 1990s

In the August 1987 issue, League Executive Vice President Dave Sumner, K1ZZ, used this space to explain in considerable detail the way in which Amateur Radio is regulated internationally. The international regulations have special importance when it comes to frequency allocations; radio wave propagation does not respect national frontiers, so it is not enough for the use of the radio spectrum to be regulated independently by the national administrations of each country. There must be an international forum in which agreements can be arrived at, without compromising national sovereignty.

Such an international forum does exist, based in that most international of cities: Geneva, Switzerland. If you go there and look it up in the phone book, look under "UIT" for "Union Internationale des Telecommunications"; Geneva is a French-speaking city, and it's only we English-speakers who call it the ITU. A World Administrative Radio Conference (WARC—and let's not get into the French equivalents!) for the Mobile Services was held there last September and October. Such specialized Conferences, usually quite limited in scope, are held at the rate of one or two per year, not necessarily in Geneva. The Mobile WARC had a number of topics on its agenda but was not expected to take up anything having a direct impact on Amateur Radio allocations. Nonetheless, for a couple of reasons the Administrative Council of the International Amateur Radio Union had determined well in advance of the Conference that IARU should ask to be admitted to participate as an observing international organization. Plans were made to field an observer team consisting of IARU President Richard L. Baldwin, W1RU, and Region 1 Vice-Chairman Wojciech Nietyksza, SP5FM, and on a part-time basis, Region 1 Treasurer Rosella Strom, I1RYS, and Region 1 EC member Mirko Mandrino, YT7MM. All four are volunteers whose expenses were covered, in Dick's case, by the ARRL appropriation to IARU in its role as International Secretariat, and in the case of the others, by IARU

Region 1 from funds provided by its member-societies in Europe, Africa, and the Middle East.

One of the reasons why IARU representation at the Mobile WARC was considered to be so important was that, as Dave reported in his August editorial, a proposal was to be considered that might lead to the holding of a major frequency allocations conference around the year 1992. And indeed, the Conference adopted a resolution recommending to the supreme authority of the ITU, the Plenipotentiary Conference (to be held next in 1989), that it "...take appropriate steps for the convening of a world administrative radio conference, not later than 1992 ..." to consider revising the Table of Frequency Allocations around 1-3 GHz to better accommodate the mobile-satellite and the mobile services. A similar, though slightly less definite, recommendation was made by another WARC earlier in 1987, that one dealing with HF Broadcasting matters (and also monitored by IARU observers). The combined effect of the two is to make it a virtual certainty that there will be an allocations conference in the early 1990s, and that it will have the power to make decisions that could seriously affect Amateur Radio in at least these two portions of the spectrum—HF and 1-3 GHz—if not from "dc to light."

As it turned out, there was another reason why it was fortunate there were Amateur Radio representatives at the Mobile WARC. While the Conference was competent to deal only with matters affecting the mobile services and having "minimum effect" on the other services, the Conference decided that "minimum effect" included introducing new allocations which would not "...unduly restrict the future use of a band already allocated to [another] service...." This loophole was a bit tempting to some administrations, and one of them, Mexico, proceeded to propose that a footnote be created to permit it to establish, on a national basis, a primary land mobile service in the

(continued on page 11)

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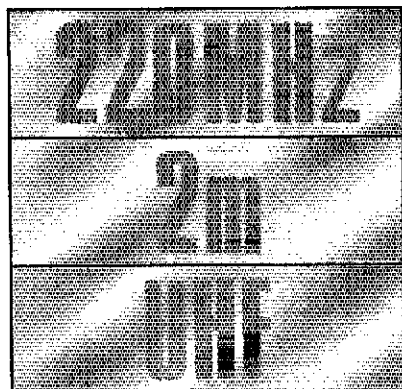
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band 430-440 MHz. This didn't sit too well with the IARU representatives, who were concerned primarily with protection of the Amateur-Satellite segment at 435-438 MHz, nor with the US delegation, which was concerned with cross-border interference. The end result, thanks to quick and appropriate action by our watchdogs in Geneva, was that Mexico obtained a footnote limited to 430-435 and 438-440 MHz and requiring that it obtain the agreement of other administrations before authorizing any land mobile operation that might cause harmful interference outside its borders. Modifications to a similar footnote upgraded the mobile allocation at 1700-2450 MHz in a few European countries to primary, with a similar coordination requirement, and Cuba got a similar footnote for a radionavigation service at 1215-1300 MHz. These developments, less than

eight years after WARC-79 took a comprehensive look at the international Radio Regulations and especially the Table of Frequency Allocations, underscore just how much pressure there is on the radio spectrum—and why we must be alert to every possible threat to the allocations which are our lifeblood.

We must not minimize the challenges we face. But at the same time, we must not be Chicken Littles. For one thing, Amateur Radio both internationally and here in the US is better prepared now than we've been prior to any previous WARC. We have good people working on our behalf, and more waiting in the wings to be needed. Financially, the League is in its best shape ever; 1987 was a good year for your national organization, as you'll see in May when the audited financial statements are available.

To underscore our commitment to meet whatever challenges the future may bring, the Administration and Finance Committee of the ARRL Board has recommended that a "Fund

for the Defense of Amateur Frequencies" be reestablished, with an initial appropriation from the General Fund of \$.70 per ARRL Full Member as of yearend 1987. This will amount to approximately \$105,000 being earmarked for this all-important purpose, a figure that is certain to grow as the reality of a major WARC draws closer. It is particularly appropriate that the amount be geared to the membership figures, for the funds came indirectly from YOU the members—from your membership dues and purchase of publications. It's your support that has made the League strong, and makes possible a strong defense on your behalf.

Over the next several years, we may ask you to make a direct contribution, over and above your membership dues, to help this fund grow. In the meantime, rest assured that the ARRL and IARU leadership are taking ITU WARC developments very, very seriously. With your support, whatever comes, we'll be ready.—Larry E. Price, W4RA, ARRL President

In Celebration of Sunspots

To a dedicated ham, the beginning of a new solar cycle is like the coming of spring. The first loud Europeans on 10 meters are like the first robins; the first round-the-clock openings on 20, like the first blossoms. The sense of renewal, of the return of life, is common to both.

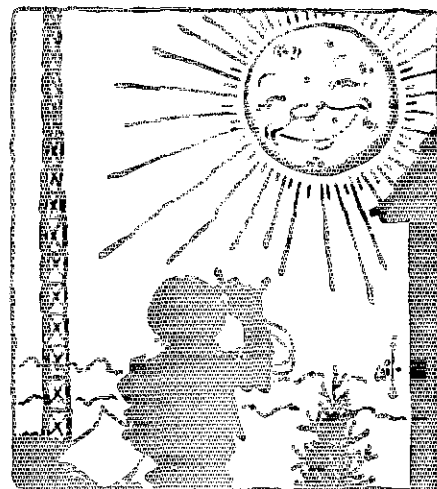
One thing about solar cycles: Unlike the seasons, you can't tell when they will change by looking at a calendar. In fact, you're never sure when one has ended and another begun until a few months after the fact! It's now apparent that we hit bottom during 1986, and that the indices of solar activity have been climbing steadily ever since early 1987. How high will they go this time? No one knows—but we can expect conditions to improve for at least the next two years, and to stay good for a couple more.

The improved propagation already was very evident this fall, and as always, 10 meters is the prime beneficiary. The thousands of Novices and Technicians who have been exercising their new 10-meter phone privileges are being given a real treat. Worldwide DX has returned to 10—not as an everyday occurrence, to be sure, but often enough to provide

a tantalizing taste of what's to come.

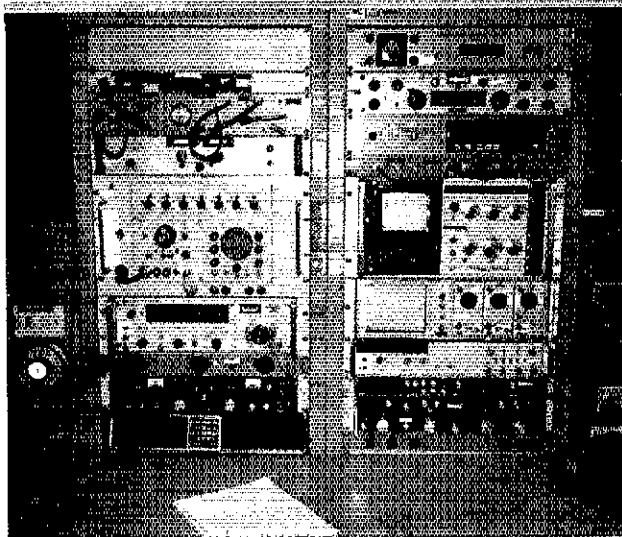
Ten meters is everyman's DX band. When it's good, it's very, very good; long chats with someone half a world away become commonplace with a few watts and a rinky-dink antenna. While 20 meters is the workhorse DX band year-in and year-out, and 15 meters is worth checking even during the solar doldrums, there are tens of thousands of hams who are DXers only when 10 is open, hibernating in local ragchews in between. On 10 meters, even in competition, a barefoot transceiver and a low tribander or small monobander usually can hold their own; for many, this makes DXing a lot more attractive.

If you've been active through previous solar maxima, you know what to expect; if you haven't, then you're in for a joyous education. But even for old hands there's a new wrinkle: a new band at 24.89-24.99 MHz (12 meters) that is often open even when 10 meters isn't. Don't have an antenna yet for 12 meters? Well, get busy! A full-size dipole for this band is only about 19 feet long. We should get access to the new 18-MHz band, too, well before the sunspots hit their stride—another new world to explore. And



let's not forget 6 meters; overseas activity on 50 MHz is greater than ever, thanks in part to the opening of the band to amateurs in the United Kingdom and some other European countries. This cycle may well see the completion of the first 50-MHz DXCC!

In the midst of challenges to our allocations and other regulatory hassles, it's sometimes possible to forget why we became hams in the first place: because operating a radio, talking to people across town or across the ocean, is fun. Courtesy of Old Sol, for the next few years it's going to be even more fun. Enjoy!—David Sumner, K1ZZ



On the road again: Does this mobile SWL setup belong to you? Yes, in a way—if you're a US taxpayer, that is! This is one view of the inside of an FCC monitoring van, as shown recently to members of the New England Amateur Auxiliary to the FCC's Field Operations Bureau. FCC FOB staffers provided the Auxiliary with an informative tour and question-and-answer period as part of an Auxiliary training session at the Belfast, Maine monitoring site. For more information on how you can be a part of the Auxiliary, contact Luck Hurder, KY1T, at ARRL HQ. (photo courtesy KY1T)

Well-Earned Praise

With the end of 1987, it's time to extend hearty thanks to all ARRL volunteers for a job well done. Through their efforts, Amateur Radio remains strong in public service, volunteer examining, state government liaison, recruitment, public relations, technical advancement, information management, clubs and self-monitoring. If you're not already involved, make a New Year's resolution to contact your Section Manager or HQ and find out how to become a part of the future of Amateur Radio.

ARRL Foundation Scholarships Available

Are you a licensed amateur planning to attend college next fall? The ARRL Foundation is administering six scholarships for the 1988-89 academic year: the Barry Goldwater Scholarship, \$5000; the Paul and Helen L. Grauer Scholarship, \$500; the L. Phil and Alice J. Wicker Scholarship, \$500; the Perry F. Hadlock Memorial Scholarship, \$500; You've Got a Friend in Pennsylvania, \$500; and the Edmond A. Metzger Scholarship, \$500. Write the ARRL Foundation, c/o HQ, for information and applications.



Polly wants a QSO: Amigo (the headphone-clad parrot), official mascot of the 1987 Pan American Games, looks on as Mariano Blume, XE1CT (at right), physician for the Aruba Pan American delegation, is welcomed to W87PAX by Kurt Pauker, KT9M. The Indianapolis special-event station logged 23,270 QSOs on 13 bands from 1.8 through 1296 MHz during its 23-day operation in August. In addition to contacting 139 countries and operating six modes, the PAX (Pan American X—Roman numeral for 10) crew sent 200 messages to North, Central and South America. QSL cards received by W87PAX have filled six boxes; no word on how many QSOs Amigo made. (photo courtesy KA9OIH)



You are my sunshine: The International Amateur Radio Union Region 2 Executive Committee met in Barbados in October. Shown here are (l-r) Fabian Zarrabe, YN3FI, Vice President; Hugo Coscio, CP5EC, Director; Luis Caamano, HI8LC, Director; Pedro Seidemann, YV5BPG, President; Frank Butler, W4RH, Director; Geg Many, 8P6AH, President, Amateur Radio Society of Barbados; Alberto Shaio, HK3DEU, Secretary; Carlos Kaufman, LU9CN, Director, and Tom Atkins, VE3CDM, Treasurer. Looks like the group enjoyed nice weather for the meeting. (photo courtesy VE3CDM)



Ham TV in Baton Rouge: KA5UFQ wants people to know that Amateur Television is alive and well in Baton Rouge. The WB5JLZ ATV repeater operates with an input on 439.25 MHz and output on 421.25 MHz, vertically polarized. They'd be glad to see you on the air! (photo courtesy WB5JLZ)

Happy 75th

August marked the 75th anniversary of Amateur Radio licensing in the US. Of those licensed in 1912, at least five are still active on the bands: George Sterling, W1AE; Julian Lovejoy, W1BT; Norman White, W2DJ; George Wilson, W7HF; and Benjamin Jackson, W6JF. Congratulations to all on behalf of the ARRL and your fellow amateurs.

The FCC Goes Househunting

The FCC is planning to move its Washington headquarters, probably in early 1990. The Commission feels it would save money by moving from its present high-rent district to some other part of Washington and consolidating its three separate headquarters offices into one.



We the people: Two of us anyway. Matt Biederman, N6NPP (shown here), and his father Ray, WB6L, earned the "We the People" Worked All States (see Sep 1987 QST, p 14) working as a team. Wonder what the Thousand Oaks, California father-and-son team will decide on for their next duo effort? (photo courtesy WB6L)

The "Considerate Operator's Frequency Guide

Some frequencies that are generally recognized for certain modes or certain activities (all frequencies are in MHz):

1.800- 1.830	CW, RTTY and other narrow-band modes
1.830- 1.840	CW, RTTY and other narrow-band modes; intercontinental QSOs only
1.840- 1.850	CW, SSB, SSTV and other wide-band modes; intercontinental QSOs only
1.850- 2.000	CW, phone, SSTV and other wide-band modes
3.590	RTTY DX
3.610- 3.630	RTTY
3.790- 3.800	"DX window"
3.845	SSTV
7.040	RTTY DX
7.080- 7.100	RTTY
7.171	SSTV
10.140-10.150	RTTY
14.070-14.0995	RTTY
14.100	NCDXF beacon
14.230	SSTV
14.313	Maritime Mobile
21.070-21.100	RTTY
21.340	SSTV
28.070-28.150	RTTY
28.200-28.300	Beacons
28.680	SSTV
29.300-29.510	Satellite downlinks
29.520-29.580	Repeater inputs
29.600	FM simplex
29.620-29.680	Repeater outputs

ARRL band plans for bands above 29.300 MHz are shown in the ARRL Repeater Directory and The FCC Rule Book.

This 24-MHz band plan was adopted by the ARRL Board of Directors in July 1985:

24.890-24.920	—CW only
24.920-24.930	—CW and digital
24.930-24.990	—CW, phone and SSTV



Take me to your leader: After frequently being asked to define the differences between the Amateur Radio Emergency Service (ARES) and the Radio Amateur Civil Emergency Service (RACES) in Howard County, Maryland, Emergency Coordinator Mike Carr, WA1QAA, decided on this approach. It serves to point out the great similarity between the two organizations and the ease with which ARRL can support each group. (photo courtesy N3DUE)



Heavy traffic ahead: Traffic handling is a breeze, according to Allyson Hurder, N1FCH, of Newington, Connecticut, shown here sending Christmas messages to the K1CE Connecticut packet traffic node. Allyson, a 10-year-old 6th grader, prefers packet and 2-meter voice nets to other traffic-handling modes. She readily agrees that Novice Enhancement was the prime reason for her having taken (and passed!) both the Novice and Technician exams on the same day. (photo courtesy KY1T)



A little (?) memento of the years: Collecting license plates can be just as addicting as accumulating gear and parts. Elmer Schoch, W9CZS, of Peoria, Illinois has mounted his collection of Amateur Radio license plates on a sheet of plywood. Elmer's plates span 1957 to 1984; 1984 (bottom right-hand corner) is a five-year plate, so it won't be mounted permanently until 1989. (photo courtesy W9CZS)



An in-the-air eyeball QSO: There are on-the-air QSOs and eyeball QSOs, but an *in-the-air* eyeball QSO? After talking with Maurice Etienne, F9LM, of Tremblay les Gonesse, France, and learning that his son Bernard would be visiting Pittsburgh the following week, Jack Siegler, WB3DPA (right), of Pittsburgh, Pennsylvania arranged to visit with him. Bernard (left) arrived with a QSL card from his father and a cousin from Paris. Jack, a flight instructor, took the two for an airplane ride over Pittsburgh. Jack reports he has been keeping in touch with F9LM and son Bernard by mail and will contact them again by Amateur Radio. (photo courtesy WB3DPA)

League Lines

ARRL election results: There are two new Directors on the Board for the Delta and Great Lakes Divisions. There are also two new Vice Directors for the Delta and Midwest Divisions. For complete election results see the Happenings column on page 52.

The ARRL Board of Directors will meet next in the Hartford area January 22-23. Now is the time to express your views to your Director. An updated list of Board members can be found on page 8.

A reminder: *The test fee for 1988 is \$4.55 if you take a Technician or higher-class exam through an ARRL-affiliated Volunteer Examiner team.* Many other Volunteer Examiner Coordinators will also charge \$4.55.

The staff of K2BSA, the national Boy Scouts of America headquarters Amateur Radio station, estimates that more than 24,000 QSOs were made by participants the world over during the 1987 Jamboree on the Air (JOTA) October 17-18. Further information will appear in a future *QST*.

Want to combine your writing and Amateur Radio skills in an exciting job offering a broad range of hands-on editorial responsibilities? The Production/Editorial Department is looking for a ham with an English or Journalism background (education or paid work experience) to fill the position of *Editorial Assistant*. Starting salary range \$15,418-16,960. Send your resume and cover letter to the Editorial Supervisor at HQ.

An opening exists in the Technical Department at HQ for a Laboratory Supervisor. We are looking for a licensed and experienced amateur with a BSEE degree or equivalent experience. The candidate must have sufficient experience in industry to know laboratory procedures and test standards, and have the ability to train and counsel laboratory personnel. The ideal candidate would have a design background, and an ability to work with experimenters in the field. Starting salary is \$34,000; excellent benefits. Contact Chuck Hutchinson, K8CH, at HQ.

Call for papers: The ARRL Antenna Compendium, Volume 2, is in its beginning stages. Volume 1 of this publication was quite popular, and plans for Volume 2 are for all-new material and an even better appearance.

HQ is soliciting papers for publication on the subject of antennas, transmission lines, propagation effects and related topics. Standard ARRL author's fees will be paid.

Additional information will appear in a future issue of *QST*, or write to the Technical Department at HQ for a *Compendium* author's kit.

Nominations and supporting documentation for this year's *Hiram Percy Maxim Memorial Award* must be in your ARRL Section Manager's hands by June 1. The Maxim Award is intended for radio amateurs under the age of 21 whose accomplishments and contributions are of the most exemplary nature within the framework of Amateur Radio. For further information, write to "Maxim Award" at HQ.

The FCC has authorized the use of the special "200" call signs to commemorate the bicentennial of the US Constitution *only by those clubs which have preregistered with ARRL.* In a letter to ARRL, the FCC said that the original order "contemplated club stations at state capitals, but early experience has shown the desirability of a broader base of participation." So, all clubs that preregistered will be able to participate. Further details appear in this month's Happenings column.

Now that the FCC has approved the special "200" calls, look for these calls on the bands from the following states:

January 2-8—Georgia and Alaska	January 23-29—Michigan
January 9-15—Connecticut	January 30-Feb 5—Kansas
January 16-22—New Mexico	February 6-12—Massachusetts

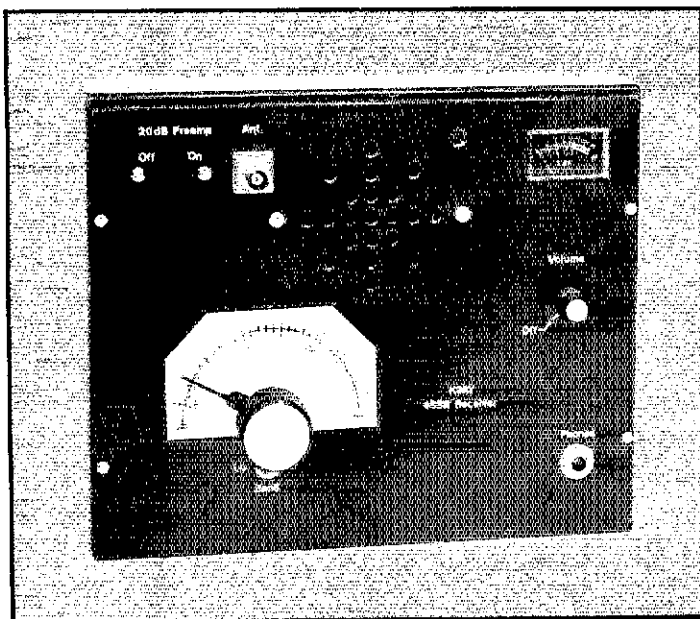
A reminder that *the 1988 ARRL Contest season begins with the VHF Sweepstakes January 23-25.* This is the weekend between the football playoffs and the Super Bowl. Details about the contest can be found on page 80 of December *QST*.

The ARRL has requested a 30-day extension of time for filing comments in Docket 87-389, the FCC proposal to amend Part 15 of its rules which permit unlicensed operation of very-low-power RF devices. Comments were to have been due December 4, but FCC has informally indicated an extension of time will be granted.

A New Breed of Receiver

Build a direct-conversion SSB receiver? Why not—it's easier to do than you might think.

By Gary A. Breed, K9AY
7277 South Clermont Dr
Littleton, CO 80122



The phasing method for generating and receiving SSB has been around for a long time. The first amateur 14-MHz SSB transmissions were made in October 1947. In July 1948 *QST*, Donald E. Norgaard, W2KUJ, described the phasing method for SSB reception. In September 1969 *QST*, Richard S. Taylor, W1DAX, described a direct-conversion (D-C) SSB receiver. That article does not cover all the circuitry that comprises the receiver, however.

Modern amateur SSB equipment uses the filter method. Thanks to high-quality, low-cost filters, the phasing method seems to have disappeared.

My recent experiments, as demonstrated in this receiver, suggest that the phasing method is no dinosaur! Recent developments in design techniques and components have made it possible to build a D-C SSB receiver with surprising performance. The block diagram of this receiver is shown in

Fig 1. (See the sidebar for an explanation of how the phasing method of SSB reception works.)

Phasing Circuits

My interest in the phasing method began with the accidental discovery of 90° phase-shift network design tables. In a book on filter design, Arthur Williams has taken the classic work of Bedrosian and updated it for modern op amp all-pass network design.^{1,2} The audio phase shift network used in this receiver is shown in Fig 2. Each op-amp stage provides a phase shift centered on a particular frequency. Cascading op-amp stages provides a stable phase shift characteristic over a band of frequencies, much like using stagger-tuned filters to get a flat passband over a desired frequency span.

Each network uses TL084 FET-input op amps, and all resistors and capacitors have

1% tolerance. Standard resistor values were placed in series to obtain the design resistance. These 1%-tolerance parts are inexpensive and easy to obtain, quite a change from those early days of SSB!³

The road to RF phasing was more roundabout. I tried several experimental configurations (see Fig 3). My first attempt was an effort to design a "proper" network, using a 0° hybrid power divider to isolate the output ports and the $\pm 45^\circ$ L-network phase-shift elements. The circuit worked well, but was not particularly wideband, covering about 200 kHz at 7 MHz with better than 1° accuracy. This circuit is shown in Fig 3A.

In another breadboard, I used LR and CR networks without paying attention to port-to-port isolation (Fig 3B). This simple plus and minus 45° network worked every bit as well as the more complex design tried earlier. My final choice for a circuit is shown in Fig 3C. It is an RC network with variable capacitors for adjustment.

This circuit performs well when termi-

¹Notes appear on page 23.

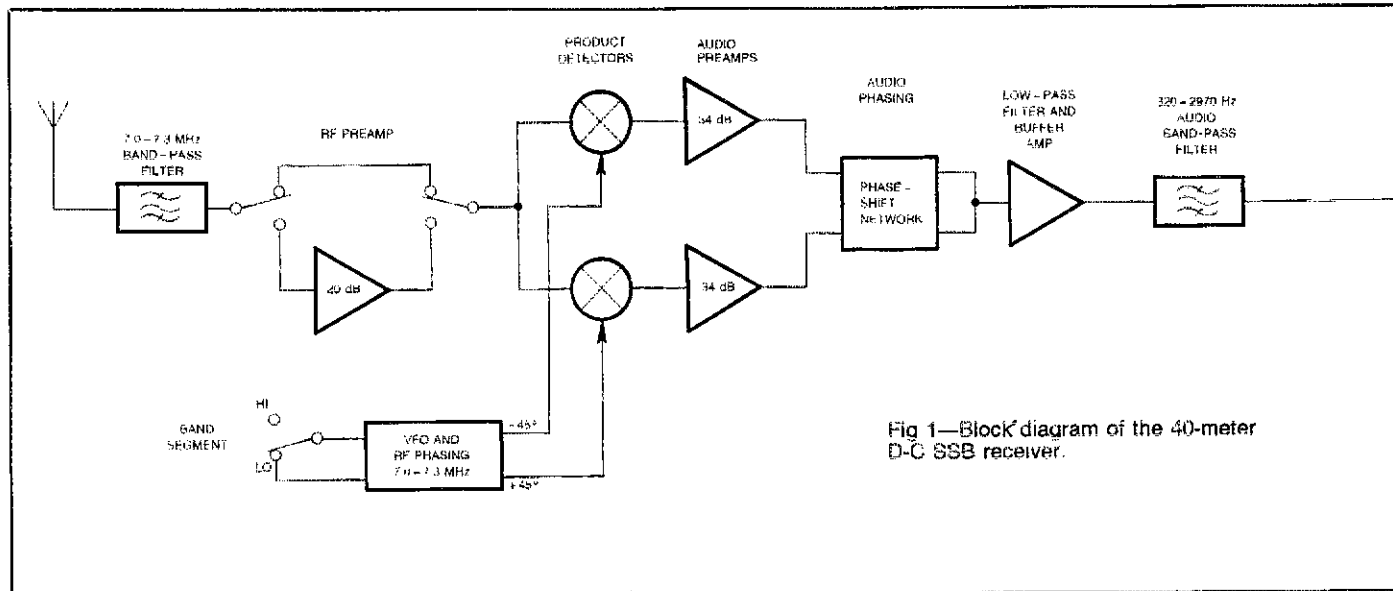


Fig 1—Block diagram of the 40-meter D-C SSB receiver.

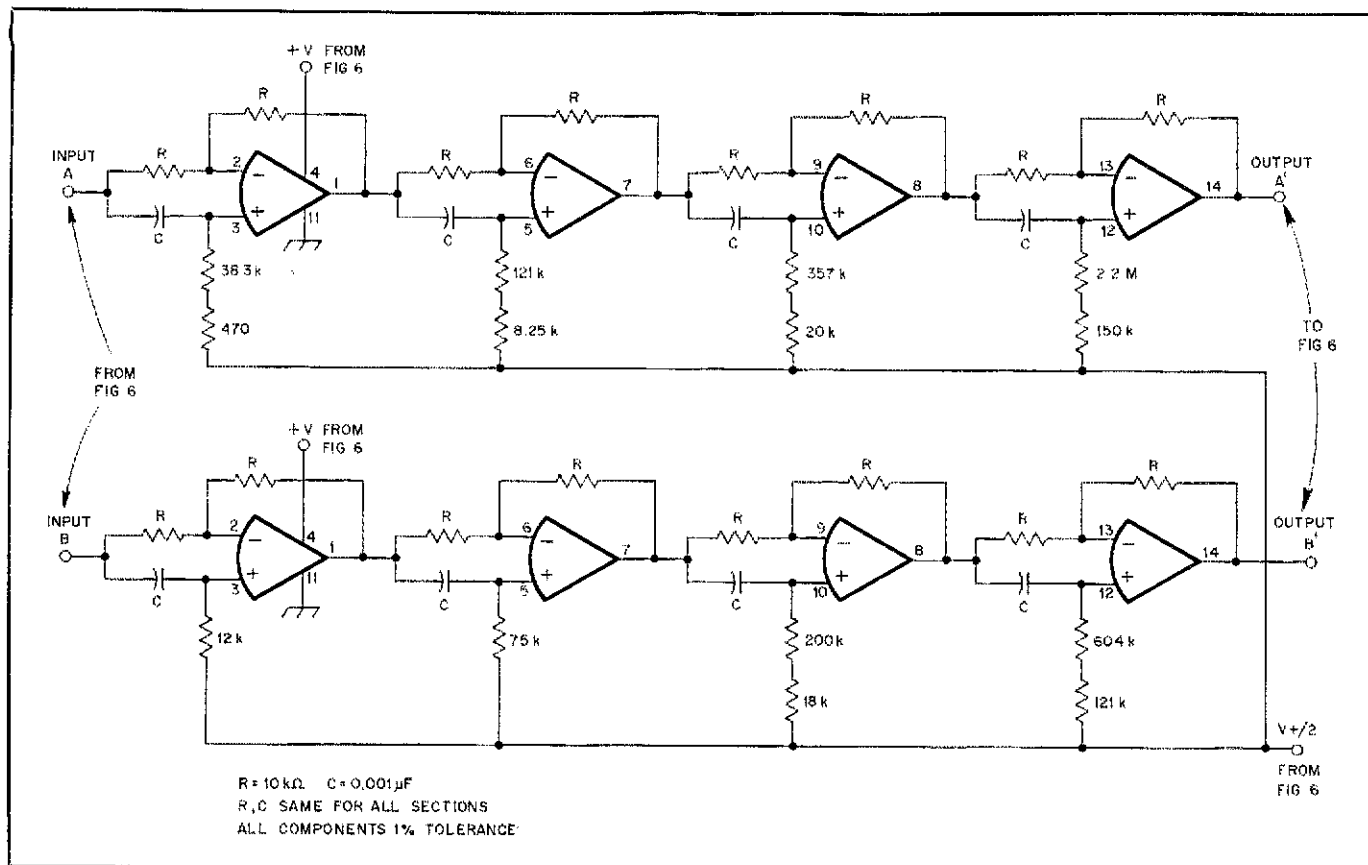


Fig 2—The 90° audio phase-shift network used in the receiver. Each leg consists of cascaded all-pass sections.

nated in 50-ohm resistors, but when connected to the product detectors, it does not provide the desired phase shift. There is enough reactance in the doubly balanced mixers to cause a significant phase variation. Through trial-and-error substitution I determined the final values shown in Fig 4. If you use this circuit in another application, start with the proper theoretical value capacitors (442 pF). Substitute capacitance values if balance cannot be obtained within the range of the trimmers.

The phasing network follows a

“standard” VFO, variations of which have been published in several ARRL publications. As shown in Fig 4, the series-tuned VFO has the tuning capacitor placed across the feedback capacitors, to obtain better tuning linearity. The only unusual feature of my application is band switch S1, which is used to get full 40-meter band coverage with the capacitor and reduction drive I had on hand.

The SSB Detector

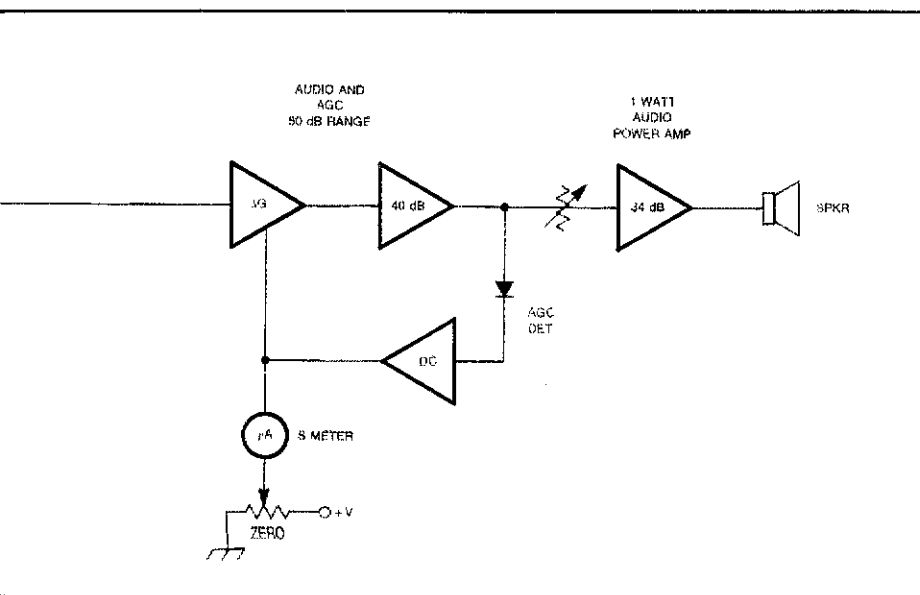
With both RF- and audio-phasing net-

works determined, I could proceed with the project. Fig 5 shows the front-end filter and RF preamplifier used in the receiver. A double-tuned, top-coupled filter provides adequate selectivity, with band edges down about 3-4 dB from the band center. The switchable RF preamp is another example of how recently developed components simplify receiver design. For the active device, I used an NE5205, which has 20 dB gain with matched 50-ohm inputs and outputs, in an 8-pin package. All that is needed is coupling capacitors and power supply bypassing. RF design was never easier!

The voltage regulator circuit is “kluged” by raising the ground pin of the 7805 above ground. This provides the desired 6.5 volts for the NE5205. Rather than use this method, you could use an LM317 adjustable regulator, or you could simply use a series connected dropping resistor of approximately 180 ohms in place of the regulator.

The phasing detector (Fig 6) starts with two SBL-1 diode doubly balanced mixers as product detectors. The outputs are terminated in 51 ohm resistors, and the audio voltage across them fed via RFCs to NE5534 low-noise op amps. I set the gain of the audio preamps at 33 dB after I discovered that higher gain caused audio clipping before the front end experienced overload. The final gain distribution of the audio stages now has a clipping threshold about equal to the overload threshold of the product detectors.

At the output of the phasing network,



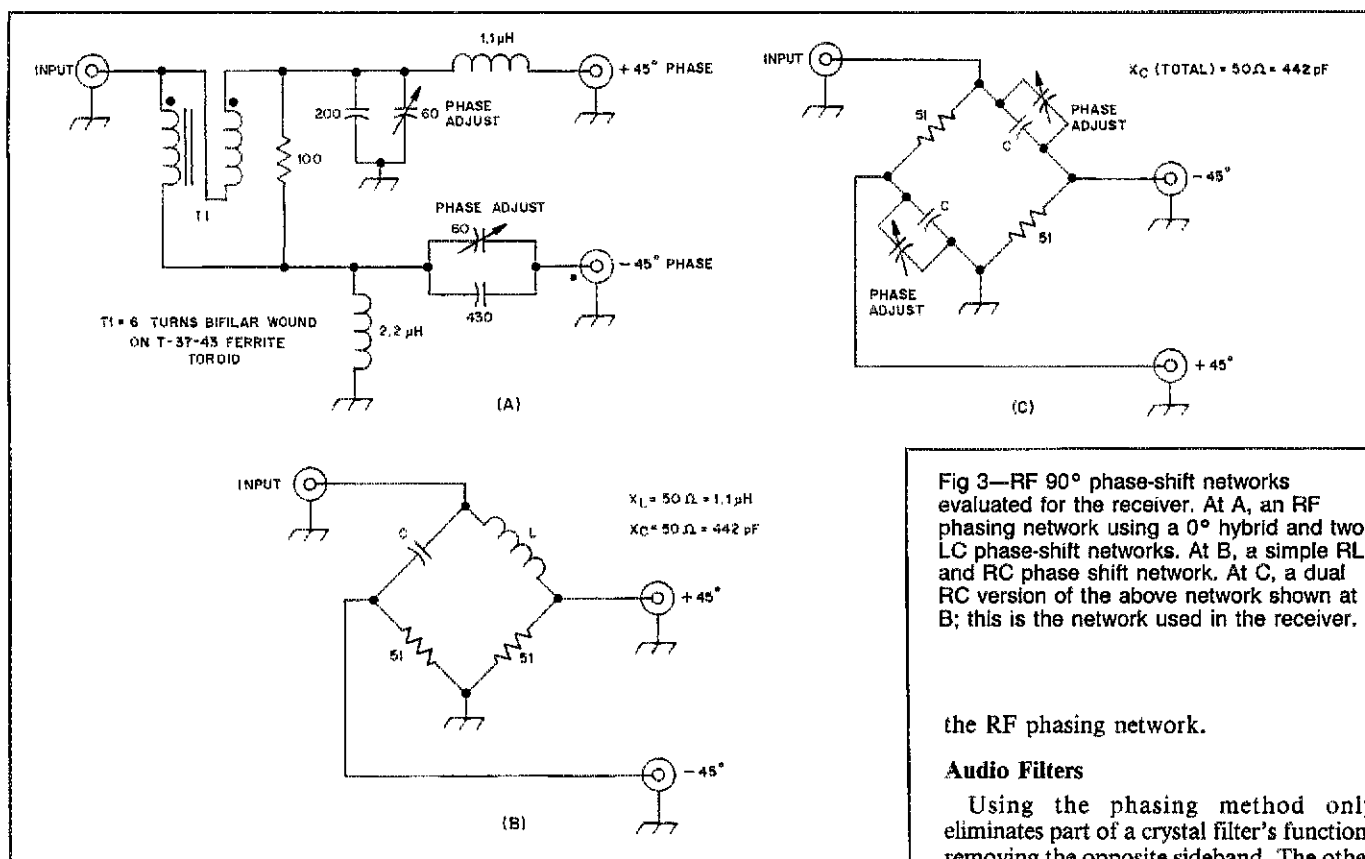


Fig 3—RF 90° phase-shift networks evaluated for the receiver. At A, an RF phasing network using a 0° hybrid and two LC phase-shift networks. At B, a simple RL and RC phase shift network. At C, a dual RC version of the above network shown at B; this is the network used in the receiver.

the RF phasing network.

Audio Filters

Using the phasing method only eliminates part of a crystal filter's function: removing the opposite sideband. The other filter function is to establish the overall band-pass characteristic. In a phasing rig, band-pass filtering is accomplished at audio, where circuit layout is not critical and common components may be used.

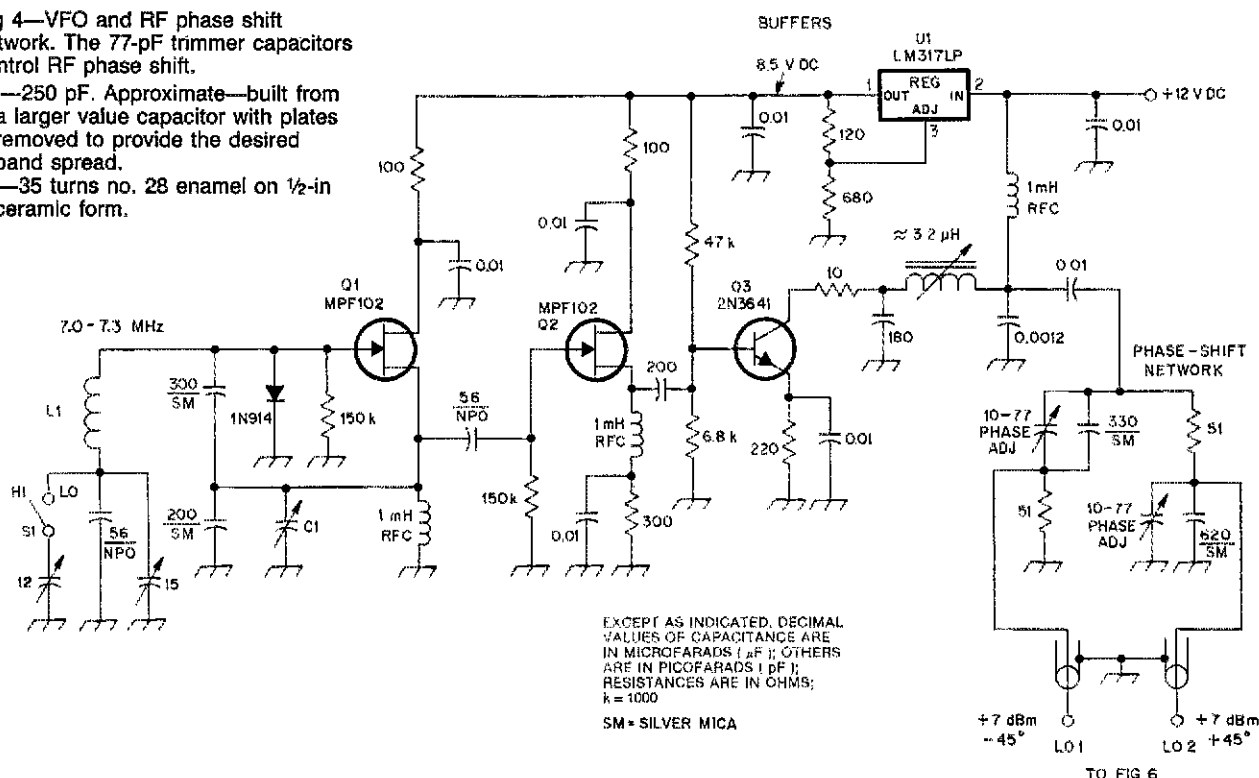
This filter circuit has four cascaded

two signal paths are summed through a BALANCE potentiometer that compensates for amplitude differences in the two audio chains. A single TL081 op amp functions

as a buffer stage, and adds two poles of low-pass filtering. Note that there is only one control to adjust in this circuit, in addition to the two trimmer capacitors in

Fig 4—VFO and RF phase shift network. The 77-pF trimmer capacitors control RF phase shift.

C1—250 pF. Approximate—built from a larger value capacitor with plates removed to provide the desired band spread.
L1—35 turns no. 28 enamel on 1/2-in ceramic form.



EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μF); OTHERS ARE IN PICOFARADS (pF); RESISTANCES ARE IN OHMS; k = 1000

SM = SILVER MICA

TO FIG 6

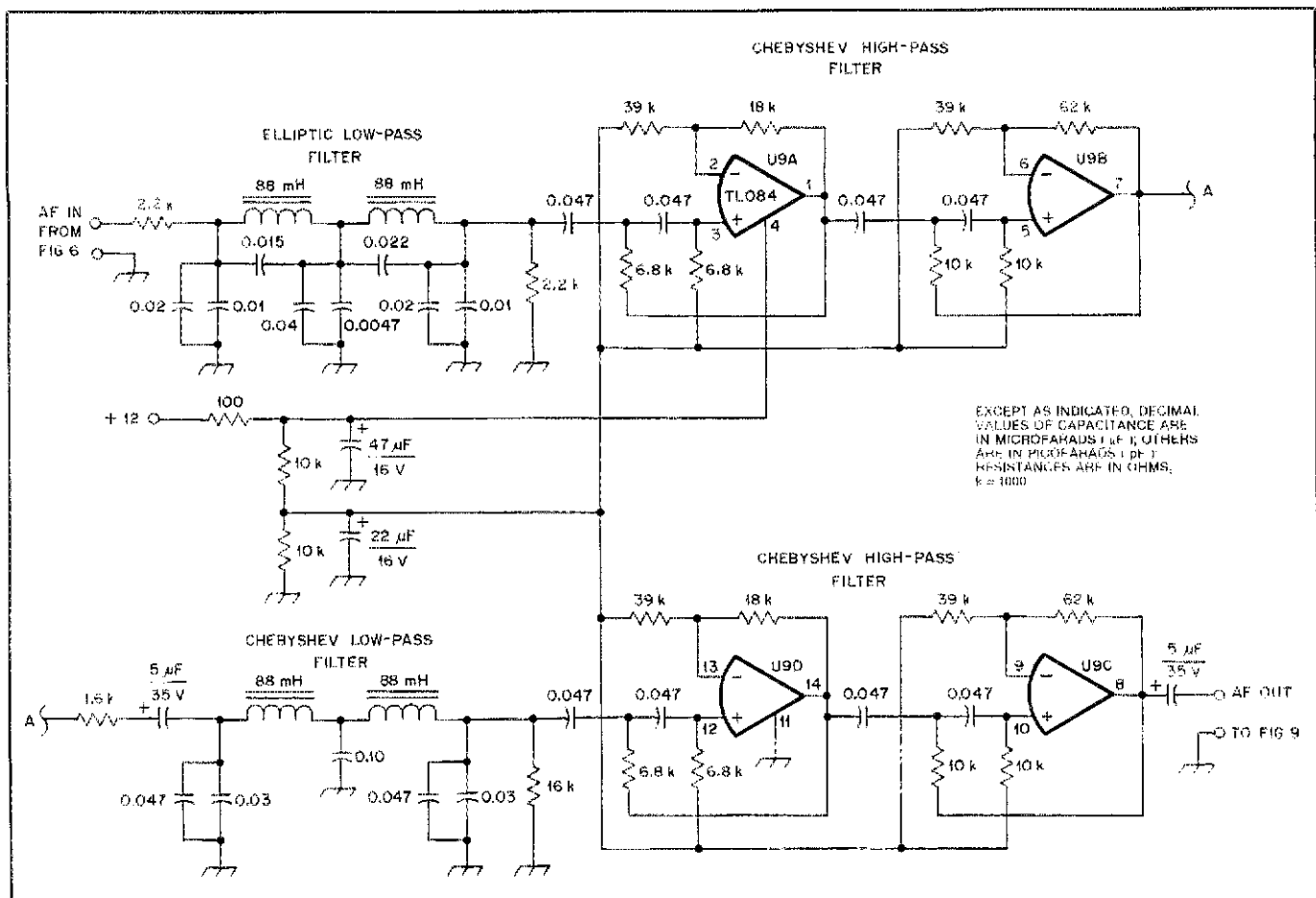


Fig 7—Circuit diagram of the four-section audio filter.

are used, and the inductors are of unknown accuracy. Adequate performance will result if you don't bother with the tweaking. Overall passband response of the cascaded filter assembly is shown in Fig 8B. The shape factor between -6 and -60 dB is 1.27, surpassing all but the best (and most expensive) crystal filters.

Audio AGC and Power Amplifier

To make the receiver more useful for casual listening, I included an AGC stage (Fig 9). The biggest drawback of any D-C design is that AGC must be accomplished at audio. The slow variations of an audio waveform limit the AGC attack time. Getting a simple circuit to work without pops or blasts is pretty tough. The circuit used here is a compromise; it has about 50 dB of AGC range and adequate listening characteristics. The attack time is fast, with some popping evident when using headphones. Popping is not noticeable using the speaker, except on very strong signals.

The circuit uses an MC3340P audio attenuator IC as the gain control element, followed by a 40-dB-gain op amp stage for loop gain. A sample of the audio output is rectified and used to develop the AGC control voltage. The attack time is set by series resistor R3; decay time is determined by the parallel combination of R2 and C4. Another op amp section provides dc off-

set and some dc gain before driving the MC3340P control pin.

A 200- μ A meter indicates the swing of the AGC control voltage, serving as a useful S meter. The meter that I used is a CB-style unit that I found at a local surplus store. Potentiometer R6 provides dc balance for zeroing the meter. Another potentiometer, R5, is a full-scale SENSITIVITY control. The meter zero changes with power supply voltage and is a handy battery condition indicator! Zero moves up scale as the voltage drops.

Audio power is provided by an LM380 amplifier IC. More than enough audio output is available. A three-inch speaker provides plenty of volume.

Alignment

Alignment of the receiver begins with the VFO, the only place where really sensitive adjustments have to be made. With S1 (see Fig 4) in the HI position, the 15-pF trimmer is adjusted for resonance at 7150 kHz when C1 is fully meshed. Use a frequency counter or receiver to check the VFO frequency when C1 is rotated to its fully open position. Remove plates from the capacitor as needed to get the desired 7150 to 7300 kHz coverage. The trimmer capacitor will need to be readjusted each time plates are removed from C1.

Once the right band-spread is reached,

tune the VFO to 7150 kHz and change S1 to the LO position. Adjust the 12-pF trimmer for 7000 kHz output. Return S1 to the HI position (operating frequency of 7150 kHz), and adjust the slug tuned coil in the Q3 collector circuit for maximum output.

The next adjustments are in the AGC circuit (refer to Fig 9). With no signal at the receiver input, set the output of U11A to 2.5 volts dc by using R4. Next, set the meter to zero with R6. Later, when the receiver is in normal operation, R5 will be used to set the meter sensitivity.

At this point, signals may be heard when the receiver is connected to an antenna. A signal generator, crystal calibrator or other stable signal source will be needed for the remaining adjustments. First, the input band-pass filter (see Fig 5) is peaked at 7150 kHz using trimmers C2 and C3. Because this is an over-coupled filter, it is normal for this peak to be broad, or to show a peak at two different settings of the trimmers. After getting the best possible peak at 7150, tune to 7100 and adjust C3 for a peak. Now tune to 7200 and tune for a peak with C2. Repeat these last two adjustments. The filter is now relatively flat over the entire 40-meter band.

The following phasing adjustments are all made near 7150 kHz. First, tune in the signal source on the lower sideband as

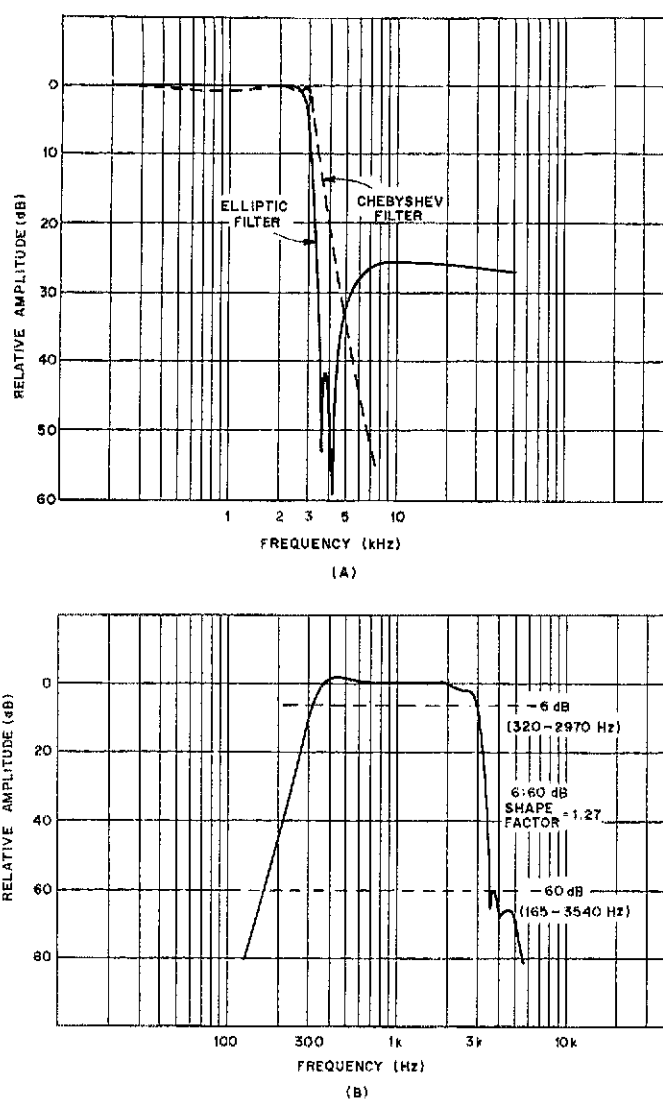


Fig 8—Band-pass characteristics of the two low-pass filter sections presented in Fig 7 are shown at A. Overall audio filter response is shown at B.

verified by listening to SSB stations. Tune through zero-beat to the upper sideband, which should be 10 dB or more lower in level than the lower sideband. If it is stronger, reverse the phasing by switching the local oscillator connections to the two product detectors.

Now tune the receiver for a 1 kHz audio note on the upper sideband. Adjust the BALANCE potentiometer, R1 (Fig 6), for minimum output. The change should be quite noticeable. Next, alternately adjust the two trimmer capacitors in the RF phase shift network (Fig 4) for best null. If a definite null cannot be found, some changes in capacitor values may be needed, as noted before. Once all is in order, you should get a very distinct and deep null in the audio output. Repeat the adjustment of the RF phasing and audio balance controls until the best null is achieved. You should be able to make the upper sideband virtually disappear. Tuning back through zero-beat should make the lower sideband

magically reappear! All that remains is to set the S meter sensitivity as you wish.

Performance

This receiver was constructed as an experiment. I set out to see what level of performance could be achieved using the phasing method. I am definitely not disappointed.

First, unlike most D-C designs, this receiver has absolutely no microphonics. At each board, power supply connections are decoupled with 100-ohm resistors and large electrolytic capacitors. In addition, the op amps have internal power-supply isolation.

Hum is only a minor problem with this receiver. This is not true with many D-C designs. Magnetic coupling to nearby power transformers is one small difficulty. (I can't use this receiver within about 18 inches of the main rig's power supply.) Hum from local oscillator radiation, 60-Hz modulation and reception of the modulated LO signal is minimized by shielding the

Table 1

Unwanted Sideband Rejection as a Function of Audio Frequency and Operating Frequency

Audio Freq	Operating Frequency (kHz)				
	7000	7075	7150	7225	7300
350	36	44	42	38	34
500	40	35	39	37	34
750	42	41	44	45	41
1000	41	47	65	50	45
1500	41	53	45	55	50
2000	40	50	42	48	54
2500	41	49	42	45	53
2900	43	50	42	47	52

Opposite Sideband Rejection (dB)
(Balanced at 7150 kHz, 1-kHz audio)

VFO and using metal-can mixer/detectors. With the RF preamp in the circuit, reverse isolation reduces LO radiation even more. There is significant hum when using the combination of an ac-operated power supply and a random-wire antenna attached directly to the antenna connector. With an outdoor antenna, there is no difference in performance with batteries or ac-operated power supply.

Outstanding sensitivity and dynamic-range performance were not major goals of this project. Demonstration of the phasing method was the primary objective, but RF performance is certainly adequate. I estimate the noise floor of the receiver to be about -100 dBm without the preamp and -117 dBm with it. This kind of performance is adequate on 40 meters, and I can hear every signal on this receiver that I can hear on my Heathkit SB-104A transceiver.

The onset of third-order intermodulation distortion from two signals spaced 20 kHz apart was measured at a very respectable -32 dBm without the preamp and -49 dBm with the preamp. Spurious-free dynamic range is then 68 dB. My feeling is that this estimate of the noise floor may be too conservative, but I don't have access to the proper test equipment for minimum discernible signal (MDS) measurement.

The best news comes last: Unwanted sideband rejection is better than expected. Table 1 lists the rejection levels versus audio frequency at several places in the 40-meter band. Note that only at the lowest audio frequencies does the rejection ever fall below 40 dB! The simple RF phasing network and the one-adjustment audio phasing combine for fine performance. Why is it so good? Can it be even better?

First, there is an element of luck in the performance over the wide (4.2% bandwidth) 40-meter band. It seems that there is some compensation between the variations in the audio and RF networks that works to my advantage by maintaining good rejection out to the band edges.

Next, the output amplitude of the audio phase shift network varies somewhat from

Understanding SSB Reception by the Phasing Method

Disadvantages of phasing-type SSB reception:

- Requires RF and audio phase shift networks.
- More difficult to tune and adjust.
- Unwanted signal rejection is better with a good filter-type receiver.

Advantages of phasing-type SSB reception:

- Does not require an expensive filter.
- Useful over a range of frequencies (filters are not).
- Ideal for a D-C receiver.

How it works

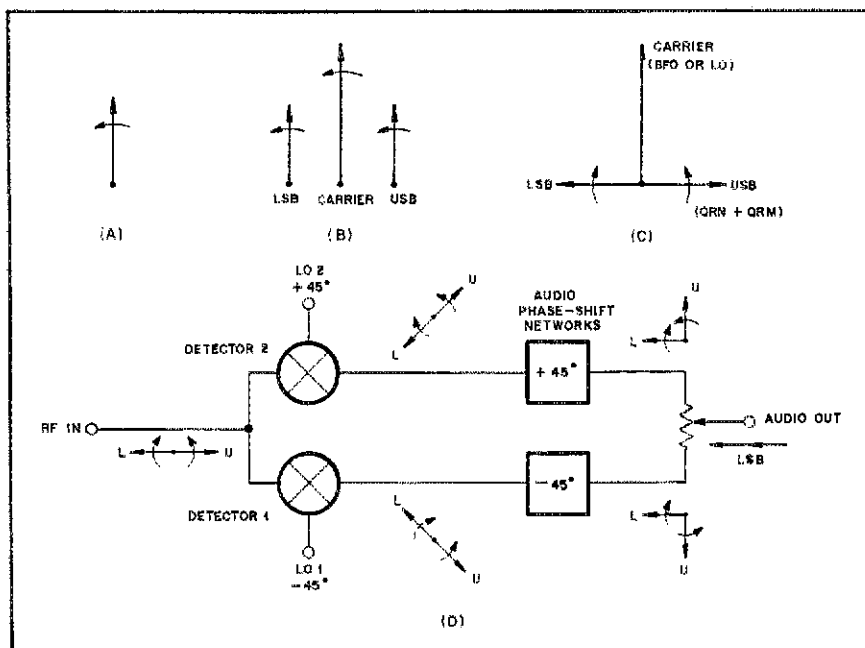
Any radio signal can be represented as a rotating vector (see Fig A). The rotational speed of the vector corresponds to the signal frequency. For example, the vector that represents a 7.2 MHz signal rotates 7.2 million times per second. The vector length corresponds to the signal amplitude.

Fig B shows three vectors. They represent a carrier and upper (USB) and lower (LSB) sidebands. The USB, being higher in frequency, rotates more rapidly than the carrier, which rotates more rapidly than the LSB. In Fig C, the phase relationship between the three, at an arbitrary instant, is shown with the carrier used as a reference. Vector rotation for USB and LSB, in this case, is shown as the difference between their actual rotation and the rotation of the carrier vector. In the receiver built by Gary Breed, the LSB is the desired signal. The USB consists of noise, interference or unwanted signals. The carrier appears as the LO signals that are used in the product detectors.

A block diagram of a phasing-type SSB receiver similar to Gary's is shown in Fig D. Assume that the same phase relationship that appears in Fig C exists at the receiver input. The local oscillator (LO) represents the carrier (reference). In Detector 1 the carrier is delayed by 45° , and in Detector 2 it is advanced by 45° . This shifts the phase relationship between sidebands in the detector outputs as shown in the diagram. The audio phase shift networks cause a

phase shift difference of 90° between the two. In this case, we assume that the upper network has a $+45^\circ$ shift and that the lower network has a -45° shift. This means that the vectors representing signals in the upper path move forward $1/8$ of a revolution, while vectors in the lower path move backward the same amount. The result is that LSB energy from the two paths will add, and USB energy will cancel. For a USB receiver, you can swap the LO connections between the detectors, or swap the inputs to the audio phase-shift network.

It is very important that a 90° phase difference exists between LO1 and LO2, and that the two audio phase-shift networks exhibit a 90° phase difference. There is nothing "special" about $\pm 45^\circ$ phase shifts. For example, 20° and 110° would do fine. You can use vector analysis, as shown here, to prove that to yourself.—Chuck Hutchinson, K8CH



At A—a signal can be represented as a vector (arrow). The curved arrow shows the direction of vector rotation. At B—vector representations of a carrier with sidebands. The USB rotates faster than the carrier, and the LSB rotates slower than the carrier. At C—vector representation of the carrier and sidebands. In this case, the carrier appears as a fixed reference. Indicated rotation is relative to the carrier vector rotation. At D—block diagram of a phasing-type SSB receiver showing phase relationships at an arbitrary instant.

high to low frequencies. I found that every audio frequency could be balanced to better than 50-dB rejection just by adjusting the BALANCE potentiometer after the audio networks. If this variation can be removed, truly high performance could be achieved.

The most encouraging result is that the phase response of the audio network is outstanding—better than 0.5° . Also, the performance of the simple RF phasing is surprisingly good, once the external influences are compensated for. I doubt that this level of performance could be maintained if switching between LSB and

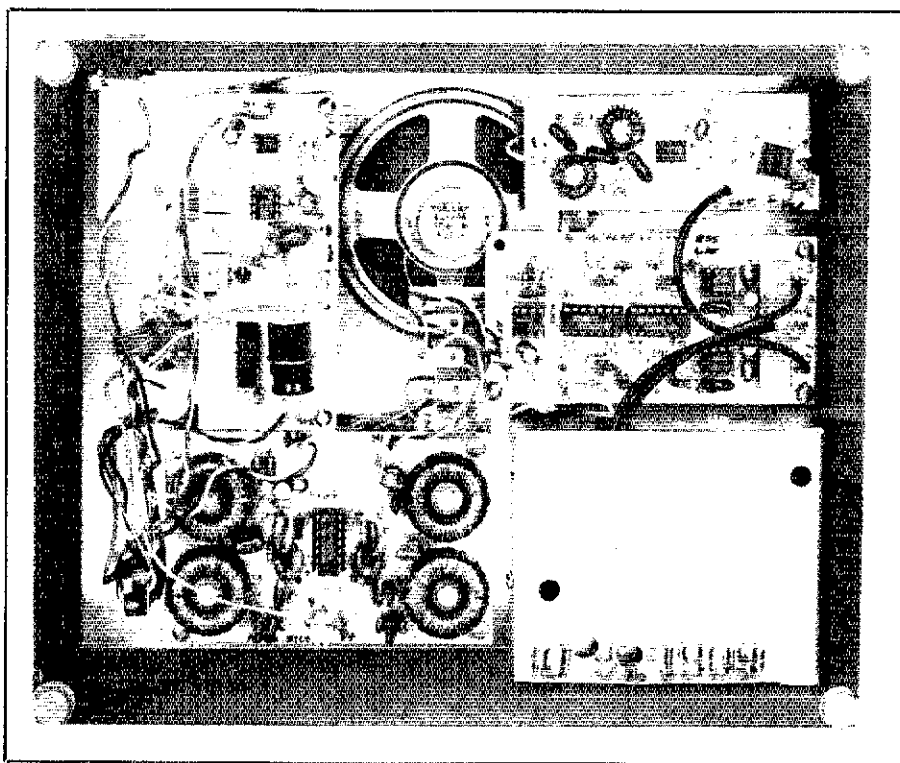
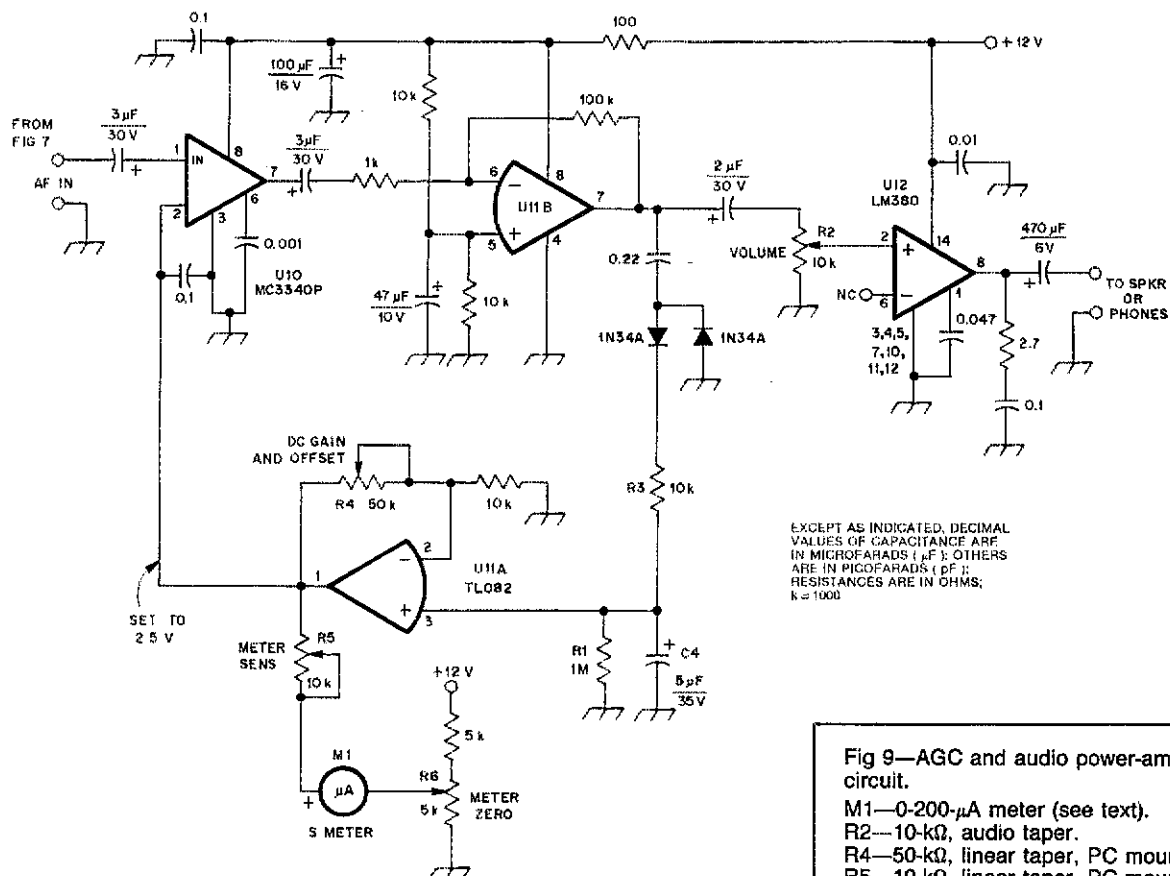
USB is needed. Further optimization of the circuitry would be required, but that's what experimental designs are all about.

What about subjective performance observations? When I demonstrate the receiver to my friends, the first comment is usually, "It sounds so good!" It's true—this is a clean-sounding receiver. Because my receiver has a little wider passband than commercial rigs, it gives an impression of better audio fidelity. Less than 1% distortion in the audio stages also adds to this effect.

Most of all, this receiver has the distinc-

tive D-C clarity. This is not an illusion—it is lack of distortion of the received signal. Crystal filters have a definite time-domain response (ringing), particularly when driven with fast-rise-time pulses such as impulse noise (QRN). Audio filters exhibit such responses to only a minor degree, and then only at the transition frequencies near cutoff. This "clean" characteristic will exist in any phasing receiver, even a superheterodyne, as long as there is no crystal or mechanical filter.

The phasing method can provide economical SSB performance. A little more



The receiver consists of five modules. Clockwise, from the upper right, they are: input filter and RF preamp, phasing detector, VFO and RF phasing (in shielded box), audio filter and AGC and audio power amplifier.

precision in AF and RF phasing networks is all that's needed. This receiver demonstrates that good phasing SSB is indeed within reach.

Gary A. Breed was licensed in October 1961 as WN9AYP. He upgraded to Technician in 1962, and that same year moved up to General class. Gary became an Extra Class ham in 1971, and received his current call sign, K9AY, in 1977. He prefers 40 meters, but occasionally operates on the other bands. Gary spent 15 years in broadcasting, eight of them as radio and television station chief engineer, and seven as a consultant. He's now the editor of RF Design magazine, a technical journal boasting 34,000 readers—12,000 of them ham radio operators.

Printed Circuit Boards for this receiver are available from A & A Engineering, 2521 W. LaPalma Ave Unit K, Anaheim, CA 92801, tel 714-952-2114.

Notes

¹Arthur B. Williams, *Electronic Filter Design Handbook* (New York: McGraw-Hill, Inc 1981), pp 7-10 through 7-34.

²S. D. Bedrosian, "Normalized Design of 90° Phase-Difference Networks," *IRE Transactions on Circuit Theory*, June 1960, pp 128-136.

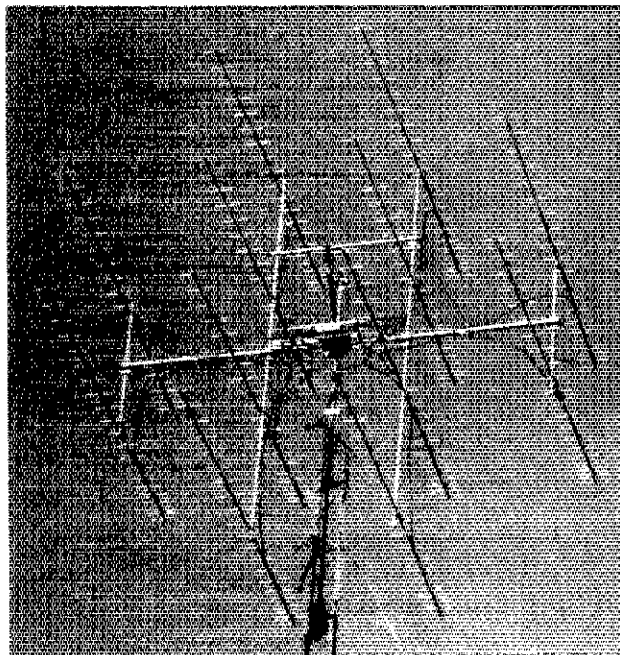
³One-percent-tolerance resistors and polyester film capacitors are available from Mouser Electronics, 2401 Highway 287 North, Mansfield, TX 76063.

⁴Don Lancaster, *Active Filter Cookbook* (Indianapolis: Howard W. Sams & Co, Inc, 1975), Chapters 4 and 8.

An Optimum Design for 432-MHz Yagis

Part 2: Here is practical construction information for a high-performance antenna that you can build for that *big* signal on 432 MHz.

By Steve Powlishen, K1FO
816 Summer Hill Rd
Madison, CT 06443



Last month, I described the development of the K1FO 22-element Yagi design. This month, I will give complete construction details and show how to scale the dimensions for other boom lengths.

Building the K1FO 22-Element 70-cm Yagi

I highly recommend that you follow *exactly* the construction information given here. If you use boom and element material of the sizes specified, you can build a top-performing Yagi—provided you pay close attention to exactly duplicating the dimensions. Some builders will want to build the Yagi with whatever material is on hand. In addition to the specific information on my mechanical design, I have

included some general guidelines for those who are willing to accept the problems faced when construction materials are changed. Please keep in mind that I cannot entertain requests to verify the dimensions, or assist in the construction or debugging, of Yagis that do not exactly follow the dimensions and construction materials recommended in this article. Translated, the last sentence says, "If you change anything, you're on your own!"

Boom Material

Fig 6 shows the boom layout. Round aluminum tubing of 7/8-inch and 1-inch outer diameter (OD) was chosen carefully to provide the highest possible boom strength, while maintaining low wind load

and light weight. Round tubing has some disadvantages compared to square tubing: It is more costly to purchase and more difficult to drill accurately. Round tubing does have advantages, however: You can use it to make telescoping boom sections (allowing easy disassembly of the Yagi), and it offers lower wind load and lighter weight than square tubing. The boom could be made out of 3/4- or 7/8-inch-square tubing. The element lengths presented later do not have to be adjusted for square tubing of this size (provided that the same element-mounting method is used).

If you use tubing of a different diameter for the boom, you will need to apply a boom-correction factor. Lengthen each element by 1 mm for each 1/8 inch increase

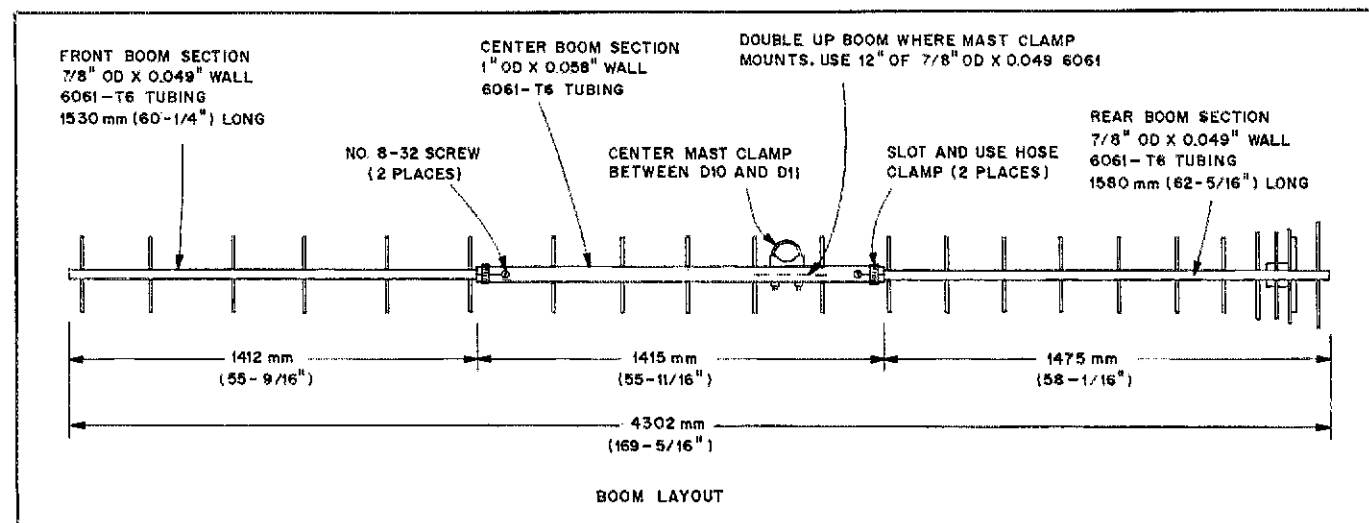


Fig 6—Boom-construction information for the K1FO 22-element Yagi. Lengths are given in millimeters to allow precise duplication of the antenna. See text.

in boom diameter; shorten each element by 1 mm for each 1/8 inch decrease in boom diameter.⁴ For example, if the entire Yagi is made of 1 1/4-inch tubing, the reflector, driven element and directors D1-D9 and D14-D20 should be 3 mm longer, while directors D10-D14 should be 2 mm longer. I don't recommend use of a boom larger than 1 1/2 inches OD—such sizes make compensation for boom effects difficult. Do not use square tubing smaller than 3/4 inch or round tubing smaller than 7/8-inch and 1-inch OD—these materials are not strong enough.

The boom materials shown in Fig 6 have been chosen for good strength versus weight. I recommend 0.049-inch-wall tubing for the 7/8-inch boom sections. Tubing with a 0.058-inch wall is suitable, but it is slightly heavier. The 1-inch center section should be 0.058-inch-wall tubing so that the end pieces telescope properly, with a minimum of slack. If a single mast clamp, mounted through the boom, is used, put a short piece of 7/8-inch tubing inside the center section where the mast clamp attaches. This doubles the wall thickness for extra strength. My array of 12 22-element Yagis has already survived 1/2-inch ice loading in combination with winds stronger than 40+ mi/h.

The boom-section lengths were chosen so the antenna can be broken down and taken on mountaintop trips or to antenna-gain measuring contests. Unfortunately, these lengths result in a lot of wasted aluminum. An alternative construction technique (provided that you do not live in an area where you get heavy icing) is to make the 1-inch center section 48 inches long and appropriately lengthen the 7/8-inch sections. If you do this, remember to apply the boom-correction factors to adjust the lengths of any elements that were mounted in the 1-inch section, but are now mounted in the 7/8-inch section.

Elements are mounted through the boom with black delrin insulators held in place by push-nut retaining rings; see Fig 7. Nylon is an acceptable, but not as desirable, alternative—provided it is black to prevent it from deteriorating because of ultraviolet radiation. Teflon® insulators such as those described by George Chaney, W5JTL, are acceptable as well.⁵ If the elements are mounted through the boom and not insulated, lengthen all elements by 5 mm (this applies for the 7/8-inch and 1-inch boom construction *only*). If the non-insulated mounting method is used, be sure that the elements have an excellent element-to-boom contact that will survive weathering effects.

To mount the elements above the boom in insulated blocks, follow the insulated-boom guidelines if the elements are centered at least 1/4 inch above the boom. If the elements are closer than 1/4 inch

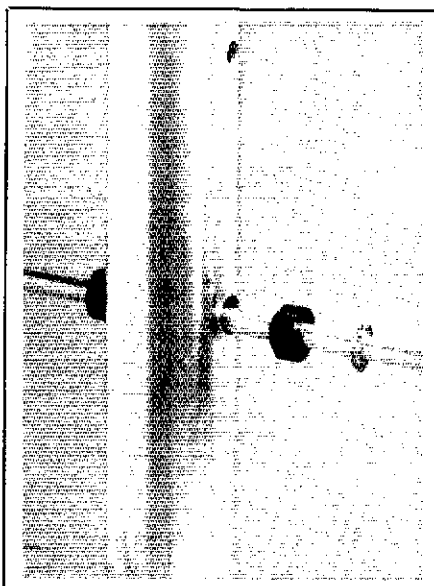


Fig 7—Element-mounting detail. Elements are mounted through the boom using plastic insulators. Push-nut retaining rings hold the element in place.

above the boom, they will require some lengthening. I am unable to give specific advice on lengthening the elements because I have not experimented with this construction method.

Use of nonconductive boom materials such as wood or fiberglass is not advised. In terms of strength versus weight and wind load, 6061-T6 and 6063-T6 aluminum tubing are without peer—at least for materials that amateurs can afford! Wood is a poor choice because of its short usable life and poor strength versus wind load and weight. Fiberglass is stronger than wood, but it is not as good as the high-strength aluminum alloys. In addition, fiberglass will deteriorate in sunlight unless it is protected from ultraviolet radiation. If you still insist on using a nonconductive boom material, shorten all elements in the 7/8-inch boom sections by 4 mm, and shorten those in the 1-inch boom sections by 5 mm.

Element Material

Element diameters other than 3/16 inch

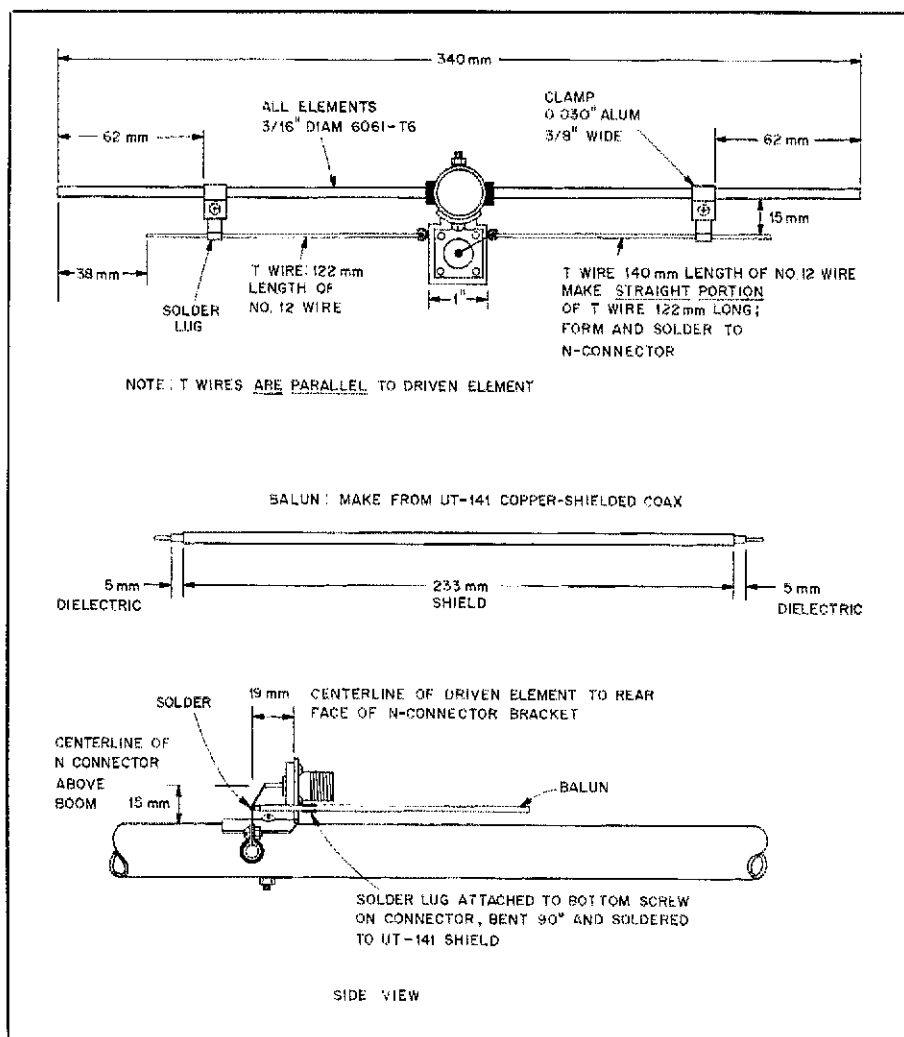


Fig 8—Details of the driven element and T match for the 22-element Yagi. Lengths are given in millimeters to allow precise duplication of the antenna. See text.

⁴Notes appear on page 30.

Table 1

Dimensions for the 22-Element 432-MHz Yagi

Element Number	Element Position (mm from rear of boom)	Element Length (mm)	Boom Diam (in)
REF	30	346	7/8
DE	134	340	
D1	176	321	
D2	254	311	
D3	362	305	
D4	496	301	
D5	652	297	
D6	828	295	
D7	1020	293	
D8	1226	291	
D9	1444	289	1
D10	1672	288	
D11	1909	286	
D12	2152	285	
D13	2403	284	
D14	2659	283	
D15	2920	281	
D16	3184	280	
D17	3452	279	
D18	3723	278	
D19	3997	277	
D20	4272	276	

are not recommended. This size represents the best compromise between strength, weight, wind load and wet-weather de-tuning effects. For other element diameters, use the following guidelines—with caution!

- For 1/8-inch-diameter elements, lengthen all elements by 3 mm, but expect worse wet-weather performance and 0.1 dB less gain (caused by resistive losses). Skinny elements are also marginal from a mechanical standpoint. For these reasons, I recommend you stay away from 1/8-inch-diameter material.

- For 1/4-inch-diameter elements, shorten all elements by 3 mm. Resistive losses are theoretically 0.04 dB less with 1/4-inch-diameter elements, but the added weight and wind load may not make the larger size worthwhile.

Preparing the Boom and Elements

All element lengths and positions are given in metric dimensions, rather than US customary units. See Table 1. Metric dimensions are much easier to work with, especially for cutting and centering elements. If you plan a significant amount of antenna work, buy a good metric scale and tape measure. If you are stuck on using inches, try to keep to 1/32-inch tolerances when converting the given metric dimensions to US customary units.

Note that element positions are referenced from the reflector end of the boom. For example, the reflector position is not at 0, but at 30 mm. This makes it easy to mark the boom for drilling if you have

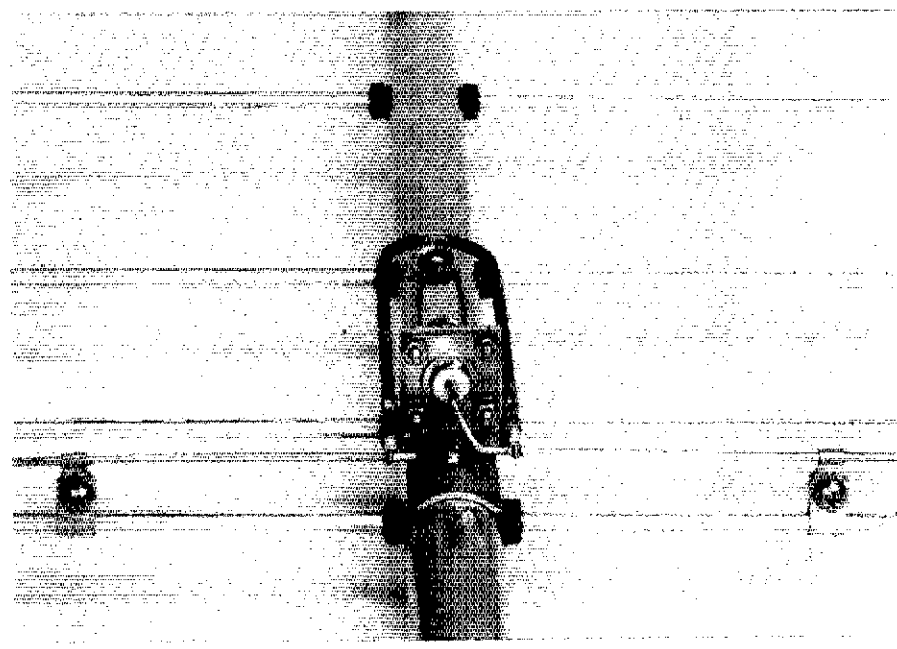
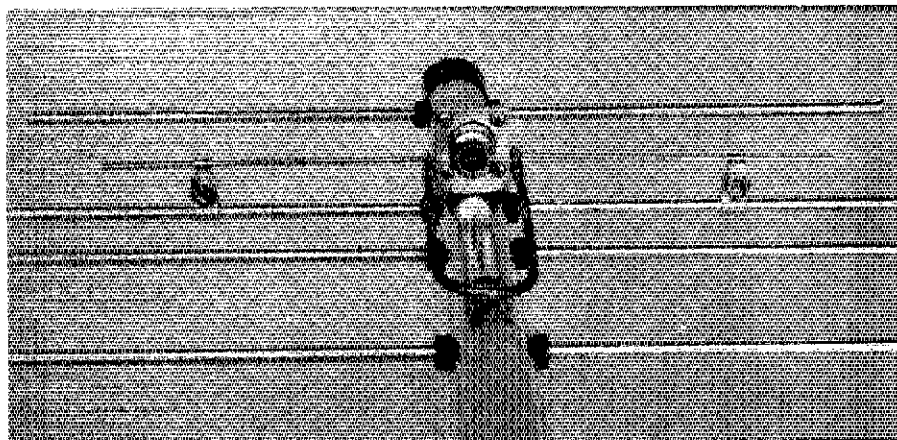
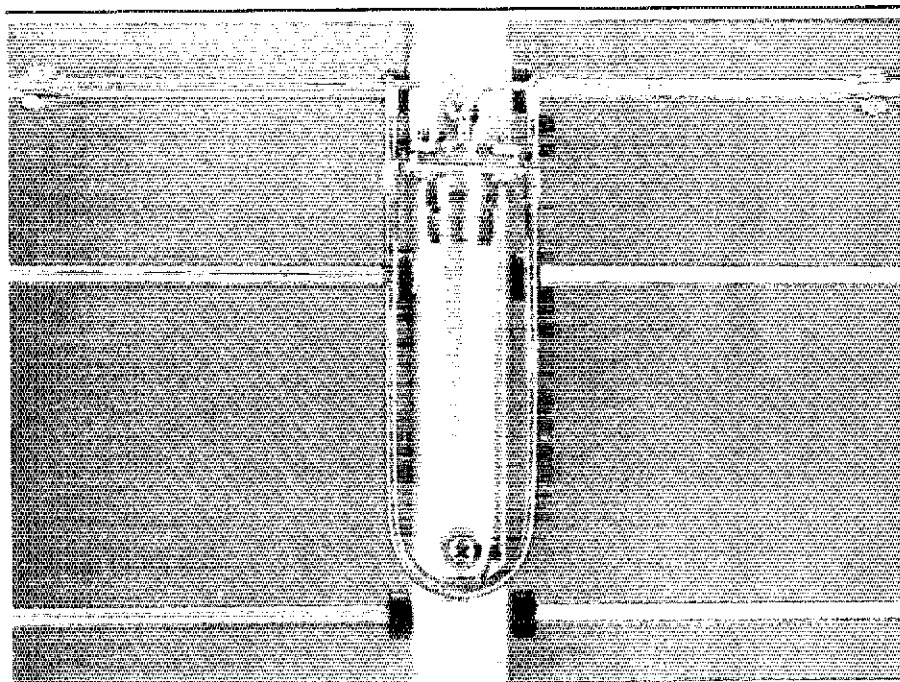


Fig 9—Various views of the driven element and T match.

a good tape measure longer than 4.3 m. Start by cutting all the boom sections to size. Next, slot the ends of the center section and use hose clamps to secure all three boom sections in place. You can then mark the element-drilling positions by putting the tape measure on the end of the boom and simply going down the boom and marking the element locations. Finally, scribe marks in the 7/8-inch boom sections where they meet the center boom section. These marks make final boom assembly easier once the elements are in place.

Keep tolerances to ± 0.5 mm if possible. Because the antenna bandwidth is so great, gain is virtually unaffected by 1-mm measurement errors. The pattern, however, may deteriorate if you get too sloppy in your construction methods.

Elements are rough cut easily with a small hacksaw. Using a vise to hold the element stock makes the job much easier. The elements can then be filed to the exact dimension. For measuring element length, I lay a good machinist's scale flat on a workbench and butt it against a straight object (such as a metal bar). Then, I butt the element end against the straight object and mark the length with a sharp scribe. I have no trouble trimming elements to within 0.25 mm using this method.

To finish the elements, I use a file to put a 1-mm chamfer on each end. The chamfer is designed into the element lengths. I feel that it slightly improves wet-weather performance and makes it easier to start the push-nut element retainers.

Driven Element

The driven element and T match used on the K1FO Yagis is patterned after the driven element and match on the RIW Products 19-element Yagi. If you cannot figure out exactly how to build the driven element, find someone with an RIW 19 and take a look at it. Fig 8 shows dimensions for the driven element and T match. Fig 9 shows the driven element photographically from different views. Fig 10 shows the general construction of the rear boom section.

If you want to optimize the match for a frequency other than 432 MHz, adjusting the driven-element dimensions should not affect Yagi performance as long as the driven element does not get overly long—more than 343 mm. You can change the size and spacing of the T-match wires, but I do not recommend changing the balun length. The balun length was chosen carefully to be an exact electrical half wavelength. Tests indicate that baluns of other lengths upset pattern balance. The first director position or length could also be adjusted slightly to improve the match, but don't change either dimension by more than 3 mm.

Making the Yagi for Other Boom Lengths

The variable-spacing geometry allows the K1FO 22-element Yagi to be scaled to other

Table 2

Design Information for K1FO Yagis of Different Lengths

Number of Elements	Boom Length (λ)	Calculated Gain (dBd)	Element Number ¹	Base Element Length (mm)	Element-Length Correction (mm)	Last-Director Spacing (mm)
11	2.0	11.7	D9	289	-3	1444
12	2.4	12.2	D10	287	-3	1672
13	2.7	12.7	D11	285	-1	1909
14	3.1	13.1	D12	284	-2	2152
15	3.4	13.5	D13	283	-2	2403
16	3.8	13.9	D14	282	-2	2659
17	4.2	14.3	D15	281	-2	2920
18	4.6	14.6	D16	280	-1	3184
19	4.9	14.9	D17	279	-1	3452
20	5.3	15.2	D18	278	0	3723
21	5.7	15.5	D19	277	0	3997
22	6.1	15.7	D20	276	0	4272
23	6.5	15.9	D21	275	0	4550
24	6.9	16.2	D22	275	+1	4828
25	7.3	16.4	D23	274	+1	5109
26	7.7	16.6	D24	274	+1	5390
27	8.1	16.7	D25	273	+1	5672
28	8.5	17.0	D26	273	+1	5955
29	8.9	17.2	D27	272	+2	6239
30	9.3	17.4	D28	272	+2	6524
31	9.7	17.5	D29	271	+2	6809
32	10.2	17.7	D30	271	+2	7094
33	10.6	17.9	D31	270	+2	7380
34	11.0	18.1	D32	270	+2	7666
35	11.4	18.2	D33	269	+2	7952
36	11.8	18.4	D34	269	+3	8239
37	12.2	18.6	D35	268	+3	8526
38	12.7	18.7	D36	268	+3	8813
39	13.1	18.8	D37	267	+3	9100
40	13.5	18.9	D38	267	+3	9389

¹Base dimensions for the reflector, driven element and directors D1-D8 are the same as those given in Table 1.

boom lengths. If the antenna is made significantly shorter or longer, adjustments to the element lengths are required. For versions with fewer than 11 elements (2.0-wavelength boom), gain will be considerably less than optimum. Gain improvement for these short Yagis requires optimization of the directors for the specific boom length. Gain is very good out to 40 elements (13.5 wavelength boom). Although the pattern remains excellent for all length Yagis, the first sidelobes do get somewhat stronger as the boom gets longer. To improve the pattern of the longer Yagis, you must optimize director lengths for the specific boom length. Driven-element tuning for an acceptable 50-ohm match is required for each version.

Table 2 summarizes performance and scaling information for Yagis based on the K1FO 22-element Yagi between 11 and 40 elements. The first three columns show the number of elements, the boom length in wavelengths, and the calculated gain for each version.

The *Base Element Length* column shows the base length, in millimeters, for directors D9 and above. (The base length for the reflector, driven element and directors D1-D8 are given in Table 1.) Note that two

correction factors *must* be applied to these element lengths.

1) The *Element-Length Correction* column shows the amount to shorten or lengthen *all* elements, relative to base element lengths. For example, if you want to build a 12-element antenna, all elements must be cut 3 mm shorter than the base lengths given.

2) The base element lengths assume that all elements are mounted in a 7/8-inch-diameter boom. For strength, you will probably use a larger-diameter boom for longer Yagis. You *must* make an *additional* element-length adjustment if you mount the elements in a boom other than 7/8 inch diameter. Add 1 mm to the base element length for each 1/8-inch increase in boom diameter. Note that if you use a combination of boom diameters (for example, 7/8-inch tubing at the ends and 1-inch tubing in the center), the boom-correction factor is applied to the elements mounted in the 1-inch section *only*.

The *Last Director Spacing* column gives the spacing, in millimeters, from the reflector end of the boom to the position of the last director. Use this information for element-position information for antennas longer than 22 elements.

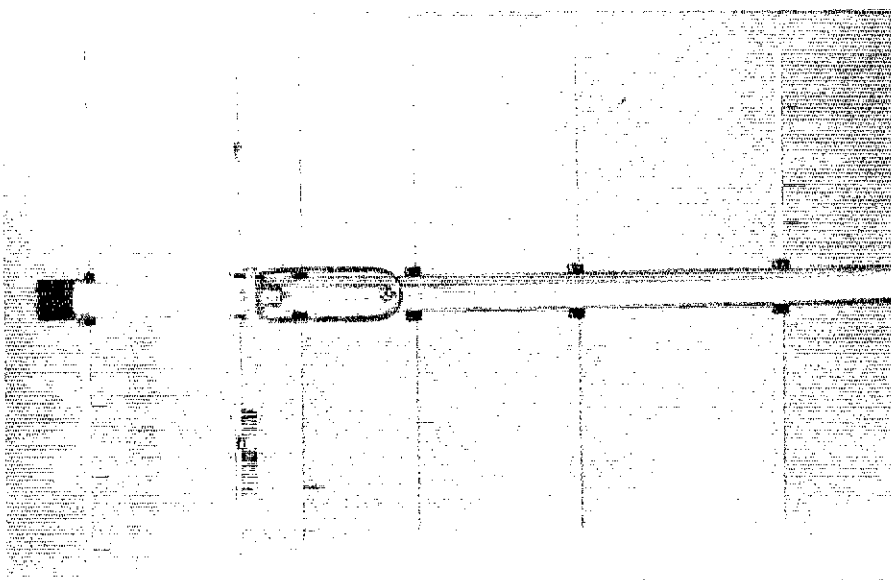


Fig 10—View of the rear boom section showing the general construction methods used.

to make the 25-element Yagi boom from two 6-foot sections of 1-inch tubing telescoped into a 6-foot center section made from 1-1/8-inch tubing. The elements must be lengthened further for such a boom: All elements in the 1-inch boom sections must be lengthened another 1 mm, and the elements mounted in the 1-1/8-inch boom piece must be made another 2 mm longer. So, taking into account adding both correction factors, the elements in the 1-inch boom section must be a total of 2 mm longer than the base dimension, and the elements mounted in the 1-1/8 boom section must be a total of 3 mm longer.

A 33-Element Yagi

I built and tested a 33-element, 10.6-wavelength (24 ft, 3 in) Yagi from the information computed for Table 2. The theoretical gain of the Yagi is 17.9 dBd, and actual measured gain is closer to 17.7 dBd. Part of this difference appears to be explained by higher resistive losses in the 33-element Yagi, compared to the shorter antenna. The measured E-plane pattern of the 33-element Yagi (Fig 11A) is extremely clean and very close to the predicted pattern (Fig 11B).

Examination of the dimensions for this

Here's an example of how to use Table 2. First, select the number of elements desired. Let's build a 7.3-wavelength, 25-element Yagi, with a calculated gain of 16.4 dBd. From the *Element-*

Length Correction column, all elements must be lengthened 1 mm over the base dimensions. Remember that the element lengths are for a 7/8-inch boom. From a structural standpoint, it may be desirable

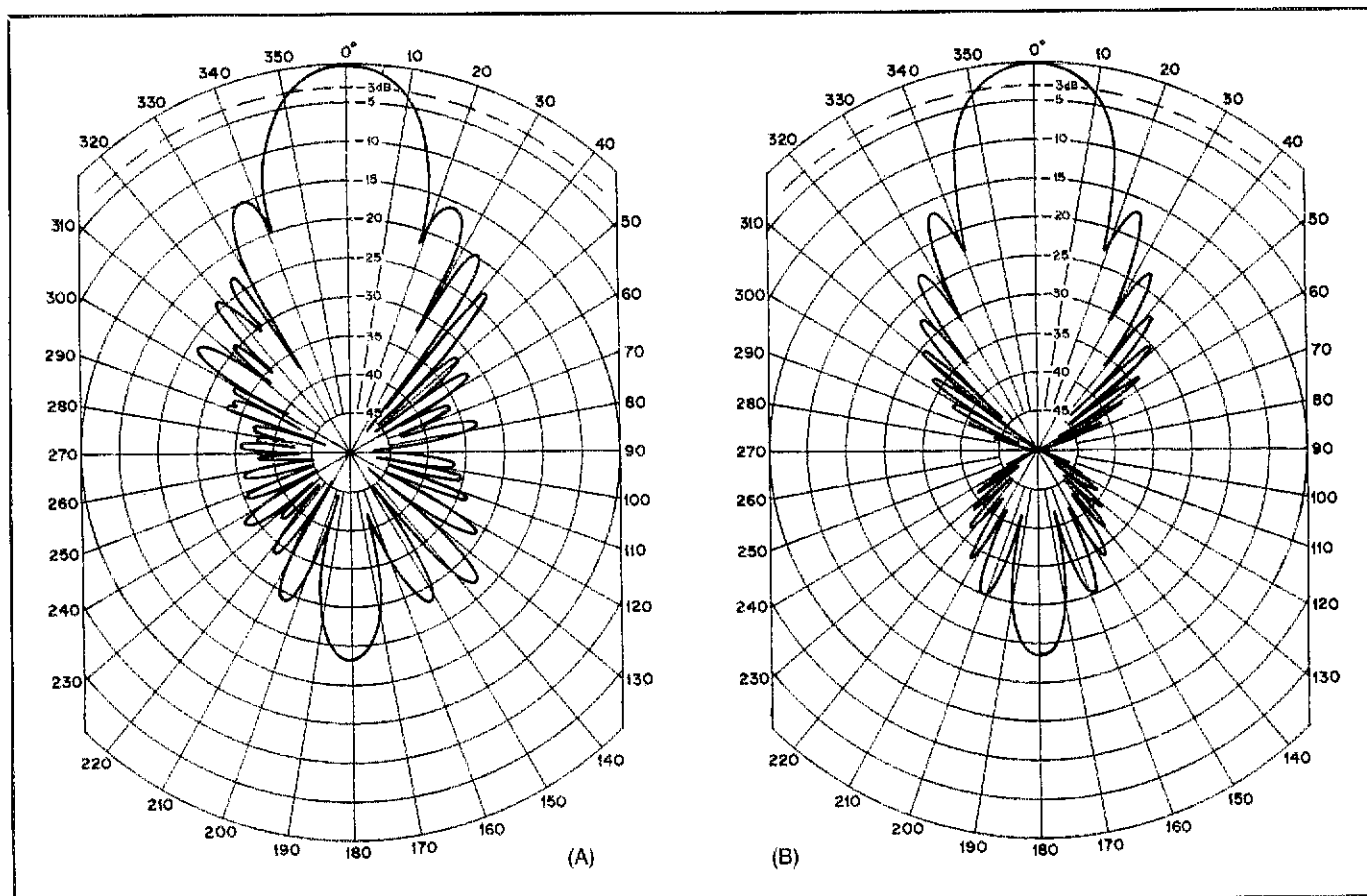


Fig 11—Measured (A) and predicted (B) E-plane patterns for the 33-element K1FO Yagi. Note: These antenna patterns are drawn on a linear dB grid, rather than the standard ARRL log-periodic grid. The linear dB grid shows sidelobes in greater detail and allows close comparison of sidelobes among different patterns. Sidelobe performance is important when stacking antennas in arrays for EME work.

Table 3
Dimensions for the 33-Element
432-MHz Yagi

Element Number	Element Position (mm from rear of boom)	Element Length (mm)	Boom Diam (in)
REF	30	348	
DE	134	342	
D1	176	323	
D2	254	313	
D3	362	307	
D4	496	303	
D5	652	299	
D6	828	297	
D7	1020	295	
D8	1226	293	
D9	1444	291	
D10	1672	290	
D11	1909	288	
D12	2152	287	
D13	2403	286	
D14	2659	285	
D15	2920	284	
D16	3184	284	
D17	3452	283	
D18	3723	282	
D19	3997	281	
D20	4272	280	
D21	4550	278	
D22	4828	278	
D23	5109	277	
D24	5390	277	
D25	5672	276	
D26	5956	275	
D27	6239	274	
D28	6524	274	
D29	6809	273	
D30	7094	273	
D31	7380	272	

Yagi (Table 3) is also useful in determining how to adjust the Table 2 dimensions for other diameter booms and greater numbers of elements. Note that not all element lengths for the 33-element Yagi correspond exactly to the table. I adjusted some elements to optimize the pattern at this specific boom length and to achieve an excellent driven-element match.

Boom-construction details are shown in Fig 12. The boom for the 33-element Yagi starts out with 1-inch-OD \times 0.049-inch-wall 6061 tubing. This telescopes into 1-1/8-inch-OD \times 0.058-inch-wall tubing. A center section of 1-1/4-inch-OD \times 0.058-inch-wall 6061 tubing completes the boom. Each of the five boom sections is approximately 5 feet long. This construction method increases the strength of the boom (to help eliminate sag and vibrations), and, as with the 22-element Yagi, makes the antenna easy to break apart for portable operation.

The 24-foot boom requires a support to minimize sag. Computer calculations indicate that the 3-4 inches of sag in the unsupported boom reduced antenna gain by 0.1 dB and caused significant distortion in the H-plane pattern. The support is made

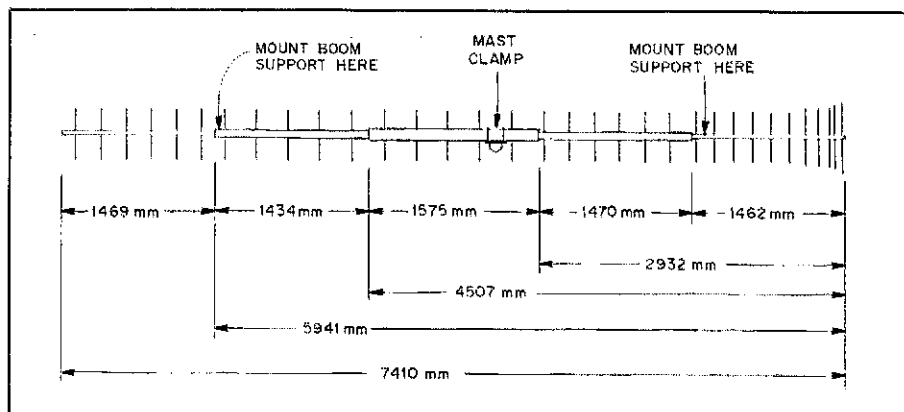


Fig 12—Boom-construction information for the K1FO 33-element Yagi. Lengths are given in millimeters to allow precise duplication of the antenna. See text.

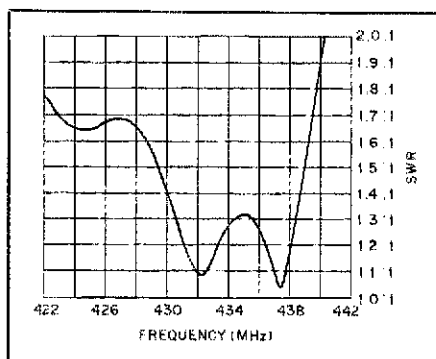


Fig 13—SWR performance of the K1FO 33-element Yagi in dry weather.

a "gimmick" driven element is not needed to obtain a good match with a wide bandwidth on a long UHF Yagi. Note that the SWR is less than 1.33:1 for over 8 MHz. Wet-weather performance is also very good, with the center frequency shifting in a similar magnitude to the 22-element Yagi. Details of the long Yagi driven element are given in Fig 14.

Stacking distances for the 33-element Yagi have been calculated to be optimum at 85 inches E plane and 80 inches H plane. Stacking distances for antennas of other boom lengths can be interpolated from those calculated for the 22- and 33-element Yagis.

Variations on the K1FO 22-element design that are built with a significantly different number of elements may not work exactly as predicted. Although virtually any length Yagi should give excellent performance, some physical tweaking may be necessary to obtain maximum performance. Specifically, versions with boom lengths less than 4.6 wavelengths are generally 0.2 dB lower in gain than what is theoretically possible for such boom lengths. This is caused by the "universal" spacings that are used. The DE to D1 spacing is closer than needed for such short Yagis. In addition, some element-length tweaks are needed to obtain the last

from a combination of 3/4-inch and 7/8-inch tubing. A 12-inch piece of 1-1/8-inch tubing, slipped inside the center boom section, strengthens the wall where the mast clamp mounts.

Like the 22-element antenna, the driven element on the 33-element Yagi was optimized with a sophisticated network analyzer. The longer Yagi also demonstrates excellent SWR bandwidth and an SWR at 432 MHz of close to 1.1:1 (see Fig 13). This is a good demonstration that

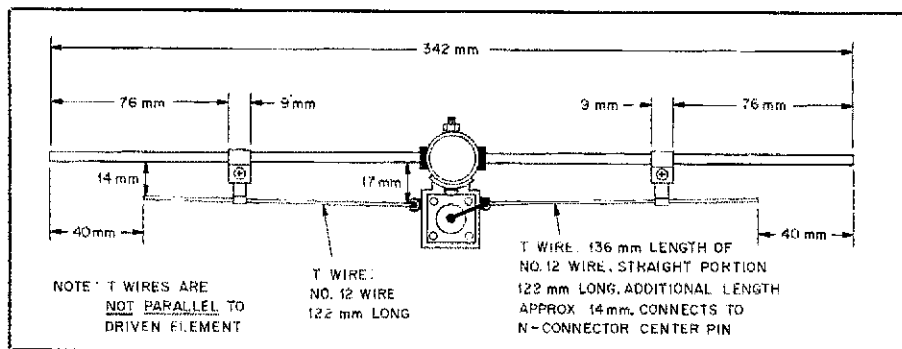


Fig 14—Details of the driven element and T match for the 33-element Yagi. See Fig 8 for additional information. Lengths are given in millimeters to allow precise duplication of the antenna. See text.

few tenths of a decibel of gain on shorter versions.

Before we get too carried away with long Yagi designs, let's return to the original premise of this article. In a practical array, we must consider the weight and wind load of the array.

Let's compare two arrays: (1) eight of the 22-element, 14-foot-long Yagis; and (2) four of the 33-element, 24-foot-long Yagis. Measured gain is 15.7 dBd for the 22-element Yagi and 17.7 dBd for the 33-element Yagi. Phasing lines will have 0.3 dB loss for the eight-Yagi array and 0.2 dB for the four-Yagi array. This gives an overall gain of 24.0 dBd for the array of eight 22-element Yagis. The array of four longer Yagis has a total expected gain of 23.3 dBd—or 0.7 dB less than the eight-Yagi array.

Wind-load area of the 22-element Yagi is 0.8 square foot; the 33-element Yagi has an area of 2.8 square feet. The total array wind-load area must include the stacking frame, phasing lines, mounting plates and so on. When everything is included, the eight-Yagi array has a wind-load area of approximately 15 square feet. Wind-load area is 19 square feet for the four-Yagi array. Thus, the eight shorter Yagis have higher gain and less wind-load area! Even if the eight 22-element Yagis were arranged two wide and four high (so they would be better for use on terrestrial paths as well as for EME), the center of the array would not have to be mounted as far above the top guys as the four 33-element Yagis to allow for elevation movement. Note that if we wanted to build a four-Yagi array with gain equal to the eight smaller Yagis, we would have to use 37-element, 28-foot-long Yagis. The wind-load area of such an array would be almost 21 square feet.

Conclusion

I delayed publishing this information on the 22-element Yagi until I was sure that it performed as well as predicted. In October 1986, I replaced my 12 RIW 19 Yagis with 12 of the 22-element Yagis. I then spent two frustrating months coping with an array that never seemed to work the way it should. After a long string of problems (including water in two different phasing lines, a cracked shield on another line, and not one but two bad relays), the array is finally in full working order. The array uses the same phasing lines that were on the old array. Because these lines are a little short, the new array uses 64- x 60-inch spacing; the net array gain is 0.2 dB lower than the maximum possible for an optimally spaced array.

Sun noise is 15.0 dB during quiet sun periods, a solid 1.5 dB higher than with the old array. Earth noise (a measure of pattern quality independent of gain) is 5.0 dB, more than 0.5 dB better than the old array. Milky Way noise (the noise measured between cold sky and the center of our

galaxy) is 5.3 dB.⁶ Other celestial measurements are 3.0 dB on Cygnus, 2.9 dB on Cassiopeia and 1.2 dB on Taurus. These readings give an approximate total system temperature of 81 kelvins (K). Subtracting receiver noise (25 K) and phasing line noise (26 K), the total antenna noise is 29 K—a truly outstanding figure. Calculations by Rainer Bertelsmeier, DJ9BV, indicate an even lower array noise for the 22-element Yagi. More information on this subject can be found in an article by DJ9BV in the fourth 1987 issue of the West German VHF/UHF magazine, *DUBUS*.

The 22-element, 6.1-wavelength (14-ft) Yagi combines light weight, low wind load, excellent gain for its size, a clean pattern and a wide gain bandwidth in one package. In addition, its geometry is adaptable to virtually any boom length. If you don't have the facilities to drill booms or cannot

locate the parts required, Tom Rutland, K3IPW, makes available Yagi kits and components for the 22-element, 33-element and variations on this design.⁷ My thanks to Tom Kirby, W1EJ, for his hard work in determining the basic design geometry for these Yagis.

Notes

⁴The actual correction in element length for each 1/8 inch of boom diameter change is 0.8 mm (1/32 inch). If a boom size is used that is significantly larger than 7/8 inch, the exact correction (0.8 mm) should be used.

⁵G. Chaney, W5JTL, "PTFE VHF Antenna Insulators," *Ham Radio*, Oct 85, pp 98-101.

⁶Sagittarius is the constellation used for array aiming. Because of the low elevation and non-point-source nature of the Milky Way, comparison of noise readings between different stations at different locations is not always meaningful.

⁷Rutland Arrays, 1703 Warren St, New Cumberland, PA 17070.

Strays



QST congratulates...

□ Bernie Cutler, KB6NR, on being awarded an Emmy from the Academy of Television Arts and Sciences, for Art Direction of the series "Max Headroom."

I would like to get in touch with...

□ husbands and wives who both hold an Extra class license, to join Extra Class Couples. Bill Precht, W3KO, 295 Strapper Rd, Bridge City, TX 77611.

□ anyone with information on hospitals equipped with ham gear. Jeff Howell, WB9PFZ, #20 Catalina Estates, Charlestown, IN 47111-1608.

□ any ham diagnosed as having Amyotrophic Lateral Sclerosis (Lou Gehrig's Disease). Lloyd Kincaid, 14319 Duncannon Dr, Houston, TX 77015.

□ hams who are bilateral amputees. Joseph Schwartz, K2VGV, 11 Windham Loop, #1JJ, Staten Island, NY 10314.

□ any hams who served aboard the *USS Culebra Island* during WW II. John Jones, N4QBP, 2000 S Eads St, #712, Arlington, VA 22202.

□ anyone who has successfully put an electronic bias switch in a Drake L-7 linear amplifier and maintained clean audio on SSB. E. G. Drummond, WR4R, US 13-Box 186, Nelsonia, VA 23414.

□ Breezeshooters. Seeking information regarding the location of the organization's original constitution and by-laws. BREEZE-SHOOTERS, INC, c/o Bud Faulhaber, N3DOS, 1059 Balmoral Dr, Pittsburgh, PA 15237.

□ anyone who has had experience operating ham radio from the Colorado River in the

Grand Canyon. Need information on antennas, frequencies and propagation characteristics for emergency communication. John Meyer, N3EFG, RD 1, Box 101A, Clarks Summit, PA 18411.



QEX: THE ARRL EXPERIMENTERS' EXCHANGE AND AMSAT SATELLITE JOURNAL

AMTOR and the AX.25 protocol are modern developments used for exchanging error-free data. Good efficiency, low undetected error rate, robustness and reliability are important attributes in an HF data transmission system. Both AMTOR and AX.25 have certain features that make them a likely candidate for such a system, yet there is room for improvement. Multipath propagation and modem design affect HF communications as well, and must be considered when designing an HF data transmission system.

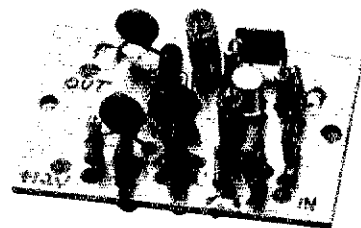
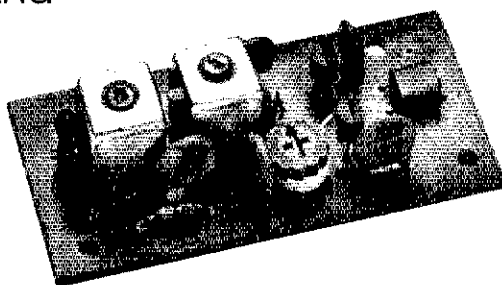
The December issue of *QEX* includes articles on:

- "New Directions in HF Data Transmission Systems—Part 1," by Barry McLarnon, VE3JF
- "Far-Field Fallacy," by H. Paul Shuch, N6TX
- "The Morphological Table—An Invention Generator," by Nick Leggett, N3NL
- "Traveling-Wave Tubes," by Geoff Krauss, WA2GFP

QEX is edited by Paul Rinaldo, W4RI, and Maureen Thompson, KA1DYZ, and is published monthly. The special subscription rate for ARRL/AMSAT members is \$8 for 12 issues; for nonmembers, \$16. There are additional postage surcharges for mailing outside the US; write to Headquarters for details.

Accessories for Your VFO

Broadband amplifiers and frequency doublers can be used with homemade VFOs to increase the power output and provide two-band operation. Two practical circuits are offered here.



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

Have you experienced difficulty with frequency stability when building a VFO for direct use on 20 meters? Or how about learning that your VFO lacks sufficient output power to properly excite the first stage of your transmitter? These are common experiences for most of us who like to build equipment.

Fortunately, some simple circuits can be built to overcome these problems, and we will focus on them in this article. You may wish to construct the broadband, fed-back amplifier described here, or you may prefer to build the push-push doubler module for obtaining 20-meter output from your 40-meter VFO. Both circuits are inexpensive and easy to get operating.

Building a Broadband RF Amplifier

Many of us recall the perennial shortage of grid drive in vacuum tube equipment. Our homemade rigs always seemed to be shy of grid drive to the final amplifier. This was particularly true of rigs built for the upper end of the HF spectrum and at VHF. In some ways, things have not changed with our solid-state home-built gear. In an effort to minimize the number of VFO or transmitter stages, we often end up with too little driving power for some stage in the circuit. Some amateur VFOs have very low output, owing to design deficiencies or lack of foresight during the design exercise.

Whatever the cause of low output power, we can boost the VFO signal by adding a broadband amplifier at the VFO output. Fig 1 shows the schematic diagram of a practical linear amplifier that uses a 2N2222A transistor. The operating potential is 12 V. The amplifier frequency

response is relatively flat from 1 to 30 MHz. Output harmonic filtering is included in the interest of providing a clean output voltage. It is desirable to "launder" the VFO output energy to ensure that a sine wave is available for exciting the first stage of a transmitter. If large amounts of harmonic current are present, the stage being excited will amplify the harmonic energy and pass it along to the next stage. Also, unwanted mixing of spurious frequencies can be reduced by delivering a clean waveform to the transmitter input port. This also helps the transmitter to operate more efficiently, and the PA stage output will be much cleaner.

The circuit of Fig 1 is patterned after a

design by Wes Hayward, W7ZOI. His circuit uses a 2N5179 CATV transistor with a 1.2-GHz f_T to provide a 65-MHz bandwidth. I find that a 2N2222 or equivalent is suitable in this type of circuit, provided a 30-MHz bandwidth is acceptable.

C4, R2 and R3 of Fig 1 form a shunt feedback network to flatten the amplifier gain and aid stability. Unbypassed resistor R4 provides degenerative feedback, which lowers the input impedance of the amplifier to approximately 50 Ω . The amplifier output impedance is on the order of 200 Ω . T1, a broadband 4:1 transformer, matches the collector of Q1 to the 50- Ω harmonic filter, FL1. Amplifier gain is approximately 10-12 dB from 1 to 30 MHz. FL1 is a simple half-wave filter that provides 30 to 35 dB of attenuation at the second and third harmonics of 7 MHz.

The smaller of the two PC-board modules in the title photo is the broadband

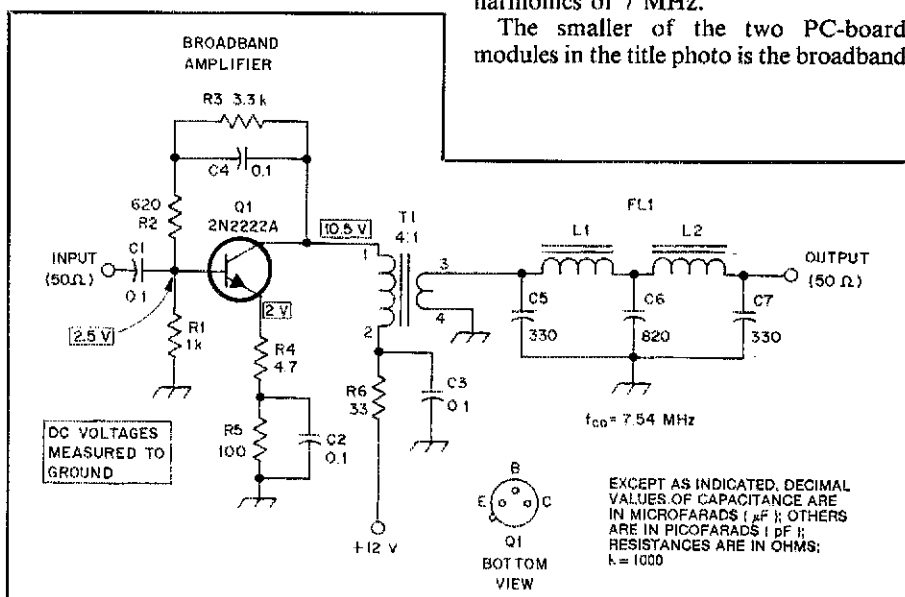


Fig 1—Schematic diagram of the class-A broadband RF amplifier. Capacitors are disc ceramic except for C5, C6 and C7, which may be disc ceramic, silver mica or polystyrene. Resistors are 1/2-W carbon composition. L1 and L2 are 1.45 μ H. Use 20 turns of no. 30 enam wire on an Amidon Assoc T-25-2 toroid core. T1 has 15 turns of no. 30 enam wire on an Amidon FT-23-43 ferrite toroid. The secondary winding has 7 turns of no. 30 enam wire.

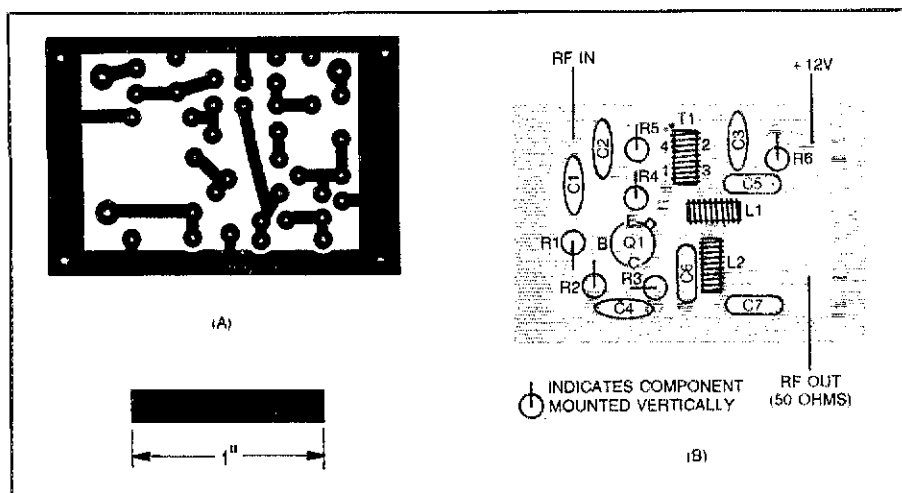


Fig 2—At A, the circuit-board etching pattern for the broadband amplifier. The pattern is shown full size from the foil side of the board. Black areas represent unetched copper foil. The component (nonpattern) side of the board has unetched copper which serves as a ground plane. Clearance holes are provided in the ground plane where component leads pass through the board. At B, a parts-placement guide. The shaded area represents an X-ray view of the copper pattern.

amplifier. A scale etching template and parts-placement guide are provided in Fig 2.

You may use the amplifier to boost your VFO output power, or you can use it as an instrument amplifier, such as between a low-level signal source and a scope or frequency counter. It is not recommended as an RF amplifier for a receiver; the noise figure is too high for weak-signal reception above 40 meters.

Push-Push Frequency Doubler

You can use your 40-meter VFO for 20-meter operation by adding a frequency doubler at the VFO output port. The advantage of doubling from 7 to 14 MHz for VFO operation is that (1) the oscillator is less prone to drift at 7 MHz, and (2) the 7-MHz VFO has greater isolation from its load (the first stage of the 14-MHz transmitter). Chirp is less likely to be experienced when a VFO is operated at half the transmitter frequency.

A single-ended (one transistor) doubler is not suitable for this purpose unless band-pass filtering is used after the doubler. This is because the fundamental energy (7 MHz in this case) will feed through the doubler and appear at the output. A good band-pass filter will attenuate the 7-MHz energy, but it is easier to use a push-push doubler of the type shown in Fig 3. This type of doubler cancels the 7-MHz driving frequency and produces 14-MHz energy at the output. It is possible to obtain up to 40 dB of 7-MHz rejection if the doubler is well balanced. Furthermore, a push-push doubler operates as efficiently as a straight class-C amplifier—a bonus feature.

You must provide ample power to drive Q1 and Q2 into conduction. They are biased for class-C operation, which requires

at least 1 volt RMS of excitation between the 2N2222 bases and emitters. I used the broadband amplifier of Fig 1 and this doubler with the experimental VFO circuit described later. The broadband amplifier was needed between the VFO and the doubler to ensure sufficient driving power for the doubler. Without the amplifier

there was no output from the doubler.

Refer to Fig 3. T1 is a broadband transformer that applies push-pull input to Q1 and Q2. The transistor collectors are connected in parallel. R1 provides emitter bias for class-C operation. It also permits the circuit to be balanced in the event Q1 and Q2 are not closely matched dynamically. R1 may be adjusted for a dip in Q1, Q2 collector current. Alternatively, you may adjust R1 while observing the 14-MHz output on a scope. Set R1 for the best waveform (least distortion). This will coincide with the dip in collector current. If R1 is adjusted to either extreme (zero resistance from one of the emitters to ground), the circuit may break into self-oscillation. That is not uncommon for push-push doublers of this variety.

L1 is adjusted for resonance at 14 MHz, and should be tweaked for the purest 14-MHz waveform obtainable. If you do not have a scope, sample the energy at the output of L2 and route it to your receiver. Tune to the VFO driving frequency (7 MHz) and adjust L1 for minimum signal.

L2 with C6 forms a 7-MHz parallel trap. L2 is also adjusted for minimum 7-MHz energy as noted on your scope or receiver S meter. The 14-MHz waveform is quite pure without L2. You may eliminate the 7-MHz trap if you are not seeking an extra clean 14-MHz waveform.

The assembled doubler is the larger of the two PC boards pictured in the title

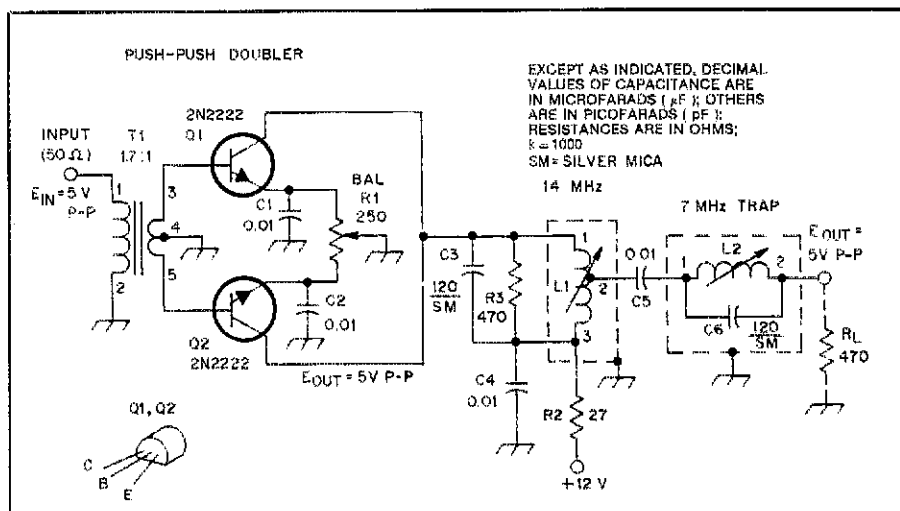


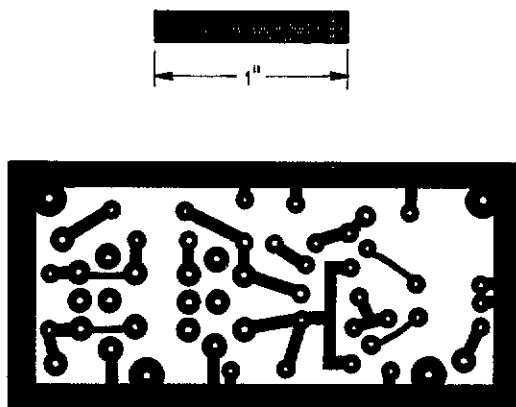
Fig 3—Schematic diagram of the push-push doubler. Capacitors are disc ceramic except for C3 and C6, which are silver mica. Fixed-value resistors are 1/2-W carbon composition.

L1—Shielded inductor, 1 μH. Use 11 turns of no. 30 enam wire on the bobbin of an Amidon L-43-6 assembly. Tap winding at 6 turns above C4 end.

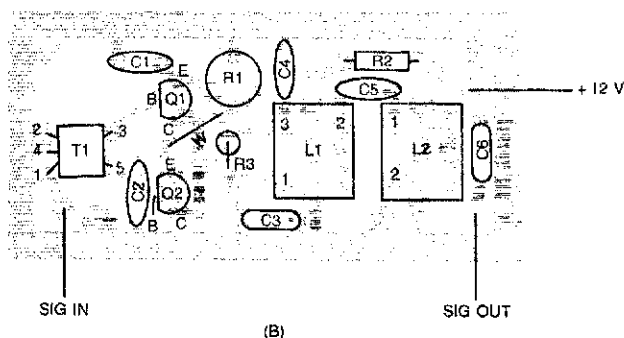
L2—Shielded inductor, 4.3 μH. Use 22 turns of no. 30 enam wire on bobbin of an L-43-6 assembly. A toroid coil and a trimmer capacitor may be substituted for C3-L1 and C6-L2. The L2 bobbin winding may have to be stack wound to accommodate all of the turns.

R1—Trimmer control, 250 Ω, carbon composition.

T1—Broadband transformer. Use 4 primary turns of no. 30 enam wire through an Amidon BN-61-2402 balun core. Secondary has 3 turns, center tapped, of no. 30 enam wire. You may substitute two rows of three Amidon FT-23-43 toroids, side by side, to form a balun core. Glue toroids with epoxy cement. Use the same number of turns specified for the BN-61-2402.



(A)



(B)

Fig 4—Circuit-board etching pattern (A) and parts-placement guide (B) for the push-push doubler. The pattern is shown full-size from the foil side of the board. Black areas represent unetched copper foil. Parts are placed on the nonfoil side of the board; the shaded area represents an X-ray view of the copper pattern. W = wire jumper.

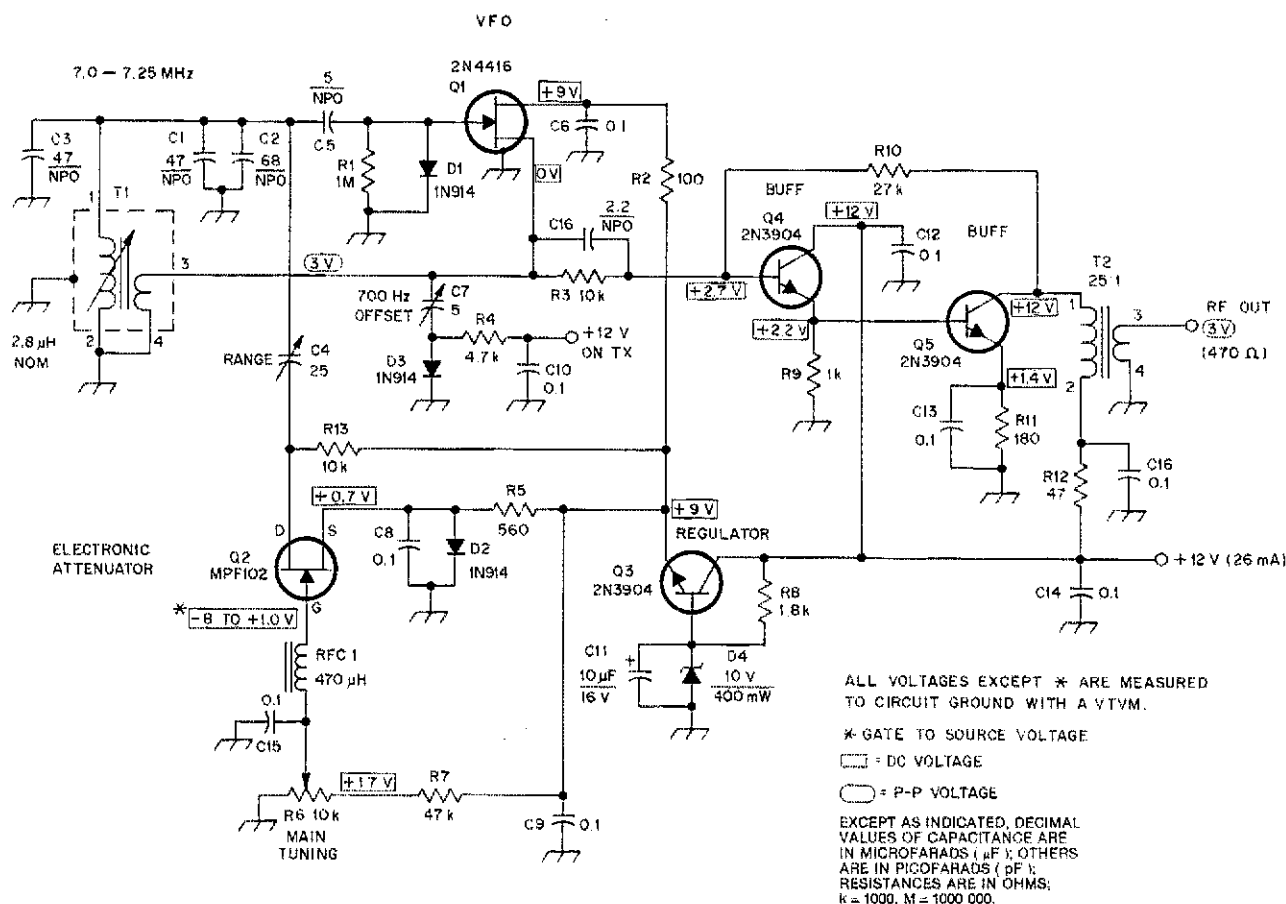


Fig 5—Schematic diagram of the experimental 40-meter VFO. Fixed-value capacitors are disc ceramic except for those with polarity marked, which are tantalum or electrolytic. Fixed-value resistors are 1/2-W carbon composition. This diagram is presented to illustrate the Q1-Q2 circuit.

C4—Small plastic or ceramic trimmer.
C7—Small 5-pF ceramic trimmer (CW offset control).
R6—Linear taper carbon composition control or 10-turn potentiometer with dial mechanism (see text).
RFC1—Miniature 470-μH RF choke.

T1—Shielded RF transformer. Primary is 2.8 μH. Use 16 turns of no. 28 enam wire on bobbin of an Amidon L-57-6 transformer assembly. Secondary has 4 turns of no. 28 enam wire. Glue winding with polystyrene Q Dope® by General Cement Co.

T2—Broadband transformer. Primary has 15 turns of no. 28 enam wire on an Amidon FT-37-72 toroid core. Secondary has 3 turns of no. 28 enam wire. Impedance ratio is 25:1.

(continued on page 46)

Measurements—How Big is That?

Did you know that the units we use for electronic measurements are part of the metric system? Here's a look at how these standard units of measure came to be.

By Julian Macassey, N6ARE
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Science, of which our radio studies are part, depends heavily on measurements and their manipulation with mathematics. We're accustomed to dealing routinely with ohms, amperes, watts, volts and many other units of measurement—units familiar the world over. An ohm in Chicago represents the same resistance as an ohm on St Helena Island, and 14.018 MHz means the same thing to a ham in Iraq as it means to the hundreds of DXers trying to crack the pileup around him. Such standardization didn't come easily, however: Its achievement took many years of concerted international effort once the need for standards became known.

Early Standards

People needed a standard system of measurement as soon as they began to communicate. Quantities had to be agreed upon for production, trade, science and taxation. Early civilizations based measurements on relationships between their bodies, physical surroundings and work capacity. The area of land plowable in one day by one man and a horse or bullock was an *acre*. The *talent*, an ancient unit of weight, was defined as the load comfortably carryable by an adult male human. The ancient Egyptian *cubit*, defined as the length of the Pharaoh's forearm, was divided into 6 *palms* and 24 *finger widths*. The derivation of the measures *foot* and *hand* follows from these. The *inch* was a thumb breadth, and 12 inches equaled 1 foot. I doubt, however, that there are many people living who have thumbs as wide as exactly 1/12 the length of their feet! (If such people exist, it's even more unlikely that their foot length is exactly three times the width of their hands!)

Such units of measure were precise enough for preindustrial societies. As trade and manufacturing increased, however, the need for standardized measurements became acute. Governments stepped in to create bureaus of weights and measures,

codifying units of measure on a national basis. Even if, for example, the Norwegian inch was longer than the English inch, the stability of the individual standards was guaranteed and enforced by government. (Before such enforcement, the fraud carried out in weights and measures was immense, giving rise to such expressions as *slang weight* and *short measure*. Fortunately, these phrases are archaic now.)

The Advent of the Metric System

After the French Revolution, the French government wanted to standardize its measurement system. Measurements based on the body measurements of a monarch, or on the output of an overworked peasant with a tired horse, would no longer suffice. French scientists saw this as an opportunity to come up with a system suitable for every purpose—a universal system appropriate for science and commerce. It would be based on decimal numbers to simplify calculations.

The architects of this system calculated the distance from the North Pole to the equator and divided it by 10 million. This repeatable measurement, based on the natural standard embodied in the spherical earth, was termed the *meter*. Two scratches, placed exactly one meter apart on a platinum-iridium bar, indicated (with the temperature of the bar at 0°C) the standard meter. The *centimeter* was 1/100 of the distance between the scratches.

The gram (gramme, or g) was defined as the mass of one cubic centimeter (cc) of water in its densest state (4°C). From this, the standard unit of mass, the kilogram (kg [1000 g], often called "kilo"), was defined.

Characterized by modern measurement techniques, the values of (and some of the relationships between) several of these quantities differ by a few decimal points from those originally defined. For example, the original liter differs from a modern cubic decimeter—to which we'd expect it

to be equivalent—by about 28 parts per million. That's not much of a discrepancy. Such errors may not be important when you're cutting a half-wave dipole antenna for the 14-MHz band, but modern science and commerce routinely require such precision. Because of this, standard means of *using* the metric standards had to be chosen. Should the standard meter be measured from the inside or the outside of the two scratches on the platinum bar? This is important when dealing with a millionth of a meter (micron or micrometer [μm])!

Sometimes such questions have had to be resolved by adoption of a new definition of the standard concerned. In 1960, an *atomic* length standard, based on one of the wavelengths present in light emitted by krypton-86 atoms, was adopted. This standard did not prove precise enough, however, because the wavelength chosen turned out to be slightly more variable than first thought. In 1983, the meter was redefined as the distance light travels through a vacuum in 1/299,792,458 of a second. In effect, this also means that the speed of light is defined as exactly 299,792,458 meters per second.¹ The inequality between the liter and the cubic decimeter was solved by redefining the liter as *exactly equivalent* to the cubic decimeter, with the recommendation that use of the term *liter* be avoided in giving the results of high-accuracy measurements.²

The logical nature of the metric system didn't guarantee its instant voluntary acceptance by the French public: A law had to be passed stating that only the metric system could be used after 1840.³ The logic of the metric system also made sense to other governments, which quickly made the metric system legal for use in commerce. The US Congress enacted such a law in 1866. In fact, US standard weights and measures have been derived from the metric

¹Notes appear on page 37.

Table 1
SI Base Units

Quantity	Unit	Symbol
length	meter	m
mass	kilogram	kg
time	second	s
electric current	ampere	A
thermodynamic temperature	kelvin	K
amount of substance	mole	mol
luminous intensity	candela	cd

Table 2
Examples of SI Derived Units Expressed in Terms of Base Units

Quantity	Unit	Symbol
area	square meter	m ²
volume	cubic meter	m ³
speed, velocity	meter per second	m/s
acceleration	meter per second squared	m/s ²
density, mass density	kilogram per cubic meter	kg/m ³
current density	ampere per square meter	A/m ²
luminance	candela per square meter	cd/m ²

Table 3
SI Derived Units (with Special Names) Commonly Used in Electronics Work

Quantity	Unit	Symbol
frequency	hertz	Hz
energy, work, quantity of heat	joule	J
power, radiant flux	watt	W
quantity of electricity, electric charge	coulomb	C
electric potential, potential difference, electromotive force	volt	V
capacitance	farad	F
electric resistance	ohm	Ω
conductance	siemens	S
magnetic flux	weber	Wb
magnetic flux density	tesla	T
inductance	henry	H
Celsius temperature	degree Celsius	°C
luminous flux	lumen	lm

standards since 1893. When the National Bureau of Standards was established in 1901, these metric standards were transferred to it.

Although the metric system is legal for trade in the US, a British-based system (feet, pounds and seconds for length, weight [force] and time, respectively) remains standard in daily use. Measures long metricized may bear names based on the British system: For some time, the standard liquor bottle has had a capacity of 0.75 liter; despite this, such a container is referred to as a *fifth*, meaning a fifth of

a gallon. (Wine is also sold in 0.75-liter bottles, but you won't hear "fifth" mentioned in relation to wine!) The focal length of camera lenses has been metricized for decades, and photographers call out lens diameters in millimeters. Radio amateurs have specified electromagnetic wavelengths in meters since the dawn of the radio technique.⁴

The International System of Units (SI)

Since 1960, what we generically refer to as "the metric system" has been known worldwide as the International System of Units. The *SI units* (after the French: *Le Système International d'Unités*) are divided into three classes: base units, derived units and supplementary units. The seven SI base units include the familiar metric units for length and mass (the meter and the kilogram, respectively); see Table 1.⁵ Other SI units are derived from these base units; Table 2 lists examples of SI-derived units expressed in terms of base units.⁶ Table 3 shows SI-derived units (with special names) that we commonly use in electronics work. Supplementary units are SI units not yet classified as either base or derived units. As of 1977, only two units had been placed in this class: the unit of plane angle (the *radian*, or rad) and the unit of solid angle (the *steradian*, or sr). The International System is maintained by the International Bureau of Weights and Measures (BIPM, after the French: *Bureau International des Poids et Mesures*).

Multiples and submultiples of SI units are formed by the addition of the appropriate prefix to the SI unit. See Table 4. (Although our decimal monetary system is neither SI nor metric, colloquial use in the US has the dollar assuming SI prefixes: Expressions such as "kilobucks" and "megabucks" are common. "Centibuck" hasn't yet slipped into use, but it may!)

The International System at Work

Aside from currency, the metric system

covers the entire spectrum of weights and measures, from quantities of beer to the thrust of rockets—but how are SI units applied to everyday things? The work of agreeing on sensible metric-based dimensions and standards is the responsibility of the International Organization for Standardization (ISO; in French, *Organisation Internationale de Normalisation*). The ISO, a United Nations agency, deals with just about every unit of measure known to humankind. There are 300 main ISO technical committees! We'll take a look at just four practical examples of ISO's handiwork: standards for screw threads, sheet metal gauges, wire gauges and paper size.

ISO Fasteners

One of the first tasks undertaken by ISO was the standardization of screw threads. This may sound whimsical if you've never tried to work on a machine made in a foreign country, but before the standardization of screw threads, many countries had their own thread standards. Some had several standards: English gunsmiths used threads specific to their trade, for instance. In some cases, screw threads differed with the metal involved. Spain's screws had left-hand threads, necessitating that Spanish screws be turned *to the left* (counterclockwise) for engagement. Under such conditions, folk wisdom offered simple advice: Don't drop a screw; you'll never be able to replace it.

The ISO fastener standards specify that screw threads, and the heads of bolts and nuts, be measured in millimeters. A screw called out as "M3" is an ISO standard screw with a diameter of 3 mm and a thread pitch of 0.5 mm. ISO metric fasteners are now standard among automotive manufacturers in the US, Japan and the United Kingdom; European industry was first in adopting ISO metric fasteners for cars. This makes car repair so much easier: Not only can one set of wrenches fit all modern cars, but fasteners from one car make will fit another. Before ISO, British carmakers used several standards: BA, BS, Whitworth and brass Whitworth fasteners might all be found on one vehicle! The Japanese used screws known as "Japanese metric"; superficially, these fasteners *looked* like ISO metric parts, but would engage only about one turn with their ISO-equivalent mates.

What about drilling holes for ISO fasteners? ISO calls out drill-bit sizes directly in milli-

Table 4
SI Prefixes

Prefix	Symbol	Multiplication Factor
exa	E	10 ¹⁸ = 1,000,000,000,000,000,000
peta	P	10 ¹⁵ = 1,000,000,000,000,000
tera	T	10 ¹² = 1,000,000,000,000
giga	G	10 ⁹ = 1,000,000,000
mega	M	10 ⁶ = 1,000,000
kilo	k	10 ³ = 1,000
hecto	h	10 ² = 100
deca (unit)	da	10 ¹ = 10
deci	d	10 ⁰ = 1
centi	c	10 ⁻¹ = 0.1
milli	m	10 ⁻² = 0.01
micro	μ	10 ⁻³ = 0.001
nano	n	10 ⁻⁶ = 0.000001
pico	p	10 ⁻⁹ = 0.000000001
femto	f	10 ⁻¹² = 0.000000000001
atto	a	10 ⁻¹⁵ = 0.000000000000001

meters, doing away with the need for tables equating numbered drills with their diameters.

ISO Metal Gauges

The thickness of sheet metal has traditionally been called out in gauges that signify metal thickness only indirectly.⁷ Ascertaining the gauge of a random sheet of metal required a good eye or a pair of calipers and a reference table. Determination of the ISO gauge of sheet metal requires no more than measuring the sheet's thickness with a pair of calipers or a micrometer: Its ISO gauge equals its thickness in millimeters.

ISO Wire Gauges

Wire-size standards have tended to differ throughout industry, and with country of origin. Many of us are familiar with American Wire Gauge (AWG) and Standard Wire Gauge (SWG) wire specifications;⁸ particular industries may use other systems, which sometimes include specification of wire thickness by calling out its weight in pounds per thousand feet. (A variation on specifying wire by weight results in phrases such as "10-pound wire"—signifying not the tension at which the wire snaps, but the weight of one mile of the stuff.)

ISO metric wire standards specify wire size merely by stating its diameter in millimeters. Anyone with a set of calipers can find the right wire, even if print calling out its dimension has rubbed off the wire jacket or fallen off the reel—no conversion tables are necessary.

ISO Paper Sizes

Despite rumors that computerization may result in "the paperless office," our consumption of paper keeps climbing—partly because of increasing use of computer-driven printers! Although we're using new means of putting information on the paper, we may be using archaic systems of sizing that paper—systems that may date to the days when most paper was made by hand.

The basic ISO paper sheet, designated A0, has an area of one square meter. An A0 sheet isn't a meter on a side, however: It is a *golden square*—a rectangle having sides in the ratio $1:\sqrt{2}$. The magic of this shape is that the $1:\sqrt{2}$ proportion holds when the golden square is doubled or halved along its longer side.

The ISO A0 sheet measures 841 × 1189 mm. The next sheet in the ISO A series, A1, measures 594 × 841 mm—half the area of the A0 sheet. Each higher size designator in the series signifies another halving of the sheet area; the $1:\sqrt{2}$ relationship between the sheet sides is maintained throughout.

The ISO paper size commonly used for magazine pages and correspondence is A4

Table 5
ISO Metric Threads

ISO Number	Outside Diameter	Pitch	Tapping Diameter
M1	1.0	0.25	0.75
M2	2.0	0.4	1.6
M3	3.0	0.5	2.5
M4	4.0	0.7	3.3
M5	5.0	0.8	4.2
M6	6.0	1.0	5.0
M8	8.0	1.25	6.7
M10	10.0	1.25	8.5
M12	12.0	1.75	10.3
M14	14.0	2.0	12.0
M16	16.0	2.0	14.0
M18	18.0	2.5	15.5
M20	20.0	2.5	17.5

All measurements are in millimeters.

(210 × 297 mm); an A0 sheet can be cut into 16 A4 sheets without waste. Nearly all computer printers and photocopying machines can handle A4 paper with little or no modification. In fact, most of these machines have had to be modified to accept US $8\frac{1}{2}$ × 11-inch and legal ($8\frac{1}{2}$ × 14-inch) paper sizes. International facsimile machines are designed to use A4 paper; a facsimile sent from the US to a country where ISO paper sizes are used may run into trouble with margins: A4 paper is slightly longer and narrower (approximately $8\frac{3}{4}$ × $11\frac{3}{4}$ inches) than our $8\frac{1}{2}$ × 11-inch sheets. Because of the constant aspect ratio of the golden square, a document or drawing on one ISO standard sheet

can be enlarged or reduced to another ISO size without loss of margins or the addition of unwanted blank areas.⁹

Users of ISO paper sizes needn't choose sheets only from the A series. The ISO B series, commonly used for maps, posters and charts, starts with a sheet (B0) 1000 × 1414 mm in size. The ISO C series, used primarily for the fabrication of envelopes, begins with C0 (917 × 1297 mm). Sheets larger than 0 are also available in all three series; these are designated by the addition of numeric prefixes to the basic sheet designator for the series in question. Thus, a sheet twice the size of A0 is designated 2A0. The $1:\sqrt{2}$ aspect ratio is maintained throughout the ISO paper-size system.

Conclusion

Standards are great—if people agree to use them. For various reasons, some standards are "more standard" than others. The US is far from metricized, for example; in everyday situations, we use the US Customary system.¹⁰ International travelers are often reminded that dimensional and operational idiosyncrasies still exist from country to country: Widely differing standards in electric current and mains plugs can make high adventure out of plugging in so much as a hair dryer overseas.¹¹ The work of the International Organization for Standardization and the International Bureau of Weights and Measures goes on.

Radio amateurs routinely depend on the logic and usefulness of SI units for

Making the Metric Leap

For many people, the main value of the metric system is its ease of use; its international acceptance is secondary. In modern society, with discounts, tax, and percentages entering every financial transaction, decimal money makes sense. The same can be said of the metric system. If a car's gas mileage is stated as 20 miles per gallon, figuring its fuel consumption over 30 feet requires quite a bit of head scratching. Gas mileage stated in liters per 100 km can be figured out for the distance to the moon or the length of a driveway with simple mental arithmetic. Among other things, digital technology has caused curious extrapolations in the British system of measurements, one of these being the decimal pound. Buying goodies with the help of a candy store's fancy digital scale is fun. The scale displays pounds and decimal fractions of pounds, not ounces. Who knows what 0.37 pound really is? But candy costing \$2.99 per pound can be priced to two decimal places using decimal pounds. Why not just use the kilo?

Confusion in changing from one measurement system to another lies not so much in any necessary calculations as in learning new values for known standards. Throughout our lives, we adopt mental yardsticks for the world around us. One yard equals about three of my forearms, a quart is so big, 100 pounds is just about what the dog weighs, and "40 degrees" feels just so on a windy day.

The way *not* to acclimate yourself to a new measurement system is to carry around conversion tables, saying to yourself, "Okay, 50 kilos equals about 100 pounds, which is one dog." The best way to learn a new measurement system is to think, "Oof! This dog weighs 50 kilos!" or "Brrr! That puddle just froze—it's zero degrees Celsius and the sun's not even down yet." In a short time, you build a new set of references. All you need to do is "think metric." Radio amateurs have used metric units for years: We enumerate wavelength, resistance, capacitance, voltage, current and many other physical quantities in units of the metric system.

¹Strictly speaking, the kilogram is a unit of mass, not of weight (force). In space, the mass of a 50-kg earth dog is still measurable as 50 kg; without the action of gravitational force, however, Rover or Rovette is *weightless* in space.—Ed.

electronic measurements. Volts, amperes, ohms, farads and many of the other units we use are actually part of the metric system. Although we may differ with our foreign cousins on whether a half-wave 40-meter dipole is 66 feet or 20.12 meters long, thanks to SI, we can talk to other hams just about everywhere and be sure that they know Watt's watt.

Notes

¹David Halliday and Robert Resnick, *Fundamentals of Physics* (New York: John Wiley and Sons, 1986), pp 4-6.

²The *International System of Units (SI)* (NBS Special Publication 330, 1977 edition) (Washington: US Department of Commerce, 1977), p 26.

³Pre-metric measurements are still referred to in some European trades even when the quantities in question are metric: If you ask a French butcher for a *livre* of meat, he'll slap the meat on the scale and sell you 500 g. Even when new standards are adopted, many people continue to refer to old measurements in colloquial speech.

⁴Even so, many hams—younger ones, at least—think "frequency" as they refer to wavelength. If you tune in on a 7-MHz ham contact and hear the participants agree to "QSY up to 20," you know they're not old-timers: A move from 40 to 20 m is a move *down* in wavelength!—Ed.

⁵Tables 1, 2, 3 and 4 were prepared from information contained in NBS Special Publication 330; see note 2.

⁶Table 2 does not list the hectare, liter and the metric ton (in some English-speaking countries, *tonne*) because these "metric system" units are not part of SI. They are considered to be "units used with the International System." The *are* (pronounced like *air*) is a unit "to be used temporarily with the International System."—Ed.

⁷Metal sizes in three such gauges are shown in the 1988 edition of *The ARRL Handbook*, p 24-6.

⁸See the copper-wire table in the *The ARRL Handbook*, p 35-6.

⁹These are all trimmed sizes. ISO also has designators for sheets slightly larger than standard trimmed sizes; printers use these to achieve *bleeds*—text or graphics running off the edge of a page. (QST's front cover makes use of bleed techniques.)—Ed.

¹⁰See *The ARRL Handbook* for a table of US Customary-Metric conversion factors.

¹¹Chapter 6 of the third edition of *The ARRL Operating Manual*, Overseas DXing/DXpeditions, contains information on standards for electric current and line plugs throughout the world.

Bibliography

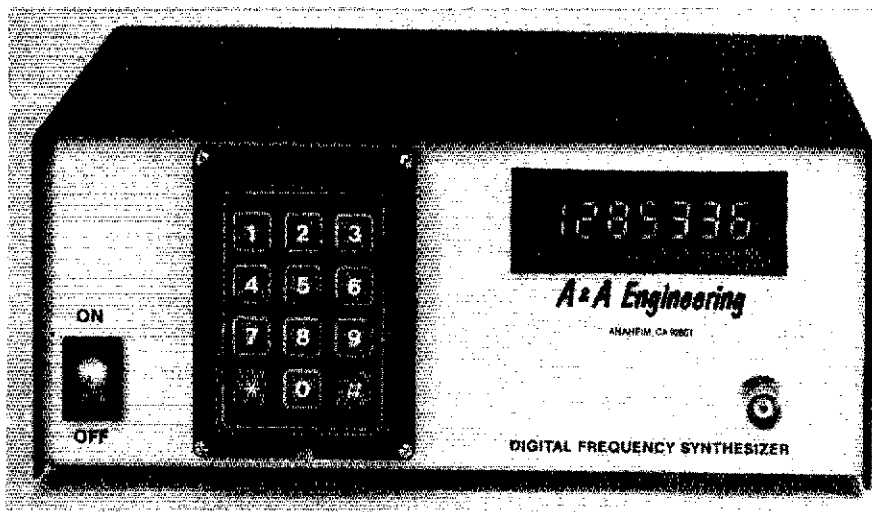
World Weights and Measures, Handbook for Statisticians, Series M, No. 21, Rev 1 (New York: United Nations, 1966). This is a compilation of all pre-metric measurements from around the world, listed by country. Also noted, if applicable, is the year each country officially went metric. In addition, there is also an index of every measurement, with its country of use and metric equivalent. Not currently listed in *Books in Print*, but worth a library/used-book store search.

Charles D. Sullivan, *Standards and Standardization* (New York: Marcel Dekker, Inc, 1983), ISBN 0-8247-1919-0. This book covers the various standards in use and their respective regulatory agencies.

John L. Feirer, *SI Metric Handbook* (New York: Bennett Publishing Co, 1977), ISBN: 0-02-665180-7. This is the best book I've found for anyone wishing to gain familiarity with SI and ISO standards. Each standard is explained fully.

QST

New Products



A&A ENGINEERING DIGITAL FREQUENCY SYNTHESIZER

□ A&A Engineering offers an assembled and tested version of the Williams Synthesizer featured in February 1985 *QST* and recent versions of *The ARRL Handbook*. Model 207-SYS, the synthesizer features 1-Hz resolution and 0.5-V P-P output into 75 ohms. Usable output is available from 1 Hz to 6.5 MHz. The synthesizer can be controlled from the keyboard or with an external computer and appropriate software. Unused PROM and RAM space is available for those who want to program in special features. Power supplies are built in, and the unit requires 120 V ac. Price class: \$430. For more information, contact A&A Engineering, 2521 W LaPalma, Unit K, Anaheim, CA 92801, tel 714-952-2114.—Mark Wilson, A42Z

AEA RFM-220™ 220-MHz RADIO MODEM

□ The AEA RFM-220 is a high-speed packet modem and 220-MHz transceiver combination. Designed for use with a TNC such as the AEA PK-87 or PK-232, it can handle data rates up to 19,200 bauds. It can also be used as a voice transceiver. The transmission mode is determined by the PTT line (voice or data) that is closed. The RFM-220 is synthesizer-controlled and covers the entire 220-MHz band in 5-kHz steps. Transmit/receive offsets are programmable from 10 kHz to 5 MHz in 10-kHz steps. Power output is adjustable from 1-25 W. Other features include

- sensitive GaAsFET receiver front end
- multiple helical resonators for good receiver selectivity
- 100 memory channels
- memory scanning
- band scanning
- 5 ms transmit/receive turnaround time

- circuitry to control an external RF power amplifier

• digital frequency display
The RFM-220 requires 13.5 V dc at 8 A maximum. Size: 3¼ × 11¼ × 8½ in. (HWD). Weight: 8 lb. For more information, contact Advanced Electronic Applications, PO Box 2160, Lynnwood, WA 98036, tel 206-775-7373.—Mark Wilson, A42Z

INTERNATIONAL RADIO 8-POLE CRYSTAL FILTERS

□ The International Radio IR88H4.0C is an AM filter designed for the Kenwood R-5000, TS-930 and TS-940 radios. It features a 6-dB bandwidth of 4 kHz—2 kHz narrower than the Kenwood YK88A1 filter.

Model IR3.3H2.1 is a 2.1-kHz SSB filter for the Yaesu FT-101/E/EE series transceivers. An exact replacement for the original unit, the IR3.3H2.1 offers improved selectivity.

Price class: \$60 for each filter. For more information, contact International Radio and Computers, 747 S Mecedo Blvd, Port St Lucie, FL 34983, tel 305-879-6868.—Mark Wilson, A42Z

COMMODORE DIAGNOSTICIAN

□ The Commodore Diagnostician is a guide to locating faulty ICs and other failures on Commodore computers and peripherals. The double-sided, laminated chart lists more than 60 symptoms and suggests possible failure points. Also included is a chart showing the location of all ICs in the C64. Price class: \$7. For more information, contact Kasara Microsystems, 33 Murray Hill Dr, Spring Valley, NY 10977, 800-642-7634.—Mark Wilson, A42Z

Amateur Radio and the Blind

===COMMUNICATIONS PARAMETERS===

Present parameters: 300,E,7,1

Echo-N Mesg-N Strip-N Pace-N

Options:

1 - 300,E,7,1 (text) 2 - 300,N,8,1 (binary)

3 - 1200,E,7,1 (text) 4 - 1200,N,8,1 (binary)

F - reset params to defaults

X - exit to terminal

Choose: 4

New parameters are: 1200,N,8,1

Echo-N Mesg-N Strip-N Pace-N

===Proceed ...

-

Ctrl-C quit Ctrl-T status B=recv U=view D=dial E=echo M=msg X=exit <Home>=Help

Part 4: We'll wrap up this series with a few more comments about modems and general operating procedures. I've included a few operating tricks, too.[†]

By Butch Bussen, WA0VJR

Box 142
Wallace, KS 67761

(photo by Gary McDuffie, AG0N)

RTTY is fun, but there are a couple of problems blind hams may encounter when using this mode. For instance, the AEA AMT-1 modem does not have any kind of squelch or threshold circuit. This means that even when there is no signal on the air, the modem tries to decode the random noise that it detects. A sighted operator can ignore such garbage on the screen, but it can drive you crazy if you have to listen to the speech synthesizer spit everything out when you're just monitoring a channel. With the PK-232, you can circumvent this annoyance by setting the THRESHOLD control so that the modem responds only to real signals. (Actually, if you turn the THRESHOLD control fully clockwise, it will copy the noise, think the channel is busy—the DCD LED will stay lit—and not key the transmitter.)

The second stumbling block for visually impaired amateurs is that Baudot RTTY has no error-checking feature. If signals are strong, things run smoothly. But as signals get weaker or fading sets in, you start to miss characters within words. Sighted

RTTY operators can read a screen and, in most cases, can tell at a glance what should have been received where garbled characters occur. The blind operator, however, is stuck with the speech synthesizer trying to interpret each word. Believe me, that can add up to hearing it say some strange things at times! Sure, you can go into screen review and check out each line and read it a letter at a time, but that's a slow and awkward process when you are in the middle of a contact.

My Preferences

I feel that packet radio and AMTOR are better choices for a blind ham as far as talking digital communications are concerned. AMTOR is my favorite mode. It's not fair to compare AMTOR and packet directly as they were designed for different purposes. I think that HF packet is greatly oversold as a conversational mode. It does allow for digipeating and error correction, both of which are important when sending traffic or computer files. Though AMTOR does not offer these capabilities, it will get through during weak-signal conditions. I was on AMTOR for a year and a half before I was exposed to packet, so I suppose that has something to do with my preference. I enjoy and operate packet on HF

and VHF, and have my own VHF digipeater.

Some Tricks of the Trade

There are all kinds of neat tricks you can do with modems. For instance, I found that I could set the baud rate on the Echo PC synthesizer at 300 and hook it *directly* to the modem. This allows me to monitor whatever is coming out of the modem without using a computer! Naturally, you have no operating control, but you can at least listen to what's going on if you need to use the computer for something else.

One night, Gary (AG0N) hooked his KPC-2 up to his modem and I was able to call him on the telephone with my computer and control his KPC-2 from my keyboard. I enjoy doing stuff like that just for the fun of it!

The thing I like best about the program I'm writing for the Apple //e is that I can type ahead while still receiving and listening to incoming data. This is really useful for AMTOR. Typing ahead does not work well on packet because as soon as you press RETURN, the packet is sent. With packet, there is a lot of information on the screen at one time, especially if you have MONITOR or MCON (monitor while connected) turned on. I find it less confusing

to make my transmission and terminate with some kind of "over" at the end. I usually use the >> as my over. If the other station does the same, it keeps things in some semblance of order and keeps outgoing and incoming text from getting jumbled on the screen. You can also ask the other station to send a space after each letter of his call sign so the speech synthesizer will say it right.

Operating Hints

When operating packet, be right on channel so you can call and monitor other stations, and others can digipeat through your station if necessary. If you are 1 kHz or less off frequency, you will force others to tune on you, if they bother to answer at all, and you will still tie up the main channel when transmitting.

For tuning AMTOR or RTTY, I have samples of the tones recorded on tape. I keep a small recorder by the rig so I can turn it on and tune the receiver until the tones are matched. You can also tune your receiver slowly until your computer starts talking. I have known people to turn on their transmit audio monitor and then transmit a signal so they have tones to listen and tune to; this is not a recommended practice! The tape recorder method works well, and you don't have to put a signal on the air to tune that way.

There are many parameters that are determined by whether you are on HF or VHF. Some, such as PACLEN and MAXFRAME, may need to be changed as conditions do.¹⁷ There are others that I set just to help the speech synthesizer keep up and to keep some stuff off the screen. These parameters include DAYSTAMP, CONSTAMP and MSTAMP.¹⁸ I generally do not care about those, and it helps cut down on speech synthesizer activity by setting them. You'll want to set the screen line length to 40 with the programs I used on the Apple; the default is 80.

Just Listening

A sighted person has the advantage of very quickly glancing at the screen to see what is going on. If the operator wants to, he or she can ignore the screen just by not looking at it. Unfortunately, if I have the speech synthesizer turned up and MONITOR activated on a busy channel, the darn thing chatters away in the background all the time! Sometimes I just get tired of listening to it and turn MONITOR off. The same thing happens with MCON on. Not only do you get the data from the station you are connected to, but everything else as well.

Gary and I are only about 250 miles apart and usually just too close to work each other direct on 14.103, so we digipeat through a station we can both hear. It is nice to be able to monitor the station we

are digipeating through to see how good the path is. There is a trick to do this without having to listen to everything else that is on. On the KPC-2, I turn BUDLIST on and put my call in BUDCALLS. A similar thing can be done on the PK-232 by putting YES WAØVJR in MFROM. This works quite well and eliminates a lot of chatter from the speech synthesizer. Of course, you want MONITOR and MCON on.

For tuning AMTOR or RTTY, I have samples of the tones recorded on tape.

Another nice feature in the PK-232 is the MBX parameter. Setting MBX to a call lets you monitor that station's transmissions, and you do not get the header all of the time, just the text. To clear MBX, type MBX %. This returns things to normal.

Other Parameters

On the KPC-2, I set HE ON; this puts the header and text on separate lines. Turn ECHO ON on both units and for echoback using AMTOR with the PK-232, set EAS to ON. On both units, the CANLINE command is set at \$18, which is a Control X. This works on the Apple even though it is also the SILENCE command for Textalker speech synthesizer. Using Screen-Talk.Pro on my PC, I have to change this character to something else because the Screen-Talk.Pro intercepts the SILENCE character and does not send it on to the modem. You can change either the SILENCE character or the CANLINE character for Screen-Talk.Pro.

It's confusing at times to handle multiple connects, keep track of which stream I am talking on and where the received text is coming from.

Another command used on the KPC-2 is PERM. If this command is issued, all extant modem parameters are stored in EEPROM. The next time you power-up the KPC-2, the parameters are set to the values in effect when the PERM command was

issued. You can change parameters and they will stay in effect only until power is removed from the KPC-2. The nice thing about this is that you can always turn the KPC-2 off and back on again and be at your chosen starting point.

The PK-232 does not have a PERM command. Any changes you make are always kept in battery-backed RAM. There is no way to return to a specific group of settings unless you do as I do and save them to a disk file. You can perform a RESET, but that destroys all the modem parameters, and returns the PK-232 to factory settings, including autobaud. The RESET command on the KPC-2 is different: It appears to be similar to the RESTART command on the PK-232.

There's a lot of traffic on packet channels, and this is especially evident when I'm digipeating through other stations. It's confusing at times to handle multiple connects, keep track of which stream I am talking on and where the received text is coming from. For this reason, I set MAXUSERS to 3 and USERS to 1. On a busy channel, the speech synthesizer is usually behind anyway.

There are certain mistakes that all packeteers occasionally make, and if you monitor much at all, you'll see them. For instance, if you are in CONVERSE or TRANSPARENT mode, you must get back to COMMAND mode to change parameters or issue commands. If you forget to do this, your commands will be sent as text. In CONVERSE mode, just press Control C to get the CMD: prompt. If you are in the TRANSPARENT mode, type a Control C three times rapidly to get the CMD: prompt.

You also need to know if you have unacknowledged packets. If you do a disconnect prematurely, these will be dumped UNPROTO and the receiving station may not receive them. You need some way to read the light on the KPC-2 to see if you still have packets outstanding. (See "The Squawker: A Light Detector," July 1987 QST, pp 35-37.) On the PK-232, just go to command mode and press C and RETURN. You'll get the connect status and this includes the number of unacknowledged packets. That is a nice feature. To get back to converse mode, just press K and press RETURN.

One thing that neither the PK-232 or KPC-2 has—that I wish they did—is battery backup for the date and time settings. If you lose power on either unit, you have to reset the clock.

Final Comments

Most manufacturers simply do not know or understand the problems faced by the blind not being able to read the screen. General operating procedure, parameter settings and defaults are in the books, and hopefully you have sighted friends who can read you these. Some manufacturers, such as AEA and Kantronics, prepare their

¹⁷Notes appear on page 40.

The Best of Both Worlds

Term-Talk is a communications program for the enhanced Apple IIe, the Apple IIc, Apple IIgs or any Apple-compatible computer that emulates any of these machines. The computer must have a minimum of 128 kbytes of RAM. Term-Talk is ProDOS[®] based, making disk access fast, and it supports the internal Hayes modems and the internal SSM modem. With the aid of a Super Serial Card, or the Apple IIgs's serial port, Term-Talk supports any external Hayes or Hayes-compatible modem, as well as any external "dumb" modem.

Term-Talk is written primarily for blind operators using speech synthesizers. However, it can be used just as effectively by the sighted. You might say it offers the best of both worlds.

If you are blind and use a speech synthesizer, you can get very annoyed by the pretty boxes much software draws on the screen. For example, you may hear "asterisk, asterisk, asterisk. . ." 40 or 80 times in a row. Term-Talk takes this into account and says: "Asterisk, asterisk, asterisk repeats 80 times." Also, you wouldn't want a speech synthesizer to try and pronounce call signs with their alphanumeric mix. Term-Talk takes this into account by spelling out the call sign. Anytime a "word" contains alphabetic and numeric characters, Term-Talk spells the word, character-by-character.

Term-Talk has the ability to send and receive files using the XMODEM protocol. This protocol has become very popular in the past few years. XMODEM is not really designed for file transfers, but for memory-to-memory transfers. Because of this, it's difficult for the Apple to learn certain important facts about the incoming file. Therefore, it's up to you to tell the computer if the file is an Applesoft, binary or text file. Also, if it's a binary file, you must supply the starting address and length of the file.

In order to make this process easier, Term-Talk offers a modified version of XMODEM. (This version was developed, and is being used by, the producers of ASCII Express[™].)²⁰ This modified version of Term-Talk transfers all information regarding the file type, date of creation, and so on. Using this program at both ends of the communications link, you're

able to send binary and Applesoft files as easily as text files. Since ASCII Express is probably the most-used Apple terminal program, this version of XMODEM is becoming very popular.

Of course, Term-Talk has a capture buffer. The buffer size is about 40 kbytes. This is a substantial improvement over many other terminal programs. You are able to save the buffer to disk manually, or with the "Auto Buffer Save" option. You're also able to send the contents of the capture buffer and any ProDOS text file to the modem.

Term-Talk has a dialing directory of up to 99 entries. Each entry has room for a name, phone number, data rate (110, 300, 1200, 2400, 4800, 9600 bit/s), parity (even, odd, mark, space, none), number of data bits (7 or 8) and stop bits (1 or 2), choice of duplex operation (half or full) and an auto log-on sequence, if applicable. After connection is established, auto log-on automatically sends the entire sequence required to log onto the machine you are calling. You can also set up Term-Talk so that all you have to do is boot the system with the Term-Talk disk, and it automatically dials the number of your choice and logs onto the system.

At any time, you can have the program enter a screen-review mode. Not only will you be able to review the current screen contents, but also the previous 24 lines.

One of the nicest features Term-Talk contains is the ability to emulate a VT-100 terminal, probably the most common one of all. This means that you can use full-screen editors as opposed to line editors. This greatly enhances your productivity. Earlier terminal programs couldn't handle the cursor addressing needed for full-screen editors.

Term-Talk is menu-driven. This makes it extremely easy to start using the program and grow with it. After you become experienced using the program, you can use the many built-in "hot keys" for even faster response.

Term-Talk is available from Computer Aids Corporation, 124 West Washington Blvd, Suite 220, Fort Wayne, IN 46802, tel 1-800-647-8255, and from Talking Computer Products, Box 142, Wallace, KS 67761, tel 913-891-3532.

—Butch Bussen, WA0VJR

manuals using word processors and make the manuals available as straight ASCII text files on disk.¹⁹ I hope others will do the same.

Summary

Many people feel awkward in the presence of someone who is handicapped. All the handicapped ask is to be treated, as much as possible, like anyone else. I think that is why I enjoy Amateur Radio so much. I can develop the same operating skills as anyone else, and I don't even have to tell anyone I am handicapped unless I want to.

If you're a sighted ham, you now probably have a better appreciation of what the blind have to contend with. Perhaps you'll have the opportunity to give a handicapped ham a helping hand. I'm sure anything you can do will be appreciated. I again want to express my thanks to AEA and Kantronics for their help and providing equipment.

Even though we've covered a lot of territory in this series, we've just scratched the surface of things that I have had to learn to help me get along in a sighted

world. Modern electronic technology has opened many doors for me that didn't exist 10 years ago. There's a world of adventure and excitement awaiting you out there on the ham bands! With the aid of the personal computer and other electronic marvels of our time, you can really enjoy Amateur Radio!

Notes

¹Parts 1-3 appeared in the Oct-Dec issues of QST.

¹⁷PACLEN sets the maximum number of user data bytes carried in each packet information field. MAXFRAME sets an upper limit on unacknowledged packets and the maximum number of contiguous packets sent during a transmission.

¹⁸Time and date stamps, connects, disconnects, and so on. The acronyms used vary slightly from one manufacturer's product to another.

¹⁹See note 3, Oct 1987 QST, p 31.

²⁰ASCII Express is produced by United Software Industries, 1880 Century Park East, Suite 311, Los Angeles, CA 90067, tel 213-556-2211.

Strays



I would like to get in touch with...

☐ anyone with a manual/schematic for a Heath SB200 amplifier. Ron Distler, W3JEH, 221 Doncaster Rd, Joppatowne, MD 21085.

☐ anyone with a manual/schematic for a Tenna Phase III regulated power supply, 13.8 V, 7 A. Morris Howard, N9BOK, 402 Third St, Box 51, Armington, IL 61721.

☐ anyone with a manual for an Eico Model 315 signal generator. Also any instructions for using grid-dip meters. Harold Blessey, N9CQX, 7810 Central, River Forest, IL 60305-1797.

☐ anyone with sections 4-7 (maintenance, theory and schematics) of the "ALPHA 374 and ALPHA 274" manual. Lu Craner, WB6SSW, 20300 Half Moon Ln, Walnut, CA 91789.

☐ anyone with an instruction manual and data on a Lafayette Radio Electronics HA-410 10-meter phone transceiver. Chalmers Hairstron, KA3PXP, 201 N Broadway, Apt 173, Baltimore, MD 27231, 301-327-4651.

AEA PK-232™ Multi-Mode Digital Communications Terminal

Reviewed by Bruce Hale, KB1MW

"Presenting the new Baud-o-Matic. It slices, dices, and chops bits; tells the time, date, temperature and your shoe size. How much would you pay for this fantastic device? But wait...there's more!" All kidding aside, the AEA PK-232 is really an *all-mode* communications terminal. It sends and receives the usual CW, RTTY (Baudot and ASCII) and AMTOR, and it can be used on HF and VHF packet. The PK-232 even receives and sends facsimile pictures. (Funny how "all-mode" used to mean CW, RTTY and AMTOR—we've redefined the term since the packet-radio explosion.) Prompted by the success of their PK-64 all-mode (there's that term again) communications terminal for the Commodore C-64, AEA has produced a similar unit "for the rest of us" computer users.

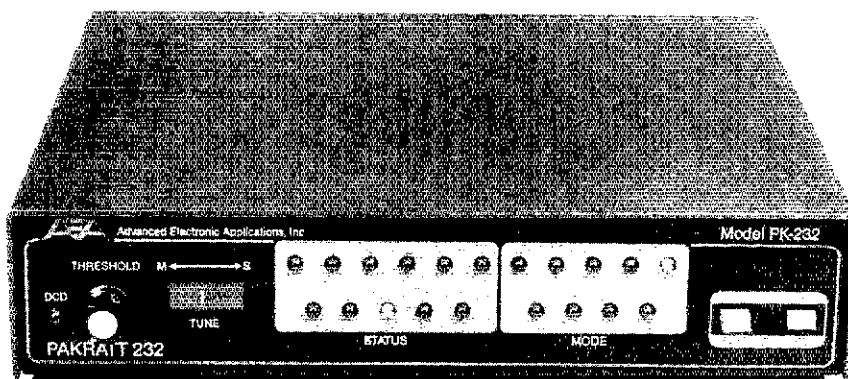
Control and Display

The PK-232 is a fairly complex-looking piece of hardware. There are 21 LEDs, a tuning display, two switches (power and RADIO 1/RADIO 2) and a THRESHOLD control on the front panel. On the rear panel, there is a POWER jack (the unit requires an external 12-V dc, 1-A supply); jacks for cables to connect two separate radios; a DIN socket that provides oscilloscope outputs for RTTY tuning and direct FSK outputs; an external modem jack; CW keying jacks for both positive- and negative-polarity keying; a DB-25S connector for the RS-232-C I/O from a computer or terminal (and the FAX-to-printer output); and an AFSK level control.

Connections

It is possible to connect two separate radios to the PK-232. A front-panel switch selects which radio is in use. This is handy for the combined VHF/HF station—changing from the HF radio to the VHF unit is as easy as pressing the switch. PTT, audio-out and audio-in lines are brought out to a pair of 5-pin inline jacks on the rear panel. AEA provides cables with matching plugs, and the manual tells you to make sure the cables are plugged into the PK-232 correctly. The plug is *not* polarized in any way; it is possible to plug it into the back of the PK-232 upside down, although once you read the manual this should not be a problem.

A VHF FM radio is connected to the audio-in, audio-out and PTT lines from



one of the radio connectors. A dc blocking capacitor and/or a special keying circuit may be required for some transceivers. (See the Kantronics KPC-2400 review in November 1987 *QST* or the ICOM IC- μ 2AT review in May 1987 *QST* for examples of this circuit.)

Connecting the PK-232 to an HF radio can be done in two ways. The AFSK output from the 5-pin jack can be connected directly to the microphone input of an SSB transceiver. Audio input to the PK-232 can be taken from the transceiver's speaker jack, or from another source—such as a phone-patch output. There is no monitor speaker in the PK-232, so you have to provide some other way to listen to the received audio if the speaker in your rig is defeated when you connect the audio-output cable.

The PK-232 can also provide direct FSK for a transceiver capable of being keyed this way. The FSK outputs are provided on the 5-pin DIN socket on the back panel. This may be the best way to go on RTTY—if your rig allows it—because the filters in most radios are sharper in the FSK position than in the SSB positions. The manual warns that many rigs are not capable of 300-baud direct FSK, so packet FSK operation may not be possible. If you plan to operate both HF packet and HF RTTY, you may want to use the AFSK output for both.

Commands

Almost all of the PK-232 functions are controlled from your terminal keyboard. On packet, the commands are familiar to anyone accustomed to the command set for a TAPR TNC 2. Other operating modes use easy-to-remember commands. When you change a command setting, the PK-232

tells you what the parameter was, and then tells you what it is now. For example, if you are in packet mode and you want to go to Morse code, you type the `CONTROL C` character (to get into command mode) and "MORSE." The PK-232 responds with

OPMODE was PACKET
OPMODE now MORSE

Similarly, when you change the sending speed, the PK-232 tells you what the old speed was and acknowledges the new speed. Commands are detailed in the comprehensive manual, along with acceptable parameters and examples of how the commands are used.

On The Air

My first experience with the PK-232 was on VHF packet. It worked well at my station. The command set is similar to that of the TAPR TNC 2, with some notable additions. Instead of the simple `MONITOR ON/OFF` of the TNC 2, the PK-232 provides several monitor modes, selected by the word `MONITOR` (or simply `MON`) followed by a number. `MON 0` is equivalent to the TNC 2 `MON OFF`—no channel monitoring is performed. `MON 1`, `2` and `3` let you see some variations of unprotocol packets, numbered 1 frames and Connect and Disconnect requests. `MON 4` is equivalent to the TNC 2 `MON ON`—you see unprotocol frames, 1 frames, connect and disconnect frames and acknowledgment of connect and disconnect frames. The enhancement of this command really becomes obvious when you use `MON 5` or `6`. `MON 5` lets you see Receive Ready, Receive Not Ready, Reject and Frame Reject frames in addition to `MON 4` frames, and `MON 6` shows you everything,

including poll final bits and frame sequence numbers. Whew! The PK-232 can show you *everything* that's happening on the frequency—probably more information than you will understand, at first. If you want to understand how the AX.25 protocol works, though, you can watch all the frames flying across your screen. I left MONITOR set at 6 most of the time; the inner workings of packet operation interested me more than the messages themselves. An interesting aside to all this—I found that the standard MON ON and MON OFF command also work on the PK-232—MON ON sets MONITOR to 4, and MON OFF sets it to 0. This allows the PK-232 to be used with the WØRLI PBBS software with no modifications to the software.

Another place AEA has enhanced the command set is in the area of what call signs are or are not allowed to connect with your station. The TNC 1 had a simple CONOK ON/OFF command. CONOK ON meant anyone could connect to you, CONOK OFF excluded everyone. The TNC 2 went a bit farther, and added the BUDLIST and LCALLS commands—you could exclude or allow the stations in the LCALLS list, depending on the setting of BUDLIST. With the PK-232, you have a command called CFROM (abbreviated CF)—CFROM ALL is equivalent to CONOK ON—anyone can connect to your station. CFROM NONE is CONOK OFF—no one can connect. CFROM YES KB1MW means *only* KB1MW can connect, and CFROM NO KE3Z, AA2Z, WA3VIL means that those three stations will *not* be able to connect. CONOK ON and CONOK OFF also work, setting CF to ALL and NONE respectively, and again providing compatibility with the WØRLI software.

MFROM means "monitor from" and it works like CFROM. MF ALL means all stations are monitored. MF YES KE3Z means *only* packets from KE3Z are displayed. MF NO W1AW-4 means no packets from W1AW-4 are shown. This is especially useful if you want to monitor traffic on a channel used by a busy PBBS, but do not want your disk buffer to fill up with messages *from* the PBBS.

Even the error messages are enhanced. In addition to the simple "?what?" when the TNC has no idea what you want it to do, the PK-232 tells you "?not enough" when you don't type enough arguments for a command, and "?too many" when you type too many. The PK-232 responds "?bad" if it understands a command, but not the command parameters. It tells you "?callsign" if a call you enter does not conform to its requirements (any string of numbers and letters containing at least one letter). It even tells you "?too long" if you type in more commands on one line than it can understand.

The PK-232 also has error messages that help prevent common operating mistakes. If you try to set the beacon interval to a

short time (type BEACON EVERY 10, for every 100 seconds), the PK-232 tells you "WARNING: BEACON too often." The PK-232 *will* beacon every 100 seconds, but it tells you that it's not a very good idea *every time you type a command* until you set the beacon interval to something longer than every 900 seconds (15 minutes). Changing the serial-port parameters works the same way; if you type a command that will change the serial-port parameters (change the data-word format or parity, for example) the PK-232 responds with "WARNING: Serial port configuration will change with next restart" every time you type another command. It's obvious that AEA put a lot of thought into the enhanced software. The PK-232 performs very well on packet, and a new user will probably find the commands easy to understand and use.

PBBS Operation

I used the PK-232 as the main TNC at my home station, along with a Xerox® 820 computer and the WØRLI PBBS software. The PK-232 worked well with no modifications to the configuration file I had been using with a TNC 2.

Only two small problems surfaced while the PBBS was running. The PK-232 displays the string of digipeaters in a packet a bit differently in the MRPT mode. A TNC 2 shows a packet that has traveled through several digipeaters like this:

W1AW-4>KB1MW, W1AW-5*, KE3Z

This packet is traveling from W1AW-4 to KB1MW, and we are seeing the packet as retransmitted by W1AW-5. The PK-232 displays the same packet as

W1AW-4>W1AW-5*>KE3Z>KB1MW with the source first and the destination last. This is easy for a human to understand (perhaps a bit easier than the TNC 2 version, in fact) but the WØRLI software is confused by the different format, and as a result, the "J" list (calls heard) on the PBBS does not get updated correctly. With MRPT OFF, the J list functions correctly, but you cannot observe the path of monitored packets.

Another potential problem for PBBS users is the MDIGI command. With MDIGI ON, the TNC displays *all* packets that are digipeated by your station, *even when you are connected*. This may be useful for someone who wants to know when his station is being used as a digipeater, but it can be fatal for a PBBS. If the PBBS is connected and a digipeated packet is displayed by the TNC, the PBBS tries to interpret the monitored packet as a command; this can cause the PBBS to go off into never-never land for a bit. Like the MRPT problem, the fix for MDIGI is simple; make sure you don't set MDIGI ON if you are running a PBBS!

CW Operation

I used the PK-232 for only two QSOs on

CW, although I did a fair amount of monitoring to get a feel for how well the tuning indicator worked and how the software handled poor fists. The tuning indicator shows a CW signal on the MARK side of the LED when the signal is tuned correctly. It worked well; signals that the PK-232 received well showed a full displacement of the tuning indicator. I wasn't too impressed with the CW receiving performance, but I really didn't expect to be. CW reception is a very difficult job for a communications terminal. The PK-232 was bothered by strong adjacent signals perhaps a bit less than some of the other CW-receiving devices I've used, but I still found that I could copy many signals better in my head than the PK-232 software could.

The PK-232 sends excellent CW, although there is no way to vary the dot/dash weighting. An interesting feature is the use of 15 WPM "Farnsworth" code for speeds less than 15 WPM. Morse at 7 WPM, for example, is sent using 15-WPM characters spaced far enough apart to give a final speed of 7 WPM.

RTTY

As expected, the PK-232 works very well on RTTY. The unit uses a filter-based modem rather than the simple XR-2211 or AM7910 one-chip demodulators found in some TNCs. As a result, even noisy signals produce good copy. I was a bit concerned that the 200-Hz shift used in the modulator might cause some problems, but the Product Review unit actually had the shift set at 185 Hz—halfway between the 170 Hz used for most RTTY work and the 200 Hz used on packet! I worked several stations on Baudot RTTY, and all told me that the PK-232 produces good signals. Finding a station to work on ASCII was a bit difficult, but I copied the W1AW ASCII bulletins fine.

The tuning indicator works well, although I find an oscilloscope display much easier to use than an LED tuning indicator. I connected an oscilloscope to the tuning outputs available at the DIN socket on the back panel. The PK-232 produces a typical "crossed bananas" tuning output, and I found that even weak signals could be tuned in easily with the scope. Some of the weaker signals did not produce a satisfactory display on the LED tuning indicator.

Monitoring Commercial RTTY

When AEA enhanced the PK-232 to allow it to receive facsimile pictures, they also added an interesting feature for RTTY reception. The Signal Identification and Acquisition Mode (SIAM™) allows you to tune in a RTTY signal and ask the PK-232 to determine the speed, shift and code being used. SIAM also allows the PK-232 to receive Russian Cyrillic and Japanese Katakana Morse code. To use the SIAM system, set the PK-232 operating mode to SIGNAL and tune in an unknown

signal. After about 10 seconds, the PK-232 responds with what it thinks the sending speed is, along with a "confidence factor" indicating the probable accuracy of the speed prediction. For example, "0.47: 50 Baud" indicates that the PK-232 is 47% sure that the speed is 50 bauds. After another 15 seconds or so, the PK-232 indicates the code in use and whether mark and space are reversed: "0.65: 110 Baud, ASCII, RXREV ON" indicates a 65% probability that the transmission is reversed 110-baud ASCII. To begin printing the transmission, you type "OK" and copy should appear on your terminal. If you're not satisfied with the confidence level, you can let the SIGNAL mode run until you are satisfied.

The PK-232 also allows you to experiment with bit inversion on received signals. Bit inversion is a signal encoding technique where selected bits in a data word are inverted from their normal level. This feature is useful for identifying RTTY "intruders" in the amateur bands. There are many ways to encode RTTY signals, however. The bit-inversion scheme may be changed many times during a single transmission, so it may be difficult to complete a positive identification before such a change occurs—even if you can figure out which bits are inverted.

AMTOR

AMTOR is one of my favorite operating modes when I'm using a computer on the air. It amazes me to watch perfect copy from DX stations—even with fairly heavy QRM—after I've been looking at the hits and misses on Baudot. The PK-232 worked very well on AMTOR, and I had several good QSOs with European stations on 20 meters.

Weather Facsimile

The PK-232 can receive and print weather FAX pictures, as well as news service FAX photos and other facsimile information. The printer connects to the DB-25 socket on the back of the unit. To connect a terminal at the same time, a Y cable must be used—some of the DB-25 lines go to the terminal and some go to the printer. More information about using the PK-232 for FAX reception can be found in the Heath HK-232 elsewhere in this month's Product Review column.

Conclusion

I have no complaints about the PK-232, although I wish that AEA had used a polarized connector for the rear-panel radio jacks. The unit worked as well or better than I expected it to in all the operating modes I tried. This box is a great way to put a computer on the air. With the VHF/HF switch, one box can be used for both; no switch box or recabling is required to go from one band to the other. The manual is well written and easy to understand. The filter-based modem is a great

performance advantage over a single-chip modem, especially for weak-signal RTTY work. AEA has produced a winner—a great addition to any computerized ham shack. Price class: \$380. Manufacturer: Advanced Electronic Applications, PO Box 2160, Lynnwood, WA 98036, tel 206-775-7373.

HEATHKIT® HK-232 PACKKIT® MULTI-MODE DIGITAL COMMUNICATIONS TERMINAL

Reviewed by Chuck Hutchinson, K8CH

There is no coincidence in the model number—the HK-232 is the Heathkit version of the AEA PK-232. What you'll get for your money with the HK-232 is the pleasure of building your own multi-mode communications terminal, and you'll have the Heath documentation (an assembly manual and a user's manual). The Heath user's manual seems to be based on the AEA manual, but there are some differences. For example, you get a full schematic diagram with the HK-232. Both manuals are held in three-ring binders (provided)—a welcome feature when you want to leave a manual open to a particular page.

Assembly and Alignment

There are only two PC boards in the HK-232—the display board and the main circuit board. All parts mount directly to these two boards. A "Y" cable is provided that connects to the DB-25S on the back of the HK-232 and to your terminal and printer. The only cables that you need to make are the cables that connect your radio(s) to the controller, and you only have to assemble the radio end of these!

Assembly instructions are top-notch. I took my time on the project, double checking every step as I went, and working only an hour or two at a time. I spent the first hour of the project updating the documentation and organizing my work area. After that it took me about 14 hours to assemble the '232. I encountered no

problems in building the unit.

I did have a small problem with alignment, however. Since my FET VOM died, I only have a VOM. The meter was not sensitive enough for the AFSK tone alignment process. After I borrowed an oscilloscope from the ARRL Lab, the alignment proceeded smoothly. A FET VOM or VTVM would probably be adequate for this process, but a standard VOM is not. The total alignment, with the scope, took about an hour.

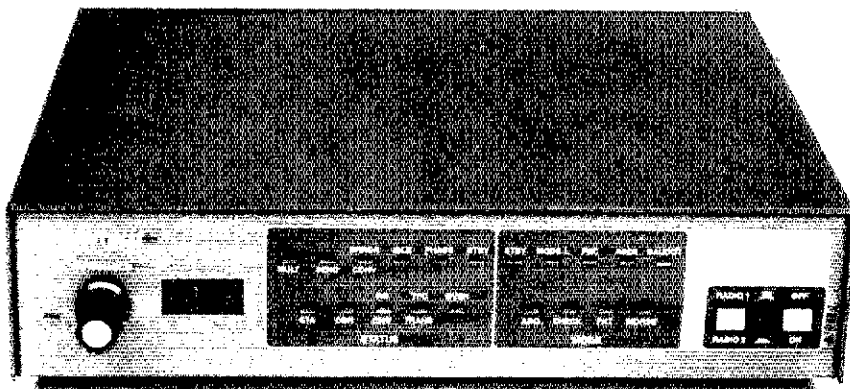
Installation proved no problem at all. The manuals are excellent; everything worked as the documentation described. Operation of the unit, as you would expect, is identical to the operation of the PK-232, described in this month's review.

Facsimile

Since most of the PK-232 review was written before the facsimile option was available, and my HK-232 arrived with the FAX option, I'll cover the operation of both units here. Weather facsimile is transmitted on various frequencies in the short-wave portion of the radio spectrum. Weather FAX stations transmit maps showing current conditions, trends, and forecasts, as well as satellite photographs showing cloud cover patterns. The broadcasts are used by ships at sea and weather forecasters.

The facsimile (FAX) command defaults in the HK-232 are set for copying HF weather maps. HF facsimile pictures are sent by frequency modulating an audio tone. The frequency varies from 1500 Hz to 2300 Hz; 1500 Hz represents pure black, and 2300 Hz represents pure white. In between these frequencies is a gray scale that continuously varies from black to white. The PK-232 and HK-232 use a 1700-Hz center frequency to resolve the continuously variable FAX signal into "black" and "white." Anything below 1700 Hz is black; anything above 1700 Hz is white. This is adequate for weather maps that are sent as line drawings, but wire-service photos will not reproduce in a full gray scale.

The FAX format used by the HK-232 and PK-232 is different from the weather



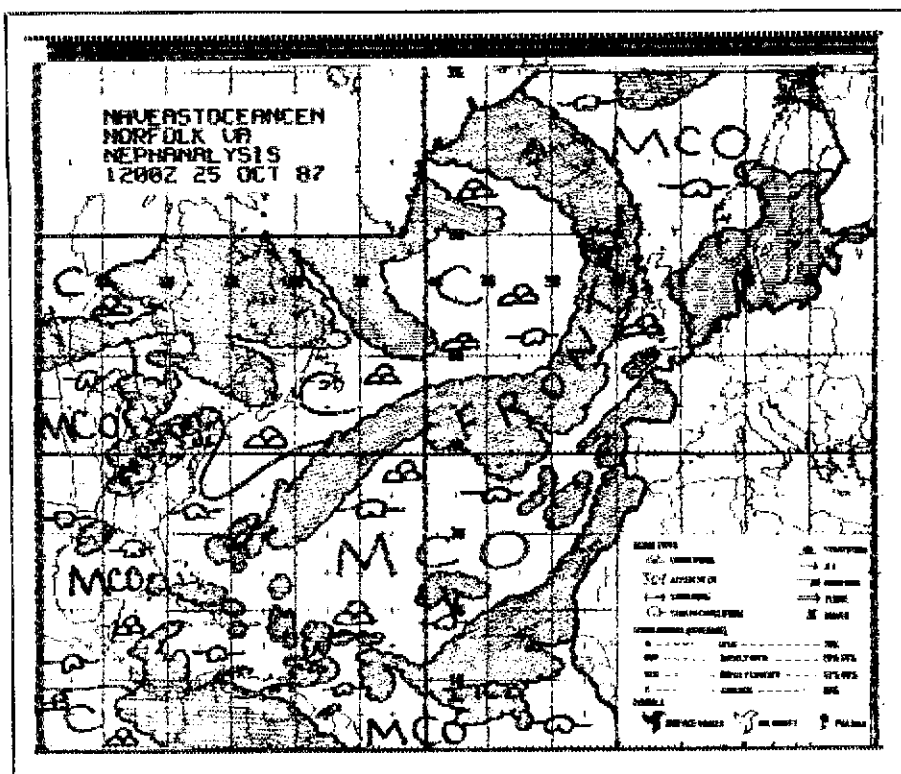


Table 1

AEA PK-232 (Serial No. 03097) and Heathkit HK-232 (Series No. 74762) Multi-Mode Digital Communications Terminals

Power requirements: 12 to 18 V dc at 700 mA

Terminal interface: RS-232-C interface with DB-25S connector (using lines 1-8 and 20 only). Autobaud data rate selection of 300, 1200, 2400, 4800 and 9600 bauds. Manual selection adds 110, 150, 200 and 600 bauds.

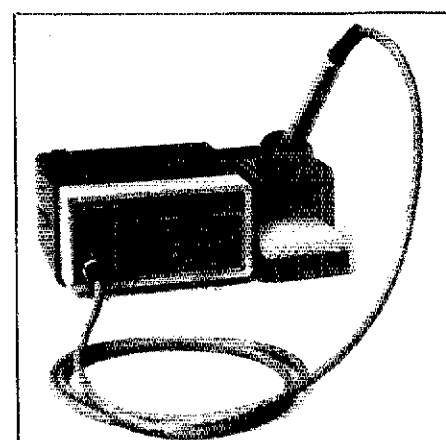
Radio interface: Two five-pin connectors (cables supplied), selectable from the front panel. Lines for receive audio, transmit audio, PTT, external squelch input and ground.

Dimensions: 2.5 x 11 x 8.25 inches (height, width, depth).

Weight: 3 lb.

terminal, the HK-232 is for you. Price class: \$280. Manufacturer: Heath Co, Benton Harbor, MI 49022, tel 800-253-0570.

New Products



ERSA MS 6000 SOLDERING STATION

The Ersa MS 6000 soldering station features a positive-temperature-coefficient ceramic heating element that makes it suitable for applications ranging from delicate IC soldering to operations requiring a 100-W uncontrolled iron. Tip temperature is continuously variable from 300 to 840°F, and warm-up time is 60 seconds. Five different tips, as well as desoldering inserts, are available. The MS 6000 has a number of features that make it comfortable to use. For example, the ceramic funnel that holds the soldering iron can be mounted on either side of the control unit, making it suitable for right- and left-handed users. Price class: MS 6000, \$120; tips, \$3.75 each. For more information, contact Robert W. Mink Import-Export, PO Box 6437, Fair Haven, NJ 07704, tel 201-758-8388.—Mark Wilson, AA2Z

Fig 1—This weather FAX picture, showing the location of weather fronts over the North Atlantic, was copied on 8080 kHz from NAM, Norfolk, Virginia.

satellite APT format. Weather satellites transmit their photos by amplitude modulating a 2400-Hz subcarrier. The HK-232 and PK-232 cannot be used to receive weather satellite photos.

You need an Epson-graphics-compatible printer to copy FAX with the HK-232. I used the HK-232 with an IBM® PC and an Epson FX-286e printer. The first step is to "turn on" the printer with the PRCON ON command. The status LEDs light in a certain pattern and will not work normally again until you issue the command PRCON OFF. Remember to turn PRCON OFF when you are through copying FAX—it will save you the frustration of trying to figure out what has gone wrong with the status indicators when you try to operate another mode.

When you first enter the FAX mode, the HK-232 waits for the sync signal at the beginning of a new picture. You can force a start, although the picture lines may not start at the edge of the printed lines. Another command allows you to change the break point so the picture lines appear properly on the page.

In addition to the weather maps transmitted by facsimile, various news organizations use shortwave frequencies to transmit news photographs to their subscribers. These transmissions use a variety of protocols. Weather facsimile pictures are sent at two lines per second, but other facsimile services may use different rates. With practice, you can "hear" the line rate.

Weather FAX signals sound like "Brrrrrip, Brrrrrip"—with the "Brrrrrips" repeated twice a second. Some news photo services use 1 line/s—that means you'll hear one "Brrrrrip" each second. The HK-232 tuning indicator LEDs show you when a signal is tuned correctly. It takes 15-20 minutes to print a FAX picture.

To see a picture the way it should appear, you may have to change some of the parameters using the HK-232 command set. In addition to adjusting the speed, you may have to change the aspect ratio or change from positive to negative printout. You can also change whether the signal is scanned left to right or right to left.

One word of warning: Trying to copy just one FAX picture is like trying to eat just one potato chip. Maybe you can do it—I can't!

The documentation on FAX operation is very good. I experienced no problems in using, and enjoying, this mode. One helpful feature is a list of frequencies used for FAX transmissions. These frequencies are a great starting point. Once you've become familiar with the sound of FAX transmissions, you should have no trouble finding other stations.

The Bottom Line

The HK-232 is a relatively easy-to-build kit. Most of the construction consists of simply stuffing the two circuit boards. If you enjoy construction and you'd like to build a full-featured communications

USING THE SB-220 AMPLIFIER WITH SOLID-STATE TRANSCEIVERS

□ The Heathkit SB-220 is one of the most popular amplifiers ever sold. It was designed in an era when most amateur equipment was based on vacuum-tube technology. Because of this, special care is needed if the SB-220 is to be used with a solid-state transceiver.

The SB-220 goes into the transmit mode when the hot contact of its rear-panel ANT RLY jack (J1 in Fig 1A) is shorted to ground, actuating K1, the SB-220 antenna relay. The open-circuit dc voltage at this jack is 125; the short-circuit current is 25 mA. Vacuum-tube-based exciters usually have no trouble switching power at this level. Solid-state rigs are a different story.

My ICOM IC-740 transceiver can't switch 125 V at 25 mA because the maximum ratings for its amplifier-control relay contacts are 24 V/1 A dc. Other solid-state transceivers likely use relays or open-collector transistors of similar ratings for amplifier control. The switching problem is complicated by the fact that the SB-220 antenna-relay solenoid is not shunted by a spike-suppression diode. The transient voltage developed by a solenoid's collapsing magnetic field can exceed the supply voltage. (If you've ever gotten a poke from relay-solenoid back EMF, you know that this voltage is not just theoretical!) With the 24-V rating of the IC-740's control contacts in mind, a direct amplifier-control connection between the SB-220 and the IC-740 seemed to invite trouble.

Fig 1B shows my solution to this problem. With Q1 and Q2 handling the actuation of K1, voltage at J1 is reduced to approximately +12. Short-circuit current through J1 is about 2 mA. Because the SB-220 must be opened to make this modification, now's a good time to install an OPERATE/STANDBY switch, S1, to save switching the SB-220's tube filaments on and off.

There's plenty of room under the SB-220 chassis for mounting the switching components; the entire circuit can be assembled on a tie strip and mounted to an available under-chassis screw. I installed my version of the Fig 1B circuit next to the SB-220's 125-V dc supply, just behind the SSB/CW rocker switch. (Take proper high-voltage safety precautions when you make this modification. Lethal voltages exist in the SB-220.) Dress the wiring for minimal coupling to RF circuits under the chassis and near the antenna relay. As installed in my SB-220, this circuit shows no susceptibility to RFI.—James Hebert, K8SS, Livonia, Michigan

QUICK REPLACEMENT FOR MULTIPIN CONNECTORS

□ After I bought a Collins R-392 receiver at a summer swap meet, I discovered that I couldn't test it because I didn't have a mate for its power connector. Here's one

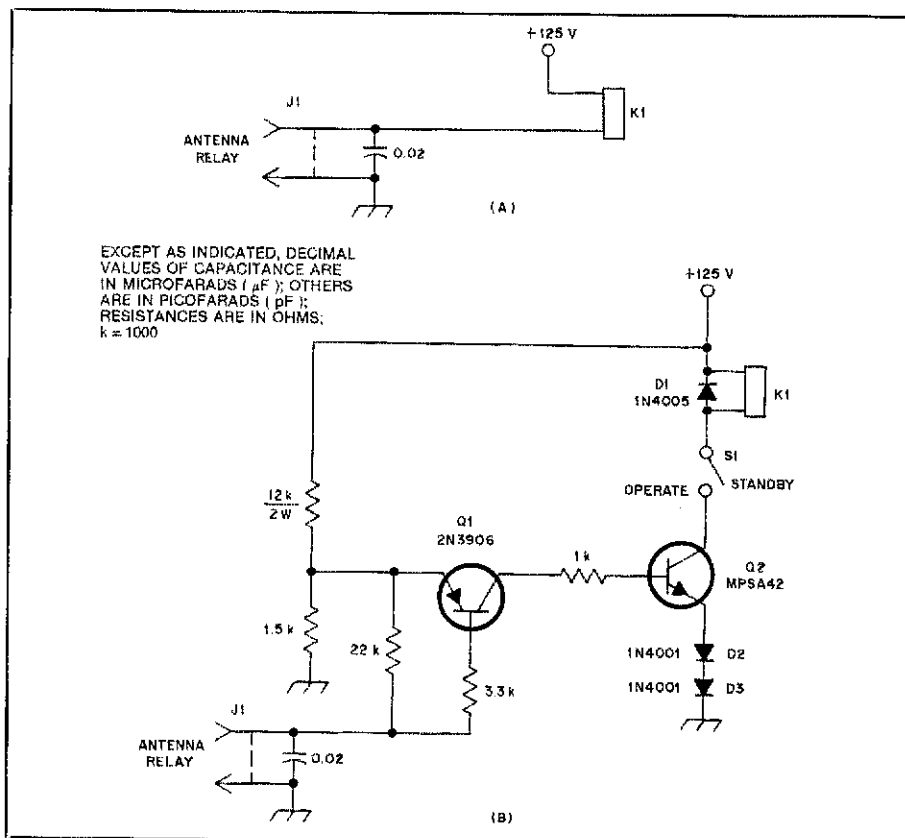


Fig 1—K8SS' SB-220 modification lowers the voltage at the ANT RLY jack, J1, from 125 at A to approximately 12 at B. Short-circuit current through J1 is reduced from 25 mA in the unmodified circuit to 2 mA in the circuit shown at B. J1, K1 and the 0.02- μ F capacitor are SB-220 parts. Resistors are $\frac{1}{4}$ -W, carbon-film units unless designated otherwise.

D1—1-A, 600-PIV diode.
D2, D3—1-A, 50-PIV diode.
Q1—General-purpose transistor.

Q2—High-voltage switching transistor, $V_{CEO} = 300$. ECG287 also suitable.
S1—SPST toggle.

solution to this problem. Obtain a package of solderless butt-splice connectors (wire size no. 22-18 in this example). Count out one for each of the pins you wish to access on the equipment plug. Crimp one end of each of the solderless connectors just enough for a snug, sliding fit on the equipment-plug pins. "Hard crimp" connecting wires to the other ends of the solderless connectors, and slide the connectors onto the appropriate pins of the equipment plug. (If you use uninsulated butt splices, slip a short piece of insulating tubing over each splice to avoid short circuits between the equipment pins.) I have successfully used this method to furnish speaker, mic and power connections to several pieces of equipment.—Ken Kolthoff, K8AXH/6, Vandenberg AFB, California

FLEXING DAMAGES COAXIAL CABLE

□ If you've ever had trouble with fluctuating SWR and similar erratic behavior in a coax-fed RF system, my experience with three pieces of coax removed from 75-MHz IF amplifier

modules may be of interest to you. The bandwidth, differential gain and phase response of the amplifiers would not stay put; the coax was the culprit.

Flexing of the coaxial cables had resulted in damage to the cable shield at several plugs. The IF-amplifier manufacturer had not provided access holes large enough for 90° coaxial adapters, necessitating that the coax be pulled away from chassis connectors at a 90° angle at several places. In this wide-band application, the integrity of the coax was critical in maintaining proper tuning of amplifier stages. Cable-shield damage resulted in signal leakage, circuit detuning and uncertain RF grounding. This was caused by 150 to 200 flexing cycles over a period of about 15 years. These cables were used indoors, by the way; wind flexing was not a problem.

Coaxial cable is particularly vulnerable to flexing damage at connectors and bulkheads. Protect it well, flex it minimally, keep bending radii as large as possible and take the action of weather into consideration. —Kurt U. Grey, VE2UG, Sept Iles, Quebec, Canada

(continued from page 33)

photo. A scale etching template and a parts-placement guide is presented in Fig 4.

Experimental VFO

I developed the amplifier and doubler modules in this article after I completed my experiments with the VFO in Fig 5. Generally speaking, there is nothing unique about the major part of the VFO, but the tuning method has not, to my knowledge, been described before. I developed the electronic tuning technique when I wanted to improve upon an earlier innovation I tried. The first circuit used a 500- Ω linear taper potentiometer in series with a trimmer capacitor (C4 of Fig 5). The carbon control was used to change the VFO frequency. Performance was acceptable, but the VFO output level varied with the resistance of the control. Also, one end of the control range yielded little change in VFO frequency, causing nonlinear operation.

I decided to try a JFET as an electronic attenuator. Q2 of Fig 5 serves this purpose. R6 varies the gate bias of Q2, and this causes the junction resistance of Q2 to change. The change in resistance increases or decreases the effective capacitance of trimmer C4. D2 regulates the potential on the source of Q2, which aids the overall VFO stability. RFC1 provides RF isolation

for Q2 from R6 and the associated wiring. A 10-turn potentiometer is used for R6 to provide bandspread when tuning the VFO. The frequency range covered by adjusting R6 is determined by the setting of C4. You may tune all of the 40-meter band, or only a few kHz of the band.

Frequency stability is excellent with this circuit. I observed 60 Hz of drift from a cold start to full stability 10 minutes later. Tests were performed at a room temperature of 72°F. The short-term drift was dreadful (some 300 Hz) until I added R13 to apply drain bias to Q2. I find this circuit more desirable than similar ones I have developed with tuning diodes (VVC diodes). The stability of the circuit in Fig 5 is much better than that of my VVC-tuned VFOs.

The use of NP0 ceramic capacitors in the VFO circuit is very important in the interest of minimum frequency drift. Also, a 2N4416 FET is better for VFO service than an MPF102, owing to the better pinch-off characteristics of the 2N4416 family of FETs. The higher pinch-off voltage rating permits greater VFO output voltage. A comparison between an MPF102 and a 2N4416 in the circuit of Fig 5 showed 2 volts P-P output at the source of Q1 with the MPF102. The 2N4416, on the other hand, produces 3.5 volts P-P at the Q1

source. The buffer section of this VFO (Q4 and Q5) is a design by Roy Lewallen, W7EL, that he uses in a 40-meter QRP transceiver.¹ Output from the overall circuit of Fig 5 is 3 volts P-P across a 470- Ω load. This is approximately the input impedance of a class-A, low level stage in a solid-state transmitter. Performance is good, despite the mismatch, when connecting this VFO to the input of the class-A broadband amplifier of Fig 1.

Closing Remarks

There is no reason why you can't develop a push-push doubler for use on other amateur frequencies. L1 and L2 of Fig 3 will need to be modified for the new frequency of operation. No other changes are required. Certainly the two practical modules in this article will be useful to you for a variety of applications. For example, the amplifier may be used to boost local oscillator output to a suitable level for injecting a diode ring, doubly balanced mixer or modulator (+7 dBm normally required). The doubler can be used to develop a two-band VFO, and the list goes on. If nothing more, these projects are ideal for a weekend of workshop activity!

¹Lewallen, R.W., Feedback, QST, Nov 1980, p 53.

New Books

THE PACKET RADIO HANDBOOK

By Jonathan L. Mayo, KR3T. Published by TAB Books Inc, Blue Ridge Summit, PA 17214. First edition, first printing, 1987. Soft cover, 5½ × 8 inches, 217 pages, \$14.95.

So you've read all the magazine articles, and you're interested in packet radio, but you're not sure what to do next? Maybe you've been operating packet radio for a few months, and you're interested in how packet *really* works? Perhaps you'd just like to read and find out more about this modern communications mode? *The Packet Radio Handbook* might be what you're looking for.

Jonathan Mayo, KR3T, has done a good job of collecting a lot of information into a small book. The first four chapters of the book might be called the "theory" section. Chapter 1, entitled "What is Packet Radio," is a good introduction for someone who is curious about packet. Chapter 2, "The History of Amateur Packet Radio," covers packet-radio history in detail. Chapter 3 covers packet hardware and modulation techniques, and Chapter 4 discusses protocols and networking.

The second half of the book is the "practical" section. Chapter 5 is called "Setting Up an Amateur Packet Radio Station." This chapter gives information on selecting a terminal, a TNC and a radio for an amateur packet station. Chapter 6 covers

operating procedures, and Chapter 7 details the packet equipment that was available in 1986, when the book was written. In Chapter 8, Mayo talks about the future of amateur packet radio. The five appendices cover the ASCII code; the RS-232 standard; addresses of manufacturers, packet clubs and organizations, and other suppliers of packet information; suggested operating frequencies; and an introduction to Amateur Radio for readers who may not be familiar with the hobby. A bibliography, glossary and index round out the end of the book.

Even though the book was published in 1987, the information about TNCs and networking is already a bit dated. New TNCs appear almost daily, and any book showing the available TNCs will be dated almost before it is published! Networking is right on the edge of the changing packet scene as well. The book does provide plenty of useful information in its other chapters, however. The author writes well, the book is easy to read, and there are plenty of graphics and photographs.—Bruce S. Hale, KB1MW

CONTEMPORARY ELECTRONICS CIRCUITS DESKBOOK

By Harry L. Helms. Published by McGraw Hill, New York, NY. First edition, 1986. Hard-cover, 8½ × 11 inches, 253 pages.

The assignment: Collect six or seven hundred useful circuits from electronics magazines, manufacturers' data sheets and applications notes. Arrange them in 28 logical chapters. Add an index, a list of

abbreviations and the addresses of all the publications where the original circuits can be found. That's what Harry Helms has done to create the *Contemporary Electronics Circuits Deskbook*.

This is an essential book for someone who does not want to reinvent the wheel. Each page of this large hard-cover book shows at least one circuit, with a short description and an original source reference. A partial list of the chapters includes circuits for active filters, amplifiers, frequency synthesis, LEDs and optoelectronics, Morse code, power supplies, single-sideband, repeaters, test equipment, transmitters and voltage regulators.

Each circuit is shown schematically. This is primarily an *idea* book—no construction details are given, and there are no photos of completed units. Helms gives references for each circuit to make it easy to find the original article if more information is required.

As the author states in his preface: "I hope this compilation saves you hours of searching through the literature to locate a specific circuit application. This book can also serve as a useful starting point for your own circuit designs. One of the most interesting points about this book is the number of circuit designs created by Amateur Radio operators; many of them meet the most exacting professional standards. Such resourcefulness and creativity is one reason why I am proud to be a part of the worldwide hobby of Amateur Radio."—Bruce S. Hale, KB1MW

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

C64 WEFAX IMPROVEMENTS

Many amateurs have indicated a desire for additions to the material I presented earlier.¹ The requests include a simpler interface (that requires no external power supply), better resolution of the fine print on the WEFAX maps, the ability to copy satellite pictures with gray shading and—last, but by no means least—automatic synchronizing and map scheduling. To this list, I added my yearning for less paper consumption, given the limited space on my sailboat to store boxes of paper.

In order to display the gray shades in satellite pictures, we need to accurately measure the incoming audio frequency during each pixel period. The computer can easily do this by counting its own clock pulses between zero crossings of the audio

signal. Because the pixel sampling cannot be synchronized with the varying audio frequencies, accommodation of the “slip” between them is needed, so two counting

registers are used.

Refer to Fig 1. The Y register is used to store the count between the beginning of each pixel sample and the next audio-signal

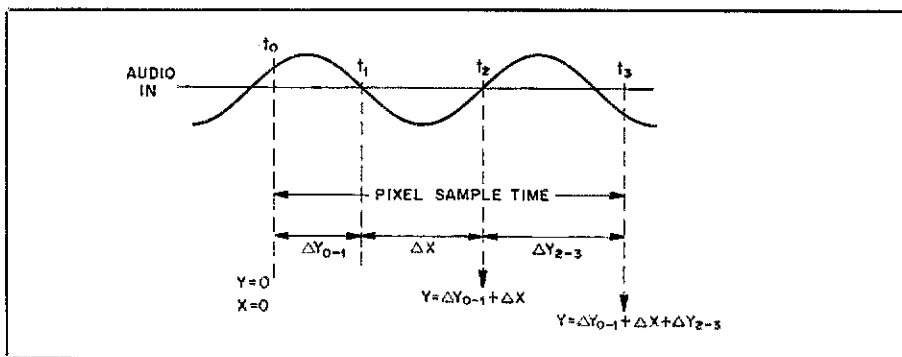


Fig 1—The X and Y registers are used to count the half-cycle period (X register) and the pixel sample time (Y register). ΔX is added to the Y register at t_2 , and Y continues to count to t_3 .

¹B. Vester, “HF WEFAX For the IBM® PC, PCjr and C64,” Technical Correspondence, May 1987 QST, pp 40-43.



Fig 2—Typical satellite picture with five shades of gray. The weight of dot density v frequency was not yet optimized. This picture was printed with the dot density equal to the linear functions of X (ie, half-cycle period).

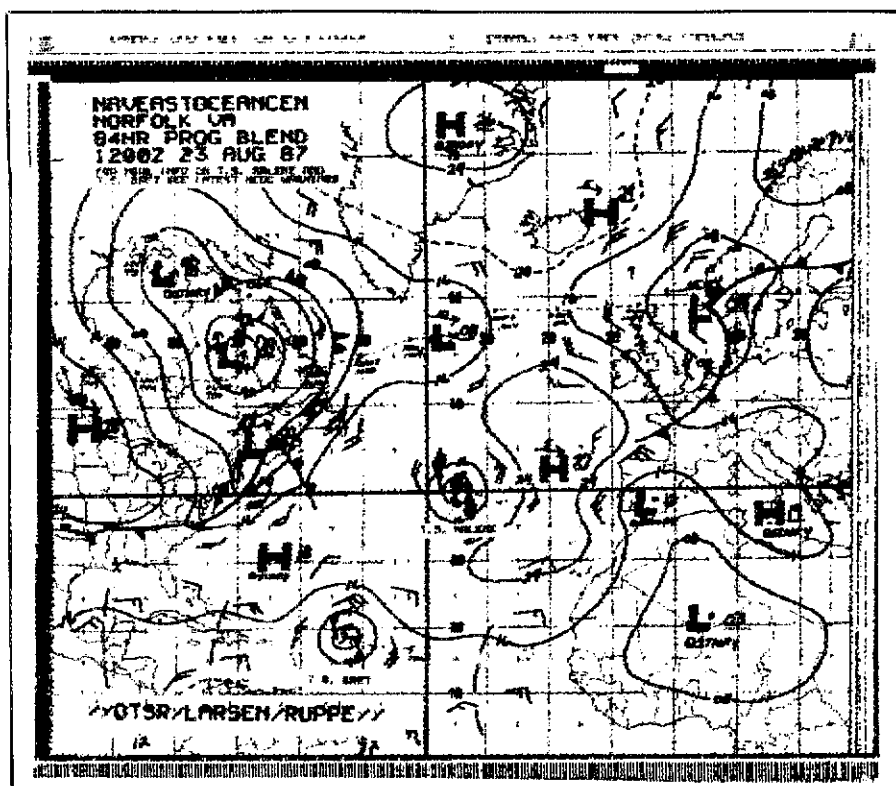


Fig 3—Tropical storms Arlene and Bret pass in the mid-Atlantic. Bret is coming in on the Easterlies, and Arlene is going out on the Westerlies.

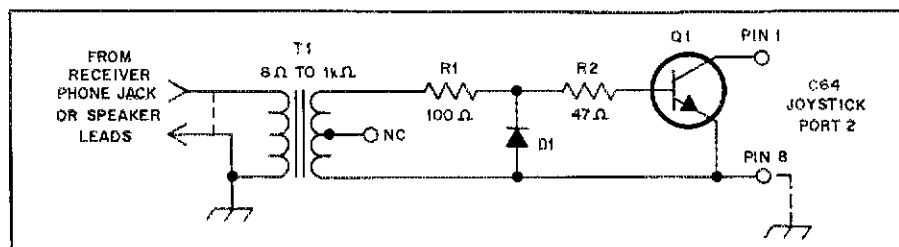


Fig 4—The interface between the receiver and computer can be boiled down to the simple clipper circuit shown here. Because you can't tell on which half-cycle (positive or negative) each pixel measurement will be made, you want symmetrical clipping. Q1 shorts the joystick pin to ground on the positive half of each audio cycle. Parasitic suppressor R2 should be connected to Q1 with short leads. You can even eliminate T1, but with some loss of symmetry and the possibility of injecting hum from ground currents between the computer and receiver.

Q1 can be any transistor with a beta greater than 100. D1 can be any general-purpose silicon diode (such as a 1N914). The values of R1 and R2 can be selected to optimize clipping symmetry (using the TUNE program). T1 is a miniature, 8- Ω 1-k Ω audio-output transformer (RS 273-1380).

zero crossing. The X register holds the count between this zero crossing and the next one (ie, the half-cycle period), and its value is stored as the audio frequency reciprocal for that pixel. Then, the X-register value is added to that of the Y register, and the Y register continues to accumulate the count to a number dictated by the desired pixel size. At the lowest audio frequency (1200 Hz), this barely fits into a pixel period for 600 pixels per half-second line. The count is kept to that within the capacity of one register (256 counts) by actually making one count every nine machine cycles.

To print maps, the X register count for each pixel is compared to a single number, and the resulting 1 or 0 rolled into the byte stream that goes to the printer (or screen). To print satellite pictures, each pixel is made up of four adjacent dots—two down and two across. This provides five possible gray shades. By comparing the X register count for each pixel with four different threshold values, a decision is made as to which dots will be printed.

A large X-register value (the black level equates to the low frequency on USB) will exceed all four thresholds and all four dots are printed. Mid-range X-register values

Table 1

Code Changes To Original Sueker Program

2536	LDY #\$00	
2538	LDX #\$00	
253A	LDA \$DC00	
253D	INY	Count loop Y
253E	CMP \$DC00	
2541	BEQ \$253D	
2543	LDA \$DC00	
2546	INX	Count loop X
2547	CMP \$DC00	
254A	BEQ \$2546	
254C	STX \$43FE	Add X to Y
254F	TYA	
2550	ADC \$43FE	
2553	TAY	
2554	CLC	Count loop Y to \$5B
2555	INY	
2556	CPY #\$5B	
2558	BCC \$2554	
255A	CLC	
255B	CPX #\$22	

Replaces:

205A	LDA \$DC00
205D	ROR
2061	JSR \$2130

The extra lines of code in the C64 program (2536-255B) are substituted for those shown in Sueker's program (205A-2061) and eliminate the need for the Sueker interface. (The code shown is not directly transferable to Sueker's program.) Line 255D (205D in Sueker's program) results in the carry bit being set to 1 when the pixel is black. The joystick port address is \$DC00; \$5B is the pixel period; \$22 is the black-level threshold.

will cause only one, two or three dots to print. My reason for choosing four dots per pixel (instead of the six that are available in the near-letter quality, NLQ, mode with the same pixel size) is that my Seikosha 1000I printer isn't fast enough to lay down that many dots per line in real time. See Fig 2 for a sample picture.

In the map modes, I chose to use the printer's NLQ capabilities to print the dots closer together—three times more dense vertically and twice as dense horizontally. This allows the use of every other line (instead of every third line) of the incoming data stream, and results in a 50% increase in vertical resolution. To maintain proper perspective (have circles print as circles), the horizontal dots work out to 528 pixels, which matches the possible audio-measuring period very nicely. A sample of this is shown (full size) in Fig 3.

I have NLQ condensed-mode programs for use with the Sueker² interface and the simple clipper circuit of Fig 4. With the same resolution parameters, the simple interface gives better readability of the fine print on the maps than does the Sueker interface (less horizontal smear). A comparison is shown in Fig 5. (Table 1 shows coding changes to the original Sueker pro-

²K. Sueker, "Real-Time HF WEFAX Maps on a Dot-Matrix Printer," Mar 1986 QST, pp 15-20.

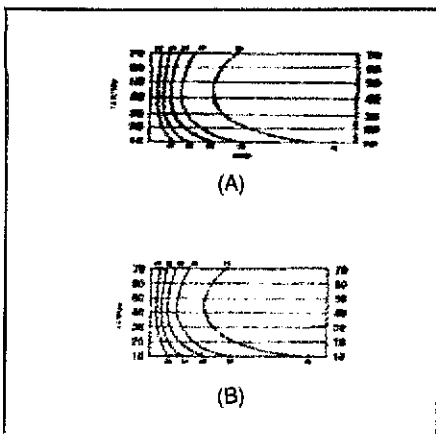


Fig 5—A comparison of picture sections made with the Sueker interface (A) and the simple interface (B).

gram to allow the use of the simpler interface.) These two picture samples were taken at noon to minimize multipath smear. The condensed mode, incidentally, is more readable than the full-width mode even though it is smaller. (The difference is comparable to that of NLQ v draft printing.) I do, however, occasionally have to use a magnifying glass to read the map. The condensed mode uses paper at half the rate of the full-width mode, and each map has a convenient note space next to it.

An automatic synchronizing code measures the black-dot count per line to detect the repeated 95% black lines during the sync period. The code then actuates the left edge of the picture just as a white tick occurs.

The scheduling program simply uses the computer's clock to turn the copying program on and off at whatever times you enter. A TUNE program is included to set up the receiver tuning before each copying period. This program also directly measures the clipper asymmetry so you can adjust the audio level for best results.

All of the accompanying pictures were made with an 8-dot, IBM-compatible printer using the Cardco + G printer interface with the C64. (The Xetec printer interface should also be compatible.) As is, the program should work with any printer using the 960-dot line command: CHR\$(27);"L";CHR\$(n1);CHR\$(n2), and the command CHR\$(27);"J";CHR\$(n) to advance the printer platen by n/216 inch. You can POKE in your own printer commands by merely adding a program line to the BASIC program used to control the whole operation.

Because a lot of folks still have 7-dot printers and may be interested in using the simple interface of Fig 4, I developed a program to accommodate them. Of course, the condensed mode and gray shades require an 8-dot NLQ printer, so are not available with the 7-dot program. (A good medium-resolution screen display program

is included on the disk.)

I'll be on a sailing cruise when this information is published, so I've arranged for the New Bern Amateur Radio Club to provide disks to interested readers; their fee is \$10 per disk. Be sure to specify which printer you're using (7- or 8-dot), and which interface (Sueker or simpler clipper) you plan to use. You can obtain the disks by contacting the New Bern ARC, PO Box 2483, New Bern, NC 28561.—Ben Vester, K3BC, 4921 Bonnie Branch Rd, Ellicott City, MD 21043

TANDEM MATCH CORRECTIONS

There are six errors in the schematic diagram of "The Tandem Match—An Accurate Directional Wattmeter," Jan 1987 QST, pp 18-26. These errors are all located in the signal-processing portion of the circuit (p 23) and occurred from my incorrect tracing of the maze of wires on the original breadboard. The corrections include:

- The 330-k Ω resistor should be connected between the ~ 2.5 V supply and the cathode of D14 (TP 9), not pin 6 of U4B.
- Change the diagram to show pins 4 and 7 of U7 to the 2.2-k Ω resistor attached to pin 1 of U3A; pin 8 of U7 connected to pin 2 of U3A.
- Insert a 1N914 diode in the line between the collector of Q4 and the circuitry associated with U3D and U7. The anode of the diode is connected to the collector of Q4, the diode cathode attaches to pin 13 of U3D.
- The 1-k Ω resistor and D10 connected between U4A pin 1 and the two 100-k Ω resistors should be eliminated and replaced by a direct connection between these two points.
- The jacks on the right-hand side of the diagram (p 23) labeled J1 and J2 should be labeled J3 and J4, respectively.
- On p 20, Fig 5, the 57- Ω resistor should be labeled 50- Ω .

Radio Shack no longer lists ICs U1-U4 numbered 276-1749 and 276-1750. Some stores may still have them in stock, however. There are other sources of supply for various items. The TLC27L2, TLC27L4 and CA3146 ICs can be purchased from Newark Electronics, 4801 N Ravenswood St, Chicago, IL 60640, tel 312-784-5100. The 1N5711 diodes are available from Surplus Sales, 2412 Chandler Rd, Bellevue, NE 68005, tel 402-733-9190. The LM334, LM336, 1% tolerance resistors and trimmer potentiometers are carried by Digi-Key Corporation, 701 Brooks Ave South, PO Box 677, Thief River Falls, MN 56701, tel 800-344-4539.

I've received many inquiries concerning the T-50-3 toroid material used for transformers T1 and T2 mentioned on p 24; the number is correct. Type 3 material is required to obtain sufficient inductance for the transformers to work on 160 meters.

If Type 2 or 6 material is used, the directional coupler will not work on 160 meters, and may not work on 80 meters. Type 3 material works fine through 50 MHz, and at 50 MHz, the difference in performance between Type 3 and Type 6 material cannot be measured.

On p 26, the date in note 8 should be corrected to read 1964.

My thanks to Dick Green, KAILBW, who spent much time and effort working with me to locate the errors, and who provided the list of parts vendors. Lastly, please make note of my new address.—John Grebenkemper, KI6WX (ex-KA3BLO), 19490 Miller Ct, Saratoga, CA 95070

[Editor's Note: Photocopies of the corrected schematic diagram (p 23) for The Tandem Match are available free of charge from the Technical Department Secretary, ARRL, 225 Main St, Newington, CT 06111. Please identify your request as Corrected Tandem Match Schematic Diagram, QS-01/87.]

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

Feedback

In "Amateur Radio and the Blind, Part 1," Oct 1987 QST, please make this change to the sidebar on p 28, left-hand column, fifth entry. The correct spelling of Bill's last name is Gerrey, and his call sign is WA6NPC. (Tnx to Ricardo J. Alfano II, W6FWX, for this information.)

Author Steve Stuntz provides us with the following corrections to his article, "A Packet Terminal for Atari Computers," Nov 1987 QST, p 17, Fig 4. On the DB-25 connector, the TRANSMIT DATA line should be shown connected to pin 2 (not pin 1); the RECEIVE DATA line connects to pin 3 (not pin 2).

Strays



I would like to get in touch with...

anyone with a schematic/parts list for a Knight KG663 regulated power supply. Lyle Seehorn, W7YKA, 3625 SW 328th St, Federal Way, WA 98023.

anyone with a schematic and parts list for a Midland Model 13-500 2-meter rig. Harold McCullen, K8LNR, 2215 N Charles St, Saginaw, MI 48602.

Official Visit Strengthens US-China Amateur Radio Link

Two weeks in the US gave three distinguished visitors from China a taste of Amateur Radio, US-style, and furthered the cause of international goodwill.

By David Sumner, K1ZZ
Executive Vice President, ARRL



ARRL President Larry Price, W4RA, flew up from Georgia to head up the hospitality at Headquarters. Here he's being "pinned" by Mr Wang. Larry and Mr Wang first met in Auckland in 1985, as heads of their respective delegations to the IARU Region 3 Conference. Larry extended the invitation for CRSA to visit the US at that time, and the invitation was renewed by First Vice President Jay Holladay, W6EJJ, at a meeting in Tokyo the following year. Jay was in charge of hospitality in San Francisco, with much assistance from local amateurs.

March 29, 1982: A decades-long silence is broken. For the first time in a generation, an Amateur Radio station, BY1PK in Beijing, is on the air from the People's Republic of China for the purpose of contacting amateurs in other countries. Before the year is out, BY8AA comes on from Chengdu, Sichuan Province; in 1983, BY4AA puts Shanghai back on the Amateur Radio map. Two additional club stations are activated in

1984; in both 1985 and 1986, six more; and in 1987, another seven. In just five years' time, Amateur Radio contact with China goes from being the rarest of the rare to being almost commonplace—and this is just the beginning.

The rebirth of Amateur Radio in China didn't just happen. The seeds were there all along, dating back to the 1920s [see sidebar]. They have been carefully cultivated by those in China who saw in Amateur Radio a potential for important contributions to national progress and development. They have been nurtured by assistance from outside China, by so many people from so many countries that it would be impossible to list them all, who recognized that the desire to help must be tempered by the need for the Chinese to set their own pace. Above all, what has sprouted is uniquely Chinese; it is an Amateur Radio that is different from what



One of the highlights of the first stopover in San Francisco was a visit to the station of Bob Ferrero, W6RJ. That's ARRL Vice President Bill Stevens, W6ZM, posing with our visitors in front of some of Bob's antennas, including a three-element 80-meter beam! Of course, we explained this wasn't a typical station. (K6ITL photo)

This Month's Cover

Occupying center stage on our cover this month is a 12-inch-tall ceramic horse, one of many gifts for American amateurs that were brought Stateside by the CRSA delegation. Surrounding it, clockwise from top:

- Wang Xun presents the horse to ARRL Executive Vice President David Sumner, K1ZZ, on arriving at League Headquarters.
- The QSL card of BY5RA in Fuzhou, the fifth Chinese club station to come on the air in early 1985. Another of the gifts for ARRL was an album of photos and QSL cards from each of the 24 Chinese amateur stations now on the air.
- Mr Tong at the microphone of W3USS in the United States Senate.
- Not all the steel shown to our visitors was in hams' backyards; they also got to see the Golden Gate Bridge.
- On the left are IARU Region 2 Secretary Alberto Shaio, HK3DEU, and Region 2 Executive Committee member Steve Dunkerley, VP9IM, who joined us at a reception for our visitors at Headquarters on October 28. Next are Mr Wang, Mr Liu, Mr Tong and Dave Sumner.
- One of the volunteer hosts in Washington was Dave Siddall, K3ZJ, who knows his way around Capitol Hill.
- A visit to the FCC helped explain how Amateur Radio is administered in the United States. Seated at his desk is Acting Chief of the Private Radio Bureau Ralph Haller, N4RH, with ARRL Secretary and Washington Area Coordinator Perry Williams, W1UED, behind the chair; to the right are Ray Kowalski, Chief of the Special Services Division, and John Johnston, W3BE, Chief, Personal Radio Branch.
- Comparison of the CRSA and ARRL emblems provides graphic evidence of our common interests!

A Brief Introduction to Amateur Radio in China

Amateur Radio activities in China date back to at least the 1920s. The first Amateur Radio organizations were formed in the 1930s, and by 1940 there was an official publication, *Radio World*, in circulation. Election to membership in the International Amateur Radio Union occurred in 1947.

In October 1958, after the founding of the People's Republic of China, the Chinese People Radio Club was established. Following that, Amateur Radio clubs appeared one after another in provinces, municipalities and autonomous regions. The Chinese Radio Sports Association (CRSA) was formed in 1964 under the jurisdiction of the All-China Sports Federation. It is the sole national organization authorized to represent radio amateurs in China, and has represented China in the IARU since 1984.

Amateur Radio activities in China have varied forms, the most popular events being two-way communication and direction-finding. The development of Amateur Radio has enabled youths to gain knowledge of radio techniques and has provided opportunities for our amateurs to exchange experiences and strengthen ties with amateurs all over the world.

At present there are 24 active stations being operated in China by some 250 operators, and the number of operators is growing rapidly. A goal is to establish at least one station in each province. Competitions in communications and direction-finding are held regularly each year; clinics in radio technique and electronics, and exhibitions of radio equipment built by amateurs, attract thousands of young participants.

In 1956 and 1958, young Chinese radio amateurs earned the Team Champion title in international radio receiving competitions. Representatives of CRSA visited Japan in 1980, 1983 and 1986, and participated in international direction-finding competitions held in Yugoslavia in 1983 and 1986. CRSA delegates attended the IARU Region 3 Conference in Auckland, New Zealand in November 1985.

With the support of our government, Amateur Radio activities are developing rapidly in China. Our visit to the United States has permitted us to thank ARRL for the great assistance that has been provided to us by the radio amateurs of the US and Canada. Please listen for the BY prefix on the air; it would be our pleasure to contact you.
—Chinese Radio Sports Association

we know, yet is the same in so many ways.

In October, ARRL enjoyed the great privilege of serving as host to three officials of the Chinese Radio Sports Association during a two-week visit to the US—their first to this country. The purposes of the trip were to allow them to see American-style Amateur Radio first-hand; to permit in-person, in-depth discussions so we may continue to learn from one another; to give them an opportunity to express in person their appreciation for the assistance and encouragement that has come their way from North America; and to give us, in turn, a chance to express appreciation for the enormous hospitality that has been extended by CRSA to amateurs visiting China.

The CRSA delegation consisted of Mr Wang Xun, Deputy Secretary General of CRSA; Mr Tong Xiao-Yong, Station Manager of BY1PK; and Mr Liu Wen-Bin, who serves as Secretary of CRSA as well as of the canoeing and yachting organizations within the All-China Sports Federation. They were kept on a grueling five-city schedule from their arrival in San Francisco on October 23 until their return home two weeks later. League officials and other amateurs in that city and in Newington, New York City, the District of Columbia and Chicago made certain that they saw as much of our nation, its people and our avocation as time would permit.

The adage that a picture is worth a thousand words was never more true than in describing the CRSA visit. We began our story on the cover of this issue, with six photos selected from the scores that were taken during their sojourn. We continue here, so you may see a bit of what they saw.

You can catch brief glimpses of Amateur Radio in China in the new ARRL video-tape, "The New World of Amateur Radio." In the tape you'll see evidence of at least one thing worth remembering: BYs may be relative newcomers to 20 meters, but they've been at Amateur Radio Direction-Finding long enough to develop some world-class competitors!



Teacher Glen Moss, NC9N (center, in the dark jacket) uses Amateur Radio to teach geography to seventh and eighth graders at MacArthur Junior High School in Prospect Heights, Illinois. Next to Glen behind the tapestry is Central Division Director Ed Metzger, W9PRN, and behind the students is International Affairs Vice President Tod Olson, K0TO. The tapestry depicts the Great Wall of China, and was a gift to the class from CRSA. A similar tapestry was presented to the DeVry Amateur Radio Club during a visit to the DeVry Institute of Technology in Chicago, where teaching techniques were compared. (W9JUV photo)



This is a typical ham shack! It belongs to Joe Schroeder, W9JUV, of Glenview, Illinois. Joe worked BY1PK, with Mr Tong at the key, from this spot two years ago. Also assisting with hospitality in Chicago were Central Division Director Howie Huntington, K9KM, Jim Georgius, W9JUG, and members of the Northern Illinois DX Association. (W9JUV photo)

ARRL Election Results

Counting of the votes for ARRL Division Directors and Vice Directors took place at Headquarters on November 20, 1987. Newly elected representatives and those who were unopposed will take office on January 1, 1988, for two-year terms.

Here are the results of the voting, and profiles of your newly elected representatives:

Atlantic Division

For Director: Hugh Turnbull, W3ABC (Unopposed)

Hugh Turnbull has been Atlantic Division Director since 1982; this followed stints as Vice Director (1980-82) and Assistant Director (1974-80). Hugh was a member of the Board's Executive Committee in 1984-86 and Chairman of the Board's RFI Task Group since 1980, and is the ARRL representative to the ANSI C.63 ad-hoc Group for RF immunity. He also serves on the Board's Administration and Finance Committee as Alternate Chairman. Hugh is a Registered Professional Engineer holding degrees from Lafayette College and West Virginia University. Hugh saw service during WW II in the US Navy, retiring from the Reserve program as a LCDR. He retired in 1979 after a 37-year engineering/management career with FCC, VOA and NASA.

For Vice Director, James M. Mozley, W2BCH (Unopposed)

Jim is a graduate of Washington University, holding BS, MS and PhD degrees in Engineering, and is a licensed Professional Engineer in Delaware and Maryland. First licensed in 1938, Jim has held licenses in six call areas. He has served as SEC, Assistant SM and VE. He served as a combat platoon leader in WW II, leaving the service in 1946 as a First Lieutenant. He took early retirement in 1985 from a 27-year career as Professor of Radiology (Radiological Engineering), formerly at Johns Hopkins Hospital and more recently at State University Hospital in New York.

Delta Division

For Director: Joel Harrison, WB5IGF, 725

Arthur P. Kay, W5APX, 628

Lionel A. Oubre, K5DPG, 521

John M. Wondergem, K5KR, 513

At the time of his election, Joel was serving his third term as Section Manager of Arkansas. He is active on all modes from 1.8 through 432 MHz, including packet and OSCAR. He has received a number of ARRL operating and public service awards. At age 29, Joel will be the youngest current ARRL Director. He is employed by the Independent Testing

Laboratories Utility Plant Service Group in Searcy, Arkansas, as a manager.

For Vice Director, Joseph A. Butler, K5OS, 1341

Jimmy Roller, N4IR, 1015

Joe, 59, is an active DXer and is on the DXCC Honor Roll. He is also a former member of the DX Advisory Committee. Joe is a past officer of the Northern California DX Club, a Charter Member of the Northern California DX Foundation, and president of the Mississippi Coast Amateur Radio Association. He is a life member of ARRL and QCWA. Joe's work background is in manufacturing and sales management with a number of large electronic firms, including GE, Westinghouse and Motorola.

Great Lakes Division

For Director: Leonard M. Nathanson, W8RC, 2425

George S. Wilson, W4OYI, 2405

Leonard was first licensed in 1948 as W8DQL, and received his present call in 1974. He served as Director of the Great Lakes Division from 1980-84, and served as First Vice President of ARRL from 1984-6, and Second Vice President since 1986. While previously serving as Director, he was Chairman of the Federal Preemption Task Force, which was instrumental in securing PRB-1, the FCC declaratory ruling on limited preemption of state and local antenna restrictions, and he also founded the ARRL Volunteer Counsel program. He now serves as chairman of the Legal Strategy Committee. Leonard holds BSEE and law degrees. Employed as an attorney, he is an active contester and has held office in numerous local clubs.

Vice Director: Allan L. Severson, AB8P (unopposed)

Allan Severson returns as Vice Director of the Great Lakes Division. He belongs to five clubs and holds a life membership in the ARRL; he served as EC and DEC for Cuyahoga County from 1978-1980, and as Assistant Director 1980-1984; and he was Ohio SCM and SM for two terms. Al's club activities have included trusteeship, the presidency and vice presidency of the Erie Amateur Radio Association.

AB8P's activities primarily have been in the public service areas. He is active on all bands, 1.8 through 440 MHz, including packet radio on VHF. Al is employed as a field Underwriter for State Farm Fire and Casualty Company.

Midwest Division

For Director: Paul Grauer, W0FIR (unopposed)

Paul Grauer returns as Director of the

Midwest Division after having held the office for 14 years. Paul has been a member of the League's Executive Committee since 1982. He's a Life Member of the ARRL, QCWA and AMSAT. Licensed in 1928, he holds an Extra Class license, owns and operates a repeater, and is a regular net check-in, having made BPL many times. As a member of MARS, he made over 19,000 phone patches for servicemen, particularly those in Southeast Asia. Paul was awarded the Raymond E. Baker Ham of the Year Award and also VOSH (for Volunteer Optometric Services to Humanity). He has a Golden Anniversary Award from QCWA and belongs to four chapters. Paul is currently President and CEO of Wilson Telephone Company.

For Vice Director: Lyndell C. "Chuck" Miller, WA0KUH, 1405

Claire R. Dyas, W0JCP, 1190

Chuck is a Life Member of ARRL who has served as an Assistant Director for the past 10 years. He appeared before both houses of the Missouri legislature in a successful effort to regain call-sign license plates, and was a member of the Kansas City, Missouri committee that worked successfully for a 60-foot-high tower ordinance. He is Chairman of the PHD VEC, which has given over 1800 examinations, and is active in numerous clubs. Chuck is 61 and a retired US Marine Corps veteran.

Pacific Division

For Director: Rodney J. Stafford, KB6ZV (unopposed)

Rod steps into a second term as Director of the Pacific Division after having served as Section Manager, Santa Clara Valley Section, from 1983-85. Age 44, he lives in San Jose, California, is married (wife N6KLI) and has been a lawyer in practice for 15 years. Writes KB6ZV, "It's the Director's duty to be available to League members to discuss their concerns, to provide useful information to clubs and members, to represent the Division and to provide leadership in conducting League affairs."

For Vice Director: James D.

Knochenhauer, K6ITL (unopposed)

James D. (Knock) Knochenhauer was re-elected Vice Director of the Pacific Division. He is a Life Member of ARRL and Northern California DX Club. Previous ARRL offices held include SEC, Santa Clara Valley Section, Regional Emergency Coordinator for Northern California, ARES Emergency Coordinator, and RACES Officer for the City of San Mateo since 1971. James holds an Advanced class Amateur Radio license, and previous calls

include W8HOK, W8GZM/4, W7TJW and K5HYX, which were issued during tours of duty with the National Public Health Service. He has been responsible for the planning and provision of emergency and disaster health and medical services in the Western states for over 20 years. He received White House Citations in recognition of these efforts in 1965, 1974, 1979 and 1982. His strong commitment to ARES and emergency communications planning efforts has helped Amateur Radio become more visible and positive in the eyes of public officials.

Southeastern Division

For Director: Frank M. Butler, Jr, W4RH (unopposed)

Frank M. Butler returns as Director for the Southeastern Division, a position he's held since 1980. He served as North Florida SCM 1957-1980 and as Division Vice Director 1979-1980. While on the Board, he has served on all standing committees, in-

cluding chairmanship of the Membership Affairs Committee. Presently, he's a member of the Executive Committee and US Representative on the IARU Region 2 Executive Committee. Frank was first licensed in 1950 as W4RKH. Upgrades followed (Advanced 1951 and Extra 1952), and when FCC offered a choice of calls in 1976, he became W4RH. Frank also holds First-Class Radio-telephone and Second-Class Radiotelegraph Operator licenses.

Since 1951, Frank has held various positions at Eglin Air Force Base as an electronic engineer. Presently, he is responsible for planning, conducting and reporting on field tests of various military radio and radar systems.

Frank is a member of numerous Amateur Radio and professional organizations, including the Eglin ARS, Playground ARC, AFMARS, CD, QCWA, AFCEA and IEEE, having held office in several. Active on HF and VHF, he has received public service awards for work in numerous emergencies.

For Vice Director: Evelyn Gauzens, W4WYR (Unopposed)

Evelyn Gauzens returns as Vice Director of the Southeastern Division for a fifth term. She was first licensed in 1952 and holds an Advanced class license. She has been Chairman of the Tropical Hamboree and ARRL Convention for 25 years. Her responsibilities have included a stint as Dade County TVI Chairman for 21 years, QSL manager for AI4ARU and an ARRL Assistant Director for 16 years.

Presently, Evelyn is serving as ARRL Public Information Officer for Southern Florida, as public relations contact for FCC Volunteer Exam teams and the local news media, and is also an NCS for FPTN and the ARRL Information Net. She is an ARRL Life Member in addition to her membership in QCWA, RCA, QCWW, YLRL, Floridors, Dade Radio Club, Dade County ARPSC, the Flamingo Net and the Florida Phone Traffic Net.

FCC PROPOSES PART 15 CHANGES

The FCC, in Docket 87-389, has proposed to amend Part 15 of its Rules, which permits unlicensed operation of very-low-power RF devices such as remote control units, wireless microphones and cordless telephones. While use of these items does not require a license, Part 15 specifies the technical standards for these devices to prevent interference to other radio services.

In this Docket, the FCC proposes to permit a general class of RF devices with greatly increased frequencies of operation and no restrictions on type of usage, bandwidth or modulation type.

Under the new proposals, these devices would be allowed virtually everywhere, except for a few restricted bands used for public safety, or for radio services such as radio astronomy or satellite downlinks, which utilize very weak signal levels.

The original Part 15 regulations were based on a general field strength standard. As devices were designed to operate on higher frequencies, this standard was found to be too restrictive. Over the years, Part 15 was amended by taking a "device-specific" approach. That is, in response to petitions, the rules were amended to permit a specific RF device. By taking this approach, a number of inconsistencies and inequities in the technical standards contained in Part 15 developed. Additionally, the standards changed over the years due to improvements in equipment, such as receiver sensitivity, the proliferation of radio services, and changes to the frequency allocations of authorized radio services.

The Commission News Release states that this proposal will "restore the technical flexibility originally envisioned for non-licensed devices."

The FCC proposal starts with the

premise that there are two kinds of RF devices: intentional radiators and unintentional radiators. Intentional radiators are devices that intentionally generate RF, such as garage door openers, walkie-talkies and cordless phones. Unintentional radiators are other devices that generate RF, such as computers and receivers. In this NPRM, the FCC proposes various field strength limits depending on frequency. The ARRL lab is conducting tests to determine how these proposed standards would compare to the present ones.

The FCC has also proposed what it calls "Consumer Bands." These bands would have higher proposed radiation limits and could have a transmission range of up to 1000 feet. At least two of these Consumer Bands are amateur bands: 902-928, 2300-2310 and 2390-2450 MHz. Of course, these bands are already shared, as the Amateur Service is using them on a secondary basis. However the proposal could result in new interference problems.

The ARRL Technical Department is conducting a thorough examination of the proposal that will aid us in filing our comments with the FCC. The due date for comments to be received by the FCC was Dec 4; however, at press time an extension to March 7 was granted.

87-14, PRB-3 NEWS

The Commission is now in the process of reading and digesting the many thousands of comments it received concerning Docket 87-14, the FCC proposal to remove the bottom 2 MHz of the 220 band from the Amateur Service.

The ARRL continues to work with specialists in the field of congressional relations to identify and make use of every

likely source of support on Capitol Hill, and many interested members continue to write or meet with their representatives explaining the amateur position.

Due to the sheer volume of comments, as well as the upcoming holiday season, FCC action on 87-14 is not expected until January or February at the earliest. It is possible that this Docket could be delayed further due to vacancies on the Commission.

In 1985, the FCC proposed additional sharing of UHF television channels by the Land Mobile Service in Docket 85-172. Recently, the Commission decided to refrain temporarily from any action in this Docket.

What is of interest to amateurs in the fight to retain 220-222 MHz is the concurring statement by Commissioner James Quello. He states: "I would agree to the expedited time table adopted in this proceeding if I were convinced that there was an urgent need for Land Mobile sharing at this time. However, as I have stated on numerous occasions, the Land Mobile community has failed to demonstrate a need for additional spectrum. Indeed the Commission is currently evaluating comments on its own internal studies which cast doubt on the need for additional sharing. In my opinion, the issue of 'need', in and of itself, justifies a cautious approach to further Land Mobile sharing." (emphasis added)

On the PRB-3 front, Forest Industries Telecommunications (FIT) has made an *ex parte* oral presentation before some of the staff of the Personal Radio Branch. FIT is one of the groups interested in becoming the Special Call Sign Coordinator (SCSC). Our readers may remember that FIT filed comments in 87-14, not only supporting the

FCC's proposal, but suggesting it did not go far enough, and that another MHz should be taken as well!

It is interesting to note that in its presentation, FIT emphasized that "it was not involved in amateur politics" and that its position in 87-14 was "not relevant to PRB-3."

FCC AUTHORIZES ADDITIONAL CLUB "200" CALL SIGNS

Just at press time, HQ received a letter from the FCC regarding the use of the special "200" call signs in celebration of the Bicentennial of the US Constitution by preregistered clubs. Previously, the FCC had authorized only the special calls by preregistered clubs located in state capitals.

The FCC letter said that the original order "contemplated club stations at state capitals, but early experience has shown the desirability of a broader base of participation."

The letter then states that the club stations preregistered with the ARRL who are not in state capitals *are approved to use the numeral 200 in the prefix in accordance with the schedule published in September QST, page 15.*

ARRL individually notified 199 clubs of this action by mail. FCC will also permit some additional registrations, provided they are made in a reasonable manner.

Amateurs are reminded that only club stations registered with ARRL may participate, as it is an absolute necessity that each FCC Field Office be provided with an up-to-date database printout of all participating stations.

Any additional questions should be addressed to the ARRL Club Services Department at HQ.

ARRL FILES COMMENTS ON N4BAQ PETITIONS

The ARRL has filed comments regarding two Petitions for Rule Making, RM-6094 and RM-6095, submitted by Ray Adams, N4BAQ.

Adams submitted these petitions on behalf of the Volunteer Examiner Coordinator's Conference, held in Atlanta, Georgia last July. At that Conference the VEC representatives present, with the ARRL/VEC not voting, decided to submit petitions requesting FCC to relax the wording of the amateur rules concerning the amateur CW exam.

Our comments focused on clarifying certain procedural representations set forth in Adams' petitions, specifically that ARRL did not vote on any item during the National VEC Conference, and thus the ARRL is not in any sense a petitioner nor did it necessarily support the rule changes requested.

In our comments we said that it was "not desirable to create a situation in which an examiner can, in accordance with the rules, prepare an examination which includes

only a few of the letters, characters, punctuation, and prosigns, thus creating an examination which an unprepared person can easily pass. Should the proposed rule changes be implemented as proposed, the resultant vagueness in examination requirements would disserve applicants and examiners alike."

Our comments concluded by suggesting that further informal investigation and possible alternative solutions of this matter would be appropriate prior to a formal rule making.

PRB-1 SUIT FILED IN COLORADO

In 1985 Boulder County, Colorado amateurs believed they had won a major victory when the County specifically exempted amateur antenna installations from the definition of a "telecommunications element" under the Boulder County Comprehensive Plan. In fact, this plan states that "Amateur antenna installations shall be exempt from height limitations."

Two Boulder County amateurs, NQ01 and N6DIY, applied for building permits to erect 125-foot antenna towers in a rural residential subdivision. The County Zoning Administrator said the towers were considered "supporting structures," which are limited to 35 feet in the County. Amateurs requested a hearing before the County Board of Adjustments.

At the hearing, amateurs were represented by attorney Robert Neece, K0KR, with ARRL Rocky Mountain Division Director Marshall Quiat, AG0X, consulting.

Amateurs cited PRB-1, the Comprehensive Plan and the public service activities of local amateurs. Despite these arguments, the County Board of Adjustments found that towers are supporting structures which are limited to 35 feet. Furthermore, the Board said that PRB-1 did not apply since amateurs were not totally precluded from having towers, since they could still communicate using towers less than 35 feet in height.

Amateurs have now filed suit in both Federal and State Courts seeking to overturn the decision. Further information concerning this case can be had by contacting Dr D. R. Evans, NQ01, 7912 Fairview Rd, Boulder, CO 80303.

ANOTHER FOREST SERVICE REGION FEE PROPOSAL

The Intermountain Region of the US Forest Service has become the fifth such region to propose higher rental fees for communication site users on US Forest Service land. The Intermountain Region administers sites in Nevada, Utah, and portions of California, Colorado, Idaho and Wyoming.

Each of the five regions has proposed a different fee schedule. In this case, the region has proposed fees based on the population within a 40-mile radius of the communications site. The proposed fee for

a two-way radio site varies between \$600-\$1100, depending on the population category.

In cases where there is more than one user occupying a building on a site, the owner will become the permit holder, and the other users will be considered as tenants of the landlord, and these tenants will be charged one-half of the proposed fee.

The proposal did note that "under certain qualifying circumstances... fees may be waived or reduced."

The ARRL will file comments in opposition to this proposal similar to those filed previously with other regions.

PART 97 RULE CHANGE

As reported in our last issue, the FCC had denied five Petitions for Reconsideration pertaining to Novice Enhancement, Docket 86-161. The FCC press release had indicated that there were minor editorial changes to Part 97. HQ has now received the actual FCC Order which contains these changes. For those of you keeping track, here they are:

(1) The line entry in the table in Section 97.61(a) which shows frequency band 28000-29700 kHz and emission A1A is removed.

(2) Section 97(d)(3) is changed as follows:

Section 97.61 Authorized emissions.

(d) ***

(3) A station with a Novice or Technician control operator is authorized to transmit only emissions A1A and J3E in frequency subband 28300-28500 kHz.

GOLDWATER SCHOLARSHIP FUND CONTRIBUTIONS

The following have contributed \$25 or more to the Senator Barry Goldwater Scholarship Fund:

Six Meter Club of Chicago—K9ONA; Nashua Area Radio Club; Nancy Ross in memory of Carleton Ross, W9ABA; De Witt Jones, W4BAA, in memory of Carleton Ross, W9ABA.

The Scottsdale (AZ) Amateur Radio Club, WA7APE, has donated \$1000 to the Goldwater Scholarship Fund.

SECTION MANAGER ELECTION NOTICE

To all ARRL members in the Illinois, Indiana, Maine, Northern Florida, Oregon, Santa Clara Valley, Vermont and Wisconsin sections: You are hereby solicited for nominating petitions pursuant to an election for Section Manager. Incumbents are listed on page eight of this issue.

A petition, to be valid, must contain the signatures of five or more Full ARRL members residing in the Section concerned. Photocopied signatures are not acceptable.

(continued on page 56)

PRB-1—The Radio Amateur's Tool in Antenna Cases

Amateurs know that an antenna is a thing of beauty. Unfortunately, not everyone agrees. Amateurs have been erecting antennas and support structures for nearly a century, and local officials have been attempting to impose restrictions on them for almost as long.

In years past, amateurs relied on their powers of persuasion in dealing with these officials. Conflicts between amateur operators and local authorities over the antenna height, the placement in the yard, the number of antennas on a particular support structure, and the like, are quite common. Although the FCC has set no specific height limitation on amateur antennas, amateurs must inform the FAA if they intend to erect an antenna in excess of 200 feet. Furthermore, there are very specific height limits if an amateur antenna is to be erected near an airport or its associated flight path (see Section 97.45 of the Amateur Service Rules, and Part 17 of the FCC rules generally). In the absence of detailed Federal regulations governing amateur antennas, municipal officials often fill in the void by enacting regulations limiting antennas and their supporting structures. These regulations seldom take into account the amateur's need for an antenna of certain dimensions and height in order that it may work effectively, and so conflicts arise.

The situation reached epidemic proportions in the early 1980s, and the amateurs who invested family savings in fighting local zoning, building code and covenant restrictions in courts around the country were losing, due to the absence of a clear statement of any interest in the matter by the FCC. The courts said that certainly the FCC regulates radio, but in the absence of a clear statement from FCC that limits the zoning power of cities and counties, the traditionally local interest in zoning regulations which protect the public generally must supersede that of the amateur.

By October of 1983, the ARRL Board of Directors reviewed the adverse court decisions and realized that antenna restrictions would continue to be a major stumbling block unless a statement of Federal preemption of local zoning ordinances was issued by FCC. On July 16, 1984, the League filed with FCC a formal request for issuance of a declaratory ruling which would declare void all local ordinances which preclude or significantly inhibit effective, reliable amateur communications. Many hundreds of comments were filed when FCC established a pleading cycle, labeled PRB-1. Comments were filed by amateurs, zoning authorities and city planners.

September 19, 1985 was a red-letter day in the history of Amateur Radio, as the

FCC issued its declaratory ruling. In this month's Washington Mailbox, we will discuss zoning ordinances and building codes, and how they are affected by PRB-1. Deed restrictions will be covered in the next installment of this column, as covenant restrictions are fundamentally different from zoning ordinances and building codes, and provide unique challenges to the amateur who wishes to erect an antenna of significant size.

PRB-1

Q. What does PRB-1 mean for the radio amateur faced with antenna restrictions?

A. Issued by the FCC, PRB-1, cited as "Amateur Radio Preemption, 101 FCC 2d 952 (1985)," is a limited preemption of local zoning ordinances. It states three rules for local municipalities to follow in regulating antenna structures: (1) state and local regulations which operate to preclude amateur communications are in direct conflict with Federal objectives and must be preempted; (2) local regulations which involve placement, screening or height of antennas based on health, safety or aesthetic considerations must be crafted to accommodate reasonably amateur communications; and (3) such local regulations must represent the minimum practicable regulation to accomplish the local authority's legitimate purpose.

Q. How can the Federal government limit the local zoning power of the city and county officials, who are much closer to the local land use conditions and who must protect the general public?

A. PRB-1 recognizes the fact that local authorities can regulate amateur installations to insure the safety and health of persons in the community, but holds that such regulations cannot be so restrictive that amateur communications are precluded. Nor can the regulations be more restrictive than that necessary to accomplish the local purpose of protecting the community. The theory of PRB-1 is that there is a reasonable accommodation to be made between the amateur's communications needs and the obligation of zoning authorities to protect the community's health, safety and general welfare. Just as it is the zoning official's job to insure the general welfare of the community, it is the FCC's job, dictated by Congress, to protect and enhance interstate and international communications, such as those provided by the Amateur Radio Service. PRB-1 notes that while there are certain general state and local interests which may, in their even-handed application, legitimately affect Amateur Radio, there is nonetheless also a strong Federal

interest in promoting amateur communications. Evidence of this interest may be found in the comprehensive set of rules that the Commission has adopted to regulate the Amateur Service.

Q. Why does PRB-1 not specify a "reasonable" height? How high can I put my antenna before the zoning officials can tell me to stop?

A. It is true that the FCC declined to state what it considered a reasonable height below which a city or county cannot regulate antennas. Many commenters suggested certain minimum heights that they considered necessary for effective amateur antenna performance. What might be reasonable in one area might not be in others. Few would suggest erecting a full-size 80-meter Yagi atop a 150-foot tower behind a townhouse, for example. Yet that same antenna is entirely acceptable in a more rural environment. As a general principle, however, a municipality which establishes a blanket height limitation of any type, especially one which does not permit at least 65 feet of antenna height, will have a difficult time justifying that limitation as a technical matter, in light of PRB-1. Even that height may be inadequate in many terrain conditions.

Q. Now that PRB-1 has established a limit on local zoning authority, can I just put my antennas up to a reasonable height, assuming that the ordinance in my town is in violation of the FCC's policies?

A. Absolutely not. The PRB-1 Order is no more than a statement of policy by the FCC. If you believe that your town's ordinance is not valid in light of PRB-1, it is up to you to establish that and get the ordinance changed by the city or county council, or to have the existing ordinance declared invalid by the state or Federal courts in your area. To violate the ordinance, or to put up an antenna without a permit, can subject you to serious fines and even criminal penalties. In encouraging local municipalities to afford appropriate recognition to the Federal interest in amateur communications, the FCC said that amateurs who believe that local or state governments have been overreaching and have precluded their communications goals may use the PRB-1 document to bring FCC policies to the attention of local tribunals and forums. It is still up to you to prove that the existing ordinance is not in accord with PRB-1.

Q. What do I need to do to prove that the ordinance in my town is in violation of PRB-1?

A. Essentially, the issue is one of

engineering evidence. You should be able to establish that you need an antenna of a certain height in order to reliably communicate on amateur HF, VHF and UHF bands. League HQ can assist you in preparing technical materials for your presentation to the planning board, city council, or at a zoning hearing. For a copy of the "PRB-1 kit," send the Regulatory Information Branch at HQ a large 9 x 12 self-addressed envelope with \$1.41 in postage affixed. This package of information will include PRB-1, sample ordinances and other related material which will be helpful to persons faced with unreasonable ordinances. The names of two ARRL Volunteer Counsel will also be given. PRB-1 can also be found in November 1985 QST, pages 60-63.

The usual concerns of a municipality in deciding how to regulate antennas are *aesthetics, safety, property values and fears of interference (RFI)*. As to the aesthetics and property values issues, which are related, the municipality's interests must be balanced against those of the amateur. No one can convince a person that an antenna looks good if they feel otherwise, but it can be established one way or another what effect an antenna of a certain height will have on property values. *Studies that the League has conducted have shown that nearby antennas have no effect whatsoever on property values.* The opinion of a local professional appraiser is a beneficial bit of preparation. The safety factor can best be addressed through exhibition of tower manufacturer's specifications for tower erection. Be sure to explain that there is no relationship between antenna height and safety. The safety issue is best dealt with by ensuring integrity in the installation,

especially relative to the size of the base and guying factors. Finally, as to RFI, that subject is solely for the FCC to consider. It is not at all subject to local regulation, and is not properly a part of a zoning official's deliberations.

Q. Judges, city councils and zoning officials place considerable emphasis on the way past similar cases have been decided. Has PRB-1 been used in a court case successfully?

A. Yes. John Thernes, WM4T, successfully sued the City of Lakeside Park, Kentucky, after initially receiving an adverse determination by a United States District Court judge. Thernes had applied in 1982 for a building permit for a 78-foot tower and antennas. The city denied his application, claiming that the zoning ordinance did not permit antennas and support structures. Thernes sued the city, and a United States District Court judge noted in 1984 that there was no statement of FCC preemption of local zoning regulations. Thernes appealed to the United States Court of Appeals, and on the eve of the oral argument in that case, the FCC issued its declaratory ruling, PRB-1. That was enough for the appeals court to send the case back to the District Court for reexamination. The same District Court judge who had ruled against Thernes earlier this time indicated that he was inclined to rule the other way. The City agreed to have a judgment entered against it, and Thernes was able to put his tower and antennas up 73 feet. He was awarded attorney's fees in the amount of \$13,800 as well. The judge, in the consent judgment, noted that municipalities have an obligation, pursuant to PRB-1, to cooperatively arrive at an

accommodation for amateur antennas in local zoning ordinances.

Most recently, PRB-1 was relied upon by a United States District Court judge in voiding an antenna ordinance in Sands Point, New York, which limited antennas to no more than 25 feet. The Court held that a limit of 25 feet of antenna height seriously interferes with the full enjoyment of the amateur's license to operate an Amateur Radio station. Though the Court noted that testimony supported minimum antenna heights of between 60 and 70 feet for good reception under ideal atmospheric conditions, the Court found it unnecessary to reach the issue of what height is necessary. Rather, it was only necessary in that case to find that a 25-foot blanket height limitation was not reasonable in light of PRB-1.

Q. Does PRB-1 require that the homeowner's association and architectural control board in my subdivision approve my antenna once I have the building permit for the tower from the city?

A. PRB-1 specifically was limited by the FCC to apply only to zoning ordinances and building codes. The FCC said that its ruling does not apply "to restrictive covenants in private contractual agreements. Such agreements are voluntarily entered into by the buyer or tenant when the agreement is executed and do not usually concern this Commission." In the next installment of this column, we will examine how restrictive covenants arise and what one can do about them.

[Note: Questions in this column are typical of those asked of ARRL HQ staff. Questions and answers which appear are prepared by ARRL staff and have been reviewed by ARRL Counsel Chris Imlay, N3AKD for agreement with current FCC interpretations and policy.]

Happenings

(continued from page 54)

No petition is valid without at least five signatures *on that petition*. It is advisable to have a few more than five signatures on each petition.

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

(Place and date)

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

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

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

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

for nomination.

Petitions must be received at Headquarters on or before 4 PM Eastern Local Time March 4, 1988.

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

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

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

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

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

Richard K. Palm, K1CE
Field Services Manager

SECTION MANAGER ELECTION RESULTS

Balloting results: In the Alabama Section, James M. Spann Jr, WO4W, received 653 votes and Joseph E. Smith Jr, WA4RNP, received 172 votes. Mr Spann was declared elected.

In the Delaware Section, Robert J. Pegritz, KC3TI, received 135 votes and Carl M. Dennis, KC3RY, received 54 votes. Mr Pegritz was declared elected.

In the Kansas Section, Robert M. Summers, K0BXF, received 335 votes and Clayton L. Robinson, W0FRC, received 238 votes. Mr Summers was declared elected.

In the Michigan Section, George E. Race, WB8BGY, received 1320 votes and Adam Paul Banner, WB8TQR, received 330 votes. Mr Race was declared elected.

In the New Mexico Section, Joe T. Knight, W5PDY, received 363 votes and Bob Scupp, W5YYX, received 156 votes. Mr Knight was declared elected.

Their term of office began January 1, 1988.

How's DX?

Conducted By Ellen White, W1YL/4
19620 SW 234 St, Homestead, FL 33031

DXAC News

At copy time, ARRL DX Advisory Committee Chairman W4FRU released the following items.

"Restructuring the DXCC: This is the year in which we celebrate the US Constitution, and I believe it and the DXCC rules have at least one thing in common. Neither was perfect in the beginning and each has been amended many times. In reviewing the history of the DXCC, I further believe that the framers of its rules were about as loose as the framers of the Constitution. Yet, each set forth a set of basic rules which, with timely modifications, has served its constituents well. The DXAC is listening to the DX community's comments and recommendations, and is assessing the practical application of many suggestions. The DXAC is also drawing upon 50 years of history and experience in administering the DXCC. It appears as if there will be some recommended changes."

(The DXAC chairman and subcommittee chairmen for the DXCC study were scheduled to meet in Oakland, California, the first part of December to finalize a draft proposal of DXCC rules.) "The recommended rules will then be forwarded to the ARRL Board of Directors for its consideration. As chairman, I cannot predict what our final product will look like. However, I can assure you that we will strive to maintain the integrity and merit of difficulty of our present program while at the same time providing fair, impartial and attainable goals.

"CW DXCC: This past October the DXAC voted not to recommend rolling back the start date of the CW DXCC Award to 1945, to coincide with other awards. Many DXers feel that the CW award, representing our first form of high-frequency communication, should have preceded or at least have had the same starting date as other, more modern, forms of communication.

"Aruba: During October the DXAC voted again whether to recommend that Aruba be added to the DXCC List. The last vote on this matter was defeated as a result of a tie vote. Normally the petition would not be considered again until a lapse of two years. However, the DXAC rules provide that the chairman may, at his discretion, waive this waiting period if (in his estimation) sufficient additional information has been received to reconsider the petition. This discretionary privilege was exercised.

"Arab Democratic Saharawi Republic: The Lynx DX Group of Spain has petitioned the ARRL for recognition of the Arab Democratic Saharawi Republic as a new country addition. I commend the Lynx DX Group for its excellent supporting documentation. To date there has not been any adverse comment from within the DXAC on this petition. Vote was scheduled for Dec 15, 1987. If the DXAC votes affirmatively, it will probably recommend that the effective date be made retroactive."—W4FRU, Chairman, ARRL DX Advisory Committee, October 30, 1987

[Editor's Note: My mailing deadline for this January issue is Nov 9, and the above material was received Nov 6. Results of the items under consideration will be carried ASAP.]

WORKED ALL BRITAIN (WAB) AWARDS

The WAB Group was founded almost 20 years ago by G3ABG to promote a greater Amateur Radio interest in Britain. The award itself reflects a grid system of Great Britain and Northern Ireland. G4GEE wants to particularly commend the recent achievements of 4X4JU and ON6JG. Recently the group was in the proud position of awarding its premier award for the first time to a station outside of Europe: to Malik Webman, 4X4JU. This achievement was for working 1100 of the 4000 WAB areas—remarkable in that only a moderate percentage of these areas actually have resident hams. (Malik spent a lot of time persuading mobiles to divert from their planned routes!) This achievement follows hard on that of Jan Galicia, ON6JG, who became the first non-G station to qualify for a Diamond Award last year. (He subsequently has been awarded trophies for working 3000 and 3500 WAB areas.)

Full details on this interesting program are available from Dr. R. J. Nash, G4GEE, 135 Farren Rd, Wyken, Coventry, CV2 5EH, Great Britain.

BRUNEI

New Awards from the Brunei Scout Association Amateur Radio Club! Commemorating 10 years of participation in the Jamboree on the Air (JOTA), a special certificate is available to non-Zone 28 stations who contact four V85 stations and two club stations (V85s BS BP JAM TS BSJ). Contacts are valid for the period Oct 17, 1987 to April 17, 1988, any band/mode.

The Brunei Scout Association ARC Award is available to those outside Zone 28 who contact three V85 scout members (V85s BA HG IR HD RA SB SK RM DU MI NO MH), and two club stations (see above).

Log extracts, copies of the cards, along with \$5 US (each) go to the Award Manager, Box 2227, Bandar Seri Begawan 1922, Brunei Darussalam.

HAMIGOS EN LE SOL

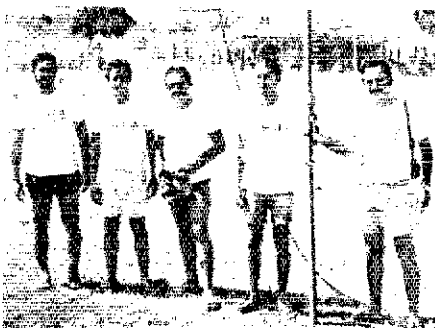
WIHTL has been going to Spain for the past four years and wants to let the ham world know about the great group in Torremolinos, Spain, on the Costa del Sol. Hamigos, the brainchild of EA7DGA (ex-G2ANX), aims to help visiting and resident hams to make contact both on the air and in person. A popular "club" feature is Sunday brunch (1200-1500 local time) at the Restaurant Hawaii (owned by EA7ASI).

AUCKLAND/CAMPBELL 1988 DXPEDITION

Preparations were almost complete at year-end for this ambitious undertaking by ZL9s BN BQD AMO, scheduled for two weeks in February, all bands CW/sideband. Two scientific people will accompany the group and insure excellent documentation and photography. The group is still hurting for funds to offset the operation. Contact Ron W. Wright, ZLIAMO, 28 Chorley Ave, Auckland 8, New Zealand.

FERNANDO DE NORONHA

The Natal DX Group, thanks to the Brazilian Air Force, activated ZY0 on RTTY, AMTOR, CW and sideband, on 10-40 last September. Propagation was very unstable, but the Natal DX Group amassed about 1200 contacts. This was



The Natal DX Group on Fernando de Noronha included PS7s BF WB KM PC BY, as ZY0s FMC FCA FKL FCM FRT (see text).

a first for teletype from Noronha with 18AA being the first contact. The group is planning bigger and better things this September, hoping for good propagation. QSL via the Natal DX Group, PO Box 385, 59001, Natal, RN, Brazil.

1988's ROYAL NATIONAL EISTEDDFOD OF WALES

This event, unique to Wales, is probably the biggest and oldest popular cultural event in the world, dating back over a thousand years. To be held Jul 30-Aug 6, it could well be the focal point of your 1988 summer holiday. The Newport Amateur Radio Society will operate GB2EC monthly as part of their preparations for the grand event, which will demonstrate a satellite receiving system, computers in Amateur Radio, and a display of home-brew and modified equipment. A unique addition will be a small audio oscillator connected to a Spectrum computer running a Morse-reading program—the kids are always amazed! The club is also sponsoring a photo competition, with photos received to be used as part of their display to show as many facets of Amateur Radio as is possible. Photo Category C will depict Amateur Radio in the World. Entries may be color or black and white and under 8 x 10 inches. (Clearly mark the reverse with name, address, call, etc. Photos to be returned must include SAE or IRCs.) Detailed information is available from the Newport Amateur Radio Society, GB2EC, Box 33, Newport, Gwent, Wales.

AN EVENING WITH MISS BHARATHI, VU2RBI

The Delta DX Assn of New Orleans hosted VU2RBI last September and found her slide presentation first rate. The trip to the Andamans required three-and-a-half years to clear permission. She asked hams worldwide to petition the Indian Government to permit another expedition to the Laccadives. Her address: Miss



VU2RBI (holding plaque, center) and the Delta DX Assn in New Orleans. See text.



(L-r) OY8M with OY5T enjoying some warm Florida weather (see Circuit). (W1YL photo)



Gee Whiz! First-Class CW Operators well known on the DX-contest-QRP circuit include G4BUE (top) and G3VTT. (W1YL photos)

R. Bharathi, VU2RBI, Asst Dir, National Institute of Amateur Radio, 5-B, PS Nagar, Hyderabad 500 457, India.

CIRCUIT

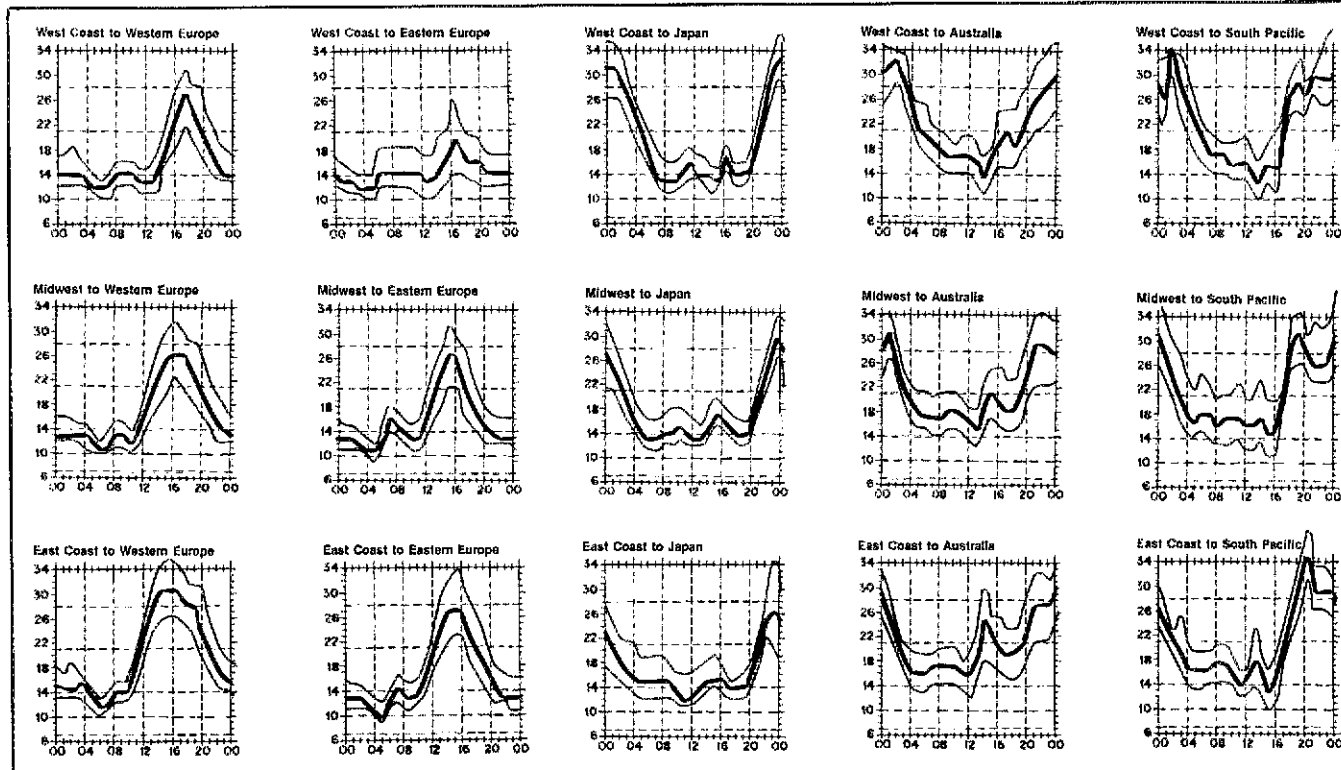
□ **OY7ML:** Old friend Martin advises that his call is still being pirated and that he is sick and tired of responding. The phony seems to be active during afternoons European time. (Now, *this* explains why OY7ML didn't seem to know this op last QSO!)

□ **Help!** K5HT is looking for TT9BL op Dave, for May of 1972; 5V7GE, op Ed, for May 1980; both 20-meter sideband. Aid goes to George Lee, K5HT, 612 Gemi, Longview, TX 75604. K1KOB wants to locate KZ5BA "Bob," worked on 20 CW in August of 1978; info (please) to Ralph King, 3409 Mornington Dr, Chesapeake, VA 23321.

□ **KL7MF:** KL7PJ relays the news that Hal, KL7MF, has had a severe stroke. Hal, KL7MF,



C21XX (see Circuit). (Thanks WB6GFJ)



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

a veteran DXer, would welcome your notes, etc, to his *Callbook* address.

□ **OY:** OY5T reports that the Faeroes Radio Amateurs group contains 125 club members with OY9JD president and OY5T VP (see photo).

□ **C21XX:** The peripatetic WB6GFJ notes that C21XX is back in Australia, being reissued his old VK5 call. Cards for C21XX and C21YL go to Eddie DeYoung, VK5XE, GPO Box 1021, Adelaide 5001, Australia.

□ **ZK2:** Mary Lou Brown, NM7N, and Jan Scheuerman, WB2JCE, will be operating from ZK2MB and ZK2JS Feb 21-26. They're planning both CW and sideband. Suggested spots: 7025 7225 14025 14225 21025 21125 21300 28025 28125 and 28300. QSL via their home calls.

□ **SU1SK:** IK8AUC says he isn't the manager (thanks VE3DTQ, VE1ACK and K6TS).

□ **Uruguay:** Special prefixes/routes for Fall's CQWW Phone: CW2A via CX2AAL (Box 4, Montevideo), CW4C via CX4CR, CW4B via CX4BBH, CW5A via CX5AO and CW8B via CX8BBH.

□ **N8BJQ/J6:** QSL via W8IMZ.

□ **P40GD:** W2GD operated CQWW CW from the extreme eastern tip of the island near San Nicholas. QSL via N2MM.

□ **TA:** K14PR (along with N4EXR) is operating on a temporary trial basis for a year. QSL TA2/K14PR via Jim Walsh, American Embassy, APO NY, NY 09254-0001, or c/o TRAC, PO Box 14, EMEK, Ankara, Turkey.

□ **VU4GDG:** The October Andamans operation by the Coimbatore Amateur Radio Club gets confirmed via Box 3755, Coimbatore 641 018,

India. VU2GDG indicates that this is pretty much the same group as for the Laccadive operation.

P40M
P40P
S0RASD

TJ1BP
TJ1DL
T77E
VP2EB
VP2ED
V47Z
XE2GKG

XE0KNE
XX9G
ZK1XO
3D2RY
4C2C
5Z4PT

8P9HR
8R1X

9J2BO

(N1CIX)
(N1CIX)
Arseli Echeguren, Las Vegas
81,01479 Luyando (Alava), Spain.
(VE3NPL)
(DK8SO)
(I0MWI)
(WA1PWF)
(KA1PGP)
(W4MGX)
YASME Foundation, Castro Valley,
CA 94546
(W5KNE)
(PA0GMM)
(KA7NLE) 1987 only
(OH1RY)
(XE2PQ)
Gerard Petiot, PO Box 30197,
Nairobi, Kenya, Africa.
(K4BA1)
Marcellus, 264 New Garden St,
Queenstown, Georgetown,
Guyana, SA
(W6ORD)

QSL Corner

Administered By Joanna Hushin, KA1IFO

Here is some information for those of you who would like to QSL a QSL manager or direct to the station location. It is passed along as we receive it and, therefore, may not be accurate. The call sign in parentheses is the QSL manager.

CE0DFL Box 1, Easter Island, Chile, SA
CS6CDL (CT1CDL)
CW2A (CX2AAL)
C21NI (OH1RY)
FG5EM/FS (W1UQ)
FG5UQ/FS (W3HMK)
FG5YL/FS (K1YL)
FT0WA (F6FNU)
HC8DX (K6VNX)
HL9BK (K2KSY)
KG4GN (AA6AC)
JW5E (LA5NM)
KH2D (KA3T)
KP2A (NE8Z) CQ WW SSB
OH3BM/4U (OH3RF)
ON5SQ/3X (ON5SQ)

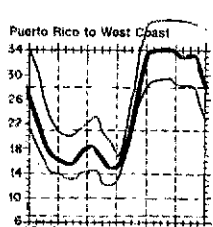
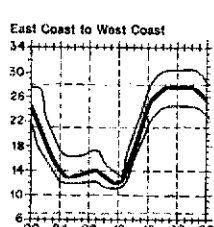
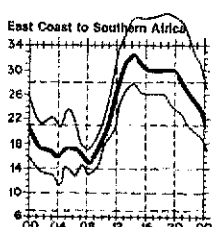
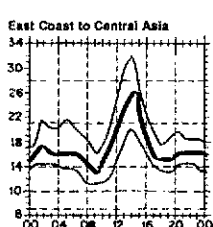
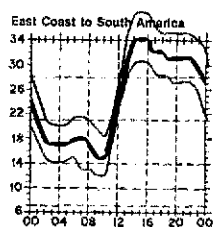
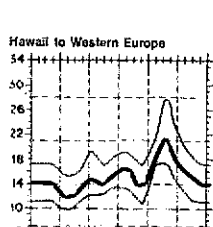
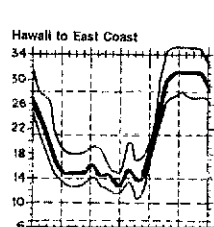
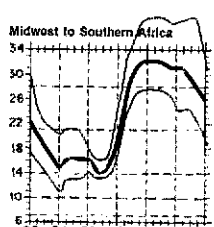
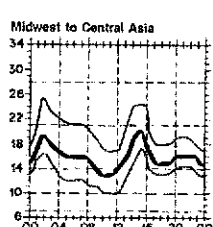
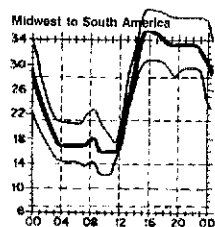
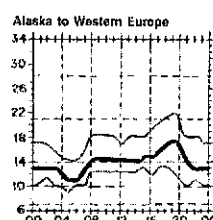
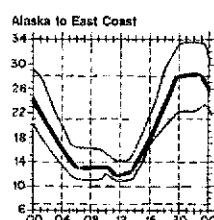
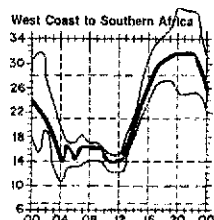
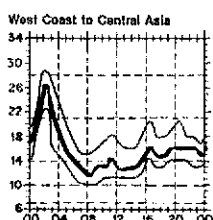
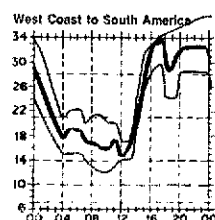
SPECIAL NOTES

W9JW Not the manager for TJ1FF
N6TY Not the manager for XX9NZ
NJ1Q Not the manager for AP2ZA

QSL MANAGER VOLUNTEERS

KA6SAR
KB4GID
N0CXV

□ QSL Corner, December 1987 *QST*, page 56, contains information and addresses for the ARRL Incoming Bureau. QSL Corner, Sept 1987 *QST*, page 63, contains information on the operations of the ARRL Outgoing Service. For additional information on bureau operations (Incoming and Outgoing), send a self-addressed, stamped envelope to ARRL QSL Bureau, 225 Main St, Newington, CT 06111.



Universal Time (UTC); the vertical axis, frequency in MHz. See April 1983 *QST*, pp 63-64, for a more-detailed explanation. The 3rd edition of *The ARRL Operating Manual* contains similar charts for a range of sunspot numbers and times of the year. Data provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for January 16 to February 15, 1988, assume a sunspot number of 67, which corresponds to 2800-MHz solar flux of 118.

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.

QST ON MICROFICHE

□ Recently, I purchased [from a private company] the entire collection of QST on microfiche. This has proven to be one of the best investments I have made in Amateur Radio.

What a thrill it is to see the evolution of our organization and the development of our hobby. A lot of work was done by our forefathers and it's extremely good reading to see what they started out with and how they solved the problems they faced.

Often I hear, for example, that we have a problem of unlicensed and discourteous operators that didn't exist in the past. Well, from reading these past issues of QST, these operators have always been a problem. Perhaps there is just more publicity now.

While microfiche is not as handy as having the actual magazine, they do take up quite a bit less space. I can research through the indexes and find articles faster than pulling out all the magazines. I am fortunate in having a photocopier to make copies of articles, but anyone can do that at their public library.—*Tom Mills, KF5DS, Greensboro, North Carolina*

ON QSLING

□ I have been on the air now for about a year. Each time I make a contact, I make out a QSL for the amateur with whom I have just chatted. Today, I got a letter (and it's not the first time) which basically said "...if you expect a QSL from someone, you should send them an SASE or if DX, IRCs."

I understand that if you want a card from a DX station, an IRC should be sent. However, if a person in the US gets a card, I don't think that it is too much to ask for a return QSL. Amateurs should state on the air that they require an SASE.

I enjoy sending QSLs and receiving QSLs, and at age 15, a lot of my money goes to postage. I know it can get expensive, but I don't think it is too much to put 14 cents on a postcard and to put it in the mailbox.—*Kevin Biekert, KB5AQV, Houston, Texas*

[If you live in Vermont, Wyoming or some other "rare" state, you may have a slightly different perspective. Hit—Ed.]

ELMERS TO THE RESCUE

□ I have been a CB operator since 1970, but no more! Now, I'm a ham.

After studying and passing my test for Novice, my next step was to purchase a rig. I found a station for sale from a local ham which included a tower and antennas, so I bought it.

I knew a local ham and told him of my

problem: I was "here" and the rig was "there." Since I am a paraplegic, I have limited mobility and was unable to set up the station. Then, one ham became many, and they took apart the station and moved it to my QTH where they dug holes, planted and guyed "my" tower and got me on the air. My thanks to: Tony Depeape, W5UPC, Arlyn Stuart, AA5BS, Tom Willbeck, N5KGN, and Bill White, KB5AJE.—*Jerry Fairbanks, KB5BKF, Longview, Texas*

DUMMY LOADS—THE SOLID STATE MYSTERY

□ I, along with other amateurs, have been told over and over again by frustrated operators that a dummy load should be used to tune up a rig. After reading a letter in the November Correspondence column of QST regarding this problem, it occurred to me that each of us is under a real misconception as to the use of that "necessary piece of equipment."

The dummy load was used in days gone by—before the advent of the solid state rig—to tune the output stages of a transmitter to 50 ohms so that the impedance of the antenna could be matched. Then we could have "full output power" and be confident of working that rare DX station. The "problem" today is that so many of those "solid state wonders" already have a fixed impedance output of 50 ohms, so we don't need a dummy load. There is no use in tuning up a solid state rig which already presents 50 ohms into the dummy load. Now, we also have that little piece of magic called the antenna tuner, but how do we use it? Well, we put a carrier on the air and tune the antenna so that we get maximum output. Wait a minute! Are we actually tuning up "on the air"? Well, yes, we are, basically because there is nowhere else to do it.

I guess this entire discussion can be condensed into a few choice words. Use common sense and find a clear spot on the band to tune your antenna. Of course, if you are a guy like me who at times likes to put a rig like the old Swan 700CX on the air, then yes, you do need a dummy load in addition to an antenna tuner. The basic rule still prevails, however: With reduced power, tune up on a clear frequency so that the rest of us don't have to endure the tuning of your antenna after you've used the dummy load to bring the rig to 50 ohms.—*Joe Cotignola, N2HOU, N Middletown, New Jersey*

THE ENHANCED NOVICE/TECHNICIAN

□ I've really been quite amused with all

the pro and con comments in recent months regarding the influx of Novice and Technician operators to 10 meters and to 220 MHz. I, for one, am most pleased with Novice Enhancement because I felt that the times are changing and Amateur Radio must change with them.

Now that we have been able to observe Novice Enhancement after being in effect over six months I am most pleased, with two exceptions: There is an element of the amateur community which apparently feels that unless one holds a General class license or better, one is not really a ham. In fact, this element goes so far as to exclude the other classes of operators from their small world and will try to encourage other operators to do the same. One wonders if they learned CW before learning to talk! Where is the compassion, the brotherhood, the understanding...the intelligence?

My second exception is that without the guidance of more experienced and compassionate amateurs (Elmers) some Novice and Technician operators are ignorant of standard operating procedure when DX comes on 10 meters or when operating on a 220-MHz repeater. When I learned the rules of the game, it was listen first, then talk. Observe how other hams operate and then take your turn. For you old-timers, remember that newer operators are using your operating practices as a guideline.

Courtesy, tact and patience are the elements of a real ham...not the class of license or quality of equipment. If you're satisfied with your Novice or Technician class, then don't let the stigma of not upgrading take away from the quality of your hobby. If you really want to upgrade, then don't let anything stop you. There's help out there; just ask!—*Robert H. Lieberman, WA9JWN, Skokie, Illinois*

THINK BEFORE YOU TRANSMIT

□ The other morning I got up and tuned to the low end of 40-meter CW. I heard an Australian operator with numerous stations calling him. Most of these stations were zero-beat with the VK. I wondered if my 150 watts and balcony-mounted trap vertical could get through these kW's. I had to call only twice to get the VK!

I am not very active these days, but it seemed quite obvious that I ought to (1) Call on a frequency a few hundred hertz above or below the VK which is different from where others are calling; (2) Send slowly, steadily and without repeating one's self and (3) Never call "on top" of a QSO not yet over.—*Stan Gibilisco, W1GV, Sarasota, Florida*

New Russian Satellite Sparks Interest Surge: Part 3

In previous months, I have discussed the new Russian Amateur Radio transponders, RS-10 and RS-11, and their telemetry suite. This month you'll learn how to use the Robot QSO machines on these Russian birds.

A Robot, as the term is applied to the RS (Radio Sputnik) satellites, is an "auto-responder," or automatic QSO machine. In other words, it's a small computer on board the satellite that can engage you in a simple CW QSO, respond to your call, log it, and send you a radio QSL. Later, if the Soviet operators keep to the practice established years ago with the RS-5 and RS-7 Robots, you may get a QSL card in the mail, too.

As I explained in earlier columns, both RS-10 and RS-11 are on the same spacecraft, and have similar functions. However, they operate on different frequencies and cannot be in operation simultaneously. The frequencies that the Robots use are given in Table 1.¹

An experienced satellite operator, Ray Soifer, W2RS, explains the Robot access procedure this way: First, listen for the Robot on one of the downlinks indicated in Table 1. If the Robot is ready for action, it will tell you so by sending CQ DE RS10 or CQ DE RS11 and then indicate the frequency on which it will listen for your call. Then, all you need to do is call the Robot as follows, using your call in place of W2RS, in the following example:

RS10 DE W2RS AR

If the Robot has heard your signal, it will respond with something like this:

W2RS DE RS10 QSL NR 775 OP
Robot TU USW QSO 775 73 SK

It is not clear what "USW" means, but the rest should be evident to most amateurs. TU is Thank You, obviously. QSLs may be sent to the usual QSL address, ie, Radio Sport Federation, PO Box 88, Moscow, USSR.

The RS birds built and launched by Russian Amateurs have traditionally been simple, rugged devices designed primarily to serve Soviet-bloc nations, where modern VHF and UHF radio equipment is difficult to get and very expensive. Consequently, RS satellites have tended to exploit the high frequencies (HF) to a much greater extent than Western satellites have in the last decade.

This may change somewhat in the future as a result of several factors. For one, the next few years will see a rise in solar activity. That will result in increased ionospheric density. Of course, this is a

Table 1
RS-10 and RS-11 Auto-Responder (Robot) Frequencies

Transponder	Mode	Uplink Frequency, MHz	Downlink Frequency, MHz
RS-10	A	145.820	29.357 or 29.403
RS-10	K	21.120	29.357 or 29.403
RS-10	T	21.120	145.857 or 145.903
RS-11	A	145.830	29.407 or 29.453
RS-11	K	21.130	29.407 or 29.453
RS-11	T	21.130	145.907 or 145.953



Leonid Labutin, UA3CR (left) and your column conductor met in Moscow last October to discuss joint Amateur Radio satellite projects.



Alexandr Papkov (left) and Viktor Samkov, of the Tsiolkovskiy Institute near Kaluga, are shown with the RS-10 and RS-11 transponders. (Reprinted from the cover of May 1987 Radio.)

boon to HF users of F2 propagation. But have you considered what it might mean to a satellite emitting, say, 15-meter signals on the outside of the F2 layer?

Obviously, at the peak of the solar cycle, which will arrive in a few years, very little 15-meter energy will get through from satellites radiating from above the F2 layer. Indeed, during the last solar activity peak in the late 70s and early 80s, it was fascinating to listen to the 10-meter downlinks of various satellites such as RS-1, RS-2 and AO-8 play peekaboo through various holes in the ionosphere.

So, for their next generation of RSs, which will operate during the next peak of the solar cycle, our Soviet colleagues will likely plan more extensive use of VHF and UHF frequencies than they have in the past. This effort may be abetted by new cooperation that now seems possible between the RS builders and the builders of the OSCARs in the West.

I recently had the pleasure of meeting with Leonid Labutin, UA3CR, at the "Space Future Forum" in Moscow, and later at his home. Leo is widely recognized as the foremost Amateur satellite enthusiast in the Soviet Union. He has undertaken to form a new affiliate of AMSAT, AMSAT-UA, for the express purpose of facilitating joint spacecraft projects. This could, in turn, lead to more extensive use of VHF and UHF by RS builders and increase launch access for all the Amateur Satellite community.² The fruits of this new era of cooperation may begin to become evident by the time you read this column.

In general, cooperation in building and launching Amateur Radio satellites can have strong symbolic meaning as well as substantive benefits for Amateurs worldwide. Next month I'll begin to introduce you to the new AMSAT Phase 3C satellite due for launch in a couple of months.

Notes

¹A complete list of frequencies employed by the RS-10 and RS-11 transponders was published in this column in October 1987.

²Launches are the rarest of all resources in the Amateur Satellite community. Launches are so rare that when one is identified and committed to, it can—and does—change the entire Amateur Satellite community. AMSAT and its affiliates try to obtain launches from all possible sources. We will accept a launch from virtually any dependable source. Against the existing background of a supreme appetite for launches (commercial, military, amateur), recognize that the USSR currently out-launches the rest of the world combined by a 10 to 1 ratio! In this context, it certainly makes sense to seek a symbiotic relation with the RS team.



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General Manager: Raymond Staines, VE3ZJ
CRRL Outgoing QSL Bureau: Box 113,
Rothsay, NB E0G 2W0
Bureau Manager: Donald Welling, VE1WF

Canada-Soviet Agreement Clears Way for Skitrek Communications

DOC has announced the signing of a special reciprocal-licensing and third-party-traffic agreement between Canada and the Soviet Union. This agreement, believed to be the first of its kind between the Soviet Union and a Western nation, is the result of many months of work by CRRL officials. It became effective on 1987 November 01 and will remain in effect until the completion of the joint Canada-Soviet Union "Polar Bridge" Skitrek expedition scheduled for February and March of this year. It clears away the last legal obstacle that would have prevented Skitrek members from using Amateur Radio as their basic means of communications with the outside world during the course of the expedition.

Following an enthusiastic response to calls for assistance made in this column and in the *CRRL News* bulletins, CRRL had well-known DXer and contestor Barry Garrett, VE3CDX, assemble the team of Canadian amateurs who will be operating the main Canadian base station and coordinating various elements of the Skitrek Amateur Radio network. At press time, Barry was with Skitrek members in Resolute, on Ellesmere Island in the Northwest Territories, operating as VE8CDX, testing equipment and communication procedures for the expedition. By the time this is printed, final preparations should be well under way.

Use of Amateur Radio to provide com-

munications for this important scientific expedition should provide a unique opportunity to bring Amateur Radio before the media and demonstrate its capabilities to the public. You will not be able to communicate with Skitrek members directly. They will be very far north using low power and it is not likely you will even be able to hear them. You will be able to hear stations in the north, operated by Barry, his team and their Soviet counterparts, relaying messages from Skitrek members, and you will be able to work these stations. That's the time to invite the media into your shack and give them a new slant on a story they'll already be following—and promote Amateur Radio at the same time.

RONALD J. HESLER, VE1SH

An obituary is hard to write, especially for someone you've known and worked with. Ron Hesler, VE1SH, was a native of Montreal. He was educated at Valley Forge Military Academy in Wayne, Pennsylvania, and at Mount Allison University in Sackville, New Brunswick. He served in the Canadian Armed Forces during the Second World War, attaining the final rank of Captain and Technical Staff Officer. He held many executive positions and served on the Boards of Directors of many companies in the Sackville, New Brunswick area, where, for much of his life, he made his home.

Ron was first licensed in 1937 as VE1KS. He held that call until 1957 when he moved to Montreal and became VE2QF. On returning to Sackville in 1966, he became VE1SH. During his life, Ron served Amateur Radio in many ways: as Vice Director, and later as Director, of the Canadian Division of ARRL; as first President of CRRL; as Director of QCWA; and finally, at the time of his death, as CRRL Atlantic Region Director. He was a member of several radio clubs in New Brunswick and in Southwestern Florida where he had a winter home. He was a Life Member of ARRL, CRRL and QCWA.

Ron held strong convictions on many aspects of Amateur Radio. Throughout his life, he shared those convictions with his friends, through his correspondence and through this column, which he founded. Ron's typewriter became almost as famous as Ron himself, and we will fondly remember times, when one or another controversy was

raging, when Ron would send us two or three letters a day. Sometimes, it was difficult to keep up with Ron and sometimes it was difficult to agree with him. But there was never any doubt about his sincerity. Ron felt strongly that Amateur Radio was worth working for, even worth fighting for. It was out of that conviction that, in 1979, Ron incorporated the Canadian Division of ARRL as CRRL. He is why CRRL exists today.

Ron left us on 1987 November 12. Our sympathies are extended to Ron's wife, Ellen, and to all of Ron's family. We have lost a true servant of Canadian Amateur Radio, a fellow worker and a good friend.



CRRL Quebec Director Claude Brunet, VE2ZZ (right) presents the 1987 CRRL Amateur of the Year Award to Jean-Serge Labelle, VE2ED. Jean-Serge was recognized for his work in providing French-language Amateur Radio bulletins on the air.


CRRL NOTES

□ Andy McLellan, VE1ASJ, has been appointed CRRL Atlantic Region Director. Andy is a well-known contestor and DXer, Manager of the CRRL Central Incoming and CRRL VE1 Incoming QSL Bureaus, and he served as CRRL Atlantic Region Director from 1982 until 1986.

□ Repeater enthusiasts, take note. Deadline for including your repeater in the 1988 edition of CRRL's *Canadian Repeater Directory* is 1988 March 01. Please submit the following information: location (city, town, hill, etc), frequency (include offsets, multiple port frequencies), call sign, sponsor (name of club, individual), source of information and notes (type of system, links) to CRRL, Box 7009, Station E, London, ON N5Y 4J9.

NOTES FROM ALL OVER

□ Complaints of RFI have resulted in one amateur in Alberta being taken off the air and another amateur in Manitoba having his power limited to 100 watts output. In both cases, alleged interference to "reception of radiocommunications" was involved. It all points out that DOC will invoke Section 64.4 of the *General Radio Regulations, Part II*, and the urgent need for RF susceptibility legislation.

□ A reminder to amateurs in British Columbia: New address for the CRRL VE7 Incoming QSL Bureau is c/o Bureau Manager Alex Ivic, VE7CNE, F12-6961 Hall Ave, Burnaby, BC V5E 3A8. You do not have to be a CRRL member to use this bureau. 

Some Thoughts on Equipment Design

Recently, I had the good fortune to attend the Mid-Atlantic States VHF Conference and hear a number of excellent talks on current microwave technology. Another benefit from attending this type of conference is that it stimulates the thinking process and encourages the formation of new ideas—as well as the rethinking of old ones.

It is interesting to consider the impact of recent technology on equipment design. Not only does state-of-the-art technology enable wonderful GaAsFET/microstrip transceivers to be built for all bands through 10 GHz, but it also makes life much easier for the beginner in microwave equipment construction. Back in the 1960s, microwave transistors were almost unheard of. Experimenters had to take great care in receiver design to construct low-noise mixers—the mixer noise figure was the receiver noise figure if a preamp could not be constructed. Solid-state preamps and power amps were not only at the leading edge of technology, but were very expensive and often unreliable. Today, a \$10 GaAsFET gives 10-20 dB gain with a 2-dB noise figure on the microwave bands below 10 GHz. A \$3 MMIC gives broadband gain in a 50-ohms-in 50-ohms-out package through 4 GHz, with 10-mW output power and a 5-dB noise figure.

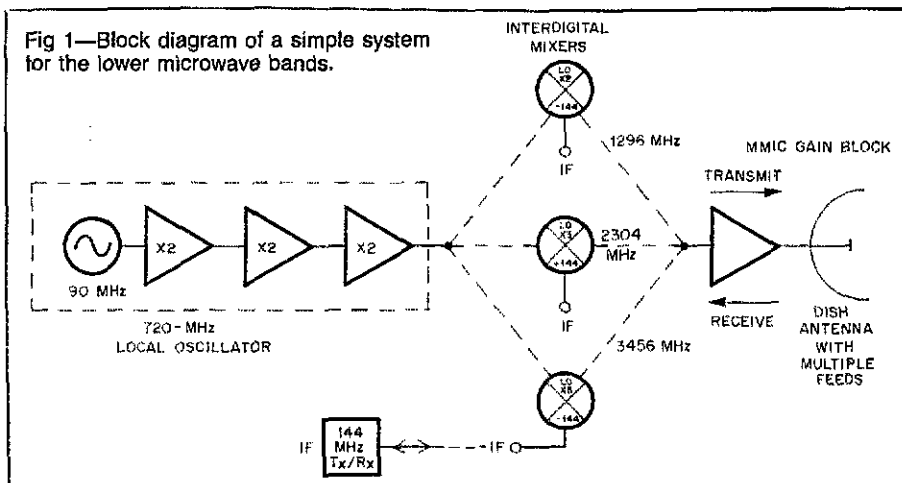
Taking these advances into consideration, it should be possible to design some simple equipment for microwave beginners. For example, almost any mixer is adequate since inexpensive low-noise preamps are easy to build. It is also possible to build general-purpose “gain blocks” that can be used on any of the lower microwave bands (1.3, 2.3 and 3.4 GHz). One item that is no easier to build now than it ever was is a clean, low-noise local-oscillator source (LO). With these thoughts in mind, the following scheme was devised (I make no claims to originality for this!). See Fig 1.

If one local oscillator could be used for a number of bands, that would ease the construction burden somewhat. It is traditional to use an LO frequency for mixers on the low side of the desired signal, but high-side injection is equally effective. If an LO is built for 720 MHz (or 360 MHz), it can be used on 1296, 2304 and 3456 MHz with a 144-MHz IF as follows:

$$\begin{aligned} 720 \times 2 &= 1440 - 144 = 1296 \text{ MHz} \\ 720 \times 3 &= 2160 + 144 = 2304 \text{ MHz} \\ 720 \times 5 &= 3600 - 144 = 3456 \text{ MHz} \end{aligned}$$

The only problems with high side injection are reverse tuning and sideband inversion. This means, for example, that to generate (or receive) USB at 1296.1 MHz, the 144-MHz IF transceiver must be tuned to

Fig 1—Block diagram of a simple system for the lower microwave bands.



143.9 MHz LSB. Most synthesizer-controlled radios operate below 144 MHz. Others can accept crystals for that range. Most microwave narrow-band operation occurs in the 200 kHz above the designated frequencies, so only a narrow range of operation (143.8 to 144 MHz) is required.

Now comes the problem of the mixer. A design that can take injection at sub-multiples of the required LO frequency is needed—a mixer with a built-in multiplier and LO filter. This exactly describes the well known interdigital mixer/filter first described by Reed Fisher, W2CQH, in 1974 *QST* and included in all recent editions of *The ARRL Handbook*. If interdigital mixers are constructed for each band, a single 720-MHz LO can be used for all three. Even a 360-MHz LO will probably work fine—my 2304-MHz receiver uses just this scheme.

Although not often described in US publications, the interdigital mixer also works well on transmit. Ideally, different mixer diodes would be used for receive (optimized for low noise) and transmit (optimized for high power) together with different LO-power injection levels (optimized for the same functions). Of course, a compromise mixer can be constructed. Remember, we don't need the last 1 or 2 dB of noise figure from the mixer because we have inexpensive preamps now. Similarly, we don't need lots of power out of a transmit mixer—we have MMIC gain blocks.

The same gain block could even be used as a preamp on receive and a power amp on transmit. A system with three MMICs could give 15-20 dB of gain with 10-mW saturated output power on transmit and a 6-dB noise figure on receive. A 6-dB noise figure is what you can get from the best diode mixer you could build with the best

diode and optimized LO injection power. Although 10 mW doesn't sound like much power, many DX contacts have been made with less. For example, W7CNK worked WA5VJB over a 189-mile path with 12 microwatts (0.012 mW) on 3456 MHz.

If you use a dish antenna with three separate feeds, you can cover all three bands. Gain would be about 19 dBi on 1296 MHz, 24 dBi on 2304 MHz and 27 dBi on 3456 MHz. Such a system could form the basis of a good portable station for the lower microwave bands.

The system described above could not be called “state of the art,” but it should be simple enough to be built by beginners. The interdigital mixers are the heart of the system and are quite easy to build. They are much bigger and heavier than equivalent microstrip circuits, but are a lot more tolerant of construction errors. A microstrip filter for 3456 MHz shifts 100 MHz for a 0.01 inch change in resonator length. I plan to put together such a system over the next few months and will report progress in this column, along with construction information. If it doesn't work I'll tell you that too!

CONFERENCE PROCEEDINGS

For those who are not fortunate enough to be able to attend the many excellent VHF/UHF/Microwave conferences conducted throughout the year, there is now a way to share in the information they disseminate. The ARRL has made available proceedings of three popular conferences—Central States, Microwave Update and Mid-Atlantic States—at a cost of \$10 each. These publications contain the substance of the conference talks, plus a considerable amount of extra information. All three publications are recommended reading for the serious microwave experimenter.

A 6-Meter DX Window

Regular readers of this column are aware that the subject of ways we can use our 6-meter band to better advantage has been discussed several times over the years. One approach has been to urge those who aim primarily, to make domestic, US and Canadian contacts to concentrate their operations around 50.2. In fact, 50.2 is designated as the "domestic SSB calling frequency" in the ARRL 6-Meter Band Plan. While recent years have produced some improvement in how stations spread out, particularly during widespread openings, few consistently operate around 50.2. Most activity can still be found in the vicinity of 50.110. In the meantime, an increasing amount of criticism has been erupting, particularly surrounding the League's June VHF QSO Party. The complaint is that stations not trying to work DX make it a general practice to operate in the low end of the band, preventing those who do wish to work DX from doing so.

Various suggestions have been offered to alleviate this problem. The May 1987 column dealt with this situation particularly as it applies to the June Contest. In it, the argument was made that it would be utterly impractical to mandate that contest operation take place higher in the band as contesters will be where most of the activity is. Despite the suggestion presented in that column that we move our routine domestic operations to the vicinity of 50.200 and thus bring the contesters up with us, no perceptible shift in operating habits was apparent during the 1987 running of the June Contest. While a few, including this conductor, were fortunate to work some quite rare DX, including CT4KQ, a number of other interesting contacts were missed because of contest QRM. Most notable of these was GJ4ICD, who heard New Mexico station N5JHV and several other 4s and 5s for over two hours, but could not attract anyone's attention through the contest QRM.

Treatment of the subject in the May column, plus a number of incidents which took place during last June's contest, led to rather spirited discussions at two VHF conferences held since that time. One of these was the Central States VHF Society's meeting held in Arlington, Texas in late July and the other was the Mid-Atlantic Conference sponsored by the Pack Rats which took place in the Philadelphia area in October. One concept which predominated these discussions was the setting aside of a specific portion of the 6-meter band for use only in working, or attempting to work, DX stations. In other words, a "DX window."

First, let's define what a DX window would be and how it might be used. Then, some of the arguments for it will be

presented. Next month, space will be devoted to some of the arguments raised against the idea as well as various alternatives suggested.

The concept for a DX window on 6 meters originated several years ago with a group of South Florida 6-meter DX enthusiasts including WB4OSN and W5DZF/4, the latter since deceased. The concept they offered was to set aside 25 kHz from 50.1 to 50.125 exclusively for working, or attempting to work, DX stations. Following the custom established on HF, DX would be defined more in terms of rarity rather than the distance involved. Thus, US stations located in the 48 contiguous states and Canadians in the VE1 through VE7 call areas would be considered "domestic." All others, including VE8, VY1, VO1 and VO2, although they do not count as separate countries from Canada, might be treated as DX. Of course, KL7, KH6 and 4U1 (the UN Building in New York City), as well as all others, would qualify as DX. Institution of the DX window would mean that we would never operate within its limits, unless calling or working a DX station, or calling CQ DX. To prevent us from forgetting to move out when the band opens, the DX window, if we decide to have one, should apply at all times, even when a band opening is a remote possibility.

The argument for a DX window seems clear. It would provide a section of the band in which the probability of hearing the usually weak signals from DX stations is improved due to the absence of strong signals from stations often engaging in rather long-winded QSOs. On the other hand, most contacts with DX stations are usually quite short, sometimes lasting considerably less than one minute. It seems apparent that those who would benefit most from a DX window are those who run low to moderate power and have modest antenna installations. The "big" stations can usually make enough noise to be heard by the DX as well as chase ragchewers away. Also benefiting would be those who, due to geographical location, have less opportunity to work a particular part of the world than more favorably located stations.

How would DX-only operation in the DX window be enforced? This is the most-asked question and the one which seems to raise the most controversy. The only answer that I can offer is peer pressure. If enough of us agree that a DX window should be created and begin using it only in pursuing DX, those not adhering to it will simply have fewer people to talk to. Certainly compliance will not be 100 percent. It seldom is. But, even if it's only 75 or 80 percent, significantly less QRM will

be present than exists now.

How would the DX window work during contests, when it appears anything goes? Once we have a generally accepted operating custom in place, it seems reasonable that those establishing rules governing contests might be persuaded to institute a rule to the effect that "all contest operation must abide by established customary practices on the various bands." This precedent has already been established to some extent by the prohibition, in the ARRL-sponsored VHF contests, of the use of 146.52, the single most popular simplex FM calling and working frequency. Heavy contest operation on that channel was widely accused of disrupting noncontest QSOs and, in few instances, even hampering emergency communications. The hue and cry heard regarding 146.52 was similar to that being voiced today with respect to contest operation blocking DX work by those not wishing to participate in the contest. It seems reasonable that any rule, such as the one outlined above, prohibiting contest participants from operating in a DX window should permit them to operate there, if pursuing DX at the time. However, they should not be allowed to use that as an excuse to work a string of non-DX stations in the process.

A DX window from 50.100 to 50.125 would imply that most calling for domestic contacts would begin at 50.130. It would not appear that the loss of 30 kHz represents a serious loss for those not particularly interested in DX. After all, the 6-meter band is 4 MHz wide, and narrow-band modes such as SSB, CW and AM are generally considered to occupy the first 500 kHz of it.

Next month, I'll present some of the arguments raised against the DX window, as well as some of the alternative suggestions that have been offered. In the meantime, please think about the matter and drop me a note expressing your opinions.

If we can reach a consensus on the desirability of establishing a DX window, we should be able to have it in place in time for next summer's E season and the F2 contacts that are quite likely next fall.

ON THE BANDS

6 Meters—Although most of us are not yet participating, 6 meters is already beginning to show signs that Solar Cycle 22 is well on its way. Last month's column carried reports of a number of stations from Florida to New Mexico working into Peru, Ecuador and the Galapagos Islands as well as contacts between Japan and Australia. Now, the other side of the world chimes in with DX tales of its own. From several sources, including overseas telephone calls from some of the participants, as well as the South African publication *VHF*

For WAS holders, listing is WAS number, call, state, call areas worked and grids worked. For others, call, state, states worked, call areas worked and grids worked. Call areas are the 10 US continental call areas plus KH8 and KL7 plus each VE and XE call area plus DXCC countries not located within the continental limits of the US, Canada or Mexico. Grids are the Maidenhead designators worked since the VUCC Award was instituted January 1983. In order to make the standings a true reflection of current 2-meter activity, those not reporting within the past two years are subject to being dropped. They will be reinstated upon presentation, in writing, of continued activity. It is not necessary to show additional states, call areas or grids worked to be reinstated. WAS holders are listed in any case. Compiled November 10, 1987. Updates for next listing must be at PO Box 117, Burtonsville, MD 20866, by May 5, 1988.

WAS Holders																																																											
										56	W4WD7*	UT	--	--	N1BUG	ME	24	10	78	K1FJM/4	FL	30	10	68	KB8SG	MI	30	8	--																														
										56	KE5C*	TX	--	--	WA1TRE	ME	24	10	58	W3ZR/4	FL	30	9	77																																			
1	K8MQS*	IA	--	--	--	--				57	WA4CQG*	AL	--	--	K2QR	NJ	45	28	66	N4EJW	FL	28	12	76	W9BOZ	IL	47	21	--																														
2	K5CM*	OK	--	--	--	--				58	WB9CAS*	IL	--	--	K2TxB*	NJ	39	--	117	WA4QFS	FL	27	7	15	WB9MSV*	IL	45	14	210																														
3	N8JA*	MO	--	--	--	--				59	W2CNS*	NY	28	--	W2RS	NJ	38	13	--	NA4I	GA	24	10	--	W9UD	IL	45	12	--																														
4	K9HMB*	IL	--	--	--	--				60	Deleted		--	--	W2RI	NJ	37	8	--	WB4RUA	AL	24	8	86	NN9K	IL	46	11	184																														
5	K1VHS*	ME	--	--	--	--				61	K8ALL*	ND	26	--	W2ORI	NY	37	8	--	WB7ECS/4	AL	24	7	64	KB9NM	WI	43	14	--																														
6	WA4MVI*†	O	--	--	--	--				62	K9XY*	WI	29	--	KE2N	NY	36	13	122	WD4AFY	GA	22	7	72	N9AQ	IL	42	13	189																														
7	K5JL*	OK	--	--	--	--				63	K1FO*	CT	18	98	N2BJ	NY	36	13	114	WD4FAB	FL	22	--	71	W3EP/9	IN	41	13	105																														
8	WA9DOT*	WI	--	--	--	--				64	W4DFK*	VA	--	--	WB2CUT	NJ	36	13	--	WA4MJD	TN	20	8	84	K9KC	IL	41	11	130																														
9	WB8ZXU*	IA	--	--	--	--				65	W5DSCR*	OK	--	--	NB2T	NY	36	12	40	K4LFF	GA	19	9	56	K9SM	IL	36	8	--																														
10	K9CA*	IN	--	--	--	--				66	WB8PAT*	OH	49	39	K2OV8	NY	36	12	35																																								
11	W8SD*	ID	--	--	--	--				67	KX8O*	CO	30	103	WA2FGK	NJ	35	11	--	WSUWB*	TX	49	39	--	W9YCV	WI	33	6	112																														
12	K5BMG*	LA	--	--	--	--				68	W7HAH*†	MT	44	149	K2GK	NJ	34	11	91	K5UR	AR	48	16	322	KD9JQ	IL	31	--	108																														
13	K5GW*	TX	--	--	--	--				69	K7KOT*	WA	--	--	K2LME	NJ	32	--	102	K9SW	OK	47	13	222	N9CUE	IN	27	10	28																														
14	WB5LUA*	TX	23	20	70	KB8RO*	OH	--	--	--	--	--	--	--	WA2FPX	NJ	31	8	--	K5WE*	OK	47	13	--	N9CEX	IL	26	9	--																														
15	K4GL*	SC	23	71	WA7BBM*	AZ	--	--	--	--	--	--	--	--	W2HRW	NJ	29	--	--	W6UGO	OK	44	12	35	K9BQL	IL	23	8	40																														
16	W8VB*	MN	14	72	SM2GGF*		--	--	--	--	--	--	--	--	K2YCO	NY	26	10	--	W5HN	TX	43	12	--																																			
17	WB5LBT*†	LA	50	73	KB8SI*	OH	--	--	--	--	--	--	--	--	W2WW	NY	24	10	44	K5MR	OK	40	14	140	W8EMS	NE	48	11	--																														
18	K4PKV*	NC	--	--	--	--				74	K2OS*	NY	17	--	WB2ZSY	NY	22	10	52	W6SSD	TX	40	11	97	WB8SIL	MO	46	13	--																														
19	W8RWVH*	MO	23	75	K1GVN*	MA	34	--	--	--	--	--	--	--	KC2KK	NY	17	7	34	WA5DBY*	TX	40	11	--	WB8SIL	MO	46	13	--																														
20	WBIDU*†	MI	23	76	WA9OZN*	IL	--	--	--	--	--	--	--	--					W5FYZ	LA	38	11	156	N9LI	KS	46	11	180																															
21	K1MNS*†	NH	48	77	WA6MGZ*†	CA	59	232	KB3PD*	DE	46	12	122	W5HFV	OK	38	10	--	NR5O	OK	38	9	109	KC2QR	MO	46	11	173																															
22	WB9VEN*	IL	--	--	--	--				78	WD5AGO*	OK	38	--	W43HM*	PA	48	26	112	K5AHJ	TX	37	11	165	KM8A	NE	44	14	218																														
23	K5FF*†	NM	18	79	WD4DGF*	TN	36	174	WA3HM*	PA	38	14	162	W6SJA	AR	37	11	169	W5HAR	AR	37	10	--	K8TLM	MO	44	11	180																															
24	W6FF*†	NM	22	149	80	VE1UT*	NS	42	--	--	--	--	--	--	W3CWG	PA	38	12	163	W5HAR	AR	37	10	--	W6BYZ*	NE	43	18	107																														
25	W7FK*	WA	--	--	--	--				81	W8RRY/5*	OK	30	--	W3XQ	PA	38	11	104	W5HMK	TX	36	10	--	W6PN	MN	43	11	52																														
26	W1JUR*	MA	34	151	82	W8BVV*	IA	--	--	--	--	--	--	--	W3XQ	MD	37	12	52	AA5V	OK	36	9	--	W6FY	MO	43	10	124																														
27	WB8OMN*	CO	--	--	--	--				83	W5RCI*	MS	12	--	AE3T	PA	37	12	--	W8NZS	OK	36	7	97	W8ODGF	NE	43	10	85																														
28	WB4EXW*	NC	18	84	W5ACX**†	NY	27	--	--	--	--	--	--	--	WA3FVJ	PA	37	11	149	NU5F	LA	35	11	135	W6WJ	IA	41	12	150																														
29	K9KFR*	IN	--	--	--	--				85	WADTKJ*	KS	25	171	K3RX	PA	37	10	130	N5BBO	TX	32	10	55	W6RAP	IA	40	10	114																														
30	K3VGX*	PA	--	--	--	--				86	KB7Q*	MT	--	--	W3JW	MD	37	--	--	K5VVV	TX	31	10	--	W6BRL*	KS	39	34	116																														
31	SM7BAE*		21	--	--	--				87	AB3D*	DE	25	32	W3ZZ	MD	37	12	135	K5DHU	TX	30	10	60	K8US	NE	39	11	125																														
32	WA7BJU*	OR	57	--	--	--				88	KF8M*	KS	28	173	W3CLQ	PA	35	10	--	W5JYX	TX	30	9	--	W6PW	CO	38	9	--																														
33	VE7BQH*†									89	WB2NPE*	NJ	37	219	W5OTC	MD	34	11	--	KE5EP	TX	28	--	74	N80Y	IA	36	10	--																														
34	W6P0*	CA	--	--	--	--				90	N5BLZ*	TX	--	--	W3JWU	PA	32	11	76	W5DFU	OK	26	7	--	W6BZKG	KS	34	11	59																														
35	WA3VSJ*	PA	27	91	K8AON*	MO	--	--	--	--	--	--	--	--	K3KEL	MD	32	11	63	W5SSU*†	AR	26	7	--	W6RWJC	IA	34	8	--																														
36	AL7FS*	AK	20	92	W8AKNF*	TN	--	--	--	--	--	--	--	--	WA3DMF	MD	32	11	57																																								
37	WB9VSG*	NE	--	--	--	--				93	WB9SDW*	IA	--	--	KB3QM	DE	32	--	68	N5AMG*		32	37	--	N8AJU	NE	32	9	102																														
38	N7NW*	WA	--	--	--	--				94	W7JUV*	AZ	47	129	W3LNA	PA	30	8	73	K8JYO*		28	7	--	W6HKE	CO	29	8	116																														
39	W5LJU*	KY	--	--	--	--				95	W8RT*	KS	27	150					K8QXY*		20	7	--	N8BTN	NE	28	10	104																															
40	W4HJQ*	TX	--	--	--	--				96	W2PGC*	NY	23	90	W4ZD*†	FL	48	47	212	W8LHD		20	14	--	W6JRP	MO	27	8	105																														
41	K5UGM*	TX	--	--	--	--				97	DL8DAT		--	--	KC4EG*	KY	41	13	--	W8LLY/6		13	5	19	KC8QG	NE	25	8	60																														
42	W5UN*	TX	--	--	--	--				98	WD9ACA	WI	--	--	WA4PCS	KY	41	11	--	K8HXW*		13	--	--	K8OKUY	KS	20	6	75																														
43	WA4LYS*†	FL	49	--	--	--									WB4NXY	KY	41	9	125	N6TX*		9	8	--	VE1AHM	NB	21	10	--																														
44	WA1JXN/7*†	MT	58	--	--	--									W54F	GA	40	14	135	W8HXM		6	3	16																																			
45	W5JTL*	MS	14	--	--	--									W4CPZ	SC	40	11	145																																								
46	W8ANH*	MN	--	--	--	--									W4CHK	TN	39	9	--																																								
47	WA4NJP*	GA	--	--	--	--									K4KAE	SC	38	13	110	KB7WW*	OR	32	10	--	VE3DSS*		38	12	--																														
48	W8WHM*	NM	--	--	--	--									WA4OWC	FL	38	13	--	WA7ADK	UT	25	7	--	VE3FKN		35	10	--																														
49	W7CI*	AZ	26	--	--	--									NY4T	TN	38	12	175	K7ICW*	NV	23	9	60	VE3LNX		28	11	69																														
50	N5KW*	OK	13	--	--	--									K4QIF	VA	38	11	--	AA7A	AZ	23	6	59	VE3EQQ*		20	16	--																														
51	WB8TEM*	IA	23	--	--	--									W4ISS	GA	37	8	--	WA7EPU	AZ	12	6	--	VE4MA		14	9	--																														
52	WD8FOY*	WI	18	--	--	--									K4CKS	GA	36	13	139	W7IDZ	WA	9	4	30	VE4AQ		11	5	7																														
53	WB8RWG*	MO	16	--	--	--									W5HUQ/4*	FL	36	13	--																																								
54	WB9ERD*	TX	--	--	--	--									W8QXQ/4*	GA	36	11	125	K8EUR*	OH	41	11	--	VE5LY*		26	10	66																														
															W4LNG	GA	36	8	30	N18O	OH	40	12	145	PA2YST*		28	--	--																														
															WA4SBC	VA	35	13	107	K8WKZ	MI	39	14	--	WA1JXN/																																		
															N4VC	TN	35	9	126	K8RZB	OH	39	10	142	C6A*		23	28	--																														
															W4FJ	VA	34	8	--	W8NPNX	OH	35	9	120	KG6DX*		22	--	67																														
															N4KZ	FL	32	9	28	W8NJR	OH	33	11	124																																			
															WD4AHZ	FL	31	10	134	W8GAP	MI	30	11	75																																			

†WAS completed in NC, now in SC.
*Some contacts made via EME.
†WAC
--Information not supplied.

Information not supplied

WASIX San Antonio has begun to receive FM communications from the East Coast up to about 35 MHz—another sign that F2

K8WKZ asks for publication of the European countries in which 6-meter operation is known to be permitted. This is a tough question as there are so many rumors flying around on the subject and checking each out with the governments involved would represent a significant task. I can say that all of the UK countries are okay. There are a few permits in EI, EI2W and EI6AS are the ones I know about. LA amateurs can now operate the band, but with very low power. Portugal and Malta are also apparently okay. As to the rest, it is a case of definite knowledge that 6-meter operation is not permitted in East Germany and the Eastern Bloc countries, to a big question mark for most of the others. Although comments regarding other countries being heard or worked may appear in this column from time to time, that should not necessarily be taken to mean that their

The Higher Bands—The operation of W3IWI and company from the 140-foot radiotelescope at Green Bank, West Virginia over the first weekend of the ARRL EME Contest went well but, like most efforts as ambitious as this, not as well as everyone had liked. An attempt was made to put four bands on the air, including 10 GHz. On that band, no two-ways were completed but echoes were heard. It is reported that they were heard in Italy with signals 40 dB out of the noise. What prevented a two-way was unanticipated noise getting into the receiver from the 40-W TWT being used. Good success was had on 13 cm with 11 completed QSOs including an EME DX record for the band. That was accomplished by a contact with ZL2ARE. Eighteen contacts were made on 23 cm and in the vicinity of 90 on 70 cm. Thanks are due to Tom and his crew for putting on another EME experiment in which many, other than only well equipped EMERs, could participate.

100 QSL Cards on the Wall—AX.25 Style

Harold Price, NK6K, is keeping a list of the different countries where amateurs are active on packet radio. Last September Harold's list topped the 100 mark. According to his current country compilation, hams in 107 ARRL DXCC countries are using packet. Most of these countries cannot be worked on VHF or UHF from the US, but packeteers in many of the countries are on HF, and it is not too difficult to snag a few if your station is properly equipped and you know where and how to look.

The Right Stuff: Modem and Receiver

In addition to the requisite HF RF equipment, a TNC and a terminal or computer, two ingredients are critical in HF packet-radio operation. First, the modem you use at frequencies below 28 MHz should operate at 300 bauds with 200-Hz FSK. In some cases, this is no problem; many of the TNCs that are available today include a 300-baud HF modem in addition to the VHF 1200-baud modem.

Some older TNCs include only the 1200-baud modem; all is not lost if your TNC is one of these, however. There are two ways of using a 1200-baud-only TNC on HF. One alternative is to modify the 1200-baud modem for HF operation. This is simply a matter of changing the value of a resistor and a capacitor in the TNC, recalibrating the modem and changing the radio-port data rate to 300 bauds. The obvious disadvantage to this alternative is that you must reverse the modification the next time you want to use the TNC at 1200 bauds.

The other alternative is to use an external HF modem with your TNC. Commercial units are available that permit you to use one TNC for both 1200-baud and 300-baud operation by the simple flick of a switch. The TNC and outboard modem combination may be connected to the HF and VHF/UHF radio equipment simultaneously. Besides the obvious advantage of not having to warm up a soldering iron each time you want to switch between HF and VHF/UHF operation, the commercial HF modems provide better HF performance than a modified VHF modem.

Before you go out and spend the money on an external modem, you might try the modified VHF modem on HF to get your feet wet. If you find that you like HF packet, you can go for an external modem. If you do not like HF packet radio, reverse the modification and it has only cost you the price of a capacitor, resistor and a little solder.

The other important ingredient for a successful HF packet operation is transceiver stability. Most modern RF equipment is stable enough for HF packet-radio operation; a word of warning is in order for those using older equipment, however. If your transceiver drifts, HF packet-radio operation will be a very difficult proposition at best.

The Right Frequency: Where the Action Is

Once your station is properly equipped, where do you operate to find packet DX? As with many of the other Amateur Radio

modes in these days of minimum sunspot activity, most of the packet-radio DX is found on 20 meters. This will change as the solar cycle causes propagation on 10 and 15 meters to improve; for the meantime, 20 meters is the band. Between 14,080 and 14,095 MHz is RTTY country; above, betwixt and below the green key operators are the packet hackers. (Avoid 14,100 MHz, ± 500 Hz, as this is used by a recognized network of CW beacons.)

Once you find the HF packet-radio operators, the trick is tuning their signals with your receiver. If your TNC or external modem has a tuning indicator, tuning is simple. Tuning without an indicator can be tricky, however, and it requires some patience. When you find a packet-radio signal, you must tune your receiver to one frequency and stay tuned to that one frequency until you receive one complete packet transmission. If you change frequency in the middle of a packet, your TNC will probably ignore the packet even if the receiver was on the right frequency before or after changing frequency. Tune the receiver in as small an increment as possible between packets; continue to do this until your TNC displays a packet on your terminal.

An easier way to "get on frequency" is to transmit a couple of unprotocol CQs and let another station tune to your frequency. The problem is that this is a hit or miss proposition if your intention is to collect countries—AX.25 style!

Good luck, and good DXing.

Packet Radio Active Countries List

3A	Monaco	EA8-EH8	Canary Islands	KG4	Guantanamo Bay	SU	Egypt
3D6	Swaziland	EI-EJ	Ireland	KH0	Mariana Islands	SV-SZ	Greece
4U	ITU, Geneva	F	France	KH2	Guam	T7	San Marino
4X, 4Z	Israel	FK	New Caledonia	KH6	Hawaii	T30	West Kiribati
5H-5I	Tanzania	FM	Martinique	KH8	American Samoa	TF	Iceland
5N-5O	Nigeria	FO	French Polynesia	KL7	Alaska	TG, TD	Guatemala
5V	Togo	G	England	KP4	Puerto Rico	TI, TE	Costa Rica
6V-6W	Senegal	GI	Northern Ireland	LA-LN	Norway	TR	Gabon
7P	Lesotho	GJ	Jersey	LO-LW	Argentina	UA3	European USSR
9H	Malta	GM	Scotland	LX	Luxembourg	VE, VO, VY	Canada
9K	Kuwait	GU	Guernsey &	LZ	Bulgaria	VK	Australia
9M2, 4	Malaysia		Dependencies	OA-OC	Peru	VP2M	Montserrat
9V	Singapore	GW	Wales	OD	Lebanon	VP9	Bermuda
A4	Oman	HA, HG	Hungary	OE	Austria	VS6	Hong Kong
A6	United Arab	HB	Switzerland	OF-OI	Finland	VU	India
	Emirates	HC-HD	Ecuador	ON-OT	Belgium	XA-XI	Mexico
A9	Bahrain	HH	Haiti	OX	Greenland	XX9	Macao
BV	Taiwan	HI	Dominican Republic	OY	Faroe Islands	YB-YH	Indonesia
BY, BT	China	HJ-HK	Colombia	OZ	Denmark	YJ	Vanuatu
C6	Bahamas	HL	Korea	P2	Papua New Guinea	YN	Nicaragua
CA-CE	Chile	HO-HP	Panama	PA-Pi	Netherlands	YT-YU, YZ	Yugoslavia
CN	Morocco	HS	Thailand	PJ2-4, P4	Netherlands Antilles	YV-YY	Venezuela
CP	Bolivia	I	Italy	PJ5-8	Sint Maarten, etc	ZF	Cayman Islands
CT	Portugal	IS0, IM0	Sardinia	PP-PY	Brazil	ZK1	Cook Islands
DA-DL	Federal Republic of	J8	Saint Vincent and	PZ	Suriname	ZL-ZM	New Zealand
	Germany		Dependencies	SA-SM	Sweden	ZR-ZU	South Africa
DU-DZ	Philippines	JA-JS	Japan	SN-SR	Poland		
EA-EH	Spain	K, W, N,		ST	Sudan		
EA6-EH6	Balearic Islands	AA-AK	United States				

A Short Story—Or How Quickly You Run Out Of Space When You Install a Radio In Your Car

Each new generation of radio imported from Japan is smaller than the previous generation. I always wondered what was the impetus to make electronic equipment smaller. Recently, I found out—the hard way.

Lucky guy I am, I managed to pick the two worst weeks of the summer for my vacation. Instead of sunning myself on the banks of Lake Winnepesaukee, I answered mail, cleaned the garage and priced lumber to build an ark in case the rain did not let up. Another thing I did to keep myself occupied during the Southern New England rainy season was drink coffee. And one day, near the end of my vacation, I overdid it. At midnight, I was still wired with coffee flowing through my veins.

Since sleep was the furthest thing from my mind, I decided to install a 220-MHz radio in my new pre-owned automobile. The car was not exactly new to me. I had owned it for over a year, but had never gotten around to installing the radio. When I put something off, I really put it off!

With coffee on my breath and a soldering iron in my hand, I attacked the car and radio. A few minutes in my junk box turned up a power connector (and cable) that mated to the radio. A few minutes more and I had the power cable assembly connected to my automobile's electronic system. I turned the radio's power switch on and the radio lit up. That was a good sign!

Next, I grabbed my quarter-wave magnetic-mount antenna, gently placed it on the roof of my automobile, snaked the feed line inside, connected the coaxial cable to the radio and the local repeater could be heard loud and clear with two locals solving the problems of the world at 1 AM—I guess I was not the only victim of too much coffee.

The Return of the Silent Key

I broke in with my call sign and one of the locals remarked that he had not heard me on in such a long time that he had been checking out Silent Keys for my name. I quickly explained my extended bout with procrastination and that I was testing the mobile installation and wanted to get the mobile radio mount installed before the caffeine started wearing off and could you please excuse me—I'll catch you later. My friends made a few wisecracks as I departed and I shut off the radio.

I found the dusty mobile mount and climbed back into my automobile to find a place to install it—and there's the rub. The radio was too big and the automobile was too small. The radio is a circa-1975 Midland 13-513 transceiver and the automobile is a circa-1982 Subaru GL wagon. This radio is big and, try as I may, I could find no suitable location to stick it in my Japanese import. I could have mounted it under the dashboard on the front passenger side, but that would

not work as most of the passengers I transport are bipeds. Since everyone over the age of 25 months shuns occupancy of the rear seat of my automobile, I thought about letting the radio lie on the floor space behind the passenger seat. I discarded that idea after I thought about some close calls I had while taking my eyes off the road to change the frequency of a radio that was mounted in relatively plain sight and then considered how much my chances of staying alive on the road would be with a radio mounted almost in back of me.

By now, the effects of the caffeine were wearing off. I could not think straight anymore. As the hypnotists say, I was becoming very sleepy. I decided to wait another day to figure out a way to install the radio. And as my head hit the pillow, I realized why the imported radios kept getting smaller—so that they could fit in the small imported vehicles.

Thus ends another chapter of "True Life Ham Radio Adventures," but, before you depart, let me leave you with some useful tips for installing radio equipment in your vehicle. Some of these tips were culled from the ARRL's *FM and Repeaters for the Radio Amateur*, while others were handed down from one generation of repeater kerchunkers to another. (If you have other tips that you would like to share, pass them along for a future installment of this column—Ed.)

Installation Tips

- Radio controls, microphone and tone pad should be located so that they can be reached by the driver without the need of changing position or detracting attention from the road.

- For safer operation, leave both hands free for driving by using a headset microphone that can be activated with a PTT switch mounted on the steering wheel.

- Cords and wires should be routed so that they will not entangle the driver's hands or feet or interfere with steering, braking or shifting gears.

- Before taking drill in hand to make holes for mounting the radio equipment or for routing cables, check to see what is on the other side of the drilling site; in today's compact vehicles, almost any spot that you pick to drill will have something on the other side of it.

- Use a pair of heavy cables to supply sufficient current from the battery to the radio equipment.

- Install a fuse near the point of connection to the battery or your vehicle's electrical system.

- Wherever a cable passes through a wall or partition in your vehicle, the cable should be protected by a grommet.

- For best omnidirectional coverage, a mobile antenna should be located on the roof in the center of your vehicle.

- Use a magnetic-mount antenna if you shudder at the thought of drilling an antenna mounting hole through your vehicle's exterior.

- Eliminate spark plug noise by using (a) resistive spark plug suppressors, (b) resistive spark plugs and/or (c) resistive-wire cabling between the spark plugs and distributor and between the distributor and the ignition coil. (c) is the most effective method of suppressing this type of interference.


- Today, many vehicles come off the assembly line with resistive-wire cabling already installed; however, after a few years, this cabling may deteriorate (as evidenced by cracked insulation) and should be replaced for continued effectiveness.

- To protect your equipment against theft, use a sliding mobile mount that allows the radio to be quickly removed and stored out of sight or carried away with you when you leave your vehicle unattended.

Happy motoring!

REPEATER LOG

According to September 1987 reports received, repeaters were involved in the following public-service events: 657 vehicular emergencies, 25 medical emergencies, 21 fire emergencies, 19 drills/alerts, 12 public-safety events, 7 weather emergencies, 5 criminal activities, 3 power failures.

The following repeaters were involved (followed by the number of events): W2VL 34, NK2W 19, WA4AOS 2, W4BFB 6, WA6BJY 9, KA6EEK 53, WD6DIH 44, W6FNO 424, N6ME 113, K6TZ 11, K8DDG 11, WD8IEL 6, KD8GL 6, WA8ULB 9, N9RM 2. 

Strays



QST congratulates...

□ Al Hovey, Jr, WA9BZW, on being named president of the Wisconsin Society of Science Teachers.

□ The following radio amateurs on receiving Citations to New Fellows from The Radio Club of America, Inc: Alan M. Dorhoffer, K2EEK, of Hicksville, New York; Augustin J. Gironda, W2JE, of Mamaroneck, New York; John J. Kelleher, W4ZC, of Annandale, Virginia; and Gordon V. West, WB6NOA, of Costa Mesa, California.

□ Stuart Meyer, W2GHK, of Vienna, Virginia on being elected president of the IEEE Vehicular Technology Society.

1987 YL-OM Contest Results

YL PHONE				YL CW			
ON6BY	157,300*	KA6SOC	20,798*	VE7YL	30,975*	KA6SOC	7,533*
K8EPE	93,240	SM7JKY	19,028	CR5YL	28,438*	WA8YYP	7,041*
DF9YY	85,575	K08GM	18,750*	K5YL	25,885*	KA0OMX	6,600*
WB3EFQ	66,930	VE7YL	18,720*	KA6ZYF	23,664	HA8KAX/	4,992
KA6ZYF	59,345	K8ONV/4	17,753*			YL	
WB7FDE	56,420	WA8FSX/7	16,538*	N7IEM	23,374	N5IMW	4,510
KA3JFB	53,560	N7APJ	16,483	KA6DOW	19,175*	WD5FOX	3,919*
N7IEM	40,936	WA2WHE	10,399*	K8ONV/4	18,480*	W6JEP	3,848
CR5YL	40,625	HA8KAX/	9,684*	VE7FNP	15,250*	N4MPQ	3,285*
		YL		AA4RO	9,948*	OZ7YL	2,550
IO2KYM	37,490*	4X6KT	7,560	WA8FSX/7	8,208	W8YL	1,995*
N7IOG	26,880	N5IMW	7,256*	VE1BWP	7,980	N9GAI	1,913
LZ1KVZ	20,938	WA4SRD	7,007				
OM PHONE				OM CW			
K4JRB	2,835*	VE1AGZ	360*	W1HOZ	893*	N0FFZ	309*
W2GBX/	2,144*	N5IVS	350*	K9WA	808*	W0IZV	285*
V2A				N9CQK	800*	KZ7V	270*
W4XT	1,181*	VE4MG	300	W6ZT	660	W2AAU	264
K0ETA	880*	H18LC	195	VE2RO	653	W2WSS	255*
W1OPZ	750*	KA9VDU	165*	HP1AC	594	W3DYA	255*
HB9MX	696	W7ULC	163*	VE3KK	580*	W4TYU	255*
W3IFZ	600*	VE7XO	135*	W9DYG	540*	VO1QST	255*
YU3WZ	570*	VK3XB	135*	W1OPZ	506*	W7ULC	248*
W9LNQ	563*	SM4GTB	121	W5RDW	403*	K7BLU	221
KF1B	489*	OK2QX	100*	HB9MX	378	W8VEN	198
CT1AVR	468*	ON5FV	100*	VE6UP	345	W9ACU	195
WB4UBD	405*	VE2RO	88*	W1OPJ	340	W9FFQ	180*
W7AHZ	385*	W3EE	88*	W7RD	330*	N05W	169*
W6HAL	384*	OH3GD	80*	WA3JXW	325*	N09S	163*
				WB1DEU	309*	N5IVS	150*
				W8DM	309*	W5NR	150

* Denotes low-power multiplier. Boldface calls are cup and certificate winners. HA8KAX/YL, a club station, was operated by HA6IQ and HA8LKJ. CT1YH operated as CR5YL.

Check logs: W1PEX, W2UAP, WB2JCE, W5RDW, NM7M, NM7N, W8KLZ, PA2CEB, SM5PAX, Y22HF, Y24JJ, Y34XF, Y39ZC, YO4BEX.

Phone		OM	
YL			
ON6BY	Gold Cup	K4JRB	
K8EPE	2nd Place	W2GBX/V2A	
DF9YY	3rd Place	W4XT	
CW		OM	
YL			
VE7YL	Gold Cup	W1HOZ	
CR5YL	2nd Place	K9WA	
K5YL	3rd Place	N9CQK	



Gold Cup CW, VE7YL—Elizabeth Anderson has been an active amateur since 1944 (see July 1987 QST). Although she has participated in many contests, this is her first win.

← 3rd SSB, DF9YY—Uschi Falk is a seasoned YL-OM Contest participant. She placed 2nd in 1978, was a country winner in 1982, earned the Gold Cup in 1984 and again became a country winner in 1986.

Exam Info

NEW TEST FEE FOR 1988

The FCC has announced that they are raising the maximum allowable reimbursement fee that can be charged each candidate to \$4.56. This new maximum test fee takes effect on January 1, 1988 and will be in effect for the entire calendar year.

The FCC authorizes each Volunteer Examiner Coordinator (VEC) to charge a test fee up to but not exceeding the established maximum. During 1988, all applicants who are administered tests other than Elements 1A and 2 at ARRL/VEC-coordinated sessions will be charged \$4.55 for all elements that they take during the same session.

Test fees are collected exclusively to offset expenses that are directly incurred in administering the VE Program. Only the FCC may establish the maximum allowable reimbursement fee that VECs may charge. No VE or VEC may otherwise derive any kind of compensation for their services. Additional information can be found in Section 97.36 of the FCC's Rules. —Jim Clary, WB9IHH, Manager, ARRL/VEC

Hamfest Calendar

Administered By Bernice Dunn, KA1KXQ
Convention Program Manager

Attention: The deadline for receipt of items for this column is the 5th of the second month preceding publication date. Hamfest information is accurate as of our deadline; contact sponsor for possible late changes. For those who send in items for Hamfest Calendar and Coming Conventions: Postal regulations prohibit mention in QST of prizes of any kind and games of chance such as bingo.

Alabama (Greenville)—Jan 31. *Sponsor:* Butler County ARC. *Time:* 8 AM-2 PM. *Place:* Beeland Park Recreation Center. *Features:* refreshments, FCC exams at Butler County EOC 8 AM. *Talk-in:* 146.07/146.67. *Admission:* None. *Tables:* \$4. *Contact:* Jim Bell K4TNS, tel (D)205-382-7911, (N)205-382-5040 or Randolph Walters, KW4B, tel 205-382-3496.

Florida (Inverness)—Jan 30. *Sponsor:* Sky High ARC. *Time:* 8 AM-3 PM. *Place:* Citrus County Fairgrounds Auditorium. *Features:* new equipment, computers, swap tables, surplus items. *Talk-in:* 146.355/146.955. *Admission:* Advance \$3, door \$4. *Contact:* Richard Barrett N2EVY, 6205 West Gwen La, Homosassa, FL 32646, tel 904-628-5063.

Florida (Fort Myers)—Jan 23. *Sponsor:* Fort Myers ARC. *Time:* 8 AM-4 PM. *Place:* 1988 City of Palms Hamfest, Moose Lodge Hall #1899, 1900 Park Meadow Dr. *Features:* New dealers, flea market. *Talk-in:* 146.28/88. *Admission:* \$3. *Tables:* \$10, may be reserved. *Contact:* Harry Arnold K9ALX, 5414 Brandy Circle SW, Fort Myers, FL 33919, tel 813-482-3113.

Florida (Sarasota)—February 20-21. *Sponsor:* Sarasota ARA Inc. *Time:* 9 AM-5 PM. *Place:* Roberts Sports Arena. *Features:* License exams, technical forums. *Talk-in:* 146.31/146.91, 147.90/147.30. *Admission:* Advance \$5, door \$6. *Contact:* Al Matlick, W2TKU, 1817 Buccaneer Terr, Sarasota, FL 33581, tel 813-923-7008.

Illinois (Danville)—Jan 23. *Sponsor:* Vermilion County ARA. *Time:* Vendors 6 AM, public 9 AM-2 PM. *Place:* UAW Local #579, Civic Center, Tilton Road. *Features:* Hamfest/auction. *Admission:* Free. *Contact:* Clint Hartley N9EVT, tel 217-442-1443, Rod Pruitt, WD9HXG, tel 217-442-4416.

Illinois (Wheaton)—Jan 31. *Sponsor:* Wheaton Community RA. *Place:* Odeum, Villa Park. *Admission:* \$4 in advance, \$5 at door. *Tables:* All tables reserved. *Contact:* Wheaton Community Radio Amateurs, PO Box QSL, Wheaton, IL 60189, tel 312-629-8006.

Louisiana (Hammond)—Jan 16. *Sponsor:* Southeastern Louisiana University ARC. *Time:* 9 AM-3 PM. *Place:* Southeastern Louisiana University. *Features:* food, drink, dealers, technical forums, VE exams. *Talk-in:* 146.40/147.00. *Admission:* free. *Tables:* first table free, extra tables \$5. *Contact:* preregister \$4.35 to SELARC, Joe Magro W0SR, 534 Iverstine La, Hammond, LA 70401.

Michigan (Dearborn)—February 7. *Sponsor:* Livonia ARC. *Time:* 8 AM-4 PM. *Place:* Dearborn Civic Center. *Features:* VEC exams by Motor City Radio Club, tables, refreshments and free parking. *Talk-in:* 144.75/145.35 and 146.52 simplex. *Tables:* Reserved, 8-foot minimum available. *Contact:* Neil Coffin, WA8GWL, c/o Livonia ARC, PO Box 2111, Livonia, MI 48151.

Michigan (Southfield)—Jan 24. *Sponsor:* Southfield High School ARC. *Time:* 6 AM exhibitors, 8 AM-3 PM. *Place:* 24675 Lahser. *Features:* food, parking. *Admission:* \$3. *Tables:* \$20 for two 8-ft tables (paid in advance), additional tables reserved \$10. *Contact:* Robert Younker, Southfield High School, 24675 Lahser, Southfield, MI 48034.

New York (Yonkers)—Jan 31. *Sponsor:* Yonkers ARC. *Time:* 9 AM-3 PM. *Place:* Exit 3 on the New York State Thruway (north), Yonkers Ave. Go west to St Johns Ave—turn left—two blocks to Teresa Ave—turn right into parking lot. *Features:* Demonstrations, free coffee all day. *Talk-in:* 146.865 MHz or 440.150 MHz. *Admission:* \$3, children under 12 free. *Tables:* \$10 or \$1-a-ft if you bring your own. *Contact:* Otto Supliski, WB2SLQ, 914-969-1053 after 5 PM.

Ohio (Mansfield)—Feb 14. *Sponsor:* Mansfield Mid*Winter Hamfest/Computer Show. *Time:* 7 AM. *Place:* Richland County Fairgrounds. *Features:* forums, DX, packet, ARES. *Talk-in:* 146.34/94. *Admission:* Advance \$3, door \$4. *Tables:* Advance \$5, door \$6, half tables available. *Contact:* Ticket/table orders must be received and paid by Feb 4, 1988. SASE to Dean Wrasse, KB8MG, 1094 Beal Rd, Mansfield, OH 44905, tel (N) 419-589-2415.

Ontario (St Catharines)—Feb 6. *Sponsor:* Niagara Peninsula ARC. *Place:* C.A.W. Hall, 125 Bunting

Road. *Features:* Dinner Dance. *Talk-in:* 147.84/147.24. *Admission:* \$3. *Tables:* \$12 commercial, \$5 noncommercial. *Contact:* NPAR Inc, PO Box 692, St Catharines, ON L2R 6Y3, tel 416-937-0590.

Virginia (Richmond)—Jan 17. *Sponsor:* Richmond Amateur Telecommunications Society. *Time:* 8:30 AM-3:30 PM. *Place:* Richmond State Fairgrounds, just off I-95. *Features:* commercial exhibits, flea market. *Talk-in:* 146.28/88, 144.83/145.43. *Admission:* Advance \$4, door \$5. *Contact:* Mark Huff, WA4DHY, tel 804-273-9469, Frostfest Phone Line.

Coming Conventions

SOUTHERN FLORIDA SECTION CONVENTION

February 6-7, 1988, Miami

The Dade Radio Club is sponsoring the 28th Tropical Hamboree/ARRL Hamfest of the Americas at the Miami Airport Hilton from 9 AM to 5 PM on Saturday and 9 AM to 4 PM on Sunday. *Talk-in* on 146.40. *Admission* is \$5 in advance and \$6 at the door. *Features* are 200 exhibit booths, 800 swap tables, forums, computers and software, license exams and on-site campground. *Vendor tables* are \$16 each (no power) for two days, power is \$10 per user. *Campsites* are \$12 per night. *Hotel rates* are \$55 single, double. Write Dade Radio Club, PO Box 350045, Miami, FL 33135-0045, or

call Evelyn Gauzens (H)305-642-4139 or (W)305-233-4444, for hotel reservation forms, tickets, swap tables, campsites.

Note: Sponsors of large gatherings should check with League HQ for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL HQ for up to two years in advance.

Attention Hamfest and Convention Sponsors

ARRL HQ maintains a date register of scheduled events that may assist you in picking a suitable date for your event. You are encouraged to register your event with HQ as far in advance as your planning permits. Note that the hamfest and convention approval procedures for ARRL sanction are separate and distinct from the date register: Registering dates with ARRL HQ does not constitute League sanction, nor does it guarantee there will not be a conflict with another established event in the same area.

We at ARRL HQ are not able to approve dates for sanctioned hamfests and conventions. For hamfests, this must be done by your Division Director. For conventions, approval must be made by your Director and, additionally, by the Executive Committee. Application forms can be obtained by writing to or calling the ARRL Convention Program Manager, tel 203-666-1541 ext 283.

February 26-28

Ohio State, Cincinnati, OH

ARRL NATIONAL CONVENTIONS

Sept 9-11, 1988—Portland, Oregon

June 2-4, 1989—Dallas/Ft Worth, Texas

Mini Directory

As a convenience to our readers, here is a list of items of particular interest and when they most recently appeared in QST.

Advisory Committee			
Members	Jun 1987, p 51	Major ARRL Operating	
ARRL International		Events and	
EME Competition	Sep 1987, p 85	Conventions—1988	This issue, p 78
Club Contest Rules	This issue, p 86	Novice Enhancement	
Constitution Bicentennial		Report and Order	Apr 1987, p 64
WAS	Sep 1987, p 14	Packet-Radio Frequency	
DX Contest Awards		Recommendations	Sep 1987, p 54
Program	Feb 1987, p 82	QSL Bureaus	
Element 2 Question Pool,		Incoming	Dec 1987, p 56
New and Revised		Outgoing	Sep 1987, p 63
Questions, Answers	Apr 1987, p 23	Reciprocal-Operating	
Frequency/Mode		Agreements	Jul 1987, p 51
Allocations	This issue, p 77	Tech and General	
Golden Jubilee of DXCC		Written Exams	Apr 1987, p 29
Award	Sep 1986, p 60	Third-Party-Traffic	
Hamfest Calendar Rules	Sep 1986, p 84	Agreements	Jul 1987, p 51
Landline BBSs	Oct 1987, p 56	VUCC Annual Listing	Dec 1987, p 68
License-Renewal		What is Amateur Radio?	Dec 1987, p 75
Information	This issue, p 77	220-MHz Band NPRM	Apr 1987, p 16

It is with deep regret that we record the passing of these amateurs:

KICTE, Robert H. Ibbittson, Hanson, MA
WIDTK, Willard S. Perry, Fort Fairfield, ME
NIEFG, William A. Wilke, Burlington, MA
NIEPA, Morris Ertman, West Hartford, CT
W1GA, George A. Hinckley, Hendersonville, NC
WA1GEO, Blanche H. Button, North Waterford, ME
KA1GHS, Robert J. Roman, Needham, MA
WA1GNJ, James F. West, Randolph, MA
WA1GPI, Charles B. Bradley, Newcastle, ME
KA1GVM, Frank A. Simpson, North Reading, MA
KA1HFK, Doris E. Hesdorfer, Waterville, ME
W1HWK, Daniel Linehan, Weston, MA
KA1ILE, James A. Lister, Bristol, CT
W1MBQ, Harold S. Lair, Vineyard Haven, MA
KA1MEE, Linda L. LeClerc, Columbia, CT
KA1NFL, Edward J. Comer, Jr., Woburn, MA
KB1OD, Roland W. Levesque, Wintthrop, ME
ABIQ, Daniel A. Benard, New Boston, NH
WA1TND, Francis W. Sykes, Bridgton, ME
W1UT, Roy N. Scribner, North Sutton, NH
W1YFH, Robert T. Eldridge, Sunderland, MA
WA2AIW, Robert L. Oswald, Clifton, NJ
W2AU, Paul A. Wandelt, Unadilla, NY
W2CHZ, Howard L. Eitelbach, Eastham, MA
WB2CLC, David L. Knight, South Plainfield, NJ
KA2DWH, James R. MacMurray, Wellsville, NY
W2EKL, Douglas N. Lapp, Melbourne Beach, FL
K2GXS, Harvey N. Squire, Randolph, NJ
WB2IZG, William A. Egen, MD, Morton Grove, IL
W2JEI, John F. Bombria, Middle Island, NY
KA2NIZ, William Hobart, North Cape May, NJ
W2NKD, Thomas J. Ryan, Jr., Scotch Plains, NJ
K2OOQ, William L. Jones, Vineland, NJ
*K2POY, August L. Oechsli, Massapequa, NY
W2PRX, Fred A. Rouse, Ithaca, NY
W2RIM, Theodore Assenheimer, Pennsauken, NJ
KD2SD, Philip Neulander, Bronx, NY
WA2SGC, Robert M. Cusumano, Great Neck, NY
KU2U, Charles B. Oakley, Princeton, NJ
W3BU1, Ernest Weiss, York, PA
W3JZ, Max Salmansohn, Abington, PA
W3KUH, Gilbert R. Wright, Silver Spring, MD
W3PMQX, George H. Stewart, III, Jenkintown, PA
K3PAJ, Frank Schuback, Sr., Erie, PA
KA3Q, Richard N. McKnew, Frederick, MD
K3RAJ, Philip Richards, New Castle, PA
KB3TN, Bruce Portnoy, Philadelphia, PA
W3UFI, Richard C. Van Kirk, Eighty-Four, PA
N4ANQ, Henry Spiegel, Bal Harbour, FL
K4BGQ, Cordell Damron, Pikeville, KY
WB4HL, Frank Halasz, Jr., St Petersburg, FL
W4CDV, Joseph L. Ruple, Bay Minette, AL
N4CJN, Donald W. Lentz, Tamarac, FL
KP4DDP, Donald E. Caldwell, Rio Piedras, PR
WB4EZA, F. Lester Long, Holmes Beach, FL
*N4FN, Kenneth R. Dush, Warren, MI
W4GHA, Sam F. Lambert, Atlanta, GA
WB4GMM, George N. Verkes, Louisville, KY
K4HO, Karl V. Rettstatt, Sebring, FL
KA4JNV, Julia C. Knowlton, Brooksville, FL
W4KYX, David G. Young, Lake City, FL
W4LKK, Jim F. Jones, Gallatin, TN
W4MGT, B. B. Lawrence Norcross, Maryville, TN
W4MQI, Waddelle S. Boyd, Laurel, MS
W4MVI, Jerome A. Bodner, Deerfield Beach, FL
K4NFU, John H. Thorne, Waelder, TX
W4NLC, William E. Johnson, Jr., Roanoke, VA
WA4NWE, Ronald S. O'Donnell, Mobile, AL
N4OHU, Don O'Neal, Shelbyville, TN
W4OXF, Joseph Rocchietti, Hermitage, TN
*K4SCP, Herschel U. Martin, Dalton, GA
WB4TIF, John C. Mayo, Hillsborough, NC
W4TUJ, Samuel E. Harvey, Knoxville, TN
W4VOD, Louis P. Aikin, Winchester, VA
W4VVN, Rod Barie, Marietta, GA
WA4VZF, C. H. Hobbs, Jacksonville, FL
W4WJF, C. Clarke Cordle, Birmingham, AL
W4WO, Charles E. Hedrick, Sr., Arlington, VA
W4YPO, Adrian T. Pickering, Sewanee, TN
W5ATR, Emory F. Burgamy, Dallas, TX
K5BKF, Arthur R. Weber, Elgin, OK

W5COR, Charles F. Crabtree, Temple, TX
KA5DXP, Hubert Capps, Jr., Aubrey, TX
W5ESM, Harvey L. Littrell, Brownsville, TX
N5FGX, Joseph W. Fink, Irving, TX
WA5GPE, Elmer R. Ohlen, Fort Worth, TX
N5GWN, Edwin G. Sanders, Mountain Home, AR
*W5IPH, Walter C. Snyder, Brackettville, TX
K5JAC, E. Murry Greer, Baton Rouge, LA
KA5LWC, George L. Wells, Jr., Baton Rouge, LA
WB5MAP, Edward G. Sullivan, Jr., Plattsburgh, NY
*K5SR, Barry S. Fromm, Greenville, TX
W5TSN, Robert E. Dunaway, Granbury, TX
W5UAU, Sidonius M. Pokorny, Horseshoe Bend, AR
W5UIH, Robert E. Myers, Ennis, TX
W5VK, B. Vinson, Little Rock, AR
*W5WG, William E. Owen, Ruston, LA
W6ABC, Newton R. Wimer, Albany, OR
KB6AFW, Burke F. Steidley, Long Beach, CA
W6ATO, Richard F. Czeikowitz, San Bruno, CA
W6BCA, Bart M. Burtchall, Jr., San Francisco, CA
W6BQH, Elwin C. Minton, Ashland, OR
W6BXS, Herbert B. Kilpatrick, Pasadena, CA
W6CEV, Elliott N. Strobel, Ventura, CA
K6EHZ, Primo T. Romiti, Oakland, CA
W6EMP, Victor C. Schumacher, Yucca Valley, CA
W6FZX, Raymond M. Sterle, Northridge, CA
K6GCW, Dorothy H. Ball, Seal Beach, CA
N6IDX, William M. Withers, Merced, CA
W6IKB, Andrew M. Garland, Pasadena, CA
W6IUX, Delmer N. Rutan, Downey, CA
W6IVP, John Anderson, Santa Ana, CA
*WA6JUT, William E. Dikes, Mount Shasta, CA
K6KIS, Leland S. Woo, Fresno, CA
WA6LAS, M. Dale Pratt, Lucerne Valley, CA
*K6MIM, Donald R. Johnson, Walla Walla, WA
WA6MWU, M. Chuck Welch, Pleasant Hill, CA
W6NBO, Neville B. Eddlestone, Stockton, CA
W6NW, F. B. Greeley, San Jose, CA
K6OCH, Don M. Norton, Los Angeles, CA
K6PAK, Ernest F. Coune, Monrovia, CA
K6POR, Berton K. Miller, Charleston, OR
W6PRK, Raymond M. Schaefer, Camarillo, CA
N6SPG, Roy L. Wilson, Lewiston, CA
W6RXX, Leroy O. Roltgen, Fresno, CA
W6RLX, Harold Mandroian, Agoura Hills, CA
W6RSU, Robert J. Ryan, Rohnert Park, CA
K6RSY, Robert F. Norie, Palm Springs, CA
W6SMS, Lawrence D. Fraley, Fresno, CA
W6VGQ, Robert R. Jensen, Sherman Oaks, CA
WB6YFA, Charles M. Snow, Brawley, CA
KA6YOF, Morris R. Parker, Palmdale, CA
W6ZIC, Robert E. Baer, West Covina, CA
KD7AF, William K. Billow, Vancouver, WA
W7ART, Herbert L. Talen, Tacoma, WA
W7DL, Robert D. Hoffman, Seattle, WA
W7EEN, Carl J. Partlow, Spokane, WA
WA7FEQ, Alva A. Berry, Kennewick, WA
W7HUD, Martin M. Wise, Youngtown, AZ
W7IC, George A. Onsum, Freeland, WA
WA7IFS, Sarah E. Sims, Eugene, OR
*W7KD, James E. Keefer, Salem, OR
KA7MLR, Frank L. Peters, Puyallup, WA
W7MPH, Edward P. Breakey, Jr., Seattle, WA
W7NNH, Calvin C. Pearson, Richland, WA
WA7NVX, Kent S. Hoffman, Lakebay, WA
W7OJ, Wally Johnson, Port Angeles, WA
W7QC, Harold M. Buroker, Bonners Ferry, ID
N7RE, Robert E. Miller, Yuma, AZ
WA7SIW, Earl T. Wilkinson, Salem, OR
WA7WBW, Don P. Hobbs, Lebanon, OR
KA7YMA, Patrick W. Waltenberg, Lebanon, OR
WA7YPS, George E. Marshall, Elma, WA
WB8BQA, Collin Brooks, Onaway, MI
K8BYF, Claud A. Henry, Steubenville, OH
N8CKR, Milton B. Stuecheli, MD, Troy, MI
N8CVH, Max L. Holloway, Moline, MI
W8DDZ, Delbert Averdick, Middletown, OH
W8DMO, Carl W. Keske, Cleveland, OH
N8DOB, James R. Smith, Woodsfield, OH
K8DTY, Cornelius E. Lutz, Birmingham, MI

W8JAE, Lawrence E. Marble, Palmetto, FL
*W8JEJ, Bill F. Antal, Detroit, MI
W8JMK, Nelson D. Knisely, Sandusky, OH
WD8JYG, Jo Ann H. Olexa, Neffs, OH
*WB8LUA, Leonard C. Bauer, Cincinnati, OH
W8MBC, Clarence H. Cookus, Martinsburg, WV
K8MDR, Nick Zamorylo, Wayne, MI
KA8MEH, Irvin E. Blackburn, Bethel, OH
KB8MX, Harry G. Bellows, Mount Clemens, MI
KA8OAJ, Frank Scarfone, Youngstown, OH
WB8RJC, Clayton Ostrander, Detroit, MI
WA8SAY, Michael C. Listiak, Youngstown, OH
W8TAE, Robert E. Hardy, Cortland, OH
K8UVG, Robert B. Jack, Atlanta, MI
KA8VFQ, Homer J. Loftis, Sr., Oak Hill, OH
W8VTP, Jack E. Barr, Mansfield, OH
W8ZIP, Paul H. Biddison, Akron, OH
W9ABA, Carleton P. Ross, Barrington, IL
W9AYP, Frank L. Uhrus, Park Ridge, IL
W9BVX, Kenneth Slane, Madison, WI
N9CKJ, Jack W. Williams, Oak Lawn, IL
K9CLP, Robert E. Benway, Marian, IN
*WD9CZC, Glenn H. Schroeder, Arlington Heights, IL
W9DNV, Arnold K. Johnson, Genoa, IL
KD9ES, James P. Hensel, Des Plaines, IL
W9GFS, Philip E. Hatfield, Evansville, IN
W9IHU, Frank Gazarek, Hinsdale, IL
W9JX, Harry E. Adams, Spencer, IN
WA9LCB, Raymond J. Dutch, Holiday, FL
W9LJI, Marvin A. Raatz, Michigan City, IN
W9MCM, Harry L. Hale, Spring Hill, FL
K9MPY, Ruben W. Puta, Mishicot, WI
W9TBA, Edgar P. Canty, Elmhurst, IL
W9TKI, Rudolph Giovacchini, Bacliff, TX
W0AKF, Hilmar J. Schmidt, Cedar Falls, IA
KB0AKH, David M. Eilers, Coon Rapids, MN
W0AUH, Lyman B. Longstreth, Jr., Bottineau, ND
W0CPY, Albert A. Foth, Newton, KS
W0DMQ, Joe E. Cardwell, Lincoln, NE
W0GML, A. Verne Roberts, Wichita, KS
W0GRB, John A. Royal, Nehawka, NE
KA0MEM, James C. Newland, Grand Forks, ND
KD0MI, William C. Adams, Denver, CO
W0MMB, William R. Lewis, Overland Park, KS
WB0QCZ, Tom Deats, Grand Forks, ND
W0QVS, Homer E. Cox, Ayrshire, IA
W0RXD, Robert H. Lanyon, Merriam, KS
*W0SBO, Merton A. Christgau, Roseville, MN
WA0UDY, Don D. Bayliss, Iron River, WI
KU0W, David S. Lufey, Cape Girardeau, MO
KC0WY, Dennis D. Peterson, Embarrass, MN
W0XE, Robert O. Medlock, Englewood, CO
WB0ZCT, Ferdinand G. Wieberg, Bloomsdale, MO
WA0ZZP, Eugene T. Nelson, Rapid City, SD
*VE1SH, Ronald J. Hesler, Sackville, NB
VE3CCN, Ray Cline, Watford, ON
VE7ARB, J. T. Nalbach, Kamloops, BC
VE7FKF, Robert Reynolds, Vancouver, BC
G3DKS, Charles Keith Street, Deltona, FL
ZL1GG, R. E. Eaton, Auckland, New Zealand
ZS2RM, P. B. Buckley, Port Elizabeth, South Africa
5B4GE, Nicos P. Lanitis, Limassol, Cyprus

*Life Member, ARRL

In order to avoid unfortunate errors in the Silent Keys column, reports of Silent Keys are confirmed through acknowledgment only to the family of the deceased. Thus, those who report a Silent Key will not necessarily receive an acknowledgment from HQ. Canadian reports should be sent to the CRRH HQ address on page 9.

Note: All Silent Key reports sent to HQ must include the name, address and call sign of the reporter as well as the name, address and call of the Silent Key in order to be listed in the column. Please allow several months for the listing to appear in QST.

Grand Rapids ARA Spreads Christmas Cheer

Information for the following story was obtained from the QRM Newsletter, a Grand Rapids ARA publication, and Speed Gray, NS8V, President. Photographs are by Rita Armour, Club Services Department Assistant.

Children in hospitals all around Grand Rapids, Michigan, have a reason to smile this Christmas. They'll have a chance to talk to Santa Claus over ham radio.

Members of the Grand Rapids ARA will activate the Santa Claus North Pole Network this Christmas season. This service is intended to provide children who must spend the holidays in the hospital the chance to tell their Christmas wishes to Santa Claus over the 146.76 repeater.

This year's effort follows on the heels of last year's success, according to GRARA President Speed Gray, NS8V. "A local TV station put their story of our event on the wire; it was shown as far away as Arizona and Florida."

Preparation paves the way for a successful event. After coordinating times and dates with the local hospitals and recruiting other local hams for support communications, the real work begins. This involves requesting nurses in the various children's wards to slowly glean information from the children, so that when Santa talks to them, he will know the child's brothers' and sisters' names, about their pets, and what they want for Christmas. All this is done



Button given to children from the Grand Rapids ARA North Pole Network operation.

to make the experience of talking to Santa more real for them.

When each child completes a QSO with Santa via the North Pole Network, he or she is given a large, uniquely designed button inscribed *I talked to Santa on Amateur Radio* to help the child remember the occasion.

The net, of course, wouldn't be as authentic without a booming, jovial voice of Santa Claus. Last year's Santa Claus Station was manned by Bill Sprecken, WA8SCS. "Without Bill's participation, the North Pole Network would not have been so successful," added Club President Gray.

hosting which club Novices on which dates and times. Make sure that every Novice is provided for. And don't forget the follow-through! Present club-generated awards (quick-printed certificates) to everyone who took part and recognize the efforts of your Novices in your newsletter and at the next club meeting.

Step Two: The Rest

Novice Roundup isn't just for the Novice and the Newcomer! It's for everyone—especially those who care about bringing newcomers along properly and giving them a good operating model to emulate. A number of good clubs hold intraclub competitions wherein the greatest number of Novice/Tech contacts per participant wins. Some clubs pit individual members against one another, while some form two or more ability-balanced teams to go toe to toe. Some more enterprising clubs even go so far as to challenge their local rival club to an interclub competition!

What will work for you? Only you can answer that, but don't forget that the event lasts nine days—plenty of opportunity for everyone to fire up the rig for a few hours.

No good-times competition will be considered a success unless the prize matches



Comic book that will be given to Grand Rapids ARA for this year's North Pole Network operation.

This year, The American Radio Relay League will provide the Grand Rapids ARA with plenty of *Archie's Ham Radio Adventure* Comic Books to distribute along with the buttons.

the effort. If the effort is made in the spirit of friendship and good humor, the prize should reflect it. A guaranteed winner is a pizza party with the "losing" teams treating the winners. There really are no losers when the real prize is fun and fellowship. As a finishing touch, a silly trophy, passed from winner to winner each year, is always good for a few laughs and leads to high-spirited involvement. Gold-painted plumbers' helpers, bent horseshoes and simulated Wouff Hongs come to mind. Only you know what will appeal to your club's collective sense of humor.

Jot down January 30 through February 7 on your calendars, and plan to make the 1988 Novice Roundup an experience your club won't soon forget.

ATLANTA RADIO CLUB ANNOUNCES SCHOLARSHIPS

The Atlanta Radio Club is pleased to announce that it will have up to two \$1000 scholarships available for young hams in 1988.

In addition to being licensed amateurs, applicants must be high school seniors who will graduate in 1988 and enter an accredited college or university for the first time.

Candidates will be judged on their high

TIME TO "ROUNDUP" A FEW NOVICES

Now that it's a bit too cold for many of us to do antenna work, it's time to put what antennas we do have to good use... and Novice Roundup is just around the corner (January 30 through February 7)! With a little inspiration from your club's more experienced members and a few hours at the mic or key, any initial reluctance your Novices may feel may quickly change into a lifelong enthusiasm for contesting.

Step One: Novices

Get those new hams on the air! You worked hard to get them licensed—don't drop the ball now. Let them know what Novice Roundup is all about; practice exchanging the proper information with them before the 30th arrives; help them get their stations on the air and make a few pre-Roundup contacts. Make sure the club station is dusted off and working well in the Novice bands.

Recruit club members to invite stationless Novices to their shacks for a few hours (or more) of operating during the event; post and distribute an operating schedule showing which "Roundup Elmers" are

school grades, ham radio achievements and citizenship/leadership qualities. Residents of Georgia and its contiguous states will be given extra consideration.

For application forms, please write to: Phil Latta, W4GTS, 259 Weatherstone Parkway, Marietta, GA 30068. **OFF**

50 Years Ago

January, 1938

□ A Chicago-area ham misinterpreted an F.C.C. release and set a considerable portion of the amateur fraternity on its individual and collective ear by blasting the 160-meter 'phone band with the "news" that 80 meters was about to be channelized! The hard work of many saner amateurs quieted things down.

□ The First "A.R.R.L." QSO Party will be held on a weekend this month, providing a chance for members to meet and chat with each other.

□ Crystal switching, alternative e.c.o. control and special construction are features of W8ZU's five-band exciter with front-of-panel band changing.

□ The coming world radio allocations conference in Cairo, with life and death power over our DX bands, has many of us concerned. Senior Assistant Secretary A. L. Budlong, W1JFN, relates the history of wireless and radio regulation from the beginning, preliminary to a treatise next month on the present situation.

□ "Bud" also provides a useful solution to a knotty question facing those of us with antenna directional problems—just where is *true* North? Corrections for longitude differences and "clock noon" (vs. true noon) do the job.

□ "PITC" may be a new call you hear soon from remote Pitcairn Island on 40 or 20 meters. WIBES relates U.S. hams' and manufacturers' efforts to produce a complete 80-watt rig with independent power supply for radio operator Andrew Young.

□ John Kraus calls his two half-wave antennas with close spacing a "flat top" beam, but it will become better known with his call sign label, the "W8JK beam."

□ Some of the Civilian Conservation Corps camps have radio circuits on a clear channel 4300 kc., and their extensive training classes in code practice will some day result in substantial additions to the ham ranks.

□ A National Trunk Line net is maintained on 3670 kc. to provide liaison between the thirteen trunk lines constituting the backbone of League traffic organization.

□ I.A.R.U. News column presents a new list of "countries" for DXCC purposes, revised from a year ago to take into account many suggestions from overseas as well as domestically. G6WY now tops the award list with 115 confirmed.

□ The National Company's ad expresses the usual greetings of the season, but with a novel twist—an individually-pasted Christmas seal. A suitable donation was made to the charity.

□ Only the sharpest eyes will catch the vulgar phrases from the mind of an advertising copy agency artist appearing in the Hygrade Sylvania ad this month. He apparently thought the print was too small to be detected, but a few hams caught it.

25 Years Ago

January, 1963

□ A combination of ruggedness, low cost and excellent noise characteristics for receiver applications make the Nuistor ideal for u.h.f. use.

W1AW Schedule

October 25, 1987—April 1, 1988

MTWThFSSn = Days of Week

Dy = Daily

W1AW code practice and bulletin transmissions are sent on the following schedule:

UTC	Slow Code Practice Fast Code Practice CW Bulletins Teleprinter Bulletins Voice Bulletins	MWF: 0300, 1400; TThS: 0000; TThSSn: 2100; Sn: 0300 MWF: 0000, 2100; TTh: 0300, 1400; S: 0300; Sn: 0000 Dy: 0100, 0400, 2200; MTWThF: 1500 Dy: 0200, 0500, 2300; MTWThF: 1600 Dy: 0230, 0530
EST	Slow Code Practice Fast Code Practice CW Bulletins Teleprinter Bulletins Voice Bulletins	MWF: 9 AM, 7 PM; TThSSn: 4 PM, 10 PM MWF: 4 PM, 10 PM; TTh: 9 AM; TThSSn: 7 PM Dy: 5 PM, 8 PM, 11 PM; MTWThF: 10 AM Dy: 6 PM, 9 PM, 12 PM; MTWThF: 11 AM Dy: 9:30 PM, 12:30 AM
CST	Slow Code Practice Fast Code Practice CW Bulletins Teleprinter Bulletins Voice Bulletins	MWF: 8 AM, 6 PM; TThSSn: 3 PM, 9 PM MWF: 3 PM, 9 PM; TTh: 8 AM; TThSSn: 6 PM Dy: 4 PM, 7 PM, 10 PM; MTWThF: 9 AM Dy: 5 PM, 8 PM, 11 PM; MTWThF: 10 AM Dy: 8:30 PM, 11:30 PM
MST	Slow Code Practice Fast Code Practice CW Bulletins Teleprinter Bulletins Voice Bulletins	MWF: 7 AM, 5 PM; TThSSn: 2 PM, 8 PM MWF: 2 PM, 8 PM; TTh: 7 AM; TThSSn: 5 PM Dy: 3 PM, 6 PM, 9 PM; MTWThF: 8 AM Dy: 4 PM, 7 PM, 10 PM; MTWThF: 9 AM Dy: 7:30 PM, 10:30 PM
PST	Slow Code Practice Fast Code Practice CW Bulletins Teleprinter Bulletins Voice Bulletins	MWF: 6 AM, 4 PM; TThSSn: 1 PM, 7 PM MWF: 1 PM, 7 PM; TTh: 6 AM; TThSSn: 4 PM Dy: 2 PM, 5 PM, 8 PM; MTWThF: 7 AM Dy: 3 PM, 6 PM, 9 PM; MTWThF: 8 AM Dy: 6:30 PM, 9:30 PM

Code practice, Qualifying Run and CW bulletin frequencies: 1.818, 3.58, 7.08, 14.07, 21.08, 28.08, 50.08, 147.555 MHz.

Teleprinter bulletin frequencies: 3.625, 7.095, 14.095, 21.095, 28.095, 147.555 MHz.

Voice bulletin frequencies: 1.89, 3.99, 7.29, 14.29, 21.39, 28.59, 50.19, 147.555 MHz.

On Monday, Wednesday and Friday, 1400 through 2200 UTC, transmissions are beamed to Europe on 14, 21 and 28 MHz.

Slow code practice is at 5, 7½, 10, 13 and 15 WPM.

Fast code practice is at 35, 30, 25, 20, 15, 13 and 10 WPM.

Code practice texts are from QST, and the source of each practice is given at the beginning of each practice and at the beginning of alternate speeds. For example, "Text is from July 1987 QST, pages 9 and 77," indicates that the main text is from the article on page 9 and the mixed number/letter groups at the end of each speed are from the contest scores on page 77.

On Fridays, UTC, a DX bulletin replaces the regular bulletin transmissions.

On Tuesdays and Saturdays at 2330 UTC, Keplerian Elements for active amateur satellites will be sent on the regular teleprinter frequencies.

W1AW CW and voice bulletins are sent on OSCAR 10, Mode B, subject to reactivation of the transponder. Look for CW on 145.840 MHz and SSB on 145.962 MHz.

Teleprinter bulletins are 45.45-baud Baudot, 110-baud ASCII and 100-baud AMTOR, FEC mode. Baudot, ASCII and AMTOR (in that order) are sent during all 1600 UTC transmissions, and 2300 UTC on WThFSn. During other transmission times, AMTOR is sent only as time permits.

CW bulletins are sent at 18 WPM.

W1AW is open for visitors Monday through Friday from 8 AM to 1 AM EST and on Saturday and Sunday from 3:30 PM to 1 AM EST. If you desire to operate W1AW, be sure to bring a copy of your license with you.

W1AW is available for operation by visitors between 1 and 4 PM Monday through Friday.

In a communications emergency, monitor W1AW for special bulletins as follows: voice on the hour, teleprinter at 15 minutes past the hour, and CW on the half hour.

W1AW will be closed on December 25, January 1, February 15 and April 1.

W2VCG uses two 8058s, the latest version, to achieve very low noise reception in his 420-Mc. converter.

□ League president W6ZH used the Lamb noise-silencing principle with modern components and circuits to attain maximum effectiveness in reducing Loran QRM on 160 meters.

□ W1ICP has yet another design for beginning amateurs, this time a simple 80- and 40-meter transmitter, crystal controlled, with self-contained power supply.

□ W6TC's HBR-16 receiver, first described in 1959 QSTs, was built by hundreds of amateurs—but each one adding or modifying features to his individual liking. W7QBR describes his version, with b.f.o. switching, audio a.g.c., Q multiplier and i.f. noise limiter.

□ Most of today's manufactured transmitters are designed for 50-75-ohm output and thus won't load a long wire or the old, reliable "Windom" half wave. W4JA shows us a simple transmatch circuit for single-wire feed.

□ Official Experimental Station W4LNG submitted an OES report on the frequency stability of third-overtone crystal oscillators, but QST's editors thought the whole fraternity should have the information about the effects of tuning, temperature

and supply voltage on the stability of v.h.f. converters.

□ Washington items: FCC has removed the 50-watt power limit on 420-450 Mc. operation. The Commission has also proposed a regulations change to permit simplified mobile logging (eliminating needs for individual time entries), at the request of the League. Senator Goldwater's bill for U.S. reciprocity in amateur licensing bogged down in administrative detail last year, but he will introduce it again to the 83rd Congress.

□ The League has requested the Postmaster General to issue a commemorative stamp honoring amateur radio operators. With only 12 subjects chosen each year from hundreds of applications, we're keeping our fingers crossed.

□ KH6IJ paid a visit to Pakistan recently and recounts for us the activities of AP hams, who proceed with unbridled enthusiasm despite huge difficulties in obtaining radio parts.

□ Responding to the lifting of power restrictions on 420 Mc., W1HDQ describes a 4X250B multiplier/amplifier to produce a healthy signal on that band.

□ Don't forget the DX Contest in February and March.—W1RW **OFF**

DX Century Club Awards

Administered By Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 25-country increments through 250, 10-country increments through 300 and 5-country increments above 300. The totals shown below are exact credits given to DXCC members from October 1 through October 31, 1987. An SASE will bring you the rules and application forms for participation in the DXCC program.

New Members

Mixed

DA2UT/170 DK2PR/201 FD1LJF/139 G3NKC/103 G4EVS/110 G0CLP/101	HA5AM/288 I1ZEU/260 IK2BLA/160 JA1IRH/110 J11LLD/208 JA2LMA/303	JA2NNF/236 JH2ESL/110 JH2UUV/246 JH3HTD/218 JA7JH/327 OK1DZL/104	PA3AOS/109 SP6AZT/224 Y03CD/220 ZL1BWK/134 KB1SC/110 NE1T/101	KE2BH/105 WA2FQS/103 WA2USA/121 WB2TOE/107 K3NEE/104	KA3BIH/140 N4CIW/130 W4VNI/108 K5HKK/115 WB5HRI/109	WJ5K/120 KA6MBF/103 NY6Y/104 WA6NDN/103 KE7PB/130	NU7V/103 W7GXX/100 N8AOV/202 N8EOA/104 W8IWI/108	WB8JKR/128 W9AA/109 NR9X/110 WA9ZXV/106 KA0BKR/152
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Radiotelephone

CP5HK/145 CP5HP/101 DA2UT/162 DF2UA/114 DK2PR/113 DL4MCF/154 G4XTA/105	GM0ARD/110 GM4ZAA/125 HB9DDW/102 I2QJ/308 I2RKI/167 IK2AHR/286 IK2BLA/160	IK6GPZ/162 I7UJ/133 IK8HVH/106 JH1ROJ/110 JH1LLD/207 JA2LMA/297	JA2NNF/206 JH2ESL/110 JH2UUV/167 JA3AFR/319 JH3HTD/218 KX6AZ/112	OZ1LRT/105 PA3AOS/103 PA3EAA/106 PY2AEJ/121 TI2SD/110 TU2QZ/102	TZ6MG/102 XE1OCA/101 YB0ZE/100 Y03CD/182 ZC4IT/107 ZL1BWK/134	K1PDX/111 KB1SC/105 K31J/172 KE2BH/105 K3PA/151 AA4DO/103	AA4ZK/109 KK4HD/105 N4CIW/109 WA4DPU/104 W05G/110 W6YHM/143	WD6L/104 KE7PB/109 N8AOV/201 W8IWI/107 WB8JKR/116 NR9X/110
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CW

DK2PR/129 DL2HAZ/111 F6FHB/239	FD1LJF/103 HA5AM/116 HB9AWS/102	HB9BHV/110 JM1GYQ/114 JA2LHG/104	JH2UUV/160 OK3THM/105 OK3ZWX/105	Y03CD/177 AA4SY/107 W5JL/265	N7HUS/113 W7KSK/100	N8GGI/100 WD8LLD/111	AE9Q/138 KJ9I/100	NU9P/102 NS8B/104
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RTTY

DL7UX/112	DL7XS/102	I5HZZ/107	JA2NNF/113	W1FZ/101	WB5QBV/104	KE7PN/102
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160 Meters

DL6EN/103	G4VGO/103	SP3BOD/107	N2MM/105
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5BDXCC

K0IFL K9WG WB2IVO	WI4K N8DBI W7KT	HA7PF JR1TNE	JA1OND Y03CD	W4OWY SP6AZT	OZ9FJ W4DHz	WB8JDA SV1NA	I4EWH JA4MRL	N1ATD DK9KD
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Endorsements

Mixed

DF3AQ/302 DJ2TI/328 DK0BZ/258 DK2BI/325 DK3KD/318 DK8NG/320 DL1KS/326 DL4MCF/160 DL6DK/229 DL7EN/359 DL7NB/328 DL7WL/310 DL7XS/301 DL8UI/323 EA4MY/323 E18H/332 F2NB/315 F6BFH/323 F6DY/281 F8RU/337 G3KEC/128 I2CEX/184	IK2BTI/218 IK6CGQ/246 IK7CJ/253 JA0CWZ/318 JA1MUZ/188 JA8NG/320 JE1MGE/318 JH1QY/307 JH1MGE/318 JA2AIR/335 JA2OZI/287 JA2XW/342 JA3AQ/333 JA3DY/350 JJ3AFV/284 LA1K/346 OE3WWB/330 OE5BYL/126 OH2BN/309 OK1ADM/348 OK3IF/224 ON6FU/315 OZ1FAO/277	OZ1FVL/235 OZ1TD/148 OZ7YY/326 OZ8BZ/333 PY5CA/307 SM0DRB/250 SM3BIU/318 SM4NLL/155 SM5CZY/345 SM6MNH/181 SM7FHJ/168 SM7PRF/153 SP7HT/340 SP9PT/331 TF3SV/325 UP1BZ/317 VE3DMC/308 VE3CJ/224 VE3NI/304 VE6KY/271 VU2TTC/211 YU2BOP/284	YU2OB/320 4X4NJ/335 5H3RB/179 9V1TL/281 AK1N/280 K1AR/316 KC1EL/127 KS1J/252 W1CJ/303 W1NHJ/342 W1TRC/318 K2BZT/360 K2MFB/174 KA2ELW/304 KB2ELW/307 KF2F/300 N2BI/200 N2MM/262 N2MK/288 N2JC/310 NR2W/280 NR2W/178	W2IQB/317 W2KJ/285 W2OW/225 W2SUA/333 W2VLP/282 WA2UXX/306 K3SKE/180 KJ3L/306 KX3I/307 N3AM/297 N3TO/300 N3US/318 W3EYF/345 AA4AF/314 AA4CJ/328 AA4VB/176 K4BAI/329 K4IR/331 K4LFX/311 N6ST/234 KB4HU/307	KB4I/308 KC4IH/232 K14M/310 N4BPP/308 N4BQD/281 N4LZL/150 N4RA/330 W4BRE/338 W4DXI/326 W4JVN/275 W4KGH/202 W4ROM/176 W4WQ/332 W4ZWE/310 WA4DAN/310 WA4VDE/314 WA4ZBK/285 WD4HLK/307 WD4LOK/177 WB4NFO/300 WB4TDH/314 WD4RCO/309	K5FNR/156 K5JUC/310 K5RJ/326 K5YCP/325 KC5TW/203 N5FW/319 N5GM/320 NA5S/270 N5JX/286 W5AC/263 W5MCH/271 W5NF/280 W5RDA/349 W5VBX/135 WF5E/349 K6GA/351 K6ICG/150 K6XJ/152 K16GI/327 KT8S/201 N6ST/314 W6KUT/361	W6PU/276 W6XP/329 W6YOC/339 WA6QH/127 W6GP/274 N5FW/319 K7NN/331 K7KG/338 K7WE/270 KY7M/274 W7OE/329 WA7ECU/233 WA7HIN/227 WB7CLU/308 K8CH/333 KD8W/180 KZ8Y/310 N8FGD/133 W8AH/359 W8CNL/335 W8EVZ/340 W8KR/339 W8RSW/344	WA8SXM/225 WB8AA/263 K9CC/200 K9KVA/183 K9QXY/315 KA9LTR/257 KC9JP/308 N9BUS/281 KQ9E/200 W9TY/315 WA9MGK/279 W9RNF/263 WD9IX/232 A10X/336 KA0DIL/166 KB0U/311 KF0H/315 N10C/310 W8CAW/323 W8GAX/292 W8GKL/352
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Radiotelephone

DF3AQ/298 DJ2TI/323 DJ4NY/127 DK2BI/323 DK3HL/322 DK8NG/317 DK9KD/319 DL7EN/331 DL7NB/319 DL8UI/321 EA1AW/233 F6CPO/295 F8RU/337 F9ER/300 FK8DH/277 G3U2M/177 HA5AM/249 I1CAW/319	I2PHN/328 I2WZX/290 IK2BTI/212 IK2ECN/177 I4WZT/255 I4ZSQ/336 I5JHW/298 IK7CJ/246 I8WES/309 IT9GA/336 JA0CWZ/312 JE1MGE/315 JA2LHG/307 JA2XW/332 JA3AQ/319 JA3DY/320 JH3HTD/218 JJ3AFV/286	JA7JH/327 K06HA/125 KH6JEB/298 KV4FZ/331 LU1JDL/183 OA4ED/200 OE3WWB/330 OK1ADM/342 ON4S/355 ON5FU/314 PY5CA/306 SM5CZY/345 VE3NI/299 VK4BJD/222 VK4ZM/159 VU2TTC/166 XE1JW/230 YU2OB/281	Z21BP/302 ZL1BQD/291 AK1N/275 K1CMI/321 K1KOB/270 NA1D/149 W1CJ/301 W1TRC/317 W1VKQ/315 WA1WMS/244 WB1BVQ/267 KA2ELW/301 KB2HZ/304 N2JC/309 N2KZ/279 NN2F/253 NR2W/155 W2IQB/300	W2NQG/284 W2SUA/333 W2VLP/279 WA2UXX/306 WA2ZLK/153 K3SKE/175 KC3KE/254 KJ3L/302 KZ3H/138 N3US/312 W3EYF/299 WB3GOP/305 AA4AF/314 AA4CJ/309 AA4NK/128 K4UAS/312 KB4CSK/225 KB4HU/307	KB4I/307 KC4BX/289 KC4IH/232 KF4VS/154 N4RA/312 NU4D/288 W4BRE/335 W4JVN/270 W4KGH/200 W4OWY/301 WA4DAN/306 WA4BIM/310 WA4GFZ/130 WA4MMO/326 WA4VDE/314 WA4ZBK/236 WB4CSK/225 K5RJ/319	K5TGE/286 K5YCP/322 KE5JE/154 N5FW/310 NA5S/260 KC5UO/300 ND5N/310 N5D/199 NY6Y/307 WD5DBV/312 WX5X/153 N6DHX/250 K6GA/334 K6KJ/327 K6LV/157 K16GI/153 N6AIT/252 K6KUT/342	W6MND/276 W6NXD/252 W6SUN/302 W6WPK/154 W6XP/329 WA6QH/127 WG6P/273 NS7J/310 W7KSK/182 W7OE/318 WA7ECU/225 WB7CLU/307 WB7WQE/269 W8AH/359 W8CNL/329 W8EVZ/335 K8MDU/154 KB8BN/283	W8NPF/250 WB8HLI/250 K9HDZ/321 K9KVA/183 K9PSN/293 KA9LTR/208 KC9JP/308 KQ9I/317 N9BUS/259 W9DMH/316 W9NZM/346 W9TY/269 W9ZM/354 WD9DZV/148 N10C/225 W8GAX/262 W8GKL/351
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CW

DJ2TI/305 DK1GF/200 DK8NG/307 DL1KS/283 DL7NB/270 DL7WL/296	EA4MY/303 IK1CJT/210 IK6CGQ/211 JA0CWZ/264 JH1IFS/307 JA2ADY/273	JA3AQ/294 JA3AFV/263 OH2BN/301 OZ1FAO/267 OZ1FVL/219	OZ4RS/177 PY2FR/289 PY5AKW/151 SM6MNH/174 SM7NJ/182 9V1TL/232	KS1J/204 W2IQB/224 W3EYF/284 AA4AR/299 W4WG/225	WA4ZBK/248 WA4DPU/243 WA4DAN/285 WB4CSK/255 N5DEE/259	N5FW/296 N5GM/252 W5AC/153 WD5DBV/271 K6GA/320	N6OC/283 W6J/298 KD8W/176 KZ8Y/281 W8AH/318	W8RSW/310 KA9LTR/209 W9TY/304 K6GUG/274 W8ULU/150
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RTTY

W2FG/152	W2FXA/175	W6GC/161
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160 Meters

W8AH/169	4X4NJ/163
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The Day the Pope Came to Town

By Bill Lynch, WB5ZJC

Your mission, Mr Phelps, should you decide to accept it, is to establish communications for all Red Cross first-aid activity during the visit of a dignitary, the Pope, to San Antonio. The Red Cross main offices, the San Antonio Emergency Operations Center, the Papal mass site, a parade, nine hospitals, the plumbers union and the Papal committee must also be interconnected by radio. In addition, a way must be found to keep track of casualties evacuated to local hospitals, and distribute this information to several command sites. The unexpected can be expected to happen, so planning must include flexibility to radically change the Amateur Radio mission at any time.

Planning Phase

Take a typical disaster—little time, fast recruitment, use of available equipment. Wouldn't it be nice to have several months' warning, lots of opportunity to build, plan and discuss? This project would allow San Antonio hams to build equipment in advance, do in-depth planning, develop procedures and meet contacts at each location. The results can apply to future public-service and emergency activities for years to come.

So, on with the planning. The best prognosticators give some figures to work with. San Antonio, Texas, the ninth-largest city in the United States, could be expected to double in size for one weekend in September. The Papal mass would probably contain 500,000 to one million people. The parade could have a similar sized crowd, and an additional 300,000 people from Mexico.

Intense planning would be the key. After getting support agreements from all the local ham clubs, Ken Harwood, WA5QZI, Emergency Coordinator (EC) for Bexar County, began delegating responsibility. Ivan Mangold, WA5RNV, AEC (and past EC) would oversee the entire project. AEC Bill Lynch, WB5ZJC, would be responsible for the mass site and recruitment. AEC Al Uvietta, KC5SS, would handle the San Antonio Emergency Operations Center and all governmental relations. Bill Urdley, N5CSC, would run communications for the parade and other off-mass-site locations and arrange linking between other radio groups such as REACT and the Civil Air

Patrol (CAP). Harry Ridenour, N0CCW, would set up the packet links between the hospitals and other critical locations. Ken would run operations at the Red Cross building.

Hams attended meetings with Red Cross, Emergency Medical Service, Emergency Operations Center management, several radio clubs and each other to fill in the details and expectations about the mission. It was important not to overcommit our resources. First priority was to serve the organizations having a longstanding relationship with the amateur community such as the Red Cross, the National Weather Service and the City Emergency Operations Center. Once their needs were met, we could begin helping other groups.

The final setup had five cells, and each was run as a net. The packet-radio operation was assigned two digital frequencies; one for local and one as the Texas Department of Public Safety backup to Austin, Texas.

Sixteen frequencies were set aside for the project with an eye on cross-channel interference. Each was tested for appropriate coverage. Uncommon simplex frequencies were selected to avoid unintentional interference from hams too far away to realize they were interrupting a low-power net.

Recruiting Phase

It became obvious early that the number of hams needed was larger than our usual projects. Fortunately, we have used a computer data base approach to recruiting for some time, but expansion of the data base was needed. A major recruitment program, including a mailing to all known hams in the area, was implemented. The data base of active, public-service-oriented hams doubled in size. In addition to the typical name and address information, it included radio equipment, antennas, past experience and other aspects so recruiters could zero in on specific needs. If net-control experience was needed, the data base would give a list of such operators.

Most successful recruitment still requires calling individual hams—one to one—and asking their help. Having a data-base program display information about each ham makes it much easier, and logging the results of the call turns record keeping over to the program. If a return call is needed in two weeks, the program can

give an alert at the appropriate time.

Equipping Phase

For years, the local EC committee has been encouraging local hams to build portable 2-meter antennas and other equipment to operate for extended periods without support. Many of the local public-service projects have been accepted with an eye toward creating regular usage of this equipment. This program has been very successful with some projects involving as many as 75 hams operating in rough field conditions for days at a time.

The many well-equipped hams encouraged others to improve their equipment mix for the Papal project. Hams began adding gel-type batteries and appropriate wiring for long-term hand-held operation, higher-gain antennas attached to headsets, and other appropriate equipment. In fact, all six antennas at the Papal mass command center were home-brew.

It was important to have uninterrupted power at the mass-site command center, so radios and packet equipment were floated across a large battery. This gave more stable power and if the short duration current requirements of several transmitters operating at the same time exceeded the power-supply capacity, the battery would take up the excess. If commercial power was lost, battery power was sufficient to continue operations to the end of the day.

The packet-radio assignment was to acquire the names and addresses of casualties arriving at each hospital, and then pass that information along with the name of the hospital to a central packet station. This central packet station was running Double-DOS® so D-Base®III could be run simultaneously. As casualties' names arrived, they would be added to a list and sorted by last name. This list could then regularly be sent back out. Then, if relatives or friends inquired of a ham about the location of a casualty, their location could be identified. This would eliminate a large volume of telephone calls to the hospitals.

The difficulty appeared early. Most hospital emergency rooms are heavily fortified with steel and concrete and face away from the city. Packet operators would rarely have a clear path to the regular digipeaters. An additional permanent digipeater and a portable would give usable paths, but several operators still had to find



The Net Control Station during the Papal visit to San Antonio was in tandem net operation. KC5FK, WA6CMJ and WD5BKO (seated, left to right) are at the controls as strategy is discussed. (photos courtesy WB5ZJC)



Packet radio was used to keep track of casualties and the location where they were being treated. K5YFW (left) and KC5FK operate the packet stations at the communications command center.

a way to get antennas outside. The hospitals in those cases were helpful in providing routing for coax.

Implementation

The mass site would have the heaviest volume of communications. The setup included one command center, two 200-bed holding areas with high-level medical care and provisions for casualty transportation by ambulance or helicopter to hospitals, 17 first-aid stations with nurse and doctor-level care surrounding the mass site, and about 35 first-aid posts within the crowd. Golf carts would be used to move casualties from the first-aid posts to the larger stations, and from stations to the major holding areas.

Amateur communications would be responsible for linking the first-aid stations and holding areas with the command operation. Hams would also man (along with a medical technician) the golf carts and provide transportation for casualties. The first-aid posts within the crowd would signal the need for assistance by raising an orange flag on a pole. The poles each had grid coordinates in large letters so their location could be readily identified.

A primary 2-meter simplex frequency was used to control the mass site. Two simplex frequencies (at least 1 MHz apart) were to be used as secondaries. Packet was set up on a standard packet frequency, and a repeater frequency was set aside for packet coordination. A second band was used to link the mass command center with the EOC and Red Cross building. Two additional repeaters were used by the parade and off-mass site operations.

The Flexibility Pays Off

Jim Carpenter, WD5BKO, and Bill Murphy, WA6CMJ established a net at the mass site by 5:30 AM. Norm Randolph, KA5AWP, and Bill Lynch, WB5ZJC,

later rotated through the net-control positions to provide relief. Requests for a reshuffling of medical personnel and supplies took the first several hours. When the clouds cleared off at about 9:30 AM, the pace of handling casualties climbed to a fever pitch, particularly along the section nearest the altar where people had waited the longest. By 10:30 AM, the increasing demand for assistance leveled off and continued until about 2:30 PM. Even with the high pace, casualties rarely had to wait more than five minutes after the need for transport was reported to net control.

After the mass, the need for medical assistance shifted to the paths back to the bus loading areas. Carts and vans were moved in order to provide ice and water to people unable to continue the long walk back.

Responding to the Unexpected

By mid-afternoon it became obvious that provisions for handling missing persons and displaced individuals were not working. These people were being sent to Red Cross first-aid stations rather than lost-and-found facilities. Using one of the alternate mass site frequencies, Norm Randolph, KA5AWP, started a second net to gather names of missing or displaced people. Those names were passed to Bruce Gould, KA5SSB, and Louis Kocurek, W5VIV, near the altar to be announced over the speaker system. Names were also cross referenced with the packet list of hospitalized casualties and many searchers were sent to the appropriate hospital.

The net then arranged to transport found individuals to a central location near the command tent. By the end of the day, all but six of these people had been reunited with their families or friends. Arrangements were made for the state police to take responsibility for the remaining displaced people so operations could be closed.

On one occasion, a ham/medical technician golf-cart team delivered a woman to medical personnel just as she went into cardiac arrest. After 30 minutes of intense effort by the medical team, she survived.

In summary, 124 hams participated, providing about 3750 hours in planning and implementing communications. Amateurs assigned to the mass site worked a single shift, arriving at Red Cross headquarters at 3:30 AM and leaving the mass site at 7:30 PM.

As the mass-site operations began to wind down, the parade started to wind its way through a crowd larger than that at the mass site. Fortunately, with a parade the crowd was spread over several miles. This allowed people to arrive just a short time before the parade and still get a good view. Casualties from the parade were less critical and fewer in number.

The parade operation differed from the mass site in that hams were spread among REACT and CAP stations to relay communications over longer distances. Amateurs tied the other radio groups to the command operation. REACT and CAP communicators maintained disciplined operations and used the capabilities of their respective equipment to the fullest. Supporting the shorter range radio communications were 17 operators from CAP, 30 from REACT and 25 from Boy Scout Explorer Post 700 (a post specializing in communications skills).

Even as the day warmed up to 94 degrees, amateurs remained cool on the air and maintained tight net discipline. They kept traffic brief and to the point, making optimum use of the frequency. It was obvious that dedicated amateurs working within a well-designed plan can carry a phenomenal load and get the job done. To quote another TV program, "I love it when a plan comes together."

Field Organization Reports October 1987

ARRL Section Emergency Coordinator Reports

Thirty two SEC reports were received, denoting a total ARES membership of 15,759. Sections reporting were: AB, AR, ENY, GA, ID, KS, LAX, MDC, MI, MN, MO, MT, NPL, NH, NM, NNJ, OH, ORG, PAC, SD, SDG, STX, SV, UT, WA, WI, WNY, WPA, WTX, WV, WY, VA.

Transcontinental Corps

Area	Successful Functions	% Successful	TCC Function Traffic	Total Traffic
Cycle Two				
TCC Eastern	109	88.00	619	1245
TCC Central				
TCC Pacific	118	95.16	589	1145
Summary	227	91.58	1208	2390
Cycle Three				
TCC Eastern	58	93.56	15	30
Cycle Four				
TCC Eastern	116	93.56	655	1280
TCC Central	88	88.00	439	908
TCC Pacific	103	83.06	616	1217
Summary	307	88.20	1710	3405
September report:				
Cycle 3				
TCC Eastern	58	96.67	34	68
Cycle 4				
TCC Eastern	115	95.83	693	1402

TCC Roster

KA1AE KB1AF K1BA W1CE K1E1C W1EFW W1ERW WA1FCD KN1K KA1MDM W1NJM KT1Q W1QY KAT1 KW1U WB2EAG W2FR WA2FJJ W2GKZ NN2H NQ2H KB2HM N2IC W2LWB W2RQ WA2SPL KA2UBD N2XJ W3ATQ N3COY N3EMD WB3GZU W3OKN W3PO KQ3T N3JV W3YVQ N3JV AA4AT N4EXQ N4GHI WB4PNY N4TN K4ZK W5GHP K5GM WB5J W5JOV AJ5K K5MXQ WZ5N W5QVK ND5T N5TC K5TL W5TNT KB5UL KB5W W6EOT W6INH N6GJO K6LL N6LHE W6FO K6UYK W6VZT KN7B K7OCT NR7E W7EP W7GHT NN7H W7IGC W7LG KA7MUL K7OVK KF7R W7TGU W7VSE KA8CPS W8PMJ K8TFF W8QHB KA8WNO AF8V KD8VX WB8YDZ W9CBE WB9UYU AD8A KQ8D KQDJ KA8EY KQEZ KJ8G NQ8HF N8IA NX8J K8JH KE8NI WA8OYI A8Q K8BU VE3FAS VE3GSO

National Traffic System

Net	Sess	Tic	Avg	Rate	% Rep
Cycle Two					
Area Nets					
EAN	31	937	30.22	.744	94.1
CAN	31	697	22.48	.607	100.0
PAN*	59	819	10.49	.513	94.1

Region Nets

1RN	62	436	7.03	.422	83.4	100.0
2RN	60	314	5.23	.298	93.3	96.8
3RN	31	180	5.80	.500	94.0	98.8
4RN	62	361	5.82	.280	79.7	100.0
5RN	62	673	10.85	.479	85.0	100.0
6RN	52	218	3.14	.279	100.0	
7RN	50	341	6.82	.450	83.1	100.0
8RN	62	271	4.37	.283	95.7	100.0
9RN	62	282	4.55	.362	91.3	100.0
ECN					70.9	
TEN	62	532	8.58	.313	85.0	100.0
TWN					96.6	

TCC

TCC Eastern	109	1245
TCC Central		
TCC Pacific	118	1145

Cycle Three

Area Net					
EAN	31	190	5.13	.497	78.8

Region Net

1RN	30	98	3.27	.321	77.1	83.8
2RN	31	99	3.20	.290	93.6	77.4
3RN					87.1	
4RN						
5RN					93.5	
ECN					83.8	

TCC

TCC Eastern	58	30
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Cycle Four

Area Nets					
EAN	31	1149	37.1	1.260	96.3
CAN	31	719	23.2	1.011	100.0
PAN	30	787	26.8	.968	99.4

Region Nets

1RN						100.0
2RN	52	209	4.02	.405	76.1	93.5
3RN						100.0
4RN	62	462	7.45	.420	100.0	100.0
5RN	52	581	9.37	.650	83.5	100.0
6RN	62	444	7.16	.500	100.0	98.3
7RN	62	346	5.58	.548	98.6	100.0
8RN	60	307	5.12	.365	92.0	98.8
9RN	62	332	5.35	.455	96.0	100.0
TEN	62	378	6.10	.530	87.1	100.0
ECN	61	171	2.80	.444	66.0	96.7
TWN	55	240	4.29	.392	95.8	100.0
ARN	31	90	2.90	.089	100.0	87.1

TCC

TCC Eastern	116	1280
TCC Central	88	908
TCC Pacific	103	1217

*PAN operates both cycles one and two.
TCC functions not counted as net sessions.

ARRL Section Traffic Managers reporting: AL, AR, AZ, CT, EME, ENY, EPA, GA, IA, IL, IN, KS, MDC, ME, MI, MN, MO, NC, NH, NPL, NNJ, NTX, OH, ONT, OR, ORG, RI, SB, SC, SD, SDG, SF, SFL, STX, SV, TN, UT, VA, WMA, WPA, WVA, WTX, VT.

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 CIV nets, 1 point each, max 30; (2) Checking into phone/RTTY nets, 1 point each, max 30; (3) NCS CW nets, 3 points each, max 12; (4) NCS phone/RTTY nets, 3 points each, max 12; (5) Performing assigned NTS liaison, 3 points each, max 12; (6) Delivering a formal message to a third party, 1 point each, no max; (7) Handling an emergency message, 5 points each, no max; (8) Serving as Emergency Coordinator or net manager for the entire month, 5 points max; (9) Participating in a public-service event, 5 points, no max. This listing is available to Novices and Technicians who achieve a total of 40 or more points. Stations that qualify for the Public Service Honor Roll 12 consecutive months, or 18 months out of a 24-month period, upon sending notification of qualifying months to ARRL Public Service Branch, will be awarded a special PSHR certificate from HQ.

375	131	119	W9JUU
KC9CJ	KA8HJK	K4ZK	
290	128	117	AA4MP
KA3DLY	N2EIA	W2RRX	WA2EPI
131	124	116	109
N9BZZ	WF60	VE4LB	KA7ZAG
130	123	115	KB1AF
KA9FFO	WB2ZJF	WA4QXT	KW1U
147	122	116	W9YCV
W2MTA	KB4WT	K4JST	W9FZW
143	NQ2H	114	108
WA4RLV	W2QNL	KD0CL	K6UYK
141	121	112	WD5GKH
WB2OWO	N4GHI	107	107
136	120	111	W6INH
WB6QVL	AA4ZV	KA2F	KA4TLC

108	KB4OPR	WA4LTO	K4BGZ
WA4PEK	92	79	66
N9EMD	KF7BX	WA1TBY	KA4TWI
W3FA	K0SI	N4KSO	K4MTX
WA3UZI		WD0GUF	65
N9BDL	91	76	W0FRC
AG8G	K0GP	KB4LB	KA7MUL
WB4HRR	KN1K	KC4VK	K1ABO
WA2JBO	90	KJBJ	N1CVE
WB4DVZ	N3COY	N7BGW	W2FR
105	VE3WV	WA0TFC	KK4FV
W1PEX	VE3GT	N0HWD	KB4JPN
W7VSE	89	VE4IX	KF5RD
WB2VUK	KA0KPY		64
104	N6MCO		N4PL
N0FOO	VE3DPO	N4KRA	WB9PFZ
103	WA2ERT	K3JL	K0PCK
ND2S	WA4LLE	KA9RII	W6RNL
KA2UBD	KA0SBY	76	WB5EPA
WB4KSG	88	KC3Y	W0JCE
K2VX	N1CPX	WA8QCA	K4ZN
WAANK	NJ3V	KB2AYD	63
102	W1RWG	N0CLS	WA4MNR
NG1A	87	75	N4MWR
AA4TE	N3EGF	WB5YDD	62
N2XJ	KA7AID	WB5J	NE2W
101	NN2H	74	W1YOLUT
W9DM	WA8WJZ		KA5UVY/T
N2HIF	WA3YLO		61
100	K4IWW		WB0WNJ
W3YVQ	N3AZW	73	KB4BZA
KI4YV	AA4HT	KA4FZI	
WB4ZTR	W5CTZ	AJ5F	60
WD4COL	85	KI4BR	WD6BZQ
99	W8OYH	N1EDD	WA3UNX
WA4RUE	KA7EEE	72	KA1HPO/T
N0DPF	NK1Q	WA9VND	A1BO
WB2RBA	K2ZVI	VE3CYR	N4EXQ
W9CBE	84	KA2NZ/T	N2DXP
98	W7GHT	W4TZC	59
VE3ORN	NJ9S	NM1K	N2EVG/T
K4NLK	KT9I	71	57
97	83	N2ABA/T	KA8HJK/T
WG7H	WA4EIC	KF4FG	WB2NLU/T
WA2FJJ	K0ERM	WB2QMP	N4MMM/T
WB4WII	WB6OBX	70	51
96	K4JUM	KD0NH	KA1NOI/T
NW7K	WR5O	N8OZB	50
95	82	69	KA6TND/T
WA1FCD	KA9RNY	WA6QCA	46
94	81	68	N6FWG/T
WB1CBP	WD4KBW	KQ3T	44
KA1GWE	NV5L	KM5L	N6QBJ/T
93	80	67	
AA4AT	KJ3E	K3NNI	
KA0ARP	WB1HBB	WB4PNY	

Brass Pounders League

The BPL is open to all amateurs in the United States, Canada and US possessions who report to their SM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in the standard ARRL form.

Call	Orig	Rcvd	Sent	Divd	Total
W3CUL	747	798	1312	51	2908
WB9YYP	0	974	64	651	1690
W3VR	310	241	291	44	886
KC9CJ	12	447	72	274	805
W1PEX	16	172	507	11	706
W9JUU	1	371	316	5	693
KA2UBD	0	318	360	2	680
K6UYK	41	288	285	7	621
N3AZW	51	245	270	32	598
WB0WNJ	186	77	327	2	592
WF60	2	312	253	23	590
NJ3V	69	226	269	4	568
K4DOR	17	251	266	2	524
WX4H	16	288	219	11	524
N4GHI	45	233	216	15	510
W7VSE	4	291	207	4	506
KN1K	2	288	178	32	500

BPL for 100 or more originations plus deliveries:

N4PL	123	WB2OWO	100
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Independent Nets

Net Name	Sess	Tic	Check-ins
Amateur Radio Telegraph Society	26	197	123
Clearing House Net	30	550	353
Early Bird Net	31	636	301
Empire Slow Speed Net	30	50	297
IMRA	27	984	1743
Mission Trail Net	31	97	896
NYSPTEN	31	58	507
Southwest Traffic Net	31	214	1618
West Coast Slow Speed Net	31	99	402
75 Meter Interstate SR Net	31	199	1371
7290 Traffic Net	49	410	2987

License Renewal Information

1) Attach a photocopy, or the original, of your license to the FCC Form 610 (available from ARRL HQ; SASE, please).

2) Mail to FCC, PO Box 1020, Gettysburg, PA 17326. There is no fee.

3) If you file before the license expiration date, you may continue to operate beyond the expiration date and until the new license arrives. After expiration, there is a five-year grace period under which you may still renew without re-

testing. However, after two years of the grace period has elapsed, you will lose your call sign, and will be assigned a new one. After this five-year grace period is over, you must be reexamined for a new license.

4) Note that 10-year-term licenses, which have been issued to all amateur licensees renewing since January 1984, have only a two-year grace period before both the license and call sign expire.

5) You may apply to have your license renewed at any time during the term of the

license. FCC suggests the application be made approximately 90 days before expiration.

6) If you are simply modifying your license (change of address, for example), you must fill out a Form 610. Incidentally, your license will also be renewed automatically for 10 years at this time.

7) If you have any questions or problems, drop a note to the Regulatory Information Branch, ARRL HQ.

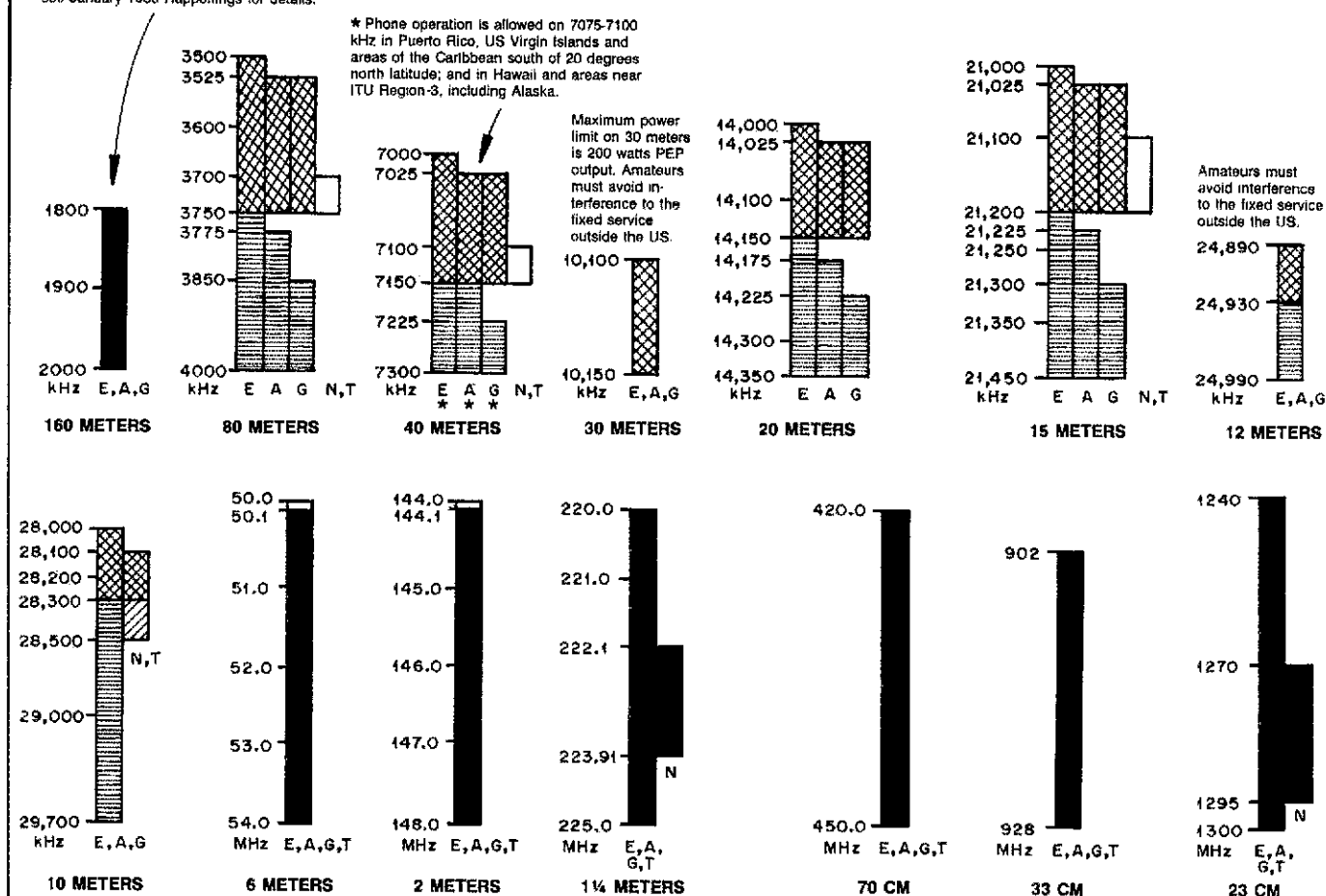
Amateur stations operating at 1900-2000 kHz must not cause harmful interference to the radiolocation service and are afforded no protection from radiolocation operations; see January 1986 Happenings for details.

* Phone operation is allowed on 7075-7100 kHz in Puerto Rico, US Virgin Islands and areas of the Caribbean south of 20 degrees north latitude; and in Hawaii and areas near ITU Region-3, including Alaska.

Maximum power limit on 30 meters is 200 watts PEP output. Amateurs must avoid interference to the fixed service outside the US.

US AMATEUR BANDS

(Effective 0001Z, March 21, 1987)



Operators with Technician class licenses and above may operate on all amateur bands above 50 MHz. For more detailed information see *The FCC Rule Book*.

5167.5 kHz Alaska emergency use only (SSB only) E, A, G, T, N

KEY

- = CW ONLY
- = CW AND RTTY
- = CW, VOICE, SSTV AND FAX
- = CW, VOICE, SSTV, FAX AND RTTY
- = CW AND SSB
- E = EXTRA
- A = ADVANCED
- G = GENERAL
- T = TECHNICIAN
- N = NOVICE

US AMATEUR POWER LIMITS

At all times, transmitter power should be kept down to that necessary to carry out the desired communications. Power is rated in watts PEP output. Unless otherwise stated, the maximum power output is 1500 W. Power for all license classes is limited to 200 W in the 10,100-10,150 kHz band and in all Novice subbands below 28,100 kHz. Novices and Technicians are restricted to 200 W in the 28,100-28,500 kHz subband. In addition, Novices are restricted to 25 W in the 222.1-223.91 MHz subband and 5 W in the 1270-1295 MHz subband.



MAJOR ARRL OPERATING EVENTS AND CONVENTIONS—1988* (Check QST monthly for updates)



JANUARY 1 Straight Key Night 6 West Coast Qualifying Run 10 W1AW Qualifying Run (35-10 WPM) 17 ARRL Hamfest (Richmond, VA) 21 W1AW Qualifying Run 23-25 January VHF Sweepstakes 23 ARRL Hamfest (Fort Meyers, FL) 30-Feb 7 Novice Roundup 30 ARRL Hamfest (San Antonio, TX) 31 ARRL Hamfest (Greenville, AL) 31 ARRL Hamfest (Yonkers, NY) 31 ARRL Hamfest (Wheaton, IL)	FEBRUARY 2 West Coast Qualifying Run 6-7 Southern Florida Section (Miami, FL) 6 ARRL Hamfest (Livonia, MI) 8 W1AW Qualifying Run (10-40 WPM) 14 ARRL Hamfest (Mansfield, OH) 19 W1AW Qualifying Run 20-21 International DX Contest, CW 20-21 ARRL Hamfest (Harlingen, TX) 20-21 ARRL Hamfest (Sarasota, FL) 21 ARRL Hamfest (Vienna, VA) 26-28 Ohio State Convention (Cincinnati, OH) 27 ARRL Hamfest (Medina, MN) 28 ARRL Hamfest (Akron, OH)	MARCH 2 West Coast Qualifying Run 5-6 International DX Contest, phone 6 ARRL Hamfest (Winchester, IN) 8 W1AW Qualifying Run 12 ARRL Hamfest (Cave City, KY) 15 W1AW Qualifying Run 20 ARRL Hamfest (Sterling, IL) 20 ARRL Hamfest (Maumee, OH) 27 ARRL Hamfest (Madison, OH) 27 ARRL Hamfest (Trenton, NJ) 27 ARRL Hamfest (Grosse Point, MI) 27 ARRL Hamfest (Libertyville, IL)
APRIL 5 West Coast Qualifying Run 8-10 Missouri State Convention (Kansas City, MO) 9 ARRL Hamfest (Alexandria, LA) 10 North Carolina State Convention (Raleigh, NC) 11 (Mon) 144-MHz Spring Sprint 13 W1AW Qualifying Run 17 ARRL Hamfest (Southington, CT) 19 (Tue) 220-MHz Spring Sprint 24 W1AW Qualifying Run 27 (Wed) 432-MHz Spring Sprint 29-May 1 Dayton Hamvention® (Dayton, OH)†	MAY 4 West Coast Qualifying Run 6 (Fri) 902-MHz Spring Sprint 6-8 ARRL Hamfest (Fresno, CA) 8 ARRL Hamfest (Medina, OH) 12 W1AW Qualifying Run 12 (Thu) 1296-MHz Spring Sprint 15 ARRL Hamfest (Wrightstown, PA) 20-22 Atlantic Division/New York State Convention (Rochester, NY) 20-22 Midwest Division Convention (Sioux City, IA) 21-22 (Sat-Sun) 50-MHz Spring Sprint 22 ARRL Hamfest (Roanoke, VA) 22 ARRL Hamfest (Randolph, OH) 23 W1AW Qualifying Run 26 (Thu) 2304-MHz Spring Sprint 31 West Coast Qualifying Run	JUNE 3-4 ARRL Hamfest (St Paul, MN) 3-5 West Gulf Division Convention (DFW Metroplex, TX) 5 ARRL Hamfest (Manassas, VA) 5 ARRL Hamfest (Muncie, IN) 5 ARRL Hamfest (Princeton, IL) 10 W1AW Qualifying Run (10-40 WPM) 10 ARRL Hamfest (South Dartmouth, MA) 10-11 ARRL Hamfest (Albany, GA) 11-13 June VHF QSO Party 12 ARRL Hamfest (Willow Springs, IL) 22 W1AW Qualifying Run 25-26 Field Day
JULY 6 West Coast Qualifying Run 9 W1AW Qualifying Run (35-10 WPM) 9-10 IARU HF World Championship 9-10 ARRL Hamfest (Indianapolis, IN) 10 ARRL Hamfest (Downers Grove, IL) 16 ARRL Hamfest (Union, ME) 17 ARRL Hamfest (Wheeling, WV) 23 W1AW Qualifying Run 23-24 ARRL Hamfest (Chicago, IL) 31 ARRL Hamfest (Garden Prairie, IL)	AUGUST 2 West Coast Qualifying Run 6-7 UHF Contest 7 ARRL Hamfest (Berryville, VA) 13 ARRL Hamfest (Indianapolis, IN) 14 W1AW Qualifying Run 23 W1AW Qualifying Run 28 ARRL Hamfest (Bluefield, WV) 31 West Coast Qualifying Run	SEPTEMBER 2-4 Southwestern Division Convention (Anaheim, CA) 9-10 ARRL National Convention (Portland, OR) 10 ARRL Hamfest (Windsor, ME) 10-12 September VHF QSO Party 11 ARRL Hamfest (Butler, PA) 11 ARRL Hamfest (Joliet, IL) 12 W1AW Qualifying Run 21 W1AW Qualifying Run
OCTOBER 1-2 New England Division (Boxboro, MA) 1-2 Mississippi State Convention (Biloxi, MS) 4 West Coast Qualifying Run 8-9 Delta Division Convention (Memphis, TN) 11 W1AW Qualifying Run (10-40 WPM) 15-16 Simulated Emergency Test 30 W1AW Qualifying Run	NOVEMBER 2 West Coast Qualifying Run 5-7 November Sweepstakes, CW 9 W1AW Qualifying Run 18-20 Southeastern Division Convention (Tampa, FL) 19-21 November Sweepstakes, Phone 22 W1AW Qualifying Run	DECEMBER 2-4 160-Meter Contest 6 West Coast Qualifying Run 8 W1AW Qualifying Run 10-11 10-Meter Contest 27 W1AW Qualifying Run

*Hamfest/Conventions of record as of November 10, 1987

†Not an ARRL event

Results, 1987 September VHF QSO Party

By Billy Lunt, KR1R

Contest Manager, ARRL

Imagine you're waiting in the wings, waiting to take center stage following a performance by Linda Ronstadt, Old Blue Eyes, Diana Ross, or Huey Lewis and the News. How could you follow an act like that?

Well, that's what happened in the September VHF Contest. Following the greatest VHF contest conditions ever experienced the previous June, how could September hope to measure up? It couldn't. Not only that, it didn't even come close!

Each VHF contest is unique when it comes to conditions. We have come to expect pretty good E-skip in June, though June '87 was something else again. Septembers past have seen some outstanding tropospheric conditions that have more than held everyone's attention. Not so this September. Everyone was left guessing if it was the other fellow getting the good conditions. Well, he wasn't. It was flat for everybody. There was a light touch of aurora on 6 meters late Sunday, but that was about it.

But that's what makes each and every VHF contest a new adventure. You just don't know what's going to happen. And heaven forbid should you miss a great opening. So you take the hand that propagation deity deals and play it the best you can. Hey, we're all at the same gaming tables.

Of course, the mountaintoppers help make it fun for everybody. They increase the number of contacts and grids to be worked, especially on the higher bands. 'Topper N2WM, however, found 50-foot visibility in the fog improved only when it rained, while Wachusett Mountain (MA) regular K1TR found that tents can become submerged in heavy rains, even at 2200 feet. Out West, NS6X had the company of hang gliders at 8000 feet, while the WD8ISK group found out why W2SZ always does so well, by going mountaintopping this time themselves. And XE2GBO had a great time 2000 feet above Ensenada, Mexico.

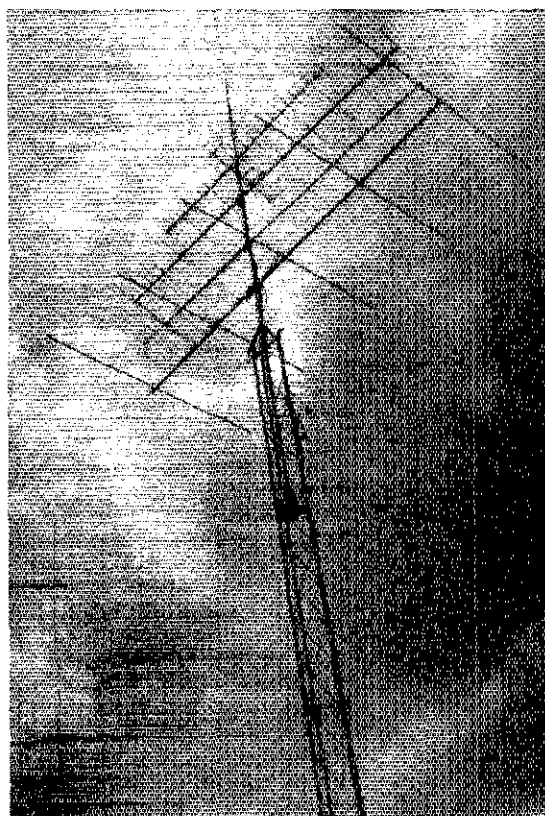
The weather had a dampening effect on the contest, as many parts of the country were inundated by two-parts-hydrogen one-part-oxygen. "Heavy rain made it seem like maritime mobile."—W1JR. "Rain, rain, rain"—VE3KKL. "If you use 9913 cable, be sure the connections are waterproof; otherwise it makes a great waterhose!"—KT2B. "Had a great time in the QRP class from a 10,000-foot mountaintop until Mother Nature got mad."—WA5DJJ.

Nonetheless, 386 entries were submitted, with 323 single-ops (of which 17 were QRP portable) and 63 multiops. This represented a total of 46,183 "rogered" contacts and 14,746 grid-multipliers QSL'd. That doesn't

exactly add up to "Dullsville," even though WD5K quipped: "Had time to begin and finish *War and Peace* in between contacts on 6 meters."

Scorewise, it's obvious from even a cursory look at the top scores that the generally punk conditions favored the Northeast. That's where the bulk of the stations are to be worked even when the conditions are not so grand. Piloting his 6-band station to a first-place solo finish was AA2Z, the only single-op 100k-plus score. Jeff, WA2TEO, just nosed out Eastern Mass's W1GCI for second place. A look at the top ten box shows some fine efforts by stations who "hung in there."

When they came off the mountain, the W2SZ gang was sure that this time they had been done in by adversities. But not so, with 409k points topping the multi-op category. K3YTL finished a respectable second with 352K. The only non-East stations to break into the Multioperator Top Ten were



A look at the 50, 144, 220 and 432-MHz antennas used by K9ES/1 in Western Massachusetts.

Single Operator Top Ten

Call	Score
AA2Z	101,265
WA2TEO	74,420
W1GCI	70,350
KB3QM	64,022
W3IP	58,191
N1DPM	57,459
N2WK	48,790
WA1OUB	47,700
K1PXE	46,221
K1RZ	44,800

Multioperator Top Ten

Call	Score
W2SZ/1	409,332
K3YTL	352,944
W1XX/3	245,378
WD8ISK	219,010
W2DRZ	200,868
K1TR	144,305
WB0DRL	142,425
K1WHS	118,542
N2WM	103,815
VE3LNX	96,036

QRP Portable Top Ten

Call	Score
K1JX	35,530
W4DO	7,392
K6LMN	5,016
KD5RO/2	3,016
WA5NFC	2,888
NM1K	2,324
N1EWB	1,962
WB4KPD/3	1,260
KD0ZY	700
N8CUX	660

WB0DRL at 142k and WD8ISK at 219k (the latter located in the Eastern periphery).

K1JX blew away all QRP opposition with a strong 33k score achieved on three bands, as this category continues to gain in popularity.

The accompanying "boxes" tell the rest of the story. We hope you find them meaningful and helpful in planning your future strategy. It's tough waiting from September to January for the next VHF contest bash. So be sure your New Year's resolutions include an operating stop for the January VHF Sweepstakes, January 23-25, 1988.—W1XX

SOAPBOX

My first VHF contest and I had a heck of a good time! I learned a lot (N2HLZ). Conditions absolutely STINKO! Still had fun! (K2OVS). First VHF contest and I only had the rig two weeks. Now I am halfway to VUCC! (KE8FD). Only licensed since May. What a blast! (N1EWB). Nowhere near the conditions of June, but what else is new! (WW4T). While returning home from vacation, I made several 200-mile-plus QSOs (N7FX). First time in the contest as a mobile—interesting. (N7DB). Bands were quiet which allowed some time for ragchewing (K6LMN). I suppose any opening on 6 meters was too much to ask for! (K1DAT). Two-meter rotor died two hours into the contest and had to use an Armstrong rotor. We took a bath every time we went outside to use it! (WB1GQR). I enjoy going out and activating the rarer grids (KD0ZY). This was a terrible contest! What has happened to VHF contesting? (WA6IJZ). Propagation was not

Single Operator QSO Leaders By Band

50 MHz

N2CEI	161
WA1OUB	136
WA2TEO	117
AA2Z	116
W3IFM	107
K1RZ	106
AK2F	94
NN9K/0	92
WA1VRH	89
W1GCI	87
N1DPM	81
WA1TRE	78
K1JX	76
AC1J	75
WA2BPE	75

144 MHz

K3NXH	346
KA2WKA	317
K1RZ	309
WB2QOQ	271
K9ES/1	263
AA2Z	259
WA1OUB	257
VE3DDW	248
W1GCI	245
N2CEI	242
WA1VRH	225
WA2TEO	221
N1DPM	218
KB3QM	212
W2HRW	211

220 MHz

WB2IEY	65
WA2TEO	60
AA2Z	60
W1GCI	54
N2EOC	52
KT2B	51
N2BJ	51
N1DPM	48
KB1I	45
K1PXE	44
W2EIF	44
KB3QM	43
WA1HYN	42
W6CPL	41
W1JR	38

432 MHz

K1FO	130
N3CX	85
K1PXE	81
W3IP	81
WA1HYN	80
AA2Z	76
WB2DNE	75
K2JWE	74
N2BJ	70
W1GCI	70
WB3JYO	68
WA2TEO	63
KB3QM	62
W1JR	61
WB9MSV	61
W2HRW	61

902 MHz

W1GCI	13
AA2Z	12
WA1MBA	10
W1JR	10
WB1FKF	9
W1RIL	9
WA1JOF	9
N2WK	8
N3CX	8
AB1U	7
N180	7
N11W	6
K9MK/5	5
W3IP	5

1296 MHz

AA2Z	34
K2JWE	32
WA1OUB	28
KT2B	28
WB3JYO	26
K1PXE	23
NO0Y	22
W1JR	22
WA1JOF	21
W3IP	20
W1RIL	19
WB1FKF	19
W2EIF	18
K2GAL	18
W1GCI	17
K2UOP/4	17
WA1MBA	17

Single Operator Multiplier Leaders By Band

50 MHz

WA1OUB	53
NN9K/0	51
K1RZ	44
N2CEI	42
W3IFM	38
WA2TEO	37
WA1VRH	35
VE3FGU	34
WA2BPE	33
AA2Z	32
N1DPM	32
KC3CL	31
VE3DDW	29
WB9MSV	28

144 MHz

VE3DDW	53
KA9BGC	51
KE8FD	51
K1RZ	48
K3NXH	48
WB9MSV	47
KC3CL	46
N8DGN	45
KE8LY	45
KB8JI	44
W3IP	44
VE3FGU	43
VE3VAL	42
KB3QM	42
KA2WKA	42

220 MHz

WB2IEY	26
WA2TEO	23
K1PXE	20
WB9MSV	19
AA2Z	19
KB3QM	19
KT2B	18
N2WK	18
W1GCI	18
KB8ZW	18
N2EOC	17
K2GK	16
N1DPM	16
K2UOP/4	16
WA8TXT	16
(WB1CJT,op)	16

432 MHz

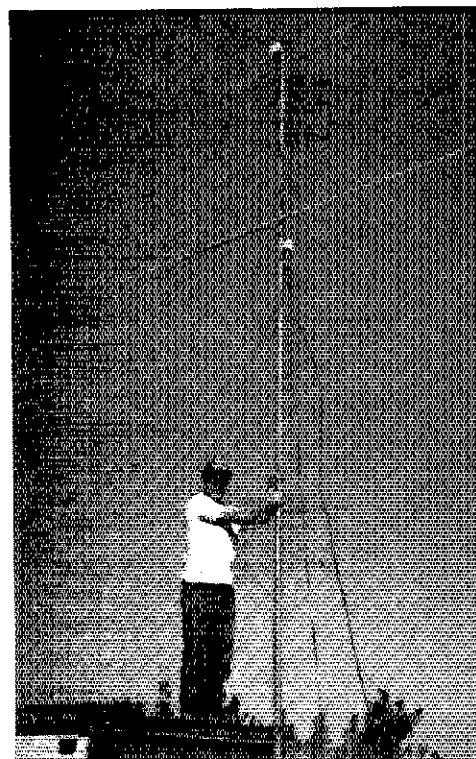
K1FO	33
N8DGN	31
WB9MSV	30
W8RAP	29
N0LL	28
WB2DNE	28
N3CX	28
N2WK	27
W3IP	25
K2JWE	25
WA8TXT	25
(WB1CJT,op)	25
K1PXE	24
AA2Z	23
K1JX	23
K2GAL	23
W3ZZ	22
KB3QM	22

902 MHz

AA2Z	8
N3CX	8
N2WK	6
N180	6
W1JR	6
W1RIL	5
WA1JOF	5
W1GCI	5
WA1MBA	5
AB1U	5
W3IP	4
W6CPL	3
N11W	3
WB1FKF	3

1296 MHz

NO0Y	18
K2JWE	15
K2GAL	15
W3IP	13
WD5AGO	13
WA0D	13
KB8ZW	12
AA2Z	12
WA1OUB	12
K1PXE	12
WA8TXT	12
(WB1CJT,op)	12
WA1JOF	10
KT2B	10
N180	9
WB2ONA	9
WB3JYO	9
KB3QM	9



Ken, VE6AFO, setting up the 144- and 432-MHz antennas at their multiop site in Alberta.

bad on 432 MHz, it was nonexistent! (WB5ZDP). Special thanks to the mountaintoppers who kept going despite the weather (K1KA). First big effort at mountaintopping. It was cold at night. Makes you wonder about January (K16X). Pretty good for

a September Contest (WA2BPE). Rain! Rain! What more can I say! (W1AIM). Activity seemed sparse on all bands except for a few outstanding efforts (K7ICW). Do love that aurora! (NN9K). Had to stop contesting for my daughter's wedding recep-

tion. You would think that she would be considerate! (NJ0X). Hope to have better propagation next year, without yellow jackets, rats, bumblebees and horse flies (N5KDA). At least there are blueberries to pick when the contest dies down up here! (KA7SOL). Problems with amp, rain and wind but I had a good time as usual. Looking forward to January contest (VE3LNX). Enjoyable contest for all; however, no one had any DX stories to tell! (K1WHS). Had a great time running through the grids (K9VGE/9). Where were all the 9s hiding? (K8KR). Those long-winded, strong signals should give their grid square when calling CQ, so little guys can know where to look (N8CUX). Worst conditions in years—fortunately, thunderstorms took out commercial power and gave me the excuse I needed to quit (WB4SLM). Unimpressive fun (WA1VRH). Frustration: Call CQ, two answers, go back to one and the other answers, but the first

Division Leaders

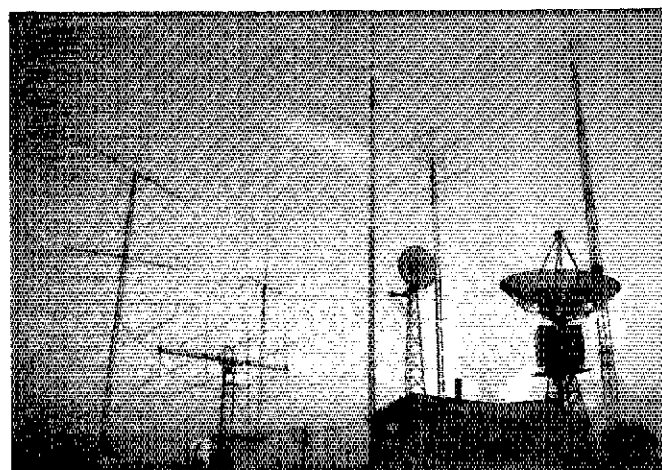
Single Operator

Call	Score	Division
KB3QM	64,022	Atlantic
VE3ASO/2	31,464	Canada
WB9MSV	40,796	Central
N0CIH	6,533	Dakota
K4RWP	4,806	Delta
KB8ZW	35,752	Great Lakes
WA2TEO	74,420	Hudson
N0LL	16,265	Midwest
AA2Z	101,265	New England
W7PUA	5,115	Northwestern
WB4AYE/8	5,380	Pacific
K2UOP/4	39,200	Roanoke
KD0GS	6,713	Rocky Mountain
WB4AXQ	8,680	Southeastern
W6CPL	18,768	Southwestern
N5HHS	22,410	West Gulf

Multioperator

Call	Score
K3YTL	352,944
VE3LNX*	96,036
W0UC/9	28,840
KC0P	91
WB4LHD/5	29,574
N4EQT	29,355
N2WM	103,815
WB0DRL	142,425
W2SZ/1	409,332
WB7PEK	5,088
WB6ITM	3,900
WD8ISK	219,010
W0SIV/7	896
W4CMA	13,596
K6MEP	2,625
WA5S	1,890

*denotes new Division Record



A nice view of the monster antenna farm at multiop station WD0DRL. These antennas and hard work earned them 7th place WVE.

Multioperator QSO Leaders By Band

50 MHz	432 MHz
W2SZ/1 281	W2SZ/1 183
K3YTL 235	K1TR 136
W1XX/3 232	WD8ISK 113
WD8ISK 180	W2DRZ 111
W2DRZ 174	K1WHS 107
K1TR 166	W1XX/3 105
K1WHS 148	K3YTL 105
N2WM 142	W2DMC 92
WB1GQR 100	K3YTL 81
KD2YB 92	WB0DRL 80
W2DMC 88	WB3LJK 80
K2CBA 85	WB1HAB 75
WB0DRL 83	W1BCG 75
W0UC/9 77	N2GHR 61
WB1HAB 76	WB1GQR 56
	K2DEL 55
	VE3LNX 55
144 MHz	902 MHz
W2SZ/1 555	K1TR 32
K3YTL 492	K3YTL 32
N2WM 393	W2SZ/1 25
WD8ISK 354	VE3LNX 16
K1TR 341	W2DRZ 14
W1XX/3 320	K1WHS 11
WB1HAB 276	W1XX/3 10
WB1GQR 270	WB2PSI 9
W2DRZ 261	WD8ISK 4
K1WHS 236	
W2DMC 236	
WB3LJK 231	
K2DEL 225	
VE3LNX 221	
WB0DRL 187	
N2GHR 187	
220 MHz	1296 MHz
K3YTL 154	K3YTL 61
W2SZ/1 116	W2SZ/1 49
K1TR 71	WB0DRL 41
N2WM 63	W1XX/3 31
W1XX/3 59	K1WHS 30
WB1HAB 55	W2DRZ 30
W2DMC 54	W2DMC 28
W2DRZ 46	K2BWR 24
K2BWR 46	K1TR 20
K1WHS 45	VE3LNX 19
WD8ISK 38	WD8ISK 19
WB3LJK 34	W2DRZ 19
W3KWH 31	W3KWH 19
WB2PSI 30	WB2PSI 14
K2DEL 28	WB4LHD/5 10

Multioperator Multiplier Leaders By Band

50 MHz	432 MHz
W1XX/3 74	WD8ISK 51
W2DRZ 67	WB0DRL 43
WD8ISK 64	W2DRZ 43
W2SZ/1 60	W2SZ/1 40
WB0DRL 53	W1XX/3 29
K3YTL 48	W3KWH 20
W0UC/9 42	K3YTL 28
K1WHS 41	WB3LJK 26
N2WM 39	K1TR 25
VE3LNX 37	N2WM 25
KD2YB 36	VE3LNX 25
W3KWH 34	WB2PSI 24
N4EQT 34	WB4LHD/5 23
K1TR 33	K1WHS 23
WB2PSI 27	W0UC/9 21
WB1GQR 27	
144 MHz	902 MHz
WD8ISK 82	K3YTL 16
WB0DRL 70	W2DRZ 13
W1XX/3 63	VE3LNX 12
W2DRZ 56	W2SZ/1 11
K3YTL 55	K1TR 10
N2WM 50	WB2PSI 8
W2SZ/1 49	W1XX/3 8
W3KWH 49	K1WHS 5
WB3LJK 46	WD8ISK 4
VE3LNX 46	
N4EQT 44	
WB4LHD/5 43	
WB2PSI 38	
WB1GQR 37	
K1TR 37	
220 MHz	1296 MHz
W2SZ/1 31	WB0DRL 32
K3YTL 30	W2DRZ 22
W1XX/3 27	K3YTL 22
WD8ISK 27	W1XX/3 20
W2DRZ 27	W2SZ/1 18
W3KWH 23	VE3LNX 16
N2WM 21	WD8ISK 14
K2BWR 20	K2BWR 14
WB2PSI 20	W3KWH 14
WB3LJK 19	W2DMC 10
K1TR 18	WB2PSI 10
K1WHS 18	K1WHS 10
VE3LNX 16	K1TR 9
W2DMC 15	WB4LHD/5 8
WB0DRL 15	WB3LJK 6

would have been a new grid (K1FO). How about an FM-only class in January? (NM1K). How about an "indoor" antenna class? (WAINLD). Nice to hear a lot of new operators! (NI1W). Fine time for the 432 module to quit! (W1GUA). Heard more stations than I could work. (K9ES/1). Murphy visited the 2-meter amp in mid-contest (W2EIO). One op told me his feet were in water. I asked if he was getting RF burns when he touched the mike. He replied, "No, the coax is under water so everything is at ground potential anyway!" (KA2IVS). Rain, rain go away—come back on Monday! (KA2WKA). Biggest thrill was working W1XX/3 on 2304 with one watt! (N2WK). The 8877 makes an efficient (but expensive) heater for the shack (WB2IEY). Murphy was my second op (KA3CXG). It's hard to contest and go to the Gaithersburg Hamfest, too (KB3HH). I operated overnight from 6288 ft on Mt Washington for the September VHF Contest, Martinique for the '87 June VHF Contest and no mention of my portable operations or use of any soapbox comments appeared. As my protest, I am not submitting any comments this September and I am considering boycotting all future VHF contests (K1FJM/4). Where did all the new blood come from and where did all the regulars go? (K9MK/5). Conditions were fair to poor. Working 1296-MHz EME helped my score! Three new grids off the moon! (WD5AGO). Sorry conditions, worked everything I could hear. Not much activity. I wonder why? (W1SQ). I live in "Black Hole Gulch" with mountains on 3 sides. Never did get any openings to the east like the guys in LA and San Diego! Complain! Complain! (K6VMN). Missed 2 QSOs of 100 miles on 10 GHz (W6OYJ). Had my wife working the contest with me. She just got her Novice ticket (WB7OHF/KB7CRT). Operated 15 hours for two contacts on 50 MHz (KC7IJ). A remote mountain is great, but 99 per cent of the QSOs were at 150-500 mile range (W0SH/7). Murphy ate my 432-MHz amp, again! (KB8JJ). It was nice to operate from the top of the hills instead of having to work over them, like I do at home! (W8VPD). If Murphy had a license, I would have to file as a multiop. The 220/432 HV supply burst into flames (KC3CL). This was my first VHF contest. It was a blast running my "Side-winder" that I picked up for 20 bucks. I am turned on about the world of VHF (KD9TH). Went portable to activate rare EN43, but two other guys had the same idea (W9WI). My best score to date! (VE3VET).

Scores

Scores are listed by ARRL Sections. Within each Section, single-operator scores are listed first and then multioperator scores. From left to right, each line lists: call, score, QSOs, multipliers and bands worked (A = 50 MHz; B = 144 MHz; C = 220 MHz; D = 432 MHz; 9 = 902 MHz; E = 1296 MHz; F = 2.3 GHz; G = 3.4 GHz; H = 5.7 GHz; I = 10 GHz; J = 24 GHz; K = 48 GHz; L = Light). An asterisk before the call sign denotes a QRP-portable station; an (N) after the call indicates a Novice station. Among the single-operator stations, the single-band winners are noted with band letter(s) being in boldface print indicating the bands won. For example, in Connecticut, AA2Z is the section winner as well as the single-band leader on 50, 144, 220, 902 and 1296 MHz. K1FO is the single-band leader on 432 MHz.

1

Connecticut				
AA2Z	101,285	567-129-ABCDE	9E	
K1PXE	46,221	326-93-ABCDE		
*K1JX	35,530	348-85-ABCD		
WA1VRH	21,980	314-70-AB		
KB1I	16,892	243-52-BCD		
AB1U	8,802	100-46-ABCD9E		
K1FO	8,580	130-33-D		
W3EP/1	3,904	122-32-AB		
W1FAJ	3,406	82-26-BCD		
W1QK	3,240	162-20-B		
WA1GTP	2,565	95-27-AB		
*NM1K	2,324	93-14-BCDE		
WA1NLD	1,978	104-19-B		
KH8C/1	1,680	53-21-ABCD9E		
K1AGDC (N)	16	4-2-C		
W1BCG (K1VYU, KA1s NQY, PFP, N1s CWD, DNP, DNR, WA1s YCE, ZTD, ops)	14,260	235-46-ABD		
Eastern Massachusetts				
W1JR	27,335	213-71-ABCD9EF		
WB1FKF	21,228	200-61-BCD9E		
WA1JOF	16,055	159-65-ABCD9E		
KA1DHO	7,320	186-40-ABCD		
AJ1E	3,825	96-25-BDE		
K1VZI	2,750	92-22-ABCD		
K1DAT	2,592	108-24-AB		
W1GXT	2,320	56-20-CDE		
W1ZNY	540	64-10-B		

Maine

WA1TRE	7,440	152-48-ABC
KA1ZX	3,000	93-30-ABC
W1PLX	798	57-14-B
K1WHS (+ AF1T, AV1S, K1MNS, KY1K, WA1NIE, KB2K)	118,542	589-138-ABCD9EFGHIJ
New Hampshire		
WA1OUB	47,700	421-100-ABE
AC1J	23,943	268-69-ABCDE
N1W	14,245	168-55-ABCD9E
K1KA	5,643	171-33-B
W1JSM	1,577	79-19-BD
N1HO	1,344	96-14-B
W1GUA	705	47-15-AB
*KA1LMR	315	32-9-ABCD
N1DNC	270	25-10-BD
N1DYF	80	20-4-B
Rhode Island		
WA1HYN	14,335	183-47-BCD
A1K	3,753	139-27-B
W1AQ (K1AGA, KA1s IHT, MO, KM1X, WA1s VEK, VPC, ops)	1,800	100-18-B
Vermont		
W1AIM	7,590	115-55-ABCD
WB1GQR (KA1s LEX, NRR, WB2JSJ, ops)	47,656	440-92-ABCD

Western Massachusetts

W1GCI	70,350	486-105-ABCD9E
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2

N1DPM	57,459	410-107-ABCDE
K9ES/1	30,976	400-64-ABCD
WA1MBA	10,935	154-45-BD9E
W1RL	6,264	74-36-ABCD9EF
K1SF	5,587	139-37-ABD
KA1MDA	3,256	148-22-B
*N1EWB	1,962	68-18-BCD
WA3EEC	1,273	67-19-AB
WB1APD	792	48-17-B
W2SZ/1 (K1DH, KA1s DZV, KPH, NC1B, WA1s UGE, ZMS, WB1HH, K2TR, N2s BNY, CJJ, GXH, WA2s GFP, KOY, SCA, SPL, WB2KMY, N4FFD, WA8USA, ops)	409,332	1238-231-ABCD9EFGHI
K1TR (+ K1BA, N1s AFQ, BEM, WA1PB, K3WM)	144,305	768-133-ABCD9EF
WB1HAB (+ KA1s KRJ, MEW, MHY)	41,616	482-68-ABCD
Eastern New York		
WA2TEO	74,420	489-122-ABCD9E
N2BJ	35,076	327-74-ABCD
WA2BAH	7,314	143-46-ABCD
KA2JUV	4,992	156-32-B
WA2MJP	4,786	149-32-B
KD2IX	1,919	101-19-B
WA2WXX	774	31-18-BD
WA2RUW	480	20-12-C
WA2DIN	84	11-7-ABC
KA2MCU	2	1-1-C

W2DMC (K2s MME, SK, KA2s IBV, TGO, KB2AYD, N2s BJ, DL, HDW, HIG, HLU, WA2s EHI, FWZ, KFS, WB2NEC, ops)	69,896	511-36-ABCD
K2CBA (+ WA1RKS, WB1BTJ, K2SIG, KA2UWI, WA2s WNI, ZGV, WB2DST)	21,432	211-75-ABCD
W2XL (+ KD2NE, NJ2L)	9,849	188-49-ABD
NYC-Long Island		
K2OV5	11,150	186-60-ABCD
W2SLY	6,392	188-34-B
W2EIO	5,049	117-33-BD
KA2BPP	2,784	116-24-B
WB2CUY	2,330	110-17-BD
WB2ZSY	2,486	113-22-B
W2EUS	1,065	34-15-BDE
NH1LZ	368	48-8-B
N2GHR (W2AAF, WA2UNY, ops)	17,800	285-50-ABD
Northern New Jersey		
N2CEI	39,237	427-87-ABC
K2JWE	31,624	306-71-BDE
AK2F	15,028	273-52-ABC
WB2GOQ	8,943	271-33-B
KA2V5	4,920	205-24-B
WA2UDT	4,080	100-30-ABCD
K4BNC	2,821	91-31-AB
N2EOC	1,788	52-17-C
WB2ONA	583	17-11-EF

N2WM (+ KB2BNU, N2S, ERH, GPD,
HEB, NV2D, K3QIA)
103, 815- 652-135-ABCD
K2DEL (KA1Z, WA1PDK, K2S, AYR, GB1, ZET,
KB2S CRU, DRV, N2S, AAM, DXP, FHC, GCM,
GXT, HOB, NJ2Y, W2VY, WA2S, FOG, ZNP, ops)
26,520- 359- 60-ABCD

South New Jersey

K2GAL 28,612- 238- 92-ABDE
W2HRW 29,997- 316- 61-ABD
W2EIF 20,352- 197- 64-ABCD9E
KA2WKA 13,314- 317- 42-B
WB2OYC 7,030- 190- 37-B
K2BWR (+ K2ZRU)
29,971- 212- 87-ABCD

Western New York

N2WK 48,790- 269-119-ABCD9EF
K2GK 12,740- 130- 65-ABCD
WA2BPE 10,269- 163- 63-AB
W2VO 6,713- 136- 49-ABD
K2SPO 6,157- 103- 47-ABD
WB2IEY 3,280- 65- 26-C
W2WGL 3,040- 95- 32-B
*KD5RO/2 3,016- 104- 29-B
KU2A 2,850- 81- 38-ABCD9
KA2VCW 2,175- 75- 29-B
N2DKP 1,728- 72- 24-B
K2MPE 1,632- 68- 24-B
NS2Z 1,403- 61- 23-B
W2HAX 1,358- 39- 22-B
KA2IYB 522- 29- 18-B
W2DRZ (+ K2S, SMN, TXB, KB2CCQ, N2AHN,
W2UCZ, WA2CFN, N1X3)
200,868- 836-228-ABCD9E
WB2PFI (WB1GHG, K2OEQ, KD2OM, N2S,
AJX, AJY, W2AV, WA2S, YMS, KD0,
WB2S CQJ, VVQ, ops)
62,310- 316-134-ABCD9EFIL
KD2YB (+ KA2ZY)
14,144- 208- 68-AB
KA2DQA (+ KA1VE, KA2GLF)
4,000- 92- 40-ABD

3

Delaware

KB3QM 64,022- 403-119-ABCD

Eastern Pennsylvania

WB3JOY 40,333- 349- 83-ABCD
KT2B 36,408- 284- 82-ABCD
WA2OMY 9,776- 133- 52-ABCD9EF
N3CX 9,328- 102- 44-CD9
WB3KRW 6,290- 133- 37-BD
KB3NQ 4,756- 160- 26-BCD
KC3FT 2,860- 130- 22-B
*WB4KPD/3 1,260- 63- 20-B
WA3JUF 928- 31- 16-BCDE
K2ZXX 789- 47- 17-B
WA3KFT 140- 18- 7-ABC
K3YTL (WA1MKE, K2LNS, NA2T, K3MKZ, KA3S,
EEO, QPQ, KB3QLN3, CXB, DAP, FJA, W3DZH,
WA3S, JWP, JMY, N3S, YON, WB3S, FAA, FKQ,
FYT, IJZ, ops)
359,944-1100-216-ABCD9EFQJ
W3LP (W3S, GFN, G2N, JUZ, WA3CUQ, ops)
14,094- 193- 54-ABCD
AC3J (+ K3S, EEL, SQO, KA3GHA, N3EMI,
W3GF, WA3SDQ)
7,259- 191- 38-AB
WA3KEY (+ WA3RXP)
2,511- 65- 27-ABD

Maryland-DC

W3IP 58,191- 337-119-ABCD9E
K1RZ 44,800- 426-100-ABE
W3ZZ 29,520- 265- 90-ABCD
WB2DNE 28,560- 282- 80-ABD
K3NIX 18,608- 346- 48-B
K3AKR 7,399- 117- 49-ABCD
W3GN 5,320- 123- 40-ABD
WA3EOQ 4,484- 64- 38-ABDE
W3JFM 4,066- 107- 36-A
WA3JYV 403- 31- 13-AB
KA3CXG 240- 24- 10-B
W3LMC 200- 20- 10-B
W3MSN 147- 18- 7-ABD
WB3LJK (K3ONV, N8CMH, WD8COT, ops)
55,833- 375-111-ABCD
N2GTE (+ N2GAR)
8,496- 152- 48-ABD
KB3HH (+ NG1W, KA3PRQ)
2,754- 84- 27-ABD

Western Pennsylvania

W3H0H 3,237- 83- 39-AB
W3KJM 216- 18- 12-A
W1X0G3 (+ K1G3, K3PS, KA3MM, N4MM)
245,378- 764-238-ABCD9EF
W3KWH (A13V, KA3S, ITM, KSD, N3EOP, NG3H,
W3S, HH, OH, TVB, WA3TTS, WB3EML, ops)
71,121- 338-151-ABCD

4

Alabama

WB4AXQ 8,680- 140- 62-AB
N4AHJ 204- 17- 12-A
WA4VUG 45- 9- 5-B
WA4NB (AA4S, NZ, YB, KA4IYO, WA4S,
HFE, RKB, ops)
3,010- 70- 43-AB

Georgia

WV4T 5,880- 112- 42-ABD
WB4SLM 3,397- 63- 43-ABCD
*WB4WKE 2- 2- 1-A
W4CMA (KA4EK, WA4TDY, WB4LRA, ops)
13,598- 170- 68-ABDE

Kentucky

N4EQT (+ K8ULC, KA8SSB, N8EZY)
29,355- 248-103-ABCD
WB4TRS (+ AK4U, NA4AN)
128- 14- 9-AB

North Carolina

W4F50 1,050- 29- 21-BD
W4BFB (WB2NHQ, AA4ZZ, K4S, JQU, TP, KA4S,
FHS, WYC, KB4UFO, WA4JUNZ, WB4S, NMA,
PCS, QCS, SLM, TLX, N9CC, ops)
759- 33- 23-AB

Northern Florida

WD4FAB 2,070- 58- 30-ABD
WA4JNE 684- 36- 19-AB

South Carolina

WD4V 14,842- 137- 82-ABCD
NB4S 5,002- 95- 41-ABD
WD4JQV 1,824- 39- 28-ABCD

Southern Florida

WD4AHZ 1,122- 52- 17-BD
W4FF 418- 39- 11-B
K4SG 294- 21- 14-AB
K1FJM/4 54- 9- 6-B

Tennessee

K4RNP 4,806- 78- 54-ABD
KF4FL 2,820- 70- 36-AB
KA4JU 2,048- 58- 32-ABD
AD4F 190- 19- 10-A

Virginia

K2UOP/4 39,200- 294- 98-ABCD
N4HB 7,644- 113- 52-ABCD
*W4DO 7,392- 118- 48-ABD
KA4FTO 3,380- 88- 32-ABD
KF4KI 2,162- 94- 23-B
WA4SBC 1,030- 35- 20-ABCD
N4BG 880- 33- 20-B
KE9A/4 330- 30- 11-B

5

Arkansas

*WASNFC 2,888- 67- 38-ABD
WB4LHD/5 (N4CAF, K5S, GHR, TNP, KA5S,
GEX, RDA, SED, UEK, N5S, GHJ, HZ2, W5S,
LMS, TES, VMY, WASNOB, WD5S, C.EJU,
KH8OES, ops)
29,574- 211-106-ABCD

Louisiana

NUSF 1,300- 65- 20-B

Mississippi

NSKDA (+ KA5ULI, N5JBZ)
3,260- 73- 40-ABD

New Mexico

W5FF 2,546- 87- 38-AB
W5IKR 918- 48- 18-BC
KN5S 560- 26- 20-ABD
*WA5DJJ 216- 17- 12-ABD

North Texas

K9MK/5 7,488- 158- 38-ABCD9E
NSWS 6,480- 138- 40-AB
AASAM 2,378- 80- 27-BC
KF5PE 2,241- 81- 27-BE
WB5ZDP 1,692- 47- 18-AB
WASZKO 756- 40- 18-AB
WD5K 406- 20- 14-A

Oklahoma

KSSW 13,850- 120- 78-ABCD
WDSAGO 5,085- 65- 45-BDE
WB5DSH 377- 29- 13-A

South Texas

NSHHS 22,410- 228- 83-ABD
WB5OBS 9,936- 150- 48-ABE
KA5TJI 2,314- 89- 26-B
WB5N 1,122- 65- 17-B
WAS5 (+ KC5FP)
1,890- 52- 30-ABD

West Texas

WSAL 2,340- 56- 36-ABD
WISQ 1,350- 44- 25-BD

6

Los Angeles

W6CPL 18,768- 233- 51-ABCD9EFL
W6PFE 430- 38- 10-ABC
K16X (+ AA6BE)
2,451- 105- 19-BD

Orange

K6CH 8,853- 170- 39-ABDE
WB9AJZ/8 5,504- 130- 32-ABCD
NB8NV 2,142- 101- 18-ABC
WAS8NN 720- 48- 12-BD

Pacific

KH6ME 180- 27- 6-BD

Sacramento Valley

*K6LMN 5,016- 106- 33-ABCD
WB9VYH 290- 29- 10-A

San Diego

WA5BNH 2,875- 80- 25-BCDEI
K6STI 2,340- 180- 13-B
W6OYJ 352- 23- 11-BCDI

San Joaquin Valley

WB4AYE/6 5,180- 113- 37-ABCD
WB8ITM (+ KB6NCF, WA8YDI, WB8COTI)
3,900- 111- 26-ABCD

Santa Barbara

WB6BCN 1,026- 46- 18-ABD
K6VMN 716- 55- 13-B
K8MEP (K86JV, W5SX, WA8FPX, ops)
2,625- 58- 35-ABCD

Santa Clara Valley

W6RXQ 5,320- 117- 35-ABCD
K6XC 480- 32- 15-AB
K6XO (CM87) 95- 19- 5-B
K6XO (CM97) 75- 15- 5-B
K6XO (CM88) 48- 8- 5-B
K6XO (CM96) 35- 7- 5-B

7

Arizona

NTAMA (+ WA7JTM)
2,352- 84- 28-AB
WA6IJZ (+ KA8ZVP)
1,856- 51- 23-ABDE
WB7OHF (+ KB7CRT)
520- 58- 13-ABD

Idaho

KC7IJ 4- 2- 2-A

Nevada

K7CW 252- 18- 7-D

Oregon

W7PJA 5,115- 103- 33-ABCD9EJ
KE7CX 4,077- 128- 27-ABCD
K7HSJ 1,120- 48- 16-ABCD
W7UDM 704- 41- 16-ABC
NR7U 572- 42- 11-BD
N7DB (CN85) 126- 15- 7-ABD
N7DB (CN85) 55- 11- 5-AB

Utah

KE7QA 28- 7- 4-B
NJ7A 18- 6- 3-B

Washington

WB7UUP 2,575- 78- 25-ABCD9E
WA7VHP 594- 33- 18-B
NFTX (CN85) 184- 18- 8-BC
NFTX (CN87) 162- 18- 9-B
NFTX (CN88) 55- 9- 5-BC
NFTX (CN84) 45- 8- 5-BC
NFTX (CM96) 32- 8- 4-B
NFTX (CM95) 25- 5- 5-AB
NFTX (CM97) 10- 5- 2-B
NFTX (CM88) 9- 3- 3-B
NFTX (CM87) 6- 6- 1-B
NFTX (CN83) 3- 3- 1-B
NFTX (CM94) 1- 1- 1-A
NFTX (CN82) 1- 1- 1-B
WB7PEK (+ KA7ICT)
5,088- 122- 32-ABCD
KA7SOL (+ KA7YFC, KB7BSC, N7IDY)
563- 49- 11-BC

Wyoming

WB5I/7 (+ W6KJY)
1,064- 35- 16-BDE

8

Michigan

N8DGN 21,052- 218- 78-BD
K8BIL 11,760- 146- 70-ABCD
KE8LY 7,290- 162- 45-B
KB8BR 2,380- 63- 34-BD
KE8GG 1,620- 60- 27-B
WB8AAX 1,325- 53- 25-B
KB8WZX 1,250- 50- 25-B
N8FLW 860- 43- 20-B
KG7Z/8 560- 29- 20-B
N8CSY 544- 32- 17-B
WB8WAO/8 (+ N8CGY)
5,000- 88- 50-ABD
WB8VPD (+ K8NTN)
3,500- 100- 25-B
WARTON (+ K8XL, KASDNO, N8S, HNO, HNR,
ILF, IRT, NY8D, WB8ZPJ)
2,768- 82- 34-B

Ohio

KB8ZW 35,752- 223-108-ABCD
WB8XTX (WB3CJT, ops)
33,288- 193-114-ABCD9EFG
KC3CL 23,816- 223- 96-ABCD
KE8FD 7,242- 142- 51-B
KA8ZOK 5,880- 99- 52-ABD
N8RO 4,932- 54- 38-D9EF
WB8MTK 3,093- 91- 33-B
WB8STU 2,108- 68- 31-B
WB8RCN 2,016- 72- 28-AB
WB8HBG 1,426- 56- 25-BD
K8KR 1,176- 49- 24-B
WB8CTX 920- 38- 23-ABD
WB8IGY 666- 34- 18-ABD
*N8CUX 860- 30- 22-B
N8IAO 570- 38- 15-B
N8CCC 450- 24- 18-ABD
WB8RMZ 300- 30- 10-B
WB8IFC 204- 15- 12-BD
WB8IGY (EM78) 20- 4- 4-BD
WB8IGY (EM88) 18- 4- 4-B
WB8IGY (EM89) 4- 2- 2-B

West Virginia

K8UC 2,800- 60- 40-BD
WB8IGY (EM98) 9- 3- 3-AB
WB8IGY (EM97) 1- 1- 1-A
WB8ISK (+ KA8IFC, WB8S, IFF, IGY)
219,010- 708-242-ABCD9E

9

Illinois

WB9MSV 40,796- 231-124-ABCD
KA9BG 8,415- 165- 51-B
WB9GBU 3,162- 59- 31-BDE
N9AQ 2,345- 67- 35-B
KA9QCC 2,212- 79- 28-AB
W9ACB 1,764- 42- 21-BD
N9CLO 1,056- 44- 24-B
WB9EEA (EN50) (+ AA9D, N9KC)
3,822- 67- 39-ABCD9E

WB9EEA (EN42) (+ AA9D, N9KC)

2,542- 56- 31-BDE
WB9EEA (EN60) (+ AA9D, N9KC)
2,134- 51- 31-ABCD9E
WB9EEA (EN52) (+ AA9D, N9KC)
1,296- 34- 24-BCD9E
N4SC (+ WB8FGP)
720- 33- 18-ABD

Indiana

KB8RI/9 22,185- 210- 85-ABCD
WB9YCZ 12,308- 147- 68-ABCD
K9DZS 1,798- 46- 29-ABD

Wisconsin

N9KS 4,488- 92- 44-ABD
WA1UU/9 1,575- 63- 25-B
KA1B 405- 29- 14-B
WB9CYV 375- 25- 15-B
KD9TH 210- 21- 10-B
WB9CZ9 (+ K9S, FVF, GJX, N9S,
AKC, BSH, WB9CQX)
28,840- 228-103-ABCD
W9WI (+ KA9HLC, WB9NLI)
5,805- 114- 43-BD
K9VGE (EN55) (+ N9BX)
608- 39- 16-B
K9VGE (EN48) (+ N9BX)
570- 36- 15-B
K9VGE (EN45) (+ N9BX)
540- 36- 15-B
K9VGE (EN58) (+ N9BX)
36- 6- 6-B

8

Colorado

KD8GS 6,113- 108- 49-ABCD
N9BD 787- 51- 13-BCD
WB8JAR 686- 49- 14-AB
KA8LJK 144- 12- 5-D
*K8IS (DN70) 138- 16- 8-BD
*K8IS (DN79) 21- 7- 3-B
*K8IS (DN85) 12- 4- 3-B
*K8IS (DN97) 4- 2- 2-B

Iowa

W8RAP 8,607- 52- 57-BDE
KA8TLJ 6,264- 174- 36-B
WB8Z 1,830- 81- 30-B
WB8OCB 1,344- 47- 21-ABCD
*KD8ZY 700- 29- 20-ABD
*KA8JWC (EN33420- 28- 15-B
KA8JWC (EN37) 180- 18- 10-A
KD8BT 128- 14- 9-A

Kansas

N8LL 16,544- 150- 85-ABD
W8AD 5,687- 93- 47-BE
N8OY 4,182- 50- 41-BE
K8TLM (DM99) 336- 16- 12-BDEF
K8TLM (EM89) 240- 12- 10-ABDEF
K8TLM (EM19) 240- 13- 10-ABDEF
K8TLM (EM77) 225- 12- 9-BDEF
K8TLM (EM87) 188- 10- 8-BDEF
K8TLM (EM87) 188- 11- 7-BDEF
K8TLM (EM88) 152- 10- 8-BDEF
K8TLM (EM18) 126- 9- 7-BDEF
W8DRL (+ W8NZS, N8SD, KA8GNX, K8BO,
W8TKJ) 142,425- 419-225-ABDEF

Minnesota

N8CH 6,533- 112- 47-BD
W8VB 5,566- 89- 46-ABCD
N8KHO 4,632- 92- 51-A
W8CHU 1,836- 43- 24-BDE
KB8ZQ 1,800- 49- 30-ABD
N8HJZ 1,782- 69- 27-AB
WB8KEK 1,012- 40- 22-AB
KC8P (+ KA8CRO, N8HJZ)
91- 13- 7-B

Missouri

K8FL 5,564- 78- 52-ABCD
W8JRP 3,280- 70- 41-ABCD
N8JX 3,180- 59- 40-ABCD
AJ8E 465- 31- 15-AB
N8EWG 81- 9- 9-B

Nebraska

K8TLM (EN80) 792- 23- 22-ABDEF
K8TLM (DN90) 240- 12- 10-BDEF
K8TLM (EN102) 112- 7- 7-BDEF

VE

Quebec

VE3ASO/2 31,464- 253- 92-ABCD9E

Ontario

VE3DDW 30,121- 316- 90-ABD
VE3FGU 14,630- 180- 77-AB
VE3KKL 12,425- 143- 71-ABD
VE3DSS 12,025- 142- 65-ABCD
VE3VAL 7,602- 181- 42-B
VE3VET 2,688- 79- 34-B
VE3DJ 595- 26- 17-BD
VE3EQO 117- 11- 9-BD
VE3PNV 26- 7- 5-B
VE3LNX (+ VE3S, ADJ, NSQ)
98,036- 421-159-ABCD9EF

Saskatchewan

VE5LY 4- 2- 2-A

Alberta

VE6BQJ 140- 14- 10-B
VE6AFO (+ VE6S, CA, EY)
273- 19- 13-ABD

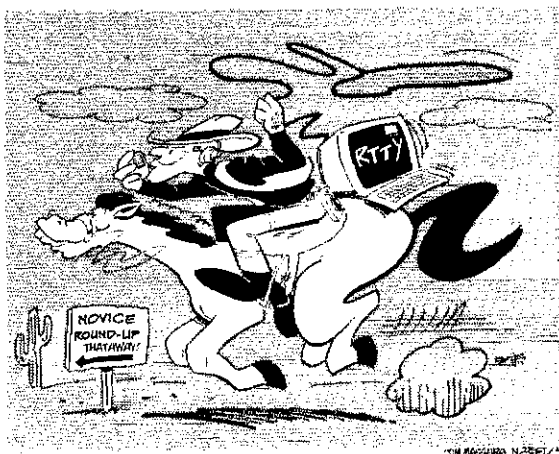
DX

XE2GBO (+ XE2MX, K16MS, N

10-meter SSB! 223- and 1295-MHz
FM simplex! 80, 40, 15 or 10-meter CW!
10-meter packet or RTTY!

In addition to the competitive aspects of NR, it is also a great chance to work new states and countries for awards, improve your code speed (particularly for license upgrading) and polish your general operating skills. Even if you've never operated contests before, jump in—it's fun! You can read all about contesting in *The ARRL Operating Manual*, available from your local dealer or direct from ARRL HQ.

2) Get the proper paperwork. ARRL offers a package of forms to help you organize your contest entry. You wouldn't dream of doing your tax return on a sheet of notebook paper, right? Examples of properly completed contest forms are shown here. They include:



- *Dupe sheets* to help you organize the

call signs of stations contacted in alphanumeric order. If you fill out the dupe sheet as you operate, you can tell at a glance whether or not you've contacted a station before.

Do not write above this line.

NOVICE ROUNDUP

License Class
☒ Novice
☐ Technician
☐ Other

CALL USED KAIKXQ/N ARRL SECTION or COUNTRY CT

CALL OF OPERATOR IF DIFFERENT FROM CALL USED

CHECK ONE: Single Operator Station ☒ Multiperator Station ☐

If multiperator, show calls of all operators, loggers

Mhz	CW QSOs	PHONE QSOs
3.7	175	N/A
7.1	90	N/A
21	23	N/A
28	29	504
222	1	5
1270	2	1
Total	320	510

Total CW QSOs 320 $\times 2 =$ 640

Total phone QSOs 510 $\times 1 =$ 510

Total QSOs 830 QSO points 1150

For QSO Points:
 CW includes—CW, RTTY, Packet
 Phone includes—SSB, FM

SCORING 1150 Total QSO points $(+1)$ 10 CW credit (\times) 68 Total multipliers (\times) 78,880 claimed score

78,880 Claimed Score

23 Hours of Operation

"I have observed all competition rules as well as all regulations for Amateur Radio in my country. My report is correct and true to the best of my knowledge. I agree to be bound by the decisions of the ARRL Awards Committee."

Date 2/10/88 Signature Bernice Dunn Call KAIKXQ

Please enclose log, photos, comments, ideas, etc. with your entry and mail within 30 days after the contest to:
 ARRL Contest Branch, 225 Main St, Newington, CT 06111.

MULTIPERATOR CHECK-OFF LIST

1	2	3	4	5	6	7	8	9	0	VE	DX
CT	ENH	GE	HA	HA	GO	HA	HA	HA	GO	HA	<u>SM</u> <u>HP</u> <u>JA</u>
ENH	HA	GO	HA	HA	GO	HA	HA	HA	HA	HA	
HA	HA	HA	HA	HA	HA	HA	HA	HA	HA	HA	
HA	HA	HA	HA	HA	HA	HA	HA	HA	HA	HA	
HA	HA	HA	HA	HA	HA	HA	HA	HA	HA	HA	
HA	HA	HA	HA	HA	HA	HA	HA	HA	HA	HA	
HA	HA	HA	HA	HA	HA	HA	HA	HA	HA	HA	
HA	HA	HA	HA	HA	HA	HA	HA	HA	HA	HA	
HA	HA	HA	HA	HA	HA	HA	HA	HA	HA	HA	
HA	HA	HA	HA	HA	HA	HA	HA	HA	HA	HA	
HA	HA	HA	HA	HA	HA	HA	HA	HA	HA	HA	

Print or type:

NAME BERNICE DUNN CALL KAIKXQ

ADDRESS 225 MAIN STREET
NEWINGTON, CT 06111

1. Check log for duplicate QSOs.

2. Copy ALL QSO info carefully. A penalty is assessed for incorrectly copied QSO info.

3. Observe mailing deadline.

4. Dupesheet sheet must accompany all entries of 200 or more QSOs.

M123-42 (2/87)
 Printed in USA

A properly filled out Summary sheet.

6	KA	KB	KC	KE	KG	KH	KI	KJ	KK	KL	KM	KN	KP	KQ	KR	KS	KT	KU	KV	KW	KX	KY	KZ	KL7
																								YY GLM WULTH
7	NA	NB	NC	NE	NG	NH	NI	NJ	NK	NL	NM	NN	NP	NQ	NR	NS	NT	NU	NV	NW	NX	NY	NZ	KH6 BKK BKA LP
8	OA	OB	OC	OE	OG	OH	OI	OJ	OK	OL	OM	ON	OP	OQ	OR	OS	OT	OU	OV	OW	OX	OY	OZ	KH

Dupe sheet

Novice Roundup

CALL USED KAIKXQ/N

log sheet 1 of 5

ARRL SECTION CT
or COUNTRY

50 QSOs per side
Number each new multiplier as worked

FREQ.	MODE	DATE/TIME UTC	STATION WORKED	COMPLETE EXCHANGE		LIST NEW MULTIPLIERS	POINTS
				SENT	RCVD		
28	SSB	1/15/88	5M5ARD	59 CT	59 Sweden	SM ①	1
		1517	HP1AC	59 CT	59 Panama	HP ②	1
		2312	VE4MYV	59 CT	59 Japan	JA ③	1
223	FM	2/2/88	W1LOU	59 CT	59 CT	CT ④	1
		0120	K1WJ	59 CT	59 CT		1
7	CW	2/11/88	K8SDE/T	59 CT	59 OH	OH ⑤	2
		0213	K8ZUR/N	59 CT	59 ENY	ENY ⑥	2
28	RTTY	2/11/88	VE7EGU	59 CT	59 BC	BC ⑦	2
		1935	K1KPI/N	59 CT	59 CT		2
		2012	NØGQAT	59 CT	59 CO	CO ⑧	1
		2014	K1WJ	59 CT	59 CT		1
		2020	K8GLVW/N	59 CT	59 SCV	SCV ⑨	1
		2025	K8HBN/KIN	59 CT	59 MT	MT ⑩	-1

Log sheet

Table 1

Novice Operating Privileges

Novice Privileges

80 meters: 3700-3750 kHz	CW
40 meters: 7100-7150 kHz	CW
15 meters: 21100-21200 kHz	CW
10 meters: 28100-28300 kHz	CW & Digital

suggested simplex packet-radio
frequencies:† 28102.3 kHz
28104.3 kHz

28300-28500 kHz	CW & SSB
1.25 meters: 222.10-223.91 MHz	All authorized modes

national simplex FM frequency:
223.50 MHz.
national simplex packet-radio
frequency: 223.40 MHz.

23 centimeters: 1270-1295 MHz	All authorized modes
-------------------------------	-------------------------

national simplex FM calling
frequency: 1294.5 MHz.

†Please avoid the propagation beacons in the 28200-28300 kHz range.

• **Summary sheet** to help you figure out your final score. The summary sheet is very important because it also helps us get your score listed correctly in *QST*. You can get your package by sending a no. 10 (business size) stamped (39 cents), self-addressed envelope to ARRL Novice Roundup Forms, 225 Main St, Newington, CT 06111. Each package includes one summary sheet, two dupe sheets and two log sheets. Each log sheet has room for 100 contacts. Feel free to make photocopies as necessary. Send for your forms package now so you'll have it in time for the contest.

Operating FUN-damentals

As noted before, Novice Roundup runs for nine days. If you want, you should be able to squeeze a full 30 hours of operating in without letting everything else in your life slide. When planning your operating strategy, remember that most people will be on the air during evening and weekend hours. These will probably be the most productive times.

Along with the new Novice Roundup bands and modes come some up-to-date rules. In previous years, you were allowed to work stations only once. This year, you may work the same station *once* on a digital mode (CW, RTTY, packet) and *once* on voice (SSB or FM). It doesn't matter which band(s) you use. For example, you might work W1AW on 10-meter SSB and 80-meter CW. In this case, you could *not* work W1AW again on 40-meter CW, 10-meter RTTY or 223-MHz FM for contest credit. Because you can work a station once per mode, you'll need to keep a separate dupe sheet for each mode. See Table 1 for a summary of the available modes.

What bands to operate will obviously depend on your station. Try to operate at

least two bands for the best combination of close-in and distant multipliers. Remember that while phone contacts often come quicker than CW contacts, CW QSOs are worth twice as much. Strike a balance that results in the best possible score.

Short contacts are best since you're trying to work as many stations as possible in a limited time. There will be plenty of time to chat after the contest. Avoid repeating information unless asked. A typical CW contact might go like this:
CQ NR CQ NR DE KAIKXQ/N KAIKXQ/N K
KAIKXQ DE WIAW AR
WIAW DE KAIKXQ 579 CT RN
KAIKXQ DE WIAW R 579 CT BK
R 73 DE KAIKXQ/N K

Note that KAIKXQ sends a slant bar followed by an N to indicate to listeners that she is a Novice (Technicians send /T) and therefore can work all callers for contest credit.

Phone contacts (ie, SSB, FM) are similar. A typical voice contact might be as follows:

CQ, CQ Novice Roundup from KAIKXQ/N, Kilo Alfa One Kilo X-ray Quebec slant November. Over.

KAIKXQ, this is WIAW, Whiskey One Alfa Whiskey.

WIAW from KAIKXQ. You're 57 Connecticut.

KAIKXQ from WIAW. QSL. You're 59 Connecticut. Go.

QSL, 73 from KAIKXQ slant N. QRZed Contest.

That's the basics. Read the rules and send for forms. When the starting hour comes around, turn on your rig and give it a try. Happy contesting!

Rules

1) **Object:** For Novice and Technician operators in the United States (and possessions and territories) to contact and exchange QSO information with as many stations as possible on the Novice bands. All authorized emissions modes may be used (see scoring information). Higher-class licensees work Novices and Technicians only.

2) **Contest Period:** The week that spans the end of January and the beginning of February, including both weekends. Begins 0001 UTC Saturday, January 30, 1988, and ends 2359 UTC Sunday, February 7. [See Table 2 for a time-conversion chart.] Operate no more than 30 hours during this nine-day period. Non-operating periods must be at least 15 minutes; listening time counts as operating time. Times on and off must be indicated in your log.

3) Entry categories:

(A) **Single Operator:** One person performs all transmitting, receiving and logging functions during the contest period.

(B) **Multioperator:** Single transmitter only. This category includes stations making use of any form of assistance, such as help with logging or relief operator,

Table 2

Novice Roundup Starting/Ending Time Conversion

	EST	CST	MST	PST
Starts Friday, January 29 local time	7:01 PM	6:01 PM	5:01 PM	4:01 PM
Ends Sunday, February 7	6:59 PM	5:59 PM	4:59 PM	3:59 PM

Novice/Techs work all amateurs; others work Novices/Techs only. Operate up to a maximum of 30 hours. Evenings and weekends are typically the most active.

during the contest period.

4) **Exchange:** Signal report and ARRL/CRRL Section (country for DX stations). Both stations must receive and acknowledge the complete exchange for the contact to count. Novices should send /N and Technicians /T after their call sign so others will know their license class. Notes: On phone, Novices send /NOVEMBER; Technicians send /TANGO. On packet, as the /N or /T will not fit in the AX.25 address field, we suggest Novices and Technicians send their call sign with the /N or /T suffix as the first item in the text of the exchange.

5) Scoring:

(A) **QSO Points:** Count one point for each complete voice QSO and two points for each complete CW QSO. Voice modes include SSB and FM; CW includes all authorized digital modes such as RTTY and packet radio. You may work stations only once on a voice mode and once on a digital mode, regardless of frequency band.

(B) **Multiplier:** Each ARRL/CRRL Section (see page 8 of QST), plus VE8/VY1, plus each DXCC country outside the sections.

(C) **Code Proficiency:** Additional points can be earned if you have qualified for an ARRL (not FCC) Code Proficiency certificate. CP credit equals the speed in words per minute indicated on the latest certificate or sticker held by the entrant. For more details on the Code Proficiency program, see Contest Corral, this issue.

(D) **Final Score:** Add your Code Proficiency credit to your total number of QSO points. Multiply that total by your ARRL Section/DXCC country total for your final score.

6) **Miscellaneous:** Crossband and cross-mode contacts are not permitted. Novices and Technicians work any amateur stations; others work Novices and Technicians only. Contacts made through repeaters (or locally used repeater output frequencies) are not permitted. Packet radio contacts made through digipeaters are not permitted.

7) **Reporting:** Contest forms (log sheets, summary sheet, dupe sheet) are available from ARRL HQ for an SASE (39 cents). Official forms are recommended. Any entrant making more than 200 total QSOs must submit duplicate check sheets (an alphabetical listing of stations worked). Incomplete or late entries will be classified as check logs and are not eligible for com-

petition or awards. Logs should indicate dates, QSO times, on and off times, signal report and section sent and received for each contact, and band. Postmark your entry within 30 days after the contest ends (March 8, 1988). Send entries to: ARRL Contest Branch, 225 Main St, Newington, CT 06111.

8) **Awards:** Certificates to every Novice and Technician entrant who submits a valid entry. Endorsements for top Novice and Technician entrant in each ARRL Section/Division. Non-Novice/Technician entries are not eligible for awards.

9) Conditions of Entry:

(A) Each entrant agrees to be bound by the provisions as well as the intent of this announcement, the regulations of his/her licensing authority and the decisions of the ARRL Awards Committee.

(B) Disqualifications: See page 86 of this issue.

Operating Pointers

- Generally, for making NR contacts on all Novice subbands, start tuning up from the low end of each band.

- Technicians are authorized all HF Novice privileges and all amateur frequencies above 50 MHz, but Novice Roundup contest operation is limited to the Novice subbands.

- Authorized power output:

- a) 200-watts maximum for all amateurs on the 80/40/15-meter Novice subbands.

- b) 200-watts maximum for Novices/Techs only on the 10-meter Novice subband.

- c) 25-watts maximum for Novices only in the 1.25-meter Novice subband.

- d) 5-watts maximum for Novices only in the 23-centimeter Novice subband. 

Strays



QST congratulates...

☐ the following radio amateur on 60 years as an ARRL member:

- J. P. Neil, KN6B, of Mountain View, California

Club Competition Rules and Contest Disqualification Criteria

The 1988 contest season is upon us. Three of the ARRL-sponsored contests during 1988 include an ARRL-affiliated club competition—January VHF Sweepstakes, February/March International DX Contest and the November Sweepstakes. There are a few changes in the Club Competition Rules effective January 1, 1988. Make sure you read them over carefully and understand them thoroughly before you make plans for your club's entry. If you have any questions concerning them, call HQ. The new rules are detailed below.

From time to time it becomes necessary to consider disqualifying an entry to an ARRL contest. The particulars are listed below. Most of the time the reason is simply that the person submitting the entry was not accurate in copying call signs or contest exchanges. As long as you are careful only to log QSOs when you are sure of the information, you should have nothing to worry about. [The use of standard ARRL contest forms will help ensure that your score is figured properly and will help speed up the publication of contest results in QST.]

Don't hesitate to call or write if you have a question about the rules listed here or the rules for any particular contest. The time to ask is before the contest, not afterward.

Club Competition

Only ARRL-affiliated clubs may participate in the club competition. A member must be listed in the regular score listings to be counted for a club.

For a club to be listed, two conditions must be met:

- 1) At least three different entries from members of the club must be submitted.
- 2) All members wishing to be included in the club score must indicate the club name on their summary sheet and the club secretary must send a list of all club members eligible to compete for the club and which level (unlimited, medium, local) they wish to enter for each competition. Remember to meet the mailing deadline!

There are three levels of club competition:

1) **Unlimited:** Any club submitting 51 or more entries. (One station can submit two entries—one on phone and one on CW—in the November Sweepstakes and the DX Contest.) All stations and all operators must reside within 175 miles of the club's center. All members must attend at least 2 club meetings per year to be eligible to submit an entry. If, however, they have not been a member for a year's time, they must have attended a meeting as a member prior to the contest. To be considered bona fide, a member must be active in club affairs. Members living outside of 175 miles and/or members operating stations outside 175 miles may not compete in the club competition. The club must be ARRL-affiliated.

2) **Medium:** Any club submitting 50 or fewer entries except as noted in local club criteria below. The same mileage and attendance requirements apply as the unlimited class club. The club must be ARRL-affiliated.

3) **Local:** Any club submitting 10 or fewer entries. All members must reside within 20 miles of the club's center. There is no attendance requirement. Again, the club must be ARRL-affiliated.

Single- and multioperator-station scores may be counted. At a guest-operated single-operator station, both the guest operator and the station licensee must be members of the same club in order to count the score for that club. At multioperator stations, at least 66 percent of the operators must be members of the same club for the score to count for that club.

In conjunction with the two meetings per year rule, the club must hold at least four in-person meetings per year. A club's entry classification may be changed if, in the opinion of the ARRL Awards Committee, the club has manipulated its number of entries to fall into a lower classification (eg, if a club with 100 members submits only the 10 highest scores, even if more than 10 of its members wish to compete).

It is not within the intent of these rules that a club should vote out a member or that a

member resign and then be voted back into the club later so the member-attendance rule can be met.

The highest affiliated-club entry will be awarded a gavel in each category (unlimited, medium, local).

The highest single-operator CW score and the highest single-operator phone score (ARRL International DX Contest and ARRL November Sweepstakes) in any club entry will be awarded with a club certificate when at least three single-operator CW and/or three single-operator phone scores are submitted.

Disqualification

If the claimed score of a participant is reduced by 2 percent or more, the entry may be disqualified. Score reduction does not include correction of arithmetic errors.

Score reduction may be made for taking credit for unconfirmed QSOs and/or multipliers, duplicate contacts, and/or other scoring discrepancies.

An entry with more than 2-percent duplicate contacts left in the log or an entry in which more than 2-percent "rubber clocking" (altering the actual time to increase the operating time so that it is greater than the allowable limit) is detected will be automatically disqualified.

If a participant is disqualified, he or she will be barred from submitting an entry in the next annual running of that specific contest; eg, disqualification from the 1988 phone SS prohibits submission of an entry for the 1989 phone SS, but 1989 CW SS participation is okay.

The calls of all disqualified participants will be listed in the QST contest report.

Any participant on the borderline of disqualification, but not actually disqualified, may receive a warning letter.

For each duplicate contact or miscopied call sign that is removed from the log by HQ, three additional contacts will be deleted as a penalty. The penalty will not be considered part of the 2-percent disqualification criteria.

In all cases of question, the decisions of the ARRL Awards Committee are final. [R5C-1]

Strays



I would like to get in touch with...

☐ an English-speaking family with 14- and/or 21-MHz SSB/RTTY capability to host one boy and one girl, ages 15 and 18, as exchange students next summer (July-August 1988). Enrique Pinilla, EA4JO, Box 17 CP 28230, Las Rozas de Madrid, Spain.

☐ anyone with schematics for the Knight Electronics TR106 and Millen 90810 6-meter transmitters. George Hudson, W2BHZ, Box 133, R#4, Pine City, NY 14871.

☐ anyone with a manual/schematic/calibration procedure for a Boonton RF Voltmeter, Model 91CA. James Lee, WB4GWX/AAV6UX, 5004 Ridge View Court, N Richland Hills, TX 76180-2521.

☐ someone who can send me schematic and parts values for Eldico Novice transmitter (model unknown) circa 1960. Has 3 variable capacitors, 3 plug-in coils, 8 xtal positions, a large 5-H/0.2 A choke, and uses a 5U4, 6AG7 and a 1625 that is in a shielded well. Tom Pendarvis, WD0EMP, PO Box 2183, Ellisville, MO 63011.

☐ anyone with an operating/technical manual and schematic for a T368D/URT military transmitter. Charles Otnott,

WD5BJT, 437 Ave K, Marrero, LA 70072.

☐ anyone with a manual and schematic for a Lafayette Model HA800 ham receiver. Tom Bradley, WB2ZKA, 29 Timber Trail Ln, Medford, NY 11763.

☐ anyone with a manual/schematic for a Tenna Phase III regulated power supply, 13.8 V, 7 A. Morris Howard, N9BOK, 402 Third St, Box 51, Armington, IL 61721.

☐ anyone who knows where to get a 4 pin linear IC, part no. EF 2106, as used in a dc-ac converter circuit described in the German magazine *ELV Journal*, No. 21. Ralph Fellows II, WB5FTV, 27155 Cole Ct, Highland, CA 92346, 714-862-8071.

Dec 31-Jan 1

ARRL Straight Key Night, Dec QST, p 86.

JANUARY

2

10 Meter World SSB Championship Contest, Dec QST, p 86.

6

West Coast Qualifying Run, 10-35 WPM, at 0500Z Jan 7 (9 PM PST Jan 6). W6OWP prime, W6ZRI alternate. Frequency is approximately 3590 kHz. Underline one minute of the highest speed you copied, certify that your copy was made without aid and send it to ARRL for grading. Please include your full name, call sign (if any) and complete mailing address. A large SASE will help expedite your award or endorsement.

9

15 Meter World SSB Championship Contest, Dec QST, p 86.

9-10

Hunting Lions in the Air Contest, Dec QST, p 86.

10

WIAW Qualifying Run, 35-10 WPM, at 0300Z Jan 11 (10 PM EST Jan 10). Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 147.555 MHz. Underline one minute of the highest speed you copied, certify that your copy was made without aid and send it to ARRL for grading. Please include your full name, call sign (if any) and complete mailing address. A large SASE will help expedite your award or endorsement.

ARCI QRP Winter Fireside Sprint, sponsored by QRP ARC International, from 2000Z-2400Z. 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: 3.985 7.285 14.285 21.285 28.385 28.885 50.385. Count 5 points for QSO with ARCI member. Others count 2 points for same continent and 4 points for different continent. If station worked is using home-brew add 5 points per QSO. Bonus points for using home-brew equipment (HB): add 200 points for each band an HB transmitter used; add 300 points for each band an HB receiver used; add 500 points for each band a HB transceiver is used. Multiply QSO points by states/provinces/countries worked per band by power multiplier (4-5 W output $\times 2$; 3-4 W output $\times 4$; 2-3 W output $\times 6$; 1-2 W output $\times 8$; 0-1 W output $\times 10$). More than 5-W output counts as checklog. If 100% natural power, multiply final score by 2; if 100% battery, by 1.5. Include description of home-brew equipment, commercial equipment and antennas used and indicate which equipment was used on which bands. Awards. Mail entry (SASE for results) before 30 days after the contest to QRP ARCI Contest Chairman, Red Reynolds, K5VOL, 835 Surrey Rd, Lake Zurich, IL 60047.

20 Meter World SSB Championship Contest, Dec QST, p 86.

16

AGCW-DL QRP Winter Contest, Dec QST, p 86.

16-17

Michigan QRP Club CW Contest, Dec QST, p 86.

North Dakota QSO Party, sponsored by the Red

River Amateurs, from 0000Z-0800Z and 1600Z-2400Z Jan 16 and 0800Z-1600Z Jan 17. Work stations once per band and mode. Exchange signal report and QTH (county for ND stations; state, province or country for others). Suggested frequencies: phone—3.905 7.280 14.295 21.380 28.500; CW—1.810 3.540 and 35 kHz up from band edges; Novice—25 kHz up from 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. Multiply by number of states/provinces/countries worked per band and mode. Others multiply by total ND counties worked (max 53). Mail logs by Feb 28 (include a large SASE for results) to Mike Beaton, KD0A, 2267 Flickertail Dr, Fargo, ND 58103.

Texas QSO Party, sponsored by the West Texas DX Assn, from 0000Z Jan 16 until 1800Z Jan 17. Phone and CW. Single operator only. Work stations once per band and mode. Mobiles may be worked again in each county. Exchange serial number and state/province/country (county for TX stations). Score 1 point per phone QSO, 2 points per CW QSO, 5 points per phone QSO with Texas mobile station (non-Texas stations only) and 7 points per CW QSO with Texas mobile station (non-Texas stations only). Texas stations multiply by total number of states/provinces/countries and Texas counties. Others multiply by total number of Texas counties worked (max 254). Suggested frequencies: CW—3.565 3.710 7.065 7.110 14.065 21.065 21.110 28.065 28.110; phone—3.940 7.260 14.280 21.370 28.600. Certificates and plaques. Send logs to be received before Mar 14 to Les Bannon, WF5E, 3400 Bedford, Midland, TX 79703.

160 Meter World SSB Championship Contest, Dec QST, p 86.

21

WIAW Qualifying Run, Jan 21 2400Z (7 PM EST 21 Jan). See Jan 10 listing for more details.

23

40 Meter World SSB Championship Contest, Dec QST, p 86.

23-25

ARRL January VHF Sweepstakes, Dec QST, p 86.

24

75 Meter World SSB Championship Contest, Dec QST, p 86.

24-25

Winter Classic and Homebrew Radio Exchange, sponsored by the Southeast ARC from 2000Z Jan 24 until 0400Z Jan 25. Object is to restore, operate and enjoy older equipment. Exchange name, signal report, state/province/country, receiver and transmitter (home-brew send PA tube) and other interesting conversation. The same station may be worked with different equipment combinations on each band/mode. Suggested frequencies: phone—3.880 7.290 14.280 21.380 28.580; CW—60 kHz up from lower band edges; Novice/Tech 20 kHz up from lower band edges. Add the number of all the different transmitters and receivers worked plus the different states/provinces/countries worked per band. Multiply that number by total number of QSOs. Multiply that total by total years old of all your transmitters and receivers used (minimum three QSOs per unit). For transceivers, multiply years old by 2. Mail logs (include SASE for results) to Jim Hanlon, W8KGI, 5560 Linworth Rd, Columbus, OH 43085.

29-31

CQ World Wide 160 Meter DX Contest, CW, sponsored by CQ Magazine from 2200Z Jan 29 until

1600Z Jan 31. CW only (phone Feb 26-28). Count 2 points per QSO with own country, 5 points per QSO with another country in the same continent and 10 points per QSO with another continent. Multiply by sum of US states (48), Canadian provinces (13) and DXCC countries (including KH6/KL7). Canadian provinces are VO1, VO2, VE1-NB, VE1-NS, 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. Mail entry by Feb 28 (phone, Mar 31) to Don McClenon, N4IN, 3075 Florida Ave, Melbourne, FL 32904.

30

French REF Contest, CW

30-31

YL-SSB QSO Party, CW, coordinated by Bill Early, WA9AEA, from 0001Z Jan 30 until 2359Z Jan 31 (phone is from 0001Z Mar 19 to 2359Z Mar 20). Frequencies are the General portion of all bands and VHF/UHF simplex. 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, ISSB number (if member) and DX-W/K partner. Score 3 points per member QSO within same continent, 6 points per member QSO in different continent, 1 point per nonmember QSO. Member stations only count as multipliers. Multiply by 1 for each DX-W/K partner; YL-OM team: US, VK, ZL, VE state or province; DXCC country. Bonus multipliers: 1 for working 15 or more members on a second band; 2 additional for 15 or more members on a third band. Multiply by 5 for maintaining a dc input under 250 watts throughout contest. Mail logs before Apr 30 to Bill Early, WA9AEA, PO Box 401, McHenry, IL 60050-0401.

30-Feb 7

ARRL Novice Roundup, this issue, p 83.

FEBRUARY

2

West Coast Qualifying Run, 10-35 WPM, at 0500Z Feb 3 (9 PM PST Feb 2). See Jan 6 listing for more details.

6-7

Crazy 8s HF, VHF and UHF Contest, sponsored by the Cuyahoga Falls ARC, from 1400Z Feb 6 until 2300Z Feb 7. Work only stations in the 8th Call Area (8 Call Area stations work everyone). Exchange state/province/country and grid locator (Maidenhead). Score 1 point per QSO. All bands 1.8 through 1296 (except 10 MHz) and all modes (including repeaters, satellites, etc). There are 2 groups of multipliers. Group one (times 1 per total): number of bands operated (min 3 QSO per band), number of grid squares worked, number of states worked. Group two (each multiplier times 8; must have min of 3 QSO per multiplier): SSB contacts, CW contacts, FM contacts, RTTY or AMTOR contacts, SSTV or ATV contacts, packet contacts, satellite contacts, AM contacts, QRP contacts (< 5 W), 12-m contacts, 6-m contacts, 220-MHz contacts, Novice contacts, ragchew contacts (min of 10 minutes each), repeater contacts, mobile contacts. Final score equals QSO points times the sum of group one and group two multipliers. Awards. Send logs to Anthony Lusere, KA8NRC, 5441 Park Vista, Stow, OH 44224.

Vermont QSO Party, sponsored by the Central Vermont ARC, from 0000Z Feb 6 until 2400Z Feb 7. Stations may be worked three times per band (once each on CW, phone and RTTY). CW and RTTY QSOs must take place in the appropriate subbands. Exchange signal report and QTH (county for VT stations; state, province or country for

others). Suggested frequencies: phone—lower 25 kHz of the 80-15 General bands, 50.110 144.200; CW—3.540-3.720 7.040 7.120 14.040 21.040 21.140 28.040; RTTY—3.620 and 90 kHz from lower band edges. Count 1 point per phone QSO, 2 points per CW or RTTY QSO. Multiply by number of states plus provinces plus DXCC countries for VT stations; others multiply by number of VT counties worked (max 14). 20-point bonus points for working W1BD. Official log sheets available for SASE to sponsor. Mail entry by Mar 1 to D. Loverin, WA1PDN, 50 Liberty St, Montpelier, VT 05602.

New Hampshire QSO Party, sponsored by the NH ARA, from 1900Z Feb 6 until 0700Z Feb 7 and 1400Z Feb 7 until 0200Z Feb 8. Work stations once per band and mode. Exchange signal report and QTH (county for NH stations; state, province or country for others). Suggested frequencies: phone—1.875 3.935 7.235 14.280 21.380 28.380 (Novice) 50.115 144.205; CW—1.810 and 35 kHz above band edges; Novice—35 kHz above band edges. Count 1 point per phone QSO, 2 points per CW/RTTY QSO and 5 points per Novice/Tech QSO. NH stations multiply by total states/provinces/countries worked. Others multiply by total number of NH counties worked (max 10). Count 20 bonus points each for working WB1CAG, WB1FFZ, N1BYQ, K1RD, W1QC and W1WQM. Logs must be postmarked by Mar 12 (include SASE for results). Send logs to Mt Moriah RS, c/o Bud Valcourt, N1BYQ, 19 Teague Dr, Salem, NH 03079.

10-10 International Net Winter Phone QSO Party

7

North American Sprint, CW, sponsored by the *National Contest Journal*, from 0000Z to 0400Z Feb 7 (phone contest 0000Z-0400Z Feb 14). Contests are separate; 80, 40, 20 meters only. Suggested frequencies: CW—3.530-3.550 7.030-7.050 14.030-14.050; phone—3.870-3.910 7.210-7.240 14.260-14.290. For a valid QSO, you must send and receive all of the following information: other station's call, your call, serial number (consecutive starting with 001), your name and state (or province/country). An operator may use only one call sign during the contest. Multiply valid QSOs by sum of states, provinces and North American countries (not W/VE). KH6 is not counted as a state or as an NA country. VE multipliers are Maritimes (VE1, VO1, VO2) and VE2 through VE8 (8 max). Non-NA countries do not count as multipliers. Special QSY rule: Stations soliciting a call by sending CQ, QRZ, etc., are permitted to work only one station in response to that solicitation. They must thereafter move at least 1 kHz before working any other station, or at least 5 kHz before again soliciting calls. Team competition: Each team has a maximum of 10 members as a single-entry unit. Clubs having more than 10 members may submit more than one team entry. To qualify, the name and call sign of each operator (and station operated if a guest op) must be registered with W6OAT. The team information may be contained either in a letter received by W6OAT before the start of the Sprint or in a Western Union Mailgram dated at least 24 hours before the start of the Sprint. There are no distance or meeting requirements for a team entry. CW and phone teams are separate. Entries must be received no later than 30 days after the Sprint. Mail CW entries to Rusty Epps, W6OAT, 651 Handley Trail, Redwood City, CA 94062. Phone entries go to Rick Niswander, K7GM, 910 W Claremont, Phoenix, AZ 85013.

8

W1AW Qualifying Run, 10-40 WPM, 0300Z Feb 9 (10 PM EST, Feb 8). See Jan 10 listing for more details.

13-15

YL-OM Contest, phone, sponsored by YLRL, from 1400Z Feb 13 until 0200Z Feb 15 (CW portion will be 1400Z Feb 27 until 0200Z Mar 1). Phone and CW are separate contests. YLs work OMs, OMs work YLs only. Use all bands; no cross-band operation. No net contacts or repeater contacts. Work stations once per band. Exchange QSO number, signal report and state/province/country. Count one point for each station worked and multiply by the total number of states/provinces/countries worked. Stations running

150 W CW or 200 W PEP SSB or less multiply final score by 1.25. Entries with more than 200 QSOs must submit dupe sheets and must score each band separately. Time limit for this contest is 24 hours and logs must indicate rest periods. Suggested frequencies: phone—3.940-3.970 7.240-7.270 14.250-14.280 21.380-21.410 28.380-28.410; CW—3.540-3.570 7.040-7.070 14.040-14.070 21.120-21.150 28.180. Awards. Logs must be received by Mar 30. Mail them to Carol Schrader, W14K, 4744 Thoroughgood Dr, Virginia Beach, VA 23455.

15

North American Sprint, phone. See Feb 7 listing.

19

W1AW Qualifying Run, 10-35 WPM. See Jan 10 listing.

20-21

ARRL International DX Contest, CW, Dec QST, p 86.

22-23

Operation Search Contest

26-28

CQ World Wide 160 Meter DX Contest, phone. See Jan 29-31 listing.

Feb 27-Mar 1

YL-OM Contest, CW. See Feb 13-15 listing.

Deadline: The deadline for receipt of items for this column is the 1st of the second month preceding the publication date. For example, your information would have to reach HQ by Feb 1 to make the April issue. Please include name of contest, dates, times (Z) and complete rules. Send to Contest Corral, 225 Main St, Newington, CT 06111.

Special Events

Conducted By Rus Wilson, KC1GX
Assistant Contest Manager, ARRL

Annapolis, Maryland: The US Naval Academy RC will operate W3ADO on Jan 23, 1300Z-2100Z, commemorating the Constitution. Suggested frequencies: 14.250 and 7.250. Special QSL card for SASE to W3VPR, PO Box 308, Davidsonville, MD 21035.

Queens, New York: The Hall of Science ARC will operate WB2JSM, a permanent exhibit at the Hall of Science, on Jan 24, 1500-2100 UTC to celebrate their 15th anniversary. Suggested frequencies: SSB—14.265, 21.365, 28.365; CW—21.135 and 14.065. For certificate, send QSL with large SASE (39 cents or 2 IRC) to Arnie Schiffman, WB2YXB, 81-22 250th St, Bellerose, NY 11426.

Coloma, California: The El Dorado County ARC will operate N6MYH from 1600Z Jan 24 until 0400Z Jan 25 to commemorate the discovery of gold in California on Jan 24, 1848. Suggested frequencies: CW—7.050, 14.050 and limited operation near 7.125; phone—in the lower 25 kHz of the 40, 20, 15 General bands and 10-meter Novice band. For QSL, send QSL and SASE to the El Dorado County ARC, PO Box 451, Placerville, CA 95667.

Marshall Islands: The Kwajalein ARC will operate KX6BU from 0600Z Jan 30 until 0600Z Feb 8, to commemorate the 44th anniversary of the battles of Kwajalein and Roi-Namur. Suggested frequencies: SSB—14.250, 21.350, 28.550; CW—7.050, 14.050, 21.050 and 28.050. QSL with an SASE to KX6BU, PO Box 444, APO San Francisco, CA 96555.

Moscow, Idaho: The University of Idaho ARC (W7UQ) will hold its 3rd annual "Alumni Reunion on the Air" starting at 2100Z Jan 30 until 0300Z

Jan 31. The goal is to make 100 contacts to celebrate the University Centennial. Suggested frequencies: phone—14.283 (2100Z-0000Z), 14.050 (2200Z-0000Z), 7.223 (0000Z-0200Z), 7.123 (0100Z-0300Z) and 3.953 (0200Z-0300Z). Listen for "CQ reunion" on phone and "CQ R" on CW. Full color QSL for SASE to the *Callbook* address.

Deadline: The deadline for receipt of items for this column is the 1st of the second month preceding the publication date. For example, your information would have to reach HQ by Feb 1 to make the April issue. Please include the name of the sponsoring organization, the location, dates, times (Z), frequencies and call sign of the special-event station. Requests for donations will not be published.

QSLing Special-Event Stations: To get your QSL or certificate from any of the special-event stations listed here, follow these simple guidelines. (1) After working the station, carefully fill out a QSL card for the QSO. Show the date and time accurately using UTC. (2) Prepare a self-addressed, stamped envelope. If sending for a certificate, use a 9- x 12-inch 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.

Strays



QST congratulates...

□ Lloyd Blevins, W5NBT, of Santa Fe, and Dr Ashley Pond, WA5LZX, of Taos, on being appointed to the New Mexico Optometry Board by Governor Garrey Carruthers.

□ John Salin, W3KFT and John Hyde, N3CGO, on being elected Commissioners of their home town, Rehoboth Beach, Delaware

I would like to get in touch with...

□ anyone with a manual, schematic or information on a Lavoie Spectrum Analyzer Model 18M. Bob Ragain, WB4ETT, 6001 S Grant St, Littleton, CO 80121 (303-794-6978 nights).

□ anyone who can help me find a US source for Telefunken ICs numbered U264B or U664B. Robert Chase, 118 Tuna Ave, Galveston, TX 77550.

The ARRL Field Organization Forum

CANADA

ALBERTA: SM Bill Gillespie, VE6ABC—A/SM: VE6AMM. SEC7IC: VE6AFO. OO: VE6TY. STM/DEC/SM: VE6ABC. Clubs throughout Alberta gearing up for Amateur and Advanced classes. Whispering Hills ARC hosts Bar-B-Que at cottage of Spence and Betty Jamison. VE6BOY, in Baptiste Lake area to wind up New Horizons funding of repeater. Over 40 attend and enjoy a splendid outing. The ABSBY Net Manager is having some difficulty in getting month-end reporting done early enough to get into this report. Please—NCS stations—get your reports in by the end of the month. Traffic: APSN QNI 464, QTC 3, Informals 26. ATN: QNI 243, QTC 42. Personal Totals: late from August: VE6GUS 117, October: VE6GUS 30, VE6EO 8, VE6AMM 8, VE6ABC 6.

BRITISH COLUMBIA: SM, H. Ernie Savage, VE7FB—British Columbia Public Service Net meets nightly on 3729 kHz. Net Manager VE7BLO, Jim, reports the net is improving as winter sets in. Also checks being High 193, Low 136, total 5172. BCEN, 3650 kHz at 0300Z. Net Manager VE7JNG, Ferdi, has completed the year's checkins with VE7JNG VE7BNI VE7BNH VE7EJ VE7EJW and VE7XA 365 to 358 tops the list. John, VE7CTJ, our STM and I wish to say thanks to all Nets and their members for their support, and seeing reports are in each month. Bill, VE7FAE, in hospital with heart problems. Bill, VE7XN and Regard also Bill, VE7JY have the shingles and not feeling too chipper. Cowichan ARC 1987/88 elected officers: President, Ken VE7DEY; Secretary, Al VE7AZS; Vancouver ARC President, Secretary, Al VE7RKN, Secretary Dick VE7RP, Surrey ARC President Vic VE7CON, Secretary Bob, VE7EYF. 73. Traffic: VE7BNI 328, VE7EJ 174, VE7ANG 101, VE7EJW 96, VE7FB 67, VE7XA 37, VE7FME 35, VE7EGM 19, VE7BVZ 14, VE7BZI 8, VE7BNI 6.

MANITOBA: SM, Jack Adams, VE4AJE—Summer coming to an end. Last minute antenna and tower work—everyone ready for winter operations. Hear a number of new amateur calls within Manitoba locally. Stu, VE4STU, and Terry, VE4ABF, can be heard on the HF bands working CW. Malcolm, VE4MG (VE4QST) informed me that his Mother Bubbles Timlick VE4ST, was honoured at the Clara 20th Anniversary convention in Richmond, Ontario with a plaque for her services as a Past President of Clara. Congratulations Bubbles. On October 1, 1987, Reginald Durie, VE4DL became a Silent Key. On behalf of CRRL, our condolences go out to the Durie family. Section net, repeat CRRL phone Net 31 sessions, 890 QNL. 17 QTC. MTN, CW net, sessions, 148, 217 QTC. MB Morning Net—31 sessions, 546 QNL, 20 QTC. Individual traffic: VE4LB 36, VE4AJE 34.

MARITIME-NEWFOUNDLAND: SM, Leigh Hawkes, VE1GA—BM: VE1BOO. Happy New Year to all. Due to the duties of his new job, our SEC VE1JH has resigned. VE1JH has recently been appointed acting Deputy Director General for DOC Atlantic Region. Congrats George. My understanding is that this Section's name is soon to be changed to ATLANTIC. This may be one of the final VE Section News columns appearing in QST. Early this year, all CRRL members will begin receiving a multi-page supplement of CRRL news with their QST. Our Section News will likely be transferred to it. Farewell to US readers. There remain a number of open Field Organization appointments. Our section can be anything we want, but it is up to EVERYONE to make it happen. Help make 1988 that year. Regret to report SK VE1AAC. Traffic: VE1BKM 62, VE1BXM 14, VE1BXL 14, VE1BVS 5, VE1BTV 5, VE1C6S 3, VE1BAX 3, VE1CK 2, VE1B3D (Sept.) VE1BKM 83, VE1VX 32, VE1BPM 15, VE1CSP 2, VE1CYS 2, VE1ABV 1.

ONTARIO: SM, Larry Thivierge, VE3GT—A/BM: VE3GT. SEC: VE3GV. STM: VE3CYR, VE3EJO. The Boy Scouts Jamboree on the Air (JOTA) proved to be a smashing success in the Greater Toronto Region. Using the call VE3GTR, several stations, including two of early 1960 vintage, were active using phone, CW, RTTY and two metres thanks to the efforts of VE3FGU, VE3FIT, VE3HBF and VE3DIR. The visiting cubs, scouts and beavers were allowed and even encouraged to tune the repeaters and experience the thrill of tuning in stations from all over the world, thanks to all the activity on 10 metres. Next year should see a permanent station, complete with a tri-band beam and tower located at the site at the Woodland Trails Camp. VE3FGU and VE3FIT have offered their services as resource people to the Boy Scouts in their respective areas with the intention of helping to encourage the younger members of the community to join the fraternity of amateur radio. As Clubs tend to cater to older people who can afford the class fees and equipment they feel that by offering their services they would be able to reach a younger segment of the population. Great ideal! I regret to report that the voice of "the Hub", in Napanee, Gord, VE3CJH has become a Silent Key. Gord's wit and enthusiasm will be missed by all those whom he came in contact with on the air. VE3BX has worked country number 337, an XU on CW. VE3FAS visited the Kingston, Peel and Oakville radio Clubs with his traffic presentation. EC and OBS VE3MCL from the "So" dropped in for a short evening on his way back to the north. VE3KO and VE3EY are new additions to the professional leaders club. VE3ISD is a new ORS appointee. Port Elgin ARS were involved in providing communications for three special exercises. Other Clubs similarly involved for parades and other events were the Niagara Peninsula, North Shore and Peterborough ARCs. A 100+ watt amplifier has been installed on Windsor repeater VE3PFR for added coverage. Reports so far have been favourable, especially along the fringe areas. New amateurs are VE3GWL and VE3SPT. Traffic: VE3GSO 305, VE3FAS 249, VE3ISD 133, VE3BEC 119, VE3CYR 118, VE3OJN 114, VE3DPO 79, VE3GT 78, VE3GNW 70, VE3WV 69, VE3BUO 40, VE3EAM 22, VE3CKZ 21, VE3WG 22, VE3NVJ 20, VE3AJN 15, VE3BDM 12, VE3KXB 10, VE3FGU 9.

QUEBEC: SM, Harold Moreau, VE2BP—STM: VE2EDO. SM: VE2ALE. Congrats to VE2CBS (Sorel-Tracy ARC) for their standing in the 1987 Field Day. More stations are on Packet now, in our section, it will help the flow of Holiday traffic. VE2BP was honoured as "Life Member" in the Royal Canadian Legion. VE2EVM est maintenant VE2YF. Prompt retablissement a Leon. VE2VL, qui a passe un sejour a l'hôpital. Bon signaux de Paul Emile, VE2JAS, avec un FT-76GX. Traffic: VE2BP 49, VE2WH 42, VE2JN 21, VE2EC 20, (Sept.) VE2JN 13.

ATLANTIC DIVISION

DELAWARE: SM, Harold K. Low, WA3WY—SEC: KC3TI. DEC: K3PFW and N3FDL. EC: KC3JM, KA3LNK, WA3PHT, WA3VDJ, WA3PNT. STM: KA3GRQ. PIO: WB3DPJ. SGL: AF3R. PSRR: K3JL. By the time you read this, you will have a new Section Manager. Please give him your full support. Note to Club Secretaries, don't forget to send your newsletter to him. James Plummer, N3AXH, became a Silent Key this last month. He will be greatly missed on the traffic nets as he was the main outlet in Kent Co. N3AXH had a packet station up and running in the Willm. area. DTN on 3505 having more activity now as is also DEPN. DTN Mon, thru Fri, at 23:30Z DEPN Sat at 23:00Z. Come on and join us. DTN sta. 363 Tric 41 in 22 sessions. DEPN sta. 61 Tric 17 in 5 sessions SEN sta. 58 Tric 1 in 4 sessions. Traffic: W3QQ 121, KA3GRQ 29, WA3WY 29, WB3DUG 24, K3JL 21, W3FEG 16, K3YBW 14, KC3TI 12, W3PVO 11.

EASTERN PENNSYLVANIA: SM, Kay Craigie, KC3LM—ASM: WA3PZO, KA3A, KO3B, K3ZFD. SEC: KB3YS. ACC: KC3QB. OOC: W3IS. SGL: WA3IAO, STM: BM: KB3UD. TC: W3FAF. PIO: W3ZVX. Best wishes to Director W3ABC and Vice-Director W3BCH as they begin new terms. Always feel free to let them know what's on your mind. Also 73 to W3FZV, new SM in Maryland/DC. Bill Boyer, W3AMQ, has retired as Public Information Officer, taking with him our sincere gratitude for many years of service to EPA. Our new PIO is Gene Pressler, W3ZLV, former president of Delmont RC and current Atlantic Division rep on the ARRL Board's Public Relations Advisory Committee. Official Bulletin Stations welcome your club's info on hamfests, license courses, and other events. An OBS sked appears in the January EPA FEEDLINE. Section newsletter for Field Organization appointees and Affiliated Clubs. Have a look at the EPA News bulletins that appear once or twice a month on packet with up to date news on the Field Organization and Affiliated Clubs. Welcome new OO KB3NO. With OO K3UWJ as chairman, West Branch ARA and Bald Eagle Repeater Assn formed a Local Interference Committee for Clinton and Lycoming Counties. SM WPA K3SMB kindly cooperated in this cross-Section agreement. State Govt Liaison WA3IAO spoke at a Tri-State ARC meeting and the Westminster ARRL Night. Good news from Tioga Co. ARC, Columbia-Montour ARC, and Pocahontas ARRL! All report several multi-hamfests. Family fun with ham radio brightens the future of our hobby. R. Board's new officers are President K3JQH, plus KA3JOI, N3ACK, WB3IRB, and N3DRM. Apply early for ARRL section for your 1988 hamfest. HQ has the necessary forms. When ARRL HQ sends zip-coded labels for new Amateurs in EPA, the SM forwards them to ARES District Emergency Coordinators for recruitment. We would like to give better coverage of ARES activities throughout EPA. To do that, we need DEC's to report regularly to SEC KB3YS. Photos, newspaper clippings, and photocopies of "thank you" letters from served organizations are especially appreciated. Traffic handlers and Net Managers please note we now use the most recent data QST's deadlines allow. It's essential your reports reach STM KB3UD by the 5th so he has time to compile the stats. Only with everyone's cooperation can we print the fresher data some have been asking for.

October Traffic: N3AZW 598, N3COY 241, N3DRM 183, KD3AQ 90, KA3DLY 86, KB3UD 70, N3CDD 68, KU3R 65, WA3QN 63, AA3B 49, W3IPX 48, K3WPI 48, KY3M 46, W3DP 38, W3JXX 37, W3KAG 36, WA3CKA 28, K3TX 21, W3TWV 20, W3ADE 14, KA3RGF 14, W3FAF 12, KO3M 12, WB8KPE 6, W3VA 5. EPA Packet BBS: K3RLI 128, WA7SSO 86, KB3UD 79, AG3F 54. NETS (QNI/QTC/Sessions): EPA 368/131/61, EPAEPTN 526/158/31, MARCTN 169/60/13, MARCARES 57/6/4, D3GARES 81/8/5, D6ARES 95/26/9, D8ARES 71/0/4, SEPATN 43/17.

MARYLAND-DC: SM, John A. Barolet, KJ3E—The time has come, so be glad, or sad! You are reading the last section news column written by KJ3E; incoming SM W3FZV will write future columns. It has been a pleasure serving you as section manager for the past thirty months. My plans for the future include a return to "playing radio." Please accept my wish that you have a joyous holiday with family and friends, both off and on the air. KJ3E had a new radio excitement recently; he worked a two-meter packet station at Beale AFB in northern California, using NETROM repeaters and the UHF satellite circuit from College Park to Fremont, CA. Speaking of space operations: W3IWI joined a big EME expedition in October to the 140-foot dish at Greenbank, WV, where they worked about 90 stations on 432, 18 on 1296, and 11 on 2304 MHz. IWI says the new DX record for 2304 MHz is 13,800 km, W3IWI/8 to ZL2AQE! K3JYD is operating a full-service packet bulletin board on the Patuxent River so we Southern Marylanders have become modern. W3DQI, living in Laurel near the junction of four counties, saved out an EC jurisdiction for himself. With the cooperation of KNSU, MDC SEC, and the neighboring EC's he established the Laurel ARES area, merging nearby portions of those four counties. That makes sense; locate HQ where the action is! An unattended packet station at a ham's house ran amok and caused interference on the Columbia ARA 2-meter repeater. W4VAQ and N8COW rapidly located the interference source using direction finding equipment. The ability to locate problems like this is a big plus for any club. Congratulations, CARA. The Frederick ARC is another club with several DF teams, tested frequently with fox hunts. SGL KW3X, recently wrote a short article for inclusion in many MDC club newsletters stressing the importance of one or more club members monitoring local government proposed and adopted actions relating to amateur radio. If not in your club newsletter, I'm sure John would mail you a copy upon request. In this last KJ3E column readers please accept my 73, a special 73 and thanks to all the MDC ARRL Field Organization appointees who worked with me during these 2 1/2 years. WITH THE NETS: Net Mgr QND/QTC/QNI: MSN/K3GY 315/1419, PON/WB3BFK 201/7153, MDD/W3FA 61/209/549 (TOP BRASS W3QQ/118, W3FA/84, K3CY/78, WA3YLO/67, K3NNI/66), MDP/N3EGF 30/152/903, HOCARES/K3NNI/61/17/143, BCN/N3EGF 42/36, PSRR: W3FA 106, WA3UZI 106, W3YVQ 100, N3EGF 87, KJ3E 80, K3CY 76, WA3YLO 74, K3NNI 67 Traffic: W3IWI (PBBS) 350, W3FA 145, KJ3E 143, W3YVQ 141, K3CY 111, WA1OAA 106, WA3UZI 104, N3EGF 95, WA3YLO 82, N3BP 9, NC3Z 75, K3NNI 62, K3KF 26, K2EB 25, W3LDD 20, KT3T 19, WA2WDT 16, K3XU 16, NF3X 15, WB3BFK 14, WA3GYW 14, N3DUE 14, W3DQI 9, K3CZJ 8, K3ORW 7, W3ZNW 4.

SOUTHERN NEW JERSEY: SM, Richard Baier, WA2HEB—ASM: N2CER. SEC: K2QJL. STM: WB2JVB. ACC: K2IXE. TC: N2BOT. PIO: VACANT. SGL: VACANT. BM: WB2JVB. OOC: WA2HEB. ATCS: K2JF, KA2RJA and WB2MNF. Happy 1988 to all of you and your families. With the influx of new licensees over the past year, it seems like a great time to put a plug in to join your local radio club. Many of your local radio clubs sponsor upgrading classes, repeaters, public service activities, contesting and many more things. However, the most important thing a club offers is the chance to meet people who share your interest—Amateur Radio. Sound interesting? For a radio club in your area, please contact our Affiliated Club Coordinator, K2IXE at 10 Hollywood Blvd. South, Forked River 08731, or you may contact me. The counties of Mercer and Salem are still in need of Emergency Coordinators. An EC can be very valuable to his or her community when a communications opportunity arises. In order for SNJ to be totally prepared when and if a communications need happens, we need an active ARES program in each of the nine SNJ counties. If you are even the slightest bit interested, please contact our SEC, K2QJL at PO Box 73, Burlington 08016, or via WB2MNF. Until next month, very 73. Traffic: WB2ZJF 191, N2CER 50, W2IML 9, WA2HEB 5.

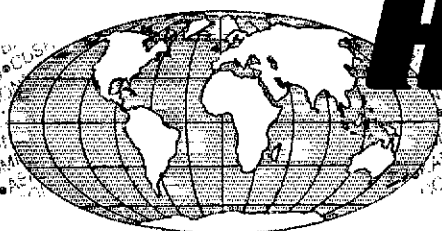
WESTERN NEW YORK: SM, William W. Thompson, W2MTA—WNY L.O.s: ACC: N2EH. BM: K2KWK. OOC: W2AET. PIO: WA2PUU. SEC: NN2H. SGL: WB3CUF. STM: W2GLH. TC: K2QR. DEC: WA2NAIV. Western, WB3CUF Mohawk, KB2KQ Southern, WB2NAO Northern, NN2H Central, EC-(32 of 40 counties) KD2AJ Clinton, N2BQV Madison, WB2YO Allegany, KA2CMQ St. Lawrence, WB3CUF Schenectady, N2CUC Orleans, WA2DHB Livingston, KB2DP Oneida, N2EH Monroe, W2EWO Tioga, KY2F Oswego, N2FTF Seneca, N2GFW Tompkins, N2GG Franklin, WB2GZE Steuben, WB2KIO Wayne, KA2KUI Essex, KB2KW Broome, WA2OEP Lewis, KA2OT5 Jefferson, WA2OVT Chemung, WA2PUU Onondaga, KA2OBQ Herkimer, WB2CZL Niagara, WA2SEF Hamilton, W2TFL Delaware, WA2TOL Cortland, WA2UKX Yates, KB2VS Genesee, K2VTI Otsego, K2Y Chenango, K2ZOD Cayuga. ALL YOU FOLKS interested in joining A.R.E.S. in your county, look up your Emergency Coordinator listed above! If your County not listed, contact NN2H or W2MTA! We need you! Net Mgrs (NM): N2EIA (NYS/MI), WB2HLY(OCTEN), K2KIR(EAN), W2MTA(2RN), KU2N(NYS/EAL), WB2OWO(WD/NB/EAL), WA2PUU(CNY/TN), KA2UBD(NYPON). SECTION PACKET NODE STATIONS (PNS): WB2AGV Southern, NA2B Northern, K3BQ Central, W2ICZ Western. NOW AIN'T THAT QUITE A ROGUES GALLERY? If you don't have an appointment, get in touch with W2MTA or you want to "GIVE SOMETHING BACK TO YOUR HOBBY/AVOCATION!" Many TNX to W2GLH and

(continued on page 94)

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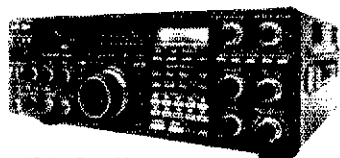
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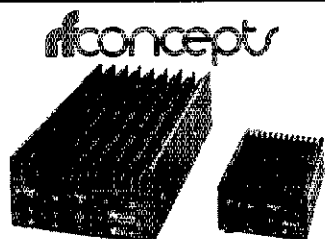
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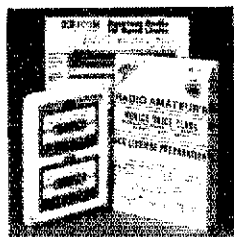
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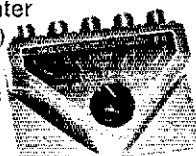
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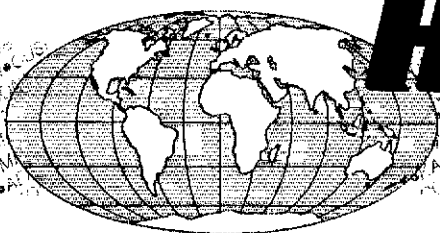


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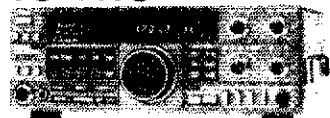
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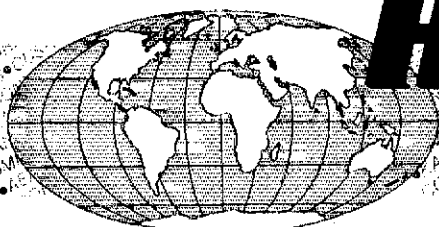
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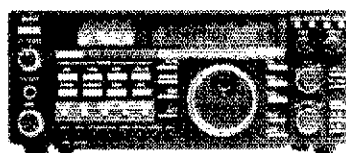
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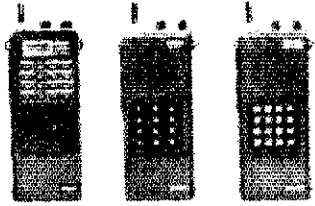
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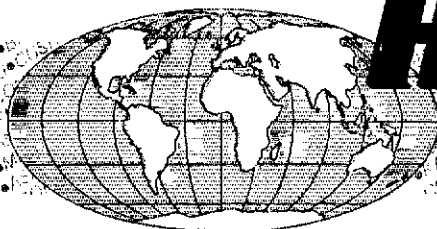
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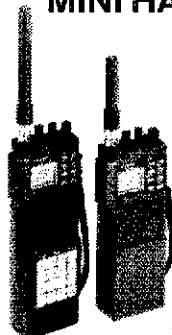
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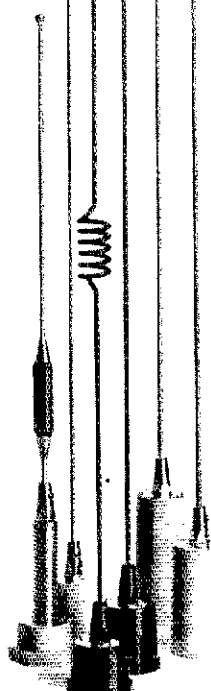
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K2KWK for accepting new positions as STM and BM, effective Nov. 1st. W2MTA will continue to assist the STM as his assistant for Packet Radio Traffic operations. Many thanks to W2BACV and N2AB for coming to the Section for coverage for APRIL Format Traffic handling in the Western New York Section and handling as Section Packet Node Stations. APPTS: (OBS) N2AB, KC3BO, WB2ACV, W2ICZ; (OES) WA2AIY, WB3CUF; (ORS) WB2ACV, N2AB. We note with deep regret that Jim Taylor, KC2U, has become a Silent Key. Public Service Honor Roll: N2ABA, N2EIA, N2EVG, WA2FJJ, W2FR, NN2H, W2MTA, WB2NLU, WB2OWO, WB2RBA, ND2S, KA2UBD, NJ3V, NE2W, KA2NZ. Oct. BPL NJ3V, WB2OWO, KA2UBD.

NY RACES SSB 089-008-04 NYSR CW 011-004-04
NYSM* CW 322-209-31 NYSR* CW 355-155-30
W2NIM* FM 344-151-33 BRVSN FM 284-007-31
NYPON* SSB 617-266-31 Blue FM 041-001-10
EmpireSS CW 297-050-30 JCHACN FM 302-020-30
LCARES FM 045-001-04 SIARC FM 4PM -04
NYSPTEN SSB 507-058-31 VHF THIN FM 032-000-04
OCTENIE* FM 661-107-31 OCTEN/L* FM 201-055-31
Q NET FM 398-003-30 CNYTN* FM 326-073-31
STAR* FM 321-057-31 WDN/L* FM 428-146-33
WDN/E* FM 469-161-31 NYS/L* CW 363-274-31

*NTS net. Ontario RACES (IARES) Sn 0830 146,22/82.
OFFICERS: Lockport ARA AE2T WB2BGA WA2WPI K2BXS;
Livingston ARA KA2POP KA2NNK WA2DHB. Oct. Traffic:
KA2UBD 880, NJ3V 668, WB2OWO 454, N2EIA 402, W2MTA
361, WA2FJJ 253, N2ABA 189, ND2S 172, NN2H 147,
KA2QOO 129, WB2RBA 106, NE2W 103, KA2ZN 89,
WB2QIX 98, WB2JH 83, W2VQ 77, K2YAJ 71, W2FE 65,
N2EBK 44, W2LYE 44, NE2S 38, WB2NLU 31, NY2V 31,
KA2DBD 30, AF2K 29, K2IUT 16, K2OR 15, W2PPS 14, AF2A
10, W2GJ 10, WB3CUF 8, KA2TWY 5, WA2OEP 2. (Sep.)
K2YAJ 90, KA2TVX 23.

WESTERN PENNSYLVANIA: SM, Otto L. Schuler, K3SMB—
SEC: WA3JFN, STM: N3EMD, BM: KC3ET, TC: N3EFN.
OOC: KX3V, ACC: AK3J, SGL: W3DTW, PIO: N3DOK.
NET QNI QTC SESS KHz T/D
WPACW 233 130 31 3585 7:00P/D
WPAPTN 363 97 31 3983 6:00/D
KFN 164 97 24 3983 1:30P/D
PFN 122 73 31 3958 5:00P/D
WPA2MTN 321 65 31 146.28/88 8:00P/D
NWPA2MTN 559 70 31 144.53/145.13 8:00P/D
RTTYWPA 7 1 4 3640 9:00P/SU

SET reports received from KC3NY, KL7IK, WA3JDI,
WA3DBW, & KA3QVR. N3EMD has taken the STM appoint-
ment. She will handle the necessary paper work such as fi-
re reports and not operations. Please give her any assistance
needed. Please. The Two Rivers Officers for 1987-1988 are:
Pres. WB3CWR V.P. KA3BNP, Sec. KD3CO, Treas. AG3H,
Act. Man. KQ3W, Trustees N3AU, KA3JUT & KA3KDU. May
they Have a good year. SKYWARN activities in the WPA
Section have been very good and the NWS people are very
pleased with the Amateurs who have helped provide as-
sistance during stormy weather. The Allegheny County
amateurs are using a scaled-down version of the Maidenhead
plan to suit the county. W3TZW AEC and K3HSE have devised
the plan and will help any one who wishes to use the same
ideas in their county can ask for their help and they will be
glad to respond. There is a two-meter station set up at the
Fgh. weather station WB3EHR and KA3COX are the opera-
tors who man the station. They make contacts in the area
surrounding Allegheny County. I would like to hear from you.
Traffic: KQ3T 279, N3EMD 245, W3OKN 153, KA3NVP 103,
N3CZW 98, N3AES 95, WA3UNX 64, WA3DBW 64, K3SMB
55, KC3ET 53, W3NGO 47, KA3OEM 48, W3RUL 39, N3FM
37, KC3GO 37, KD3AC 32, WB3GUK 22, KV3L 21, WA3QNT
21, KA3GXP 18, W3KUN 16, W3SN 11, KA3EGE 9, K3LTV
7, W3AHH 3.

CENTRAL DIVISION

ILLINOIS: SM, David E. Lattin, WD9EBQ—SEC: W9QBH,
STM: K9CNP, OOC: W9TT, BM: K9EUI, SGL: W9KPT, PIO:
N9EWA, ACC: W9STT, TC: N9RF, ASM: AA9D.

NET	FREQ	TIMES (LOCAL ILLINOIS)
ISN	3905	1800 DAILY
ILN	3690	1830 + 2200 DAILY
ITN	3705	1900 DAILY
CTN	147.69/09	2100 DAILY
ILARES	3905	1630 1st + 3rd Sundays

ILLINOIS INDEPENDENT NETS

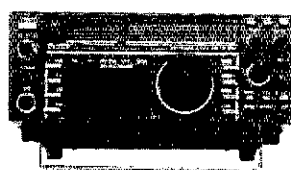
LEN	3940	0900 Sundays
ILPN	3915	1830 M-F, 1430 Sunday
NCPN	3915	0700 Monday-Saturday
NCPN	7270	1215 Monday-Saturday

1987 SET has come and gone with the reports in to date a
little slim this year, but perhaps the reporting is slow. Morgan
County EC W9QES reports that Morgan Co. ARES centered
their SET activity around a 100-mile bike race which covered
4 counties with 100 riders participating. Morgan Co. ARES
was assisted by ARES members and other amateurs from
Cass, Scott and Schuyler Counties. A report of the operation
was published in the local newspaper from a release written
by OES. Three Morgan Co. ARES members and one new
Novice participated in a Jamboree On The Air (JOTA) in which
160 scouts operated. This project was a result of an Amateur
Radio presentation made to one of the local scout troupes.
During the October meeting of the Illinois Volunteer Agencies
Active in Disaster (VOLAG) WD9EBQ reported on the involve-
ment of Illinois Amateurs in responding to the communications
problems that arose as a result of this summer's flooding in
the Chicago and suburban areas. It was reported at that
meeting that the National Volunteer Organizations Active in
Disaster (NVOAD), of which ARES is a member organization,
has requested that Illinois VOLAG (of which ILARL is a
member organization) host a six state disaster preparedness
conference. Illinois VOLAG has accepted the call, and has
scheduled the event for September of 1988. WD9EBQ is
working to insure that Amateur Radio, hopefully represented
by a ranking official from ARRL headquarters, is on the
program for the three-day conference. Traffic: KA9FEZ 327,
W9HLX 198, NC9T 155, W9HS 140, NN9M 108, WA9VLC
105, K9CNP 104, W9LWH 90, K9QEW 78, N7DOY 73,
W9HOT 67, K9EUI 42, WB9TVD 27, W9KR 25, KA9BB 19,
WD9DZU 19, KD9J 18, W9WMP 9, W9VEY/M 8, WA9RM 6,
W9IL 4, W9RTD 4, W9JMG 2.

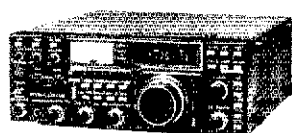
INDIANA: SM, Ron Koczor, K9TUS—ASM: W9UMH, KD9ER,
SEC: WB9ZQE, STM: W9JLJ, ACC: K9TUS, TC: K9PS, PIO:
KA9LQM, SGL: WA9VQO, Net Managers: ITN KD9DU, QIN
K9JL, ION KD9ER, VHF W9PMT, IWN KA9ERG.
Net Freq Time Daily UTC QNI QTC QTR Sps
EN 3630 1330/2130/2200 3349 509 91
QIN 3656 1430/0000/0300 660 267 2343 88
IGN 3705 /2315/ 128 40 645 30
IWN 3910 /1310/ 1820 348 31
VHF Nets: 5165 307 4611 150
Appt: N9CEG, PIA, Gary, KA9QMI, NM, Fort Wayne, OO
reports rcvd from K9FW, KA9DZM, WB7OWG, WA9VQO,
BPL: W9JLJ Orig 1; Rcvd 371; sent 316; Divd 5. Thanks and

ICOM

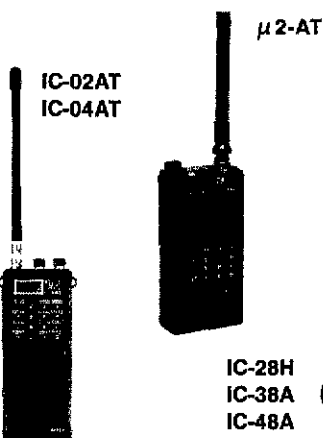
KENWOOD



IC-735



IC-751A



IC-02AT
IC-04AT

μ2-AT



IC-R7000

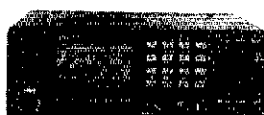
IC-28H
IC-38A
IC-48A



TS-711
TS-811



TS-940S



TM-2550A
TM-3530A



TS-440S
TS-430S

TH-215A
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- **Larsen Antennas**
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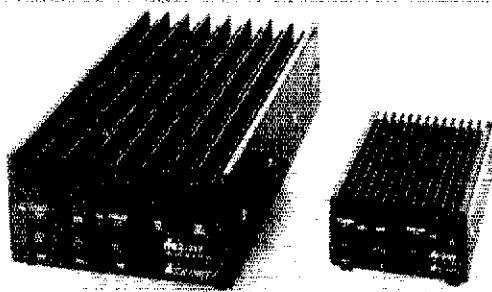
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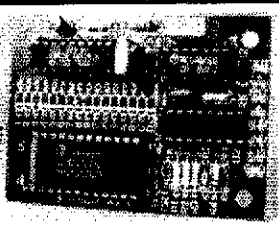


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congratulations to all Hoosier hams who took part in this year's SET. In most areas, the activity was very successful. In other areas, we found problems which need to be corrected. If you had problems, work to correct them. There are a lot of SETs to the west and in your emergency preparedness chain! Now that the holiday season is behind us, we can start thinking about 1988. Please let me know what your hamfest and VEC testing schedule is for the coming year. I include that info in my weekly bulletins which go around the state. We also make sure that all of our state NCS have the info for their nets. I can't publicize your activities if you don't tell me about them! I plan to be at the South Bend hamfest on January 3 and the Laporte Winter hamfest on February 28; hope to see you there. Several Indiana counties are in need of an Emergency Coordinator. This appointee is the local point of county ARES activity and is THE most important appointee in a county. Contact me for info on becoming an E.C. Many people are complaining to me about problems with repeater coordination in Indiana. There's little I can do officially, since ARRL doesn't want to be involved in coordination. If the state needs to upgrade its coordination practices, it's up to the trustees to either resurrect the IRC or get some other body to do the job. IRCC had lengthy discussion on the topic at their last meeting. Bruce, W9UMH, IRCC Chairman, is looking into the subject. If you're having problems or have suggestions, let him know. I will back any effective coordinator just as I have backed N9WB in the past. Traffic: W9UJ 693, K9J 289, K9AF 172, N9BZ 123, K9TKE 100, K9ARNY 78, K9DER 66, N9BK 43, K9QMI 43, K9BHR 40, K9QCF 40, K9GHI 35, K9LQ 34, W9ZC 34, K9SBW 31, W9BPF 25, W9BHI 22, K9WV 23, K9DIY 21, W9PMT 13, K9OUP 11, W9BTZ 10.

WISCONSIN: SM, Richard R. Regent, K9GDF—SEC: W9OAK, STM: K9LTC, ACC: K9POZ, BM: W9BSW, GOC: N9G9, POC: K9Z2, SGL: AGSV, TC: K9GDF. Do you need help with an antenna tower ordinance problem? Ask our State Government Liaison, AGSV, John Ackerman, for guidelines and materials. John also is inviting top operators to his station for upcoming DX contests. Don't forget the VHF Sweepstakes January 23rd through 25th with special club competition rules. The Novice Roundup begins the end of January; help Novices in your town to get on the air and have some fun. If you're a hot contender, get in touch with W9XT or K1TMM of the Society of Midwest Contesters. Congratulations to new Official Observer W9KLN. New officers Mancorad: Pres. N9GHE, V Pres. W9BESM, Treas. W9JUKZ and Sec. N9VFN. W9PRN, Central Division Director, tells me I have been appointed to the Emergency Communications Advisory Committee. Thanks Ed, Dodge Examiners January 9th exams. 1 PM at St. Nicholas Parish in Milwaukee, reservations with KB9G. West Allis RAC Midwinter Swapfest January 9th at Waukesha County Exposition Center Forum, Highways J and FT, with Amateur Exams available. See you at the ARRL booth, January 23rd, Four Lakes Annual Banquet at Mimick's Top Hat starts at 5:30 PM with Fundamentally Sound Barber Shop Quartet. Congratulations to Watertown ARC on becoming ARRL affiliated. W9BSMM of Milwaukee would like to get timely weather data from Northern Wisconsin packet radio hams during severe-weather emergencies. Anyone got some suggestions? Sorry to report Silent Key, W9WYF, who was a CharterLife member of the West Allis RAC. Please let me know the dates for your group's or club's swapfests, picnics, dinners and special events planned for 1988. I include them in this column, in various newsletters, and will attend them if possible. Best wishes in the New Year.

Net	Freq	Time	Manager	QNI/QSP/Sections
BWN	3984	6 AM	WD9ID	1255/1318/27
BEN	3985	Noon	K9ARII	750/280/31
WSBN	3985	5:30 PM	K9ANV	878/200/31
WNN	3723	6 PM	N9DGL	156/8/30
WSSN	3645	6:30	N9BDL	161/30/31
WIN-E	3662	7 PM	W9BCH	286/173/31
WIN-L	3662	7 PM	K9CJC	165/5/40
NWLN	3494	6:30 PM	W9ZCM	351/4/31
Traffic: W9BYPY	6930	K9CJC	880	K9BPL 120, W9DND 113, W9WYS 102, W9BNNR 101, N9BXC 97, W9UCL 83, K9EP 82, N9BDL 80, W9DID 76, W9BCH 58, W9CXY 58, K9AKG 57, AGG 52, W9UTO 41, W9IEM 38, W9ODV 35, K9BED 28, K9FHI 27, W9BJD 27, K9AJDY 25, W9DNDQ 22, W9NKL 15, K9JPS 11, K9USV 10, K9LJU 10, W9UW 7, N9GPM 4, W9PVD 4.

DAKOTA DIVISION

MINNESOTA: SM, George Frederickson, K0JOT—By now the Great Annual Migration should be in place in the South and Southwest with many signing calls with "port 4, 5 or 6." The rest of us are simply hanging on by the seat of our pants as the season has really come to Minnesota. Again, from the Northern reaches of Minnesota comes the October Amateur of the Month. Congratulations to Jim Gilbertson, WB0UKI of Red Lake Falls. Keep it up Jim. W9TIV, Jim Stodolka reports that W7ZGT, Owen Swenson, who was originally licensed in St. Paul, MN, visited from Seattle for a week in October. And reportedly, the Special Event Station that operated from the Science Museum in St. Paul, also in October, was a great success. This event was sponsored by the St. Paul Amateur Radio Club and Kudos to Mary Mahre, W6MGI, who spent all four days (and more) at that location. It was Mary who made the event "go." Dog sled fans here's your chance; Communication help is needed in Duluth during the John Beargrease Dogsled Race, Jan. 13-18, 1988. This is an annual event covering a route from Duluth to Grand Portage and back. Needed are 2 meter rigs and mobile 40 and 80 meter rigs. Contact Ray Rath, W9IIM, Box 410, Bruno MN 55712, or Joe Simonet, W9TBC, 120 W. Chestnut St, Stillwater, MN 55082. For this time, 73 Jim Swisher, K9EPY, STM.

NET	FREQ	TIME	QNI/QTC/SESS	MGR
MSN/1	3885	6:30P	381/183/31	W9UCE
MSN/2	3885	10:00	311/50/31	K9DNH
MSSN	3710	8:00P	280/63/31	K9BSBY
MSPN/N	3860	12:05P	457/171/31	W9CVNJ
MSPNE	3860	5:30P	984/423/31	K9OT
PICO	3925	9:00A	4169/338/123	W9BAC
MNAMWXNT	3860	6:00P	443/285/30	K9OGI

MN EMERGENCY FREQ. 3860 kHz; Bulletins 3860 kHz Traffic: W9CVNJ 592, W9TFC 355, K9EPY 345, K9DCL 212, N9CLS 184, W9UCE 146, N9FOO 142, W9DM 129, K9I 126, K9ARP 121, N9IAN 113, K9BSBY 89, W9GRW 76, W9BONE 68, K9DNH 65, K9BII 63, N9JP 58, K9OGI 45, W9DGF 38, K9OT 35, K9PDM 33, K9CSE 30, K9DCI 30, N9HSR 31, N9HWD 17, W9TIV 16, W9KYG 5.

NORTH DAKOTA: SM, Bill Kurti, N9AFP—Minor area hams are trying out a new site for their repeater that would give them the coverage they have needed for a long time, GOOD LUCK. Congratulations N9OS on being named the SKYWARN spotter of the year, well deserved Rick. Bismark's N9FAZ put a new 60-cm repeater on the air, input is 449.2 output is 444.2 MHz. They also put together a parade trailer that made its debut in the Folkfest Parade, Trx to K9CB who organized it. The Packet system in our Section is showing slow but steady growth, with a new Digi at Graton, Trx to Tom W9LRE. The

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Works absolutely great! . . . (Bob N1EKP)

Thanks for a fantastic antenna . . . (Jeff KA8TKC)

The antenna went together quickly without missing or left over parts. Nice job of packing! . . . (Ray KE7RO)

A fine antenna! . . . (Joe KA3MMJ)

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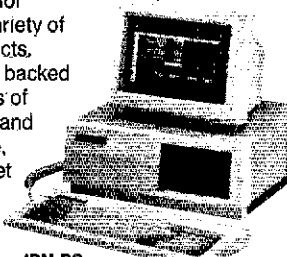
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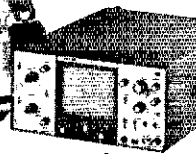
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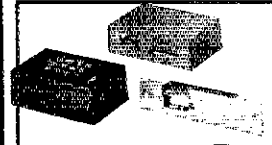
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call is WAOLRE-1 or digical GAF. Also don't forget to report changes in repeater status to WB0VHW. Should be cold enough to start on that antenna project now. Traffic: KA0F-SM 70.

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GOOSE RIVER	1.990	9AMSUN	4/76/3			W0CDO
DATA	3.885	6.30PMDA	26/496/19			KA0F-SM
NORTH40	146.64	020ZSUN	4/38/10			NS0H
WXNETS	3.885	9AM	12.30 24/156/7			W0GFE
			5 PM			

STORMNET 3.885 runs as needed during storms.

SOUTH DAKOTA: SM, R.L. Cony, W0YMB—Asst. 8M: N0ABE, W0PPR, SEC: KA0KPY, STM: KD0YL. Our congratulations to the Aberdeen Radio Club for having submitted their paperwork to HQ for their Club Affiliation. I hope that their affiliation is complete by the time this appears in print. Let's all keep in mind SAFETY FIRST. KB0BCF Eldon Jameson of Wallace is confined to a wheelchair. He is paralyzed, having broke his back and four ribs in a fall of 30 feet while erecting his antenna on Oct 13th. At the Watertown convention, VE exams 7 upgraded to Tech, 2 to General class, 6 to Advanced class and 1 to Extra class. Mobridge Area Amateur Radio Club has received their 100% membership Certificates from HQ. It is believed that this is the first 100% certificate issued in the State. Who will be next? Total Traffic for S. Dak. for October was 975 Messages handled.

DELTA DIVISION

ARKANSAS: SM, Joel M. Harrison, W5SIFG—ASM: K5UR, SEC: N5BPU, STM: W5OK, ACC: N5SD, SGL: W5LCI, TC: W5FD, OOC: N5R5Q, BM: W5LL, PIO: K5TML. Repeater Frequency Coord: W5B5FP. We are in the process of having each of our clubs appoint or elect an Official Bulletin Station and a Public Information Assistant. These amateurs will be assisting our PIO K5TML and Bulletin Manager Eldo, W5LL. It is very important that news information about ham radio is put before the public, and the appointment of a PIA will certainly help. We also want to have the ARRL bulletins available on your local 2-meter nets. Having your own OBS will keep each one abreast of the latest ARRL information. Also, as the new year begins, ACC N5SD and I want to remind each of you to get an early start on your 1988 annual club report. I would like to avoid a few of the stragglers we seem to always have. Please make an effort to update early this year so we can be aware of new club officers. Happy New Year to all.

LOUISIANA: SM, John "Wondy" Wondergem, K5KFR—ASM: K5BCX, SEC: N5ADF, ACC: K5DPG, SGL: KD5SL, TC: W5RWF, OOC: K5CQK, Packet: N5SS. The Iberville Repeater Assoc. in Plaquemine 1987 officers: Pres: W0CQK, VP: W0CQK, VP: Clark, K5SL, Communications: Jim KA5UFQ, Treas: Randy, K5B5Y, Sec: Kermit N5JLZ. Their Oct. newsletter describes the activity of Amateur Television in South Central La. At present the only ATV repeater in La. is the W5SILZ repeater on 439.25 MHz input and 421.25 out. Antennas are vertically polarized with transmissions of 1st rate full color fast-scan pictures from one station to another. Recently, Jim, KA5UFQ, and Kenny, W5SILZ, had a La. first when they made a live remote telecast of a Revolutionary Battle re-enactment with the entire remote in the rear of a pick-up and powered by the normal 12-volt electrical system. Certainly food for thought for the technical bunch. The Arcadian Area in Lafayette 1987-88 officers: Pres: W5DFD, VP: W5CQK, VP: W5CQK, Sec: Betty, KA5DKE, Treas: Don, KA5RAU, Traffic: LTN Oct. 31 sessions, Traffic 88, Check-ins 25, DRN-5 La. represented 98% by K5WOD, W5W5BZ, W5W5, W5TOA and K5B5W. de Bill W5S5YD DRN-5

MISSISSIPPI: SM, Jim Davis, K5KZ—ASM: W5TRD, SEC: W5S5K, SGL: N5CV, ACC: K5VXV, PIO: W5N5M, BM: W5EPW, TC: K5F5D, OOC: K5K5T, STM: K5B5W, VHF/UHF COORD: N5DWU. Welcome home to hospital N5E2V and new call to N5LKS. Congrats to W5JTL on receiving QST award presented by K5VXV ACC Miss ARRL, Vicksburg ARC meeting nite of 12 Oct 87; to new upgrades: to Extra: K5DCE, N5INH. To Advanced: W5MMU, N5KKG, N4PFR, N4OXS and N5LJC. To Gen: KA5ZJE, Don Gleaves, Sr., no call avail, K5B5BX, To Tech: K5B5ET, K5B5ZL, K5B5NA, K5B5EFU, Venice Thompson, no call avail, K5B5DQE, KA5UAB, K5B5CP, K5B5CJ and KA5MFP. Certificates of completion to N5KKI, K5B5VY, KA5P5M, KA5ET, K5B5E, and K5B5V. No call avail. DEC. back news for Meridian area. DRN5 sessions 62, QNI 673, Miss rec 95% by N5AMK, KT5Z, W5HKW, K5B5W, W5T5CQ, Miss Trc Net (K5B5W) sessions 31, QNI 148, QTC 80. Miss 6to Net (W5YRX) sessions 15, QNI 87, QTC 11; NE Miss 2Mtr FM Net (N5SM) Sessions 31, QNI 217, QTC 5. N5SHOBA ARC 2Mtr Emerg Net (N5VPP) sessions 4, QNI 44; MSBN (K5F5D) sessions 31, QNI 1759, QTC 32; ARRL Info Net (K5K5Z) sessions 4, QNI 56; Coast ARES (KA4PKA) sessions 5, QNI 58; MCAFA Repeater, K5OS/R on 146.13/73 MHz, participated in three emergencies: one fire and two vehicle accidents. Lauderdale County ARES w/32 members, sessions 4, QNI 77. Mini lks to W5EPW, BM Miss ARRL, passing eight regular bulletins, four propo bulletins and two CPRL bulletins. Mini lks to KA5GK, who repaired K5VVR in Hernando, after severe lightning strike and K5VVR now back on air at 146.31/91 MHz. Traffic: W5WZ, recd 15, sent 20, total 35. N5AMK recd 133, sent 177, total 310; W5JDF recd 36, sent 35, total 71. KT5Z recd 44, sent 56, del 2, total 102. W5Q5H recd 85, sent 85, orig 5, total 175. K5K5Z, recd 6, del 2, total 8.

TENNESSEE: SM, John C. Brown, N04Q—ASM: WA4GLS, ACC: WA4GLS, SEC: W9FZW, TC: WA4GZO, SGL: WA4GZZ, STM: NG4J, TC: W4HHK. I really goofed last time in that I left off a very important announcement, this is the selection of the 1986 "Ham of the Year." Very sorry about that; it was a member of your Tennessee Section Staff, Milt, WA4GZZ, your State Government Liaison. Hardest congratulations to Milton. I guess that I was all concerned about not being at the Cedars of Lebanon Hamfest where it was announced. Please accept my apology. Milt, although his delay is long past, the month of October was really an active month for hamfests. We had four of them for the month. Your SM made all of them as is his policy it at all possible. You might say that I went the length and breadth of this Great State of Tennessee. Memphis, Tri-Cities (Kingsport, Bristol and Johnson City), Chattanooga and Eastview (McNairy County-Selmer). That concludes a very prolific year for hamfests, almost a dozen in all. Some clubs are already doing work to get their 1988 hamfest set up. It is not too early to begin the task. I am sure that some of the people are not so sure about that as the same few people are having to do all the work. These things are supposed to be "CLUB PROJECTIONS," not just the fruits of a very few. So how about everyone getting the word out with your manual and not just with your mouth. All club members are needed to lend a helping "HAND." I am only passing along the words that I see in the various club bulletins. The CW Net Honor Roll for last period is N4QZB, W4LVP, NG4J and W4DDK. Congrats to these people. Keep up the good work. The section individual station activities for this period is light as follows: W9FZW 188, WA4FMR 131, K4WWQ 49, W4DDK 44, W4TYV 19, W4PFP 14, KA5KDB 11,

KB4UQ 8, N4QZB 8, W4PSN 7, K4V 6 and WA4HKU 5. Thanks for your reports and the line work in handling the traffic for the section. CUL.

GREAT LAKES DIVISION

KENTUCKY: SM, John Thernes, W04T—SEC: W04NHO, STM: KA4MTX, PIO: WA4SWF. This month was big doings with the Simulated Emergency Test. We had several areas of activity with extended net sessions and drills by many EC's throughout the Section. There were a few weak areas of coverage but this is something to work on for the next year. Thanks to all who participated. The Cave City Hamfest is March 12th, see you there! I am getting reports of more Novice classes and testing sessions. Keep up the good work. WA4GHQ, W4EJA, W4B4CZ, KB4VOX, N4DIT and W4TPB provided communications for the Team Challenge Horse Trials at Masterson Park.

NET	QNI	QTC	SESS	MGR
MKPN	1455	197	33	W4PRWJ
KTN	891	129	33	W4LBG
KNTN	243	79	40	K4AOZ
KYN	356	151	54	K4A/KXZQ
TSTMN	448	37	32	K2Q

(*S.E.T. Sessions included in totals).
SAR (OCT): K4VHF 233, W4DRWU 203, K4IQH 110, N4GNL 101, K4AVX 64, WA4SWF 61, KA4MTX 62, W4BLBQ 25, WA4NOG 16, W4DCQF 9, N4PEK 9, W4BAUN 7, KU4A 7, PSHR: K4IQH 75, KA4MTX 61.

MICHIGAN: SM, James F. Seeley, W8BMTD—Silent Keys, with deep regret: W8JEJ, KA8RHP. I have accepted the resignation of Jim Wades, W8B5WJ, as STM and have appointed Skip Wallace, W8B5QC, to this very important section leadership post. My heartfelt thanks to Jim for his many months of good service to our traffic efforts in MI. Skip brings to the position a background of multi-mode traffic experience. His leadership qualities have been well demonstrated in his term as general manager of QMN, and anyone who knows him has to admire his enthusiasm and drive. W8B5HU has accepted interim appointment as QMN GM. About SET, 1987 version: many of you will remember my publicly expressed dissatisfaction with MI's overall performance in 1986. Nobody argued with me. The fault was thought largely to be "too much emphasis on packet" on the traffic side of the exercise, and "poor planning and lack of leadership" sharing the blame overall. However, it's a poor exercise indeed if no lessons are learned, no experience gained. Our fledgling packet emergency system was given the "smoke test" — and smoke it did, magnificently! But what a difference a year can make. In '86, packet was the goat; in '87, it was the hero. Acceptance of packet as a useful emergency communications tool is growing. Growing also are the installed facilities, the software, and the experience. In sum, I am pleased with MI's SET '87 as I was displeased with '86 — and again, nobody is arguing with me! Well done, group. Motor City did it again, capturing their own Ivory Olinthouse Field Day Award for 1987, but this time by a scant 0.8 percentile point (K5B's figures). Watching the competition in this activity over the years has been one of my comfortable pleasures, the while recognizing the worth of the club's contribution to the furtherance of a very popular operating activity. My final "Neatest Newsletter" award has to go to Garden City ARC's "the Wireless." Content is good, too! You'll note a couple of PBBS (Packet Bulletin Board System) entries in this month's traffic report. These were the first such reports I've received, and a couple of interesting questions have already been raised. Should BBS traffic be considered as "regular" (that is, individual station) traffic and so counted and rated? Should a BBS be eligible for BPL? What do you think? (Please copy me on your replies to my successor; I'm leaving the SM job, but I'm still vitally interested in everything that goes on.) Oct net summary (Net, QNI, Tfc, Sessions): MITN 570 269 29; QMN 1091 263 94; MACS 508 111 31; SEMTN 355 77 30; UPN 1148 69 35; VHF activity 687 2 37. Traffic: WA1LRL "PBBS 351, N8FTY 210, W8BQK 196, N8EGK 156, W8B5GJ 136, AF8V 132, KB8X W8BYDZ 118, W8B5RHU 100, W8QBH 77, W8Y1Q 73, W8B5YA 85, K8GXV 62, K8HPH 57, K8UPE 54, W8IDT 48, W8B5DH 43, N8JB 42, W8B5MTD 40, W8B5WJ 37, K8EJG 36, W8B5WJ 31, K8CPC 30, W8E0I 26, K8JZU 23, KA8LAR K8BTU 22, N8HWL 18, KA8VX 16, N8FTY 14, W8B5MV W8URM 12, KD8LZ 11, N8XS 2.

OHIO: SM, Jeffrey A. Maass, K8ND—ASM: N8AUH, SEC: W8B5MP, STM: K8FJ, BM: K8ZM, ACC: KJ3O, TC: K8B8U, OOC: W8BZCE, SGL: N8CV.

NET	QNI	QTC	SESS	Time (Local)	Freq	MGR
BNE	281	64	31	1845	3.577	N8EVC
BNL	214	110	31	2200	3.577	K8TVG
BNR	301	136	39	1800	3.605	W8EK
BSSN	281	148	57	0945, 1900	3.873	K8BFW
ONN	127	32	24	1825	3.708	W8BKW
OSN	254	47	30	1810	3.577	N8AEH
OSSN	2439	841	104	1030 1615	3.925	W8JGW
				8 1830		
OSSN	169	72	31	0645 M-F	3.577	KA8QJV
				0800 S-Sn	3.577	KA8QJV
				1700 Sun	3.877	W8BMPV

Ohio Section ARES Net
VE exam sessions for January and February: Columbus 1/9; Marietta 1/9; Elvira 1/24; Dayton 2/13; Maumee 2/13; Lisbon 2/20. Contact me for details. Bob Johnson, K3RC, keeps track of exams in Ohio and provides me with the data that you read here each month. Keep him apprised of your pending test dates! As you may have noted in the header, I have named a new Official Observer Coordinator (OOC), Mike Patrick, W8BZCE. Mike resides in Springfield, and some biographical information may be found in the Ohio Section Journal. Official Observers should expect to hear from Mike! Thanks to Joe Subich, AD8I, who held the OOC post since the beginning of my first term as OOC! I am saddened to note that W8B5LJ is Silent Key, as reported in the OH-6 IN News-letter. N8CDN, ARES Emergency Coordinator for the Lorain County, reports that they have received a donation of a Ford ambulance for use as a mobile communications unit! The Lake County ARA provided public-service communications for six events in the four months ending in October, including three runs and three parades/festivals! As reported in the Findlay RC newsletter Signal Report, W8B5LK built and launched an ATV transmitter with a 2-meter beacon under a balloon, and watched it rise 700 to 800 feet per minute. The equipment assembly weighed 2 pounds, 11 ounces, and reports on the ATV video were received from as far away as Chicago. The 2-meter transmitter was heard in Baltimore, MD, and St. Louis, MO. The balloon and its equipment package were later recovered from a bean field near Custer, OH. Bill has a videotape of the start, flight and recovery, and an excellent club program? And exciting experiments that your club can undertake using Amateur Radio? The 1987 Simulated Emergency Test (SET) saw less traffic activity than past years, due in part to our decision to emphasize local ARES drills and exercises. Next year will return to a statewide scenario as our central theme, and we will plan to alternate our emphasis from year to year. The Ohio Disaster Services Agency Emergency Operating Center (W8SGT) was manned by W8BKO,

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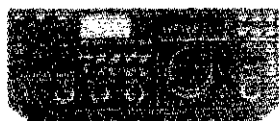
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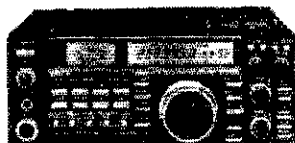


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By popular demand, we are extending our end-of-year sale* of genuine top-rated 8-pole FOX TANGO filters for Kenwood, Yaesu, Drake, Heath, and Collins indefinitely. Buy at discounts of 10%, 20%, and even 30% or more at a time when these Japanese-made units should be getting more expensive. Our secret? Fine products, low overhead, high sales volume. Filters are our prime specialty!

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MA SERIES CRANK-UP TUBULAR TOWERS

Will handle 10 sq. ft. antennas at 50 MPH winds.

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD Top	SEC. OD Bot.	SUGGESTED HAM PRICE
MA-40	40'	21'6"	2	242	3"sq.	4 1/2"	\$ 735.00
MA-550	55'	22'1"	3	435	3"sq.	5"	\$1245.00
MA-550MDP*	55'	22'1"	3	620	3"sq.	6"	\$2640.00
MA-770	71'	22'10"	4	645	3"sq.	8"	\$2385.00
MA-770MDP*	71'	22'10"	4	830	3"sq.	8"	\$3780.00
MA-850MDP*	85'	23'6"	5	1128	3"sq.	10"	\$5090.00

*MDP models complete with heavy-duty motor drive with positive pull down.

Shown w. optional MARR 550 motor base and motor drive



FREE STANDING CRANK-UP TOWERS

Will handle 18 sq. ft. antennas at 50 MPH winds.

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD Top	SEC. OD Bot.	SUGGESTED HAM PRICE
TX-438	38'	21'6"	2	355	12 1/2"	15"	\$ 925.00
TX-455	55'	22'	3	670	12 1/2"	18"	\$1395.00
TX-472	72'	22'8"	4	1040	12 1/2"	21 1/2"	\$2295.00
TX-472MDP*	72'	22'8"	4	1210	12 1/2"	21 1/2"	\$3695.00
TX-489	89'	23'4"	5	1590	12 1/2"	25 1/2"	\$3995.00
TX-489MDPL*	89'	23'4"	5	1800	12 1/2"	25 1/2"	\$5995.00

*TX-472MDP includes heavy-duty motor drive with positive pull down. TX-489MDP comes with heavy-duty motor drive with dual level wind and positive pull down. (Both motor drive models include limit switch brackets)

FREE STANDING HEAVY-DUTY CRANK-UP TOWERS.

Will handle 30 sq. ft. antennas at 50 MPH winds.

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD Top	SEC. OD Bot.	SUGGESTED HAM PRICE
HDX-538	38'	21'6"	2	600	15"	18"	\$1195.00
HDX-555	55'	22'	3	870	15"	21 1/2"	\$2095.00
HDX-572	72'	22'8"	4	1420	15"	25 1/2"	\$3595.00
HDX-572MDPL*	72'	22'8"	4	1600	15"	25 1/2"	\$5495.00
HDX-589MDPL*	89'	23'8"	5	2440	15"	30 1/2"	\$7195.00

*Includes heavy-duty motor drives with dual level wind and positive pull down. HDX-572MDPL includes limit switch brackets only. HDX-589MDPL includes limit switches and limit switch brackets.

FREE STANDING "LOW PROFILE" COMPACT CRANK-UP TOWERS.

Will handle 18 sq. ft. antennas at 50 MPH winds. (TMM-433HD handles 24 sq. ft.)

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD Top	SEC. OD Bot.	SUGGESTED HAM PRICE
TMM-433SS*	33' w/o mast	11'4"	4	315	10"	18"	\$ 985.00
TMM-433HD*	33' w/o mast	11'4"	4	400	12 1/2"	20 1/2"	\$1195.00
TMM-541SS*	41' w/o mast	12'	5	430	10"	20 1/2"	\$1295.00

*Hy-Gain and some Alliance rotors when installed inside tower will restrict retracted height by approx. 24". Most Kenpro models allow full retraction

Standard bases included with all towers (except MA-770, 770-MDP and 850-MDP).

ALSO AVAILABLE: • Motor drives for most towers
• 5' to 24' antenna masts • Coax arms • Service platforms
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Ham Radio Outlet (All Locations) • U.S. Tower (209) 733-2438

Prices are FOB factory, Visalia, CA. Prices and specifications are subject to change without notice.

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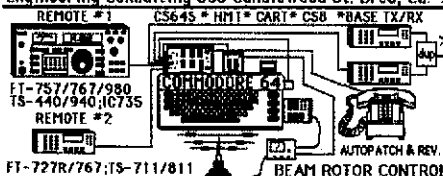
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Programmable Repeater Controller/HF & VHF Remotes/Autopatch

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New Ver 4.0 Features:

- *Individual user access codes
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- *Store 1000 (16 digit) tel #'s
- *Ten 22-digit Macro memories
- *Lock mode/multi, remotes link
- *New computer sounding voice
- *Individual access privileges
- *2 Tone paging & Packet Input

- REPEATER CONTROLLER
 - *Change all access codes remotely
 - *Synthesized male/female voice
 - *Program: mail box or ID tel
 - *With touchtones from HT
 - *Alarm clock & auto excite mode
 - *Micro commands: 22 digits max
 - *32 CTCSS manual & auto paging
 - *Code practice & voice feedback
 - *Multifunction voice alarm clock
- HF REMOTE #1
 - *10 Memories/auto mode sel
 - *Scan up/down sel, rate or step
 - *Voice ack, all control commands
- AUTOPATCH
 - *300 Auto/quick dial mem. recall
 - *300 call signs/paged/32 sub tone
 - *50 enable/disable tel #'s
 - *Hi/Low priority access codes
 - *Directed/general & reverse page
 - *Full or Half duplex (level cont.)
 - *Security mode/TT readback on/off
 - *Store MCI/Sprint tel. #'s
 - *Reverse Patch active all modes
 - *Call waiting/quick dial & reset
- Y.F. REMOTE #2
 - *Dual VFOs/Rev/Split/CQR detect
 - *Set Scan inc. & on/off/Vol. resume

- Super Comshack CS64S \$349.95
 - *\$4.00 ship USA; incl. computer interface, disk, cables & manual (simplex version inc. on request)
- SYSTEM OPTIONS
 - *External Relay Control: 3 DPDT relays + 5 open collector outputs. CS-8579.95
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 - *Manual (Refundable)..... HMT1 \$15.00
 - *Row & col. freq. control. RAP \$149.95
 - *C64 D.C. Switcher P.S. DCPS \$119.95

MINI (BEAR CAT) COMPUTER CONTROL FT-727R

Programs and Scans 100 ch. In Ham/General coverage. Converts HT into a powerful 100 ch. scanner & programs all for field use!

- *Yaesu FT-727R
- *MONITOR 64
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- *Loads & programs all FT-727R parameters in less than 15 secs.
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Touchtone to RS-232C (300 baud interface)

Program your computer in basic to decode multidigit "strings", sound alarms, observe codes, includes basic program for C64 VIC20/C128.

works on all computers! MODEL DAP \$39.95

"Audio Blaster" IC-02/04 AT/2AT/16T/FT209/FT727R

Module installs inside the radio in 15 Min. Boost audio to 1 watt! Low standby drain/Corrects low audio/1000's of happy users. Miniature audio amplifier—

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- *Draws 1.1A @ 12v
- *70kHz 75% efficient
- *Outputs 5v @ 2 amps and 9 vdc 60Hz
- *Crystal time base
- *Plugs into C64 power

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Touchtone 4 Digit Decoder & on/off latch with all 16 Digits

- *Low power, C105 + 5 to +12 Volts
- *User programmable 50,000, 4 digit codes
- *Send code once to turn on, again to turn off
- *Momentary & Latch output drives relay
- *Wrong digit reset, no falseing; 2 to 4 digits
- *Hute speaker audio until call is received
- *LED displays latch state, Optional 4 digit extra custom latch, (7225) IC's \$6.95 ea

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Complete line of NICAD packs for Icom, Kenwood, Tempo, Santic, Azden, Cordless Telephones, Alkaline, Nicad, Mercury and Lithium Cells. All battery packs include a 1 year guarantee. Commercial Radio Packs also available.

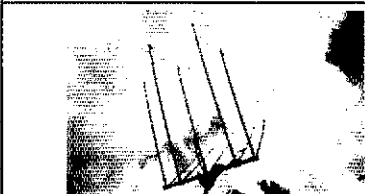
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and is represented by sending a delegate to the meeting. NNJ Chapter 77 of the QCWA selected Ed Solov, K2SE posthumously for their 1987 Elmer of the year award. Congratulations to the following who were newly licensed or upgraded during October sessions conducted by: NNJ VE Board, Ramapo Mountain ARC, Bergen ARA, and Ocean/Monmouth ARC, Novice: J. Grullion and J. Jackson, Technician: KA2EEK, KA2QLA, KA2QML, KB2CBP, KB2CVZ, KB2EQ, WA2JJO, J. Cutolo, KB2EKN, E. Bailling, KA2VEL, KB2EGP, and C. Perckham, General: KA2JLU, KA2AZR, D. Celantano, KB2EKN, and WB2FLU. Advanced: KB2DAB, and WA2JLU. Extra: W2GJK, WB2PRS, N2FJO, WB2WGM, WB2DTT, WB2YHT, KD2ZD, N2ZHM, N2HMT, and WA1KBE, Novice Enhancement and new Tech privileges is evident in this month's activity. Of the 33 successful applicants this month, 15 or 45% were Novice (2) or Technician (13). The Major Armstrong Memorial ARC has joined the list of NNJ Affiliate clubs providing Volunteer Examinations. Sorry to have to report Silent Key Tom Ryan, W2NKD of Scotch Plains. Tom was well known in the NNJ Field Organization for his many years of service in Traffic Handling, ARES and other areas. He was the Communications Coordinator for Union Counties Division of Emergency Management, VP of the Electronic Technology Society of NJ, member of QCWA, Society of Wireless Pioneers, and Tri-County RA. Until his illness he was our DEC for Union County, Traffic Nets: /p=VHF Packet Liaison, September 1987. Traffic:

Net	Mgr	Freq	Time	Sess	SES	QSP	QNI
NJM	WB2ZJF	3695	1000	Dy	30	107	214
NJPN	W2CC	3950	1800	Dy	34	52	287
NJNE	KA2F	3695	1900	Dy/P	29	120	266
NJNL	WA2EPI	3695	2200	Dy/P	28	84	126
NJVN/E	WB2FTX	146.895	1930	Dy/P	31	28	213
NJVN/L	WB2ANK	146.49	2230	Dy/P	29	42	135
NJTTN	WA2EPI	223.88	2100	Dy	22	48	126
NJSH	WB2FKG	3735	1830	Dy	30	37	141
NNJ/PL	W2QNL	145.01	24hr	via	1	77	

WA2NSA
SAR/PHSR: WB2QMF 9471, N2DXP 5160, W2RRX 176/117, N2XJ 376/102, WA2EP1 131/110, KA2F 115/116, W2QNL 217/122, K2VX 112/103.

MIDWEST DIVISION

IOWA: SM, Wade Walstrom, WB2EJ—ASM; WB2AVW, SEC: K2DBG, STM: KC2XL, ACC: NU2P, OOC: WA2QMU, BM: K2IRI, TC: K2DAS. Several clubs have elected new officers and are listed as follows: Eastern Iowa DX Assoc.: Pres. K2JH, VP W2WV, and Sec-Treas. N2B8I, Ft. Madison ARC: Pres. KA2YAF, VP N2GCP, Sec. KA2QJQ, Treas. N2HMF, Davenport RAR: Pres. WB2BP, VP N2UG, Sec. W2DAMA, Treas. WA2QEW, Collins ARC: Pres. WB2JUV, VP WB2QAV, Sec. N2VYV, Treas. WB2FX. Those upgrading in October include NU2CI to General, KA2FBL to Extra (from Tech), WB2UKZ to Advanced, and KA2YGX to Technician. N2B8I is recuperating from successful heart bypass surgery. KA2RIU and XYL are the proud parents of twin baby boys. Congratulations! The Iowa-Illinois and Mt. Pleasant ARCs participated in a simulated emergency with the Des Moines CAP. Packet radio was again successfully used. The Davenport Radio Amateur Club has been busy providing communications for the Donahue Frontier Days and the Heartland Hustle and participated in an SET. KC2XL has been heard on packet. I would like to hear from clubs planning to celebrate the Constitution Bicentennial during Iowa's week on December 17-23, 1988. Reminder: Emergency calls are sent to the SM via packet by routing to W2EJ via WA2R1. Traffic: W2SS 214, KA2ADF 114, WB2LS 72, K2GP 70, KC2XL 68, K2BRE 62, WA2JL 46, N2SM 43, WB2AVW 35, K2PT 26, WB2MCX 22, KA2VBA 11, W2OMV 9, K2CKZ 7, KA2STB 5, A2ER 3.

KANSAS: SM, Robert M. Summers, KB2XF—SEC: W2CHJ, STM: W2OYH. By the time this column will be read, the first snow will have fallen or at least it should have according to the early snowbirds. Division Convention and the State Convention at Wichita were both successful and well attended. The Kansas Nebraska Radio club did present a new award this year. Named was W2RXD (now a Silent Key) as first recipient. The award will be known as the Kansas Amateur Memorial Award of Achievement. It will be awarded each year henceforth. The Kansas Amateur of the year award was presented to W2FC. All clubs and individuals please take note, ONLY one nomination was received this year. There are a lot of hams out there that are deserving of this award, but if no one nominates them, they can't be considered. NOMINATE and RENOMINATE until they are recognized. Net activity for September: K2BN QNI 1180 QTC 139, KPN 356/7, KMWN 596/552, KWN 801/341, CSTN 1946/45, QKS 187/75, QKS-SS 29/4, THOUGHT FOR THE MONTH—INTRODUCE A NEW NOVICE TO QKS-SS 3735 kHz each Mon, Wed and Fri. at 7:30 PM local time. Mgr is Ed, W2WYM. He will also welcome you too. He has a speed for everyone! Ed also likes to have his graduates QNI QKS. Traffic: W2FR 301, K2BFX 129, N2ZM 129, W2FR 126, K2SU 112, W2OYH 85, W2FDJ 62, W2CMT 51, W2ZEN 45, K2CL 32, N2B2 29, W2CHJ 17, W2WYM 16, W2PB 16, N2B2D 13, N2DJT 7, W2RBO 6.

MISSOURI: SM, Ben Smith, K2PKC—Club officers for the Indian Foothills ARC for 1988 are Pres WB2PRM, VP NC2L, Sec-Treas WA2I. The Jefferson Barracks ARC will hold their annual Amateur auction Friday evening March 11, 1988, at Concordia Turners Hall, 6432 Gravois Ave. in South St. Louis. On Sept. 27, the Kimberling City ARC dedicated their new club station and club room. The station was dedicated as a memorial to a deceased member, W5BDL. Amateurs from western and central Missouri provided communications for the MS 150 Bike Tour. The tour started in the Kansas City area and ran to Columbia, and took two days. Amateurs were assigned to each of the three medical vans. Different 2-meter repeaters along the route were used. Amateurs assisting were: W2EIG WB2JN WA2IB KA2REN WB2EJ KA2SY NW2F NOBIZ WB2ROT N2AOK WB2WZM KA2RQK W2SDYQ WB2IZY K2EET N2BFB W2ZOG KC2SJ W2RDL WA2JWJ and KC2FI. The St. Charles ARC operated a Jamboree On-The-Air station and invited a Scout Pack from Iowa to take part in the operation. Thirty two Scouts talked with other Scouts around the United States. St. Charles ARC members helping were: KB2BGM KB2BEP N2LAB KA2IKU W2OGS N2BQ and WB2RAB. The Indian Foothills ARC provided communications for the National Cornhusking Parade and operated a special-event station at the championships in Marshall. Club members assisting were: WA2I WB2PRM W2VXZ KB2YB W2KNE KB2YG KA2YVA WB2SZ WB2SHH N2BLP WA2IZY W2KUC KA2CZ and N2NHN. The Kimberling City ARC operated a message booth at the local County Fair. 129 messages were sent from the booth. Silent Key reported KA2SSZ.

Net	Ses	QTC	Day	Time	PM	Freq	Mhz	Mgr
MON	62	359	18h	Dy	7:00/9:45	3.580		K2SI
MOSSB	31	697	109	Dy	8:00	3.963		K2ORH
MEOW	31	574	88	Dy	5:30	3.963		K2DSQ
ZAEN	4	60	23	Tue	8:00	147.84/24		N2BE
HBN	22	271	22	Mon-Fri	12:05	3.880		K2DSQ
RRABN	30	423	11	Dy	8:00	146.19/79		KA2LLN

MORAT	5	30	7	Sat	8:00AM	3.630		N2OE
K2BARC	4	56	4	Mon	8:00	148.41		K2ASSE
ARESN	5	44	4	Thu	9:00	147.885/255		N2FOW
SLAN	4	288	3	Mon	8:00	148.31/91		K2WEX
CMEN	5	76	2	Wed	9:00	148.16/76		K2PKC
SWARC	4	57	2	Tue	7:00	148.04/84		K2JUD
LOZBC	27	445	0	Mon-Sat	8:00A	146.13/73		N2HVO
LOZFM	4	91	0	Fri	9:00	146.13/73		N2HVO
TON	5	51	0	Thu	9:00	146.09/9		N2P
MOSES	3	27	0	Thu	8:30	146.25/605		K2OS
SARN	4	37	0	Tue	9:00	146.43/703		W2ENW
JCCCN	4	30	0	Wed	8:00	146.40/70		WB2DZX
CMOYL	4	20	0	Mon	9:00	147.285/895		N2HVO
MOFON	4	18	0	Wed	8:15	222.42/402		A2IO
CARL	3	16	0	Wed	8:30	146.46		WB2WLU
MMAPN	4	14	0	Sun	8:00	28.25		N2B8

Traffic: K2SI 198, WB2MA 194, A2IO 117, N2DN 108, WA2YJX 98, K2DAS 98, N2Q9 95, K2ONP 85, WA2HTN 82, K2CUC 73, WA2FYA 68, K2ORH 64, K2PKC 60, W2DELL 54, W2OUD 41, KM5L 40, KA2P 22, WB2CJL 14, K2GAJ 10, K2SY 4.

NEBRASKA: SM, Vern Wilke, WB2QGM—STM: Jerry Kohn, WB2EGK, SEC: Michael Rührdanz, N2FER. The new Emergency Coordinator for Gage County is Daniel L. Witulski, WB2ORU of Beatrice. The Pine Ridge Amateur Radio Club of Chadron is in the process of putting together a first-aid kit for club use at various club activities. One item the club considers essential is an airway device for cardiopulmonary resuscitation, CPR. A first-aid kit and people skilled in its use as well as people who have completed approved CPR courses are important safety factors at any type of club activity. The Midlands ARES group held a Simulated Emergency Test (SET) during October. The scenario consisted of a disaster which required the evacuation of people from the metropolitan Omaha area to Grand Island in central Nebraska. The Lincoln Amateur Radio Club will operate a special events station during February 1988 as part of the celebration of the 200th anniversary of the United States Constitution. WB2JUV is in charge of the special events station. The Lincoln ARC assisted the Lincoln Police Department in patrolling parking areas during the September 19th Farm Aid III concert. Lincoln Police Chief Dean Leightner praised the efforts of the 57 volunteers from the club for providing a combined total of 500 shifts, driving 737 miles and logging 263 hours of time, all in the single day of the concert. On September 30th, Amateur Radio operators from Lincoln participated in a Lincoln/Lancaster County Civil Defense drill. The training exercise was a test of the National Disaster Medical System which consisted of a scenario where a major earthquake strikes St. Louis, making it necessary to fly injured people to unaffected cities for medical treatment, including Lincoln, NE. Traffic: K2DKM 226, WB2OTD 35, WB2OBK 16, N2VJ 13, KA2PK1 12, WB2QGM 12, N2DA 7, KA2BCB 3, W2DCRD 1.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Pete Kemp, K2J1Z—ASM: KB1H, STM: K2IEC, SEC: N2DCS, OOC: NA1I, ACC: NK1J, PIO: W2CMF, TC: W2HAD, SGL: K2JAD.

NET	NM	SESS	QTC	QNI
CN	WB1GXZ	58	114	247
CPN	NK1J	34	105	363
WCN	N1EDD	36	159	355
CSN	WB1GXZ	22	53	125
NVTN	K1CE	26	75	206
CSTN	K1CE			222
RTN	KA1JAN	4	3	89

HAPPY NEW YEAR. Your section leadership wishes you all a fine year, one filled with increasingly better band conditions and opportunities to enjoy our hobby. After 17 years at the helm, K1EIR has decided to step down as NEAD Section Chief. This is certainly no order. The new NM of CN is WB1GXZ, no stranger herself to the NTS system. Taking over the reins as the new NM at Westconn will be N1EDD. The newly organized CTYL group is growing rapidly. They recently held a luncheon in Norwalk attended by over 30 YLs. YLs interested in joining should contact KA1JVN for details. SCARA recently operated a JOTA special-events station from the Battleship Massachusetts. Congrats to all the hams in Western Connecticut who provided emergency communications to their respective communities as a result of a freak early Oct snowstorm. N1EPI and K2J1Z recently put on an ATV demonstration for students. K1EIR has decided to step down as NEAD Section Chief. This is certainly no order. 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R&L ELECTRONICS 575 main st. HAMILTON! OHIO 45013

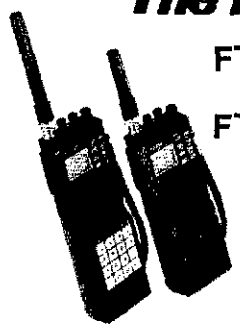
Large
Stock

YAESU
The radio.



KENWOOD

ICOM

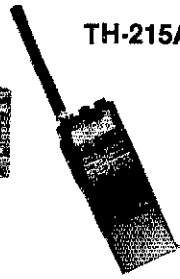


FT-23R

FT-73R

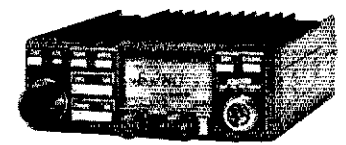


FT-767GX HF/VHF/UHF



TH-215A

IC-28A/28H IC-38A



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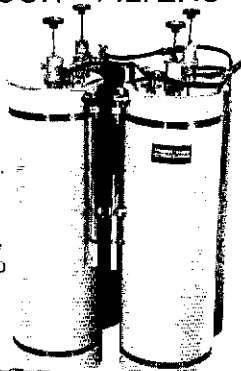
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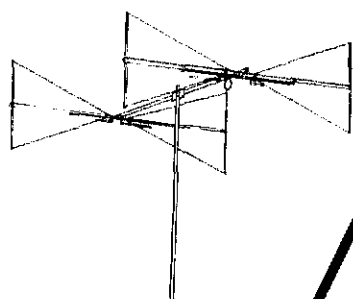


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Straight Talk on CW and DX'ing

CW operations and HF DX'ing are two all-time popular amateur radio pursuits, and using modern transceivers with features supporting those interests always provide the most successful returns. Realizing those features are only briefly highlighted in colorful magazine advertisements, this Tech Talk explains their use in straightforward and plain language. This information assures your "full potential enjoyment" of various communication assets. Any occasional reference to the design excellence of ICOM's new generation transceivers is unavoidably intentional.

Paramount transceiver designs for superb CW operating and DX'ing include balanced RF and mixer receiving circuits for maximum sensitivity and low noise, Passband Tuning for continuous selectivity adjustment, and several competitive-edging items. These special attractions include **exceptionally smooth break-in, bandwidth-optimizing IF filters, and deluxe electronic keyers with iambic operation.**

Full CW break-in, or QSK, is truly an operator's winning edge when contesting or working DX pileups. The ability to listen in between your own dots and dashes lets you spot exactly when a precisely timed call has the best chance of catching the distant station's attention, thus turning unnecessary transmissions into successful QSOs. Some CW operators analogize using only semi break-in to "calling with their eyes closed, then peeping to see if they got through." Others enthusiastically report using their "barefoot" transceiver with full break-in yields QSO success comparable to running a high-power amplifier and transceiver without full break-in operation. Considering the preference of operator agility over brute force, such claims are logically justified. Two final notes for enjoyable break-in operation: adjust your sidetone level so it's slightly louder than received

signals and use fast AGC. Your receiver will recover faster, and received signals will exhibit a comfortable "background effect" while you're transmitting.

The combined use of narrow filters and Passband Tuning is undeniably beneficial for CW DX'ing, and that fact is often recognized during competitive operations. A DX station returns to a particular caller, but that caller lacks razor-sharp selectivity and doesn't copy his/her desired reply. Meanwhile, callers with adjustable selectivity are able to zero in on the DX station like there's no one else on frequency. The ability to recognize your own call letters amidst many others may seem reasonable, but wide bandwidths allow QRM to build and a receiver's AGC can be clamped by strong near-frequency signals.

Electronic keyers with self-completing dots and dashes, memory action, and iambic operation assure even the shakiest "fist" sends perfectly formed Morse characters. That capability has been field-proven by mobile operators working CW while bouncing along back roads while merely tapping proper sides of a paddle. A keyer's memory action will also "follow behind" slightly faster wrist actions, thus minimizing operator speed variation.

Iambic operation is best understood through the following "stepped comparison" of transmitter keying items. The classic bug used a vibrating pendulum to automatically generate dots when its (single) level was moved in one direction, while dashes were manually produced by moving the lever in an opposite direction. Character weight and spacing were operator determined, and various "swings" were commonplace. Electronic keyers rectify operator inconsistencies by producing perfectly timed and spaced dots and dashes in a truly effortless manner. Assuming one includes proper spacing between individual letters, beautiful sounding Morse is produced.

Iambic or "squeeze key" operation with memory action adds a deluxe finishing touch to electronic keyer operation. A paddle with independently operating dual levers is used, and pressing either lever produces a constant string of dots or dashes. Simultaneously pressing both levers produces a series of alternating dots and dashes, depending on which lever first makes contact. A brief squeeze with the dash lever "leading," for example, produces a "C." A similar dit leading squeeze produces an end of transmission-signifying "AR." A "Q" is produced by constantly holding the dash lever while briefly tapping the dit lever after hearing the second dash's beginning. Likewise, and "F" or "L" results by constantly holding the dit lever and tapping the dash lever at the appropriate "insertion point." The name "Frank" is thus produced by five "squeeze actions": dits leading on the first three letters and vice-versa on the last two letters. Squeezed C's, R's, and K's can also be combined with separate wrist movements as desired for producing other letters. Indeed, **any amount of iambic operation can be used or simply ignored according to one's preference.** A noniambic keyer doesn't support "squeeze key" operation with a dual lever paddle, but an iambic keyer will also operate "conventional style" with a single lever paddle if desired. It's the best of both worlds.

All of the previously discussed CW and DX'ing aspects are supported by ICOM's technically advanced HF transceivers. Deluxe iambic keyers plus narrow 500Hz filters are factory installed in the IC-781, IC-761, IC-751A, and optional in the IC-735. Full CW break-in is included in all of these units, and ultra-narrow 250Hz filters are optional. Ready to move ahead of the DX'ing crowd? **Key into the ICOM spotlight and enjoy CW action in top style!**



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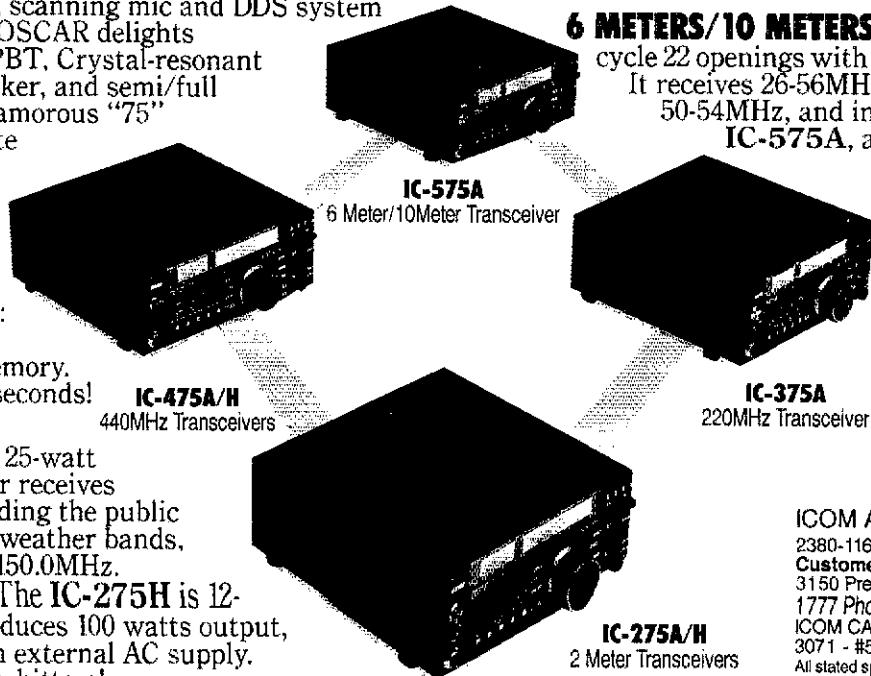
Monitor all of today's action with our scanning modes: spectrum, program-mable, mode, and memory. 9 memories in five seconds!

2 METER/10 METER. ICOM's 25-watt IC-275A VHF leader receives 148.0-174.0MHz including the public service, marine, and weather bands, and transmits 140.1-150.0MHz. Includes AC supply. The IC-275H is 12-volt DC-powered, produces 100 watts output, and will operate with external AC supply. Two of ICOM's heavy hitters!

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440MHz. Enjoy topnotch 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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* 1.8 MHz will not tune on some antennas.

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ex SEC and active DEC. His advice will be missed. I spent some time at a JOTA site, as reported last month, and need to correct the sponsor of the event. It was sponsored by the Metcom District of the Greater Boston Scout Council not the Norumbega district as stated. I had a great time. The Algonquin club is running a 10M net on 28.400 at 800 PM on non-meeting Wednesdays. They meet the first Wednesday of the month at the Marlboro boys club. The Mayflower Club also runs a 10M net on 28.455 at 1000 PM on non-meeting Mondays. They meet on the first Monday of the month at the Plymouth County Sheriff's Office. Both nets report lots of DX check ins, and are looking for some locals to check in also. Thank you to all who contribute so much to our hobby, especially the elmers and teachers who ensure that new hams have someone to turn to for guidance. Next month will be quite busy, with holiday shopping, club meetings, traffic booths at malls and the SET in late November. I hope you all have a Happy Turkey day. Traffic: KN1R 500, KN1U 351, WA1BY 252, WA1FC 124, K1AFJ 210, N1BA 165, K1ABO 164, W1CE 157, W1ZHC 124, N1AJJ 99, K1BA 83, NK1Q 83, N1CVC 78, K1BZD 53, WA1KLG 53, KA1NOI 41, WA1PQM 36, K1SEC 35, K1LIH 23, KA1EID 21, K1GGS 18, K1LCQ KA1EDY 14, KA1KCU 9, WA1SNH 9, N1EGN 6.

MAINE: SM, Cliff Lavery, W1RWG—ASM: Bill Mann, W1KX, SEC: KA8UVQ, STM: WA2ERT, BM: W1JTH, OOC: W1KX, PIO: KY1E, SGL: K1NIT, TC: KQ1L, Sally Dawson, KA8UVQ, SEC: reports that WB1GOZ has stepped down as EC for Cumberland County and Mel Heath, WB1CBP, has been appointed to replace him. W1KX, OOC, reports QO activity by N1BCF, W1ISO, K1NIT and the appointment of AK1W. Thanks to Red Cotton, W1BTY, for his JOTA Report of on-the-air contact from his station by six Cub Scouts from each of the following dens: Den 376 with W1JTH Oct 16, Den 375 and Den 374 with W1JTH and W1TGY Oct 17, and Den 378 with W1RWG and N1BCF Oct 18. He reported that lively question-and-answer periods followed each session. WA2ERT, STM, reports the appointment of Everett LaPorte, N1EUK, as Net Manager of the Central Maine Emergency Net. W1JTH, BM, reports 37 total transmissions for September, comprising nine ARRL, four Maine, and four propagation bulletins by seven bulletin stations plus four transmissions on packet BBS. Yarmouth Junior High School scheduled a class of 11 pupils in a Communications Technology class taught by Bob Maurais, KA1LUL. The course ran for 7 weeks (35 class periods of 45 minutes) using ARRL Tune in the World. On November 2, nine successfully passed the Novice test given by KA1LUL and Mel Heath, WB1CBP.

NET	SESS	CHECKINS	TRAFFIC	MGR
Sea Gull	25	932	208	K1GUP
Pine Tree	32	330	164	WA2ERT
Aroostook Emerg	4	72		WA1YNZ
MePubSvc	NO REPORT			KA8UVQ
RACES	4	62	22	W1RWG

PSHR: WB1CBP 94, WA2ERT 89, W1RWG 88, Traffic: WA2ERT 198, ND1A 121, KA1JOJ 117, K1KX 101, AK1W 99, WB1CBP 95, W1RWG 82, KA1ODT 65, WA1UIE 42, W1VEH 36, W1JTH 32, W1BMX 17, WA1YNZ 8, N1BJW 6, N1FFN 4.

NEW HAMPSHIRE: SM, Bill Burden, WB1BRE—TC: W1JY, SGL: N1AJX. This was the month of the big Deerfield Fall Fleamarket and lots of fall foliage! The ARRL booth was again very busy, and I saw a lot of familiar faces and had many great chats. Our Division Director, Tom, K1KI, was there Saturday and Luck, KY1T, from HQ staffed the table for many hours. We had a helping hand from Phil, WA2MBQ, who was presented with his QST article award by K1KI. Tnx to Tom, Luck and Phil for helping at the table. There has been discussion about how our hobby community can be more so that when we face restrictions or other local problems, we have a good "civic" record in our favor. Some clubs are already involved in such local, civic activities—CVFMA is working to establish a yearly scholarship program for local High School students. The Interstate Rptr Soc voted to make a contribution to the NH Easter Seals campaign, GBRA is collecting canned goods for a Christmas basket and NARC has contributed funds raised at Deerfield to the Shriner's Burn Center. While these are not Ham radio activities, they are important in that they establish clubs as local civic organizations with tangible evidence of support for their communities. While emergency comm is usually our focus, public and civic activities like these are ongoing evidence of our commitment to our neighbors and communities. This year, SET focused on local net activity. SEC K1ACL reports that packet radio was a big part of SET with local nets having packet liaisons to State CDRQ in Concord. The Northern Counties Emerg Net provided comm for the annual Mt Washington Hill Climb with both 2M FM and Packet nets. Participants: K1BA (NCS), NK1Q, WA1PEL, N1DAS, KA1LZ, K1LJH, KA1IXA, N1DQA, N1CMD, ND1O, WA1OJB and K1OIQ. Mt Moriah Rptr Soc sponsored another VE session this month with 19 of 26 applicants upgrading. Warren, WB1HBB, reports progress in the Ham license-plate situation—the state has agreed to go back to using the traditional "1" figure on Ham calls instead of a vertical bar. Efforts are continuing to establish a special Ham license plate. NARC instructor KA1LDS has started another Novice class with teens (and younger). W1FJH reports that the Southeastern Valley ARC has a full schedule of programs for the next few months. Many clubs have gotten a look at the "New World of Amateur Radio" video and the reviews are great! It's been shown to school & scout groups. KB1X1, NHNTN manager reports that they have completed their 5th traffic-handling training cycle on the net. This 10M Novice traffic net has been handling an increasing amount of ttc and meets M-F at 1900 local on 28.330 MHz. Give them a call! In the beginning, N1ALI was NCS with 12 chikins and 6 QTCs! Now there are two sessions daily using the Mt Washington and Concord rotas with ttc moved by local stations. W1TN reports that W1FYR has been appointed NM of the Tristate FM Emerg Net. The Tristate FM emerg net covers the greater Keene area M-F at 1930 local on 147.375 rptr and is now affiliated with NTS. W1FYR commented that Westlink news is piped in via phone line, local ARES activities are reported, ttc is passed and ARRL bulletins are read. Again, drop in and participate! Finally, Dot and I attended the first dinner meeting of the newly formed White Mountains Chapter of 10-10 International in Salem, NH. Dot, KA1LDS, is a 10-10 enthusiast, and I went as a guest. John, KA1LEV, did a fine job of hosting the dinner and meeting and the group is helping new hams and old-timers get active on 10-10. Think about all these folks working hard to advance Amateur Radio with nets, local public service, training and operating. Think about giving them a hand once in a while with a checkin or by handling a piece of ttc or by helping a prospective Ham get his/her license! Traffic: GSFM 156, GSPN 96, N1H 68, NHNTN 36, W1PEX 706 BPL, N1CPX 361, WA1FHB 308, K1TQY 131, WB1HBB 111, W1FYR 80, N1ALM 74, WA1LE 60, N1NH 50, W1TN 42, N1AKS 41, WA1YZN 40, WB1GXM 34, KA1LMR 34, K1OIQ 29, KA1HPO 26, K1M 21, KA1UO 13, KA1JOJ 7, N1DQA 5, KA1KFX 3.

VERMONT: SM, Frank I. Sutor, W1CTM—ASM: KD1R, STM: AE1T, SEC: W1KRV, PIO: WA1YGY. The present winter wx should allow us the opportunity to continue our ARES public-service support to both local communities and to the state as

(continued on page 112)

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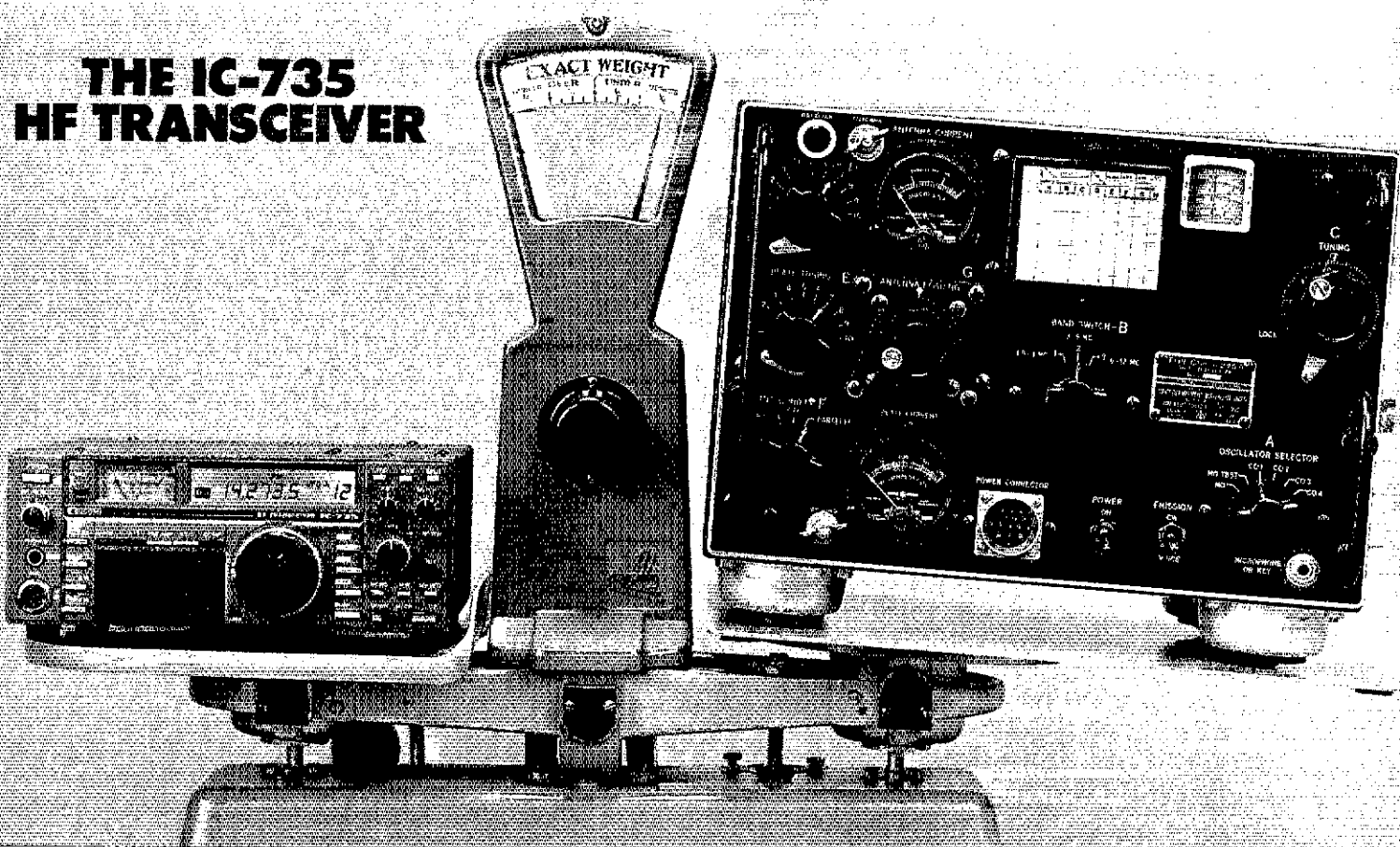
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All Amateur Band Coverage. It's a high performer on all the ham bands, plus it includes general coverage reception from 100kHz to 30MHz. May be easily modified for MARS operation.

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Exceptional Receiver. To enhance receiver performance, the IC-735 has a built-in receiver attenuator, preamp, and noise blanker. PLUS it has a 105dB dynamic range and a technologically advanced low-noise phase locked loop for extremely quiet rock-solid reception.

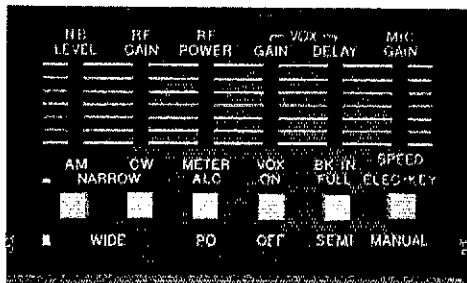
Simplified Front Panel. Controls which require infrequent adjustment are placed behind a unique hatch cover on the front panel of the radio. The hatch cover is designed to protect seldom used controls from being accidentally knocked off line, but also provides easy access. The large LCD readout and con-

veniently located controls enable easy operation, especially important for the mobile environment.

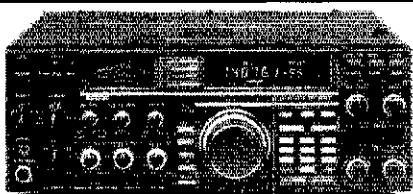
More Features. FM built-in, HM-12 scanning mic, program scan, mode scan and memory scan. Switchable AGC, automatic SSB selection by band and RF speech processor. Continuously adjustable output power up to 100 watts, 12V operation, 100% duty cycle and deep tunable notch filter.

Options. A new line of accessories are available, including the AH-2 mobile antenna system, AT-150 whisper quiet automatic bandswitching antenna tuner for base station operation and the PS-55 power supply. The IC-735 is also compatible with most of ICOM's existing line of HF accessories.

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SP-20 Ext. speaker w/audio filter	149.00	139 ⁹⁵
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FL-53A 250 Hz 2nd IF CW filter	108.00	99 ⁹⁵
FL-102 6 kHz AM filter	56.00	
EX-310 Voice synthesizer	46.00	



IC-751A 9-band xcvr/1-30 MHz rcvr	1649.00	139 ⁹⁵
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MB Mobile mount, 735/751A/761A...	24.50	
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SM-8 Desk mic - two cables, Scan...	78.50	
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IC-475H 75W 440 FM/SSB/CW	1599.00	1429
IC-575A 25W 6/10m xcvr w/ps	1399.00	1249



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AG-1* Mast mounted preamplifier		99.50	
IC-471H* 75W 430-450...	CLOSEOUT	1399.00	989 ⁹⁵
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Accessories common to 271A/H and 471A/H

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UT-15 Encoder/decoder interface	14.00
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IC-290H 25W 2m SSB/FM	CLOSEOUT	639.00	549 ⁹⁵
IC-490A 10W 430-440...	CLOSEOUT	699.00	399 ⁹⁵

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IC-27A Compact 25W 2m FM w/TTP mic	429.00	379 ⁹⁵
IC-27H Compact 45W 2m FM w/TTP mic	459.00	399 ⁹⁵
IC-37A Compact 25W 220 FM, TTP mic	499.00	439 ⁹⁵
IC-47A Compact 25W 440 FM, TTP mic	549.00	489 ⁹⁵
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UT-16/EX-388 Voice synthesizer	34.99	
SP-10 Slim-line external speaker	35.99	

IC-28A 25W 2m FM, TTP mic	459.00	399 ⁹⁵
IC-28H 45W 2m FM, TTP mic	489.00	429 ⁹⁵
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Larsen PO-TLM Trunk-lip mount	22.00	
Larsen PO-MM Magnetic mount	22.00	

RP-3010 440MHz 10W FM repeater	1229.00	1089
IC-1200A 10W 1.2GHz FM Mobile	699.00	629 ⁹⁵
IC-1271A 10W 1.2GHz SSB/CW Base	1229.00	1089

AG-1200 Mast mounted preamplifier	105.00	
PS-25 Internal power supply	115.00	104 ⁹⁵
EX-310 Voice synthesizer	46.00	
TV-1200 ATV interface unit	129.00	119 ⁹⁵
UT-15S CTCSS encoder/decoder	92.00	

RP-1210 1.2GHz 10W 99 ch FM xcvr	1479.00	1299
RP-2210 220MHz 25W repeater	1499.00	1329



Hand-helds

IC-2A 2-meters	279.00	249 ⁹⁵
IC-2AT with ITP	299.00	259 ⁹⁵
IC-3AT 220 MHz, TTP	339.00	299 ⁹⁵
IC-4AT 440 MHz, TTP	339.00	299 ⁹⁵
IC-02AT 2-meters	365.00	299 ⁹⁵
IC-02AT/High Power	399.00	339 ⁹⁵
IC-03AT for 220 MHz	449.00	389 ⁹⁵
IC-04AT for 440 MHz	449.00	389 ⁹⁵
IC-u2A 2-meters	299.00	269 ⁹⁵
IC-u2AT with ITP	329.00	289 ⁹⁵
IC-u4AT 440 MHz, TTP	369.00	329 ⁹⁵

Accessories for micros - CALL \$

IC-12AT 1W 1.2GHz FM HT/batt/cgr/TTP	459.00	399 ⁹⁵
A-2 5W PEP synth. aircraft HT	499.00	449 ⁹⁵
A-20 Synth. aircraft HT w/VOR	599.00	529 ⁹⁵

Accessories for all except micros

BP-7 425mah/13.2V Nicad Pak - use BC-35	74.25
BP-8 800mah/8.4V Nicad Pak - use BC-35	74.25
BC-35 Drop in desk charger for all batteries	74.50
BC-16U Wall charger for BP7/BP8	20.25
LC-11 Vinyl case for Dlx using BP-3	20.50
LC-14 Vinyl case for Dlx using BP-7/8	20.50
LC-02AT Leather case for Dlx models w/BP-7/8	54.50

Accessories for IC and IC-O series

BP-2 425mah/7.2V Nicad Pak - use RC35	47.00
BP-3 Extra Std. 250 mah/8.4V Nicad Pak	37.50
BP-4 Alkaline battery case	15.25
BP-5 425mah/10.8V Nicad Pak - use BC35	58.50
CA-5 5/8-wave telescoping 2m antenna	18.95
FA-2 Extra 2m flexible antenna	11.50
CP-1 Cig. lighter plug/cord for BP3 or Dlx	13.00
CP-10 Battery separation cable w/clip	22.50
DC-1 DC operation pak for standard models	23.25
MB-16D Mobile mntg. bkt for all HTs	24.50
LC-2AT Leather case for standard models	54.50
RB-1 Vinyl waterproof radio bag	34.95
HH-SS Handheld shoulder strap	16.95
HM-9 Speaker microphone	47.00
HS-10 Boom microphone/headset	23.25
HS-10SA Vox unit for HS-10 & Deluxe only	23.25
HS-10SB PTT unit for HS-10	23.25
ML-1 2m 2.3w in/10w out amplifier	SALE 99.95
SS-32M CommSpec 32-tone encoder	29.95

Receivers

R-71A 100kHz to 30MHz receiver	\$949.00	799 ⁹⁵
RC-11 Infrared remote controller	67.25	
FL-32A 500 Hz CW filter	66.50	
FL-63A 250 Hz CW filter (1st IF)	54.50	
FL-44A SSB filter (2nd IF)	178.00	159 ⁹⁵
EX-257 FM unit	42.50	
EX-310 Voice synthesizer	46.00	
CR-64 High stability oscillator xtal	63.00	
SP-3 External speaker	61.00	
CK-70 (EX-299) 12V DC option	12.25	
MB-12 Mobile mount	24.50	
R-7000 25MHz to 2GHz scan rcvr	1099.00	949 ⁹⁵
RC-12 Infrared remote controller	67.25	
EX-310 Voice synthesizer	46.00	
TV-R7000 ATV unit	131.95	119 ⁹⁵
AH-7000 Radiating antenna	89.95	(7)

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ICOM IC-900 FIBER OPTIC FM MOBILE

ICOM introduces the revolutionary IC-900 multi-band FM mobile transceiver. ICOM, first in utilizing fiber optic technology in amateur radio, enables you to create your own mobile communications system. Six band combinations... 10M FM, 6M, 2M, 220MHz, 440MHz, and 1.2GHz. It's the most advanced, versatile, compact, and easy-to-use mobile available.

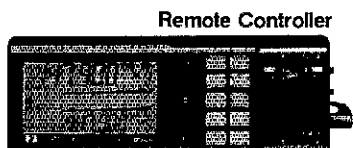
Features Galore. The IC-900 is an operator's dream... Listen on two bands simultaneously or transmit on one band and receive on a different band when using a second speaker (true full duplex crossband operation!). 10 memories per band, independent PL tones and

offset into each memory, memory and programmable band scan, and all subaudible tones in actual Hz readout.

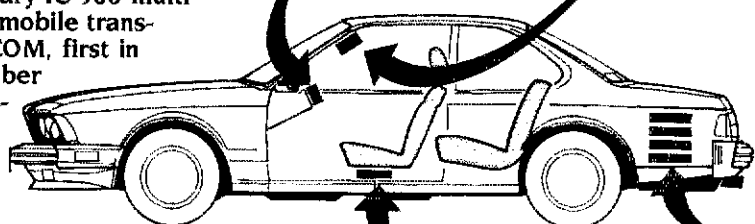
The IC-900 includes an ultra compact remote controller, an Interface A unit, Interface B unit, SP-8 speaker, HM-14 up/down DTMF mic, fiber optic and controller cables.



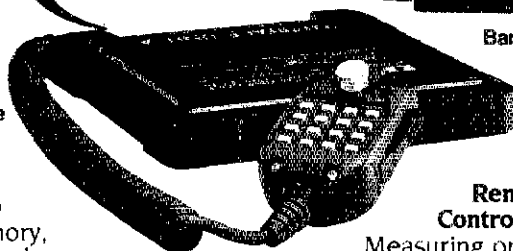
Speaker



Remote Controller



Interface Unit A



Band Units/Interface Unit B

Interface Unit A is installed in a location near the driver's seat.

Interface Unit B controls the six band units and can be installed in your car's trunk. A fiber optic cable runs from Interface A to Interface B, which transports an abundance of information

through a 3/16" cable and eliminates RF feedback.

Remote Controller.

Measuring only 2 inches high by 5.7 inches wide by 1 inch deep, the remote controller can be installed on your car's dash or sun visor with the supplied velcro. And, if you want, take the controller with you when you leave your car. The controller features a super large, highly visible LCD.

Band Units are "stacked" onto the Interface B Unit via the supplied mounting bracket. Optional band units available are:

Band Unit	Power Output	Frequency
UX-19A	10W/1W	28-30MHz
UX-29A	25W/5W	138-174MHz Rx; 140.1-150MHz Tx
UX-29H	45W/5W	138-174MHz Rx; 140.1-150MHz Tx
UX-39A	25W/5W	216-236MHz Rx; 220-225MHz Tx
UX-49A	25W/5W	440-450MHz
UX-59A	10W/1W	50-54MHz
UX-129A	10W/1W	1240-1300MHz



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

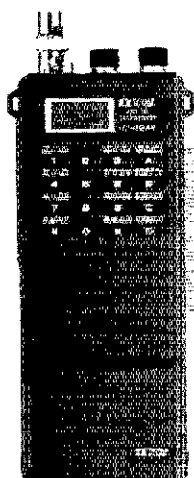
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WIN!!

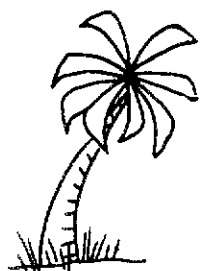
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IC-02AT 2-Meter
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Handheld

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- * See the new line of ICOM equipment



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Swap Tables, 2 days: \$16.00 each. Power: \$10.00 per user.

All swap table holders must have registration ticket.

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(All RV vehicles, tent campers, vans, trailers welcome — no ground tents, please.)

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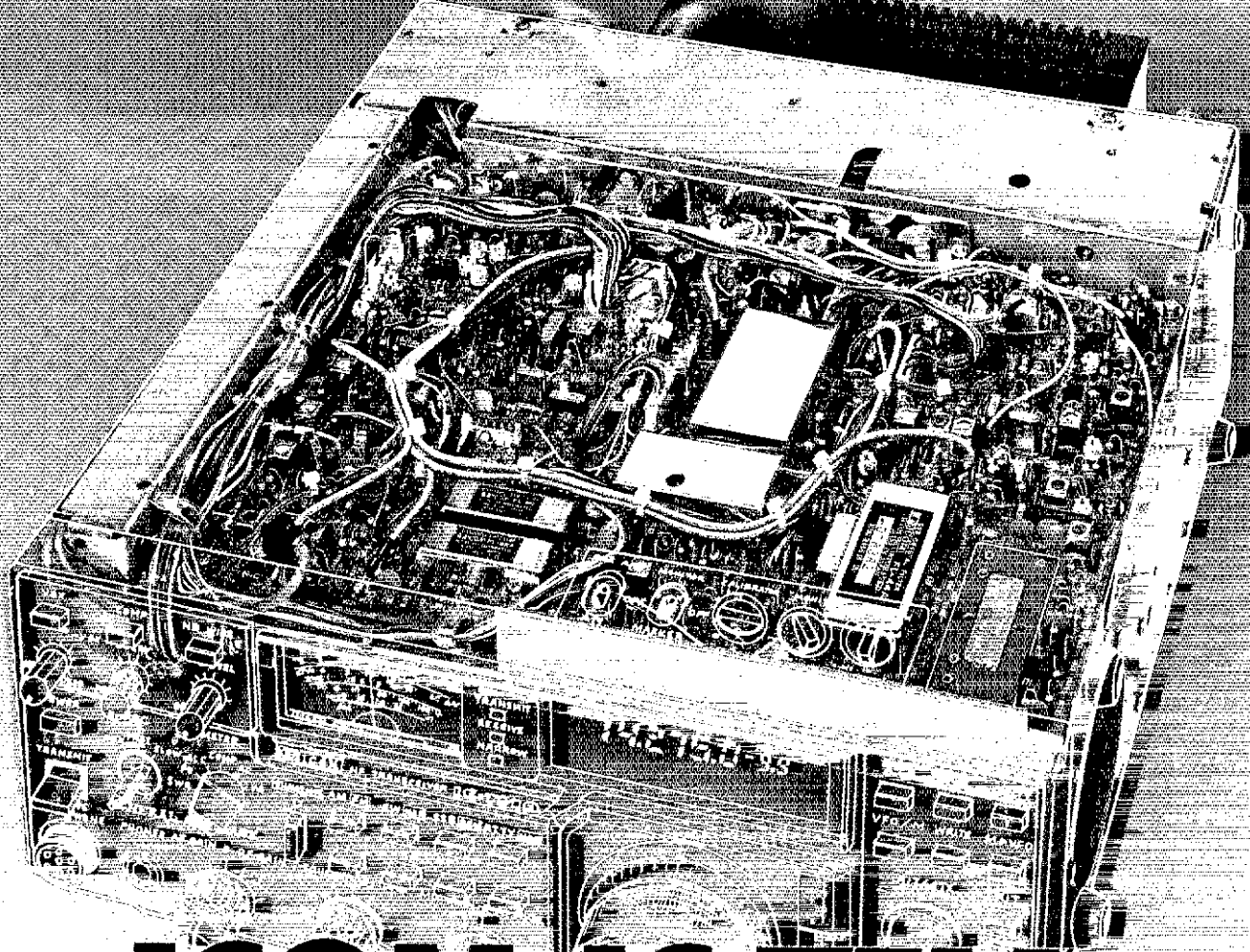
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(305) 642-4139

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DADE RADIO CLUB, P.O. BOX 350045, MIAMI, FL 33135

4-Page Brochure
Available . . .
December 1st



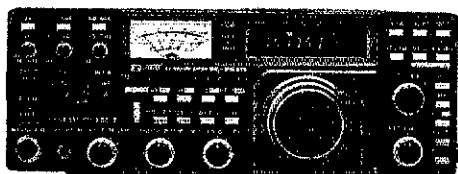
ICOM IC-751A

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- All HF Band Transceiver / General Coverage Receiver
- Advanced Circuit Designs
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- Superb Frequency Stability
- Continuous Duty Operation
- Crystal Clear Signal Quality

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32 Tunable Memories. Store both frequency and mode information. Use them to quick-access your favorite spots or as 32 preferred frequency-remembering VFOs.

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Special attractions include an electronic keyer, semi or full break-in rated to 40 WPM, panel selectable 500Hz/FL-32A CW filter, and volume control-tracking sidetone. SSB transmissions are enhanced with an RF speech processor and tone control to produce sparkling clear audio. PLUS there's a new rubberized tuning knob for velvet-smooth tuning and a full line of accessories and filters.

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RECEIVER

Frequency Range 28.0000-29.9999 MHz
Circuit Type Superhetrodyne, dual conversion
Carrier Range 1-500 Hz
Sensitivity SSB & CW better than 0.3 µV for 12dB SINAD
Selectivity -6dB -60dB
SSB CW 2.6 KHz 4.7 KHz
AM FM 6.0 KHz 18 KHz

TRANSMITTER

Frequency Range 28.0000-29.9999 MHz
Tuning Steps 100 Hz 1 KHz 10 KHz 100 KHz, 1 MHz
Emission Types LSB, USB, CW, AM, FM
Power Output 30 watt Model
SSB—25 watts AM FM—8 watts
CW—30 watts
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a whole. The combination of Simulated Emergency Test (SET) and early snowflakes in Green Mts have provided nearly 200 section ARES members with needed practice for real winter emergency capability. SEC W1CVR and TC W1AHM have reviewed the KA1DLK (10/87) vx emergency report and have provided recommendations to VT Dept. of Emergency Management. WA1VOY (Al) and W1KVR (Joe) were able to get help for an injured motorist in Rutland. Their quick attention was in the finest tradition of the Amateur Radio Service. The 11/87 meeting of Green Mt Wireless Soc. (Rutland) was highlighted by a mini-auction. Rumor has it that 2 visitors from Burlington (Al and W1CVR) went home with a lot less \$ than when they arrived. Both Pete and I wish to thank club president N1EWE (Dick) and your whole club for a FB evening. A copy of the "New World of Amateur Radio" VHS tape is available for loan to clubs/individuals with section—contact W1CTM. Twin State RC toured the West Lebanon (NH) municipal airport control tower. Thanks to KA1CPR (Dave) TSGC has voted to sell their clubhouse/property N1EMF (Bill) has new computer which he says will guarantee prompt delivery of club newsletters. It's not too early to plan support for the VT OSC Party scheduled for Feb. 6-7—contact WA1PDN for details. A package of ARRL data is provided to all newly licensed hams within the section—contact W1CTM for ur free copy. VE exams scheduled for Jan 16 in Montpelier at 9 Heaton St.—contact K1HKL. The week of Mar 12-18, we will celebrate admission of Republic of Vermont (1777-1791) into Union in conjunction of 200th anniversary of US Constitution. A list of authorized section (W200) stations will be published in Feb/Mar QST. Oct Traffic: W2SPR 68, W2SPR 69, W1 161, WA1JVV 126, W1KVR 168, NB1A 34, N1DHT 23, NETS: CVFMM 4765, VTN 32179176, BSEN 4/9912, TSEN 4/560, CAR 27 585 61, GMM 27/242/28, VPHN 4/748.

WESTERN MASSACHUSETTS: SM, Bill Voedsch, W1UD—OO:RFI, N1CMM, P1OAC, K1BE, SEC:SGI, WB1HUI, TC: KA1JMM, STM: KA1EXJ. Congratulations to KA1IFC and KA1IT. Both handled in excess of five hundred pieces of traffic and a BPL certificate is on the way. A great job. MARRA had a fox hunt Oct 18. Couldn't ask for any better weather and nobody really wanted to find the fox. Great autumn foliage. WB1HUI informed that the Q1 OSC Party Greylock is up and running. The 144220 link should be working by the time you read this. K1MEA-1 is now handling the NTS digi traffic for W. Mass. Many thanks to K1UGM for use of his BBS until we in WMA could get our own up and running. NBBAS fall auction was a great success. Many pieces of equipment changed hands. CMARRA's Explorer Post 73, under the able direction of W1UJA, W1SPG, NE1C, operated in Jamboree-On-The-Air from Treasure Valley in Exeter, MA. Their new commercial truck was sold on 10-30 and 11/4/20. Explorers N1FBD, KA1QOH, KA1QOI and KA1QOZ were the operators. KA1QOZ (BP9AY) spent two weeks (CQWW) on the island of Barbados with XYL Judy. What a way to enjoy the best of both worlds!

In December Section News I ran an inappropriate statement of my opinion on the operating practices of two Mt. Wachusett repeaters. With this month's column I'd like to retract my statements and apologize to the repeater trustees for misrepresenting their operations policies, and particularly for seeming to question their personal ideologies, which I certainly do not. WMA Section News last month was also technically misleading in not clearly differentiating between PL'd and closed repeaters—W1UD.

Traffic: KA1IFC 571, KA1CPR 413, WB1HUI 173, KA1EXJ 111, WA1YK 74, KA1EKO 45, NM1U 44, K1HKK 24, W1JVV 40, K1JHC 28, N1FJ 11, WA1PDN 8, W1ZPB 8, W1UD 135.

NORTHWESTERN DIVISION

IDAHO: SM, Don Clower, KA7T—SEC: W7REX, STM: W7GHT, OOC: W7BCYO, ACC: N7BI, P1O W7PPO. I want to thank the many hams who participated in the SET. We had a good turn out over the state. Luck Hurdur, KY1T, has taken over the OO program for the ARRL. Luck has really jumped in with both feet, and is doing a bang-up job. If you have ever complained about things you hear on the bands, maybe it is time you do something about it. Check into the OO program. We need more OOs in Idaho who are willing to give a little of themselves to help the whole amateur community. Contact W7BCYO or me if interested. Traffic: W7GHT 207, NW7K 50, Q1CXG 18, Net

CD	Freq	Time	Sess	QNI	QTC
NE	3.990	0810m-f	22	773	13
NW7N	146.38/98	1930d	31	913	38
Farm	3.937	2000d	31	1834	20
IMN	3.635	2100d	35	300	109

General: When talking with new hams mention the ARRL and the benefits of joining the league. K3P, 3 Don.

MONTANA: SM, Ken Kopp, K6PQ—GFAARC's K7ABV is now HFVHF Awards Manager for WAS, 5BWA5 & VUCC awards. Butte ARC held local SET exercise. WB7UTJ finished 4-yr effort for all MT counties. W7TGU made BPL for Oct. KA7EEE is new IMN Manager. New licenses are up 18% over last year, 40% over year before, yet only 30.3% of total US licenses are ARRL. What can YOU do to raise the ARRL? There was still a lot of Hells and Wiles traffic for the fire crews in southern Oregon. Curly Stroy, WA7TIC, is the new Clackamas County Emergency Coordinator. Curly has been active in the ARES for years and will do a fine job. We still need Emergency Coordinators for Washington and Yamhill counties. If you are interested in the position please contact Dale W7BPB or myself. Thomas Larson, NY7D, from Eugene, Oregon was the recipient of the 3rd Annual Robert S. Cresap Memorial Scholarship for \$500. He will attend Oregon State University. Traffic: W7VSE 506, N7BGW 230, W7GH 176, KA7EEE 166, WB7VSN 153, W7DDG 103, KA7ZAG 63, KF7BX 59, N7APC 30, KA7AID 12, Late Sept. WB7NLP 570, W7DDG 118, N7APC 85, W7LNE 8.

OREGON: Randy Stimson, KZ7T—ASM: KM7R, STM: W7VSE, SEC: W7BPB, P1O: K7CYN, SGL: KA7KSK, ACC: W7FO, RFI: AK7T, OO: N7SG, STC: N7ENI. Well the forest fires are finally over, but not before the hams were called on again. We were needed again at the fire in Polk County. There were 15 hams who put in many 12 and 15 hour shifts. The hams manned the Red Cross HQ, the shelters and were in the communication trailer. Also the Sheriff asked us to help them which was a plus for Amateur Radio. There was still a lot of Hells and Wiles traffic for the fire crews in southern Oregon. Curly Stroy, WA7TIC, is the new Clackamas County Emergency Coordinator. Curly has been active in the ARES for years and will do a fine job. We still need Emergency Coordinators for Washington and Yamhill counties. If you are interested in the position please contact Dale W7BPB or myself. Thomas Larson, NY7D, from Eugene, Oregon was the recipient of the 3rd Annual Robert S. Cresap Memorial Scholarship for \$500. He will attend Oregon State University. Traffic: W7VSE 506, N7BGW 230, W7GH 176, KA7EEE 166, WB7VSN 153, W7DDG 103, KA7ZAG 63, KF7BX 59, N7APC 30, KA7AID 12, Late Sept. WB7NLP 570, W7DDG 118, N7APC 85, W7LNE 8.

WASHINGTON: SM, Brad Wells, K7RL—STM: KD7ME, SEC: KA7INX, TC: W7BUN, OOC: N7DVR, SGL: KD7AG, BM: N7CAK, P1O: N7FKV, ACC:ASAC: K7CPH, ASM: KD7G, ASM: KA7CSP, ASM: W7QUP, ASM: K7CLL. The start of a new year with 3 additions to round out our Section Staff, John Larson, W7HIV, is our new Section Public Information Officer. His job is to interface this Section with news media across the state. John holds a degree in photo-journalism and has been a reporter for newspapers in New Jersey and California. He also served as a corporate public-relations officer. If you are interested in the position of Public Information Assistant, contact John at PO Box 2875, Silverdale, 98383. Two Asst. Section Managers have been appointed to the Staff. Hal Jones, W7UOF, lives in Seattle and recently retired from the Boeing Company. He has been the EC of King County, DEC for King/Pierce, and is currently net manager for the

Washington Emergency Net. He is both the EC and RC for Clark County. Ken has been active in the NTS and is helping to develop an ARES packet networking program in SW Washington. Ken's the Sunday Section Manager. Assistant Section Managers are charged with providing ARRL Section representation for clubs and individuals within their area of the state. Your ASMs are Gene Sprague, KD7G (Everett); Hal Jones, W7UOF (Seattle); Ken Weber, K7CLL (Ridgeline); Tom Plaisance, K7CPH (Yakima); and Kyle Pugh, KA7CSP (Spokane). There has been some confusion on how to obtain an ARRL Field/Station Appointment. Each Staff member in this Section, appoints and cancels Field or Station Appointments within their area of responsibility. This breaks down as follows: Jerry Seligman, W7BUN: Assistant Technical Coordinators; Phil Dunn, KD7ME: Official Relay Stations and Net Managers; Ed Holloway, KA7INX: Emergency Coordinators, District Emergency Coordinators and Official Emergency Stations; Hal Jones, W7UOF: Official Bulletin Board; John Tsalis, K7FKV: Public Information Assistants. If you are interested in a Field or Station Appointment, contact me or any member of the Section Staff for a pamphlet outlining various appointments within the Field Organization. Get involved—it's your Section. WA7TWB reports a new Novice Net on 28325 each Wednesday at 2000 PST. Congrats to new officers of Yakima ARC: Pres KA7IAY, VP N27A, Sec KB7AMD, Treas KA7KAX. It's not too early to plan for the 1988 National Convention in Oregon. Write N.A.R.C.; PO Box 25088, Portland, OR 97225 for complete info. Clark County ARES provided a 5-day HF link to California to handle H & W traffic from numerous fire areas in that state. Many thanks to the various clubs and organizations who send the newsletters. Beginning this month the ARRL/VEC reimbursement will be \$4.55 for each license examination. PUBLIC SERVICE HOURS: King 664, Pierce 119, Yakima 111, Island 25, Benton 17, Franklin 17, Walla Walla 15, Thurston 7, Traffic: N7GJG 206, W7GKX 166, K7GXZ 141, N6EQU 120, WA7CBN 51, K7BUX 48, W7LKB 40, W7APS 34, KA7PMD 31, WA7PIN 26, WA7JEN 24, N7DIP 18, K7UOH 16, K7AJT 10, W7IEU 10, W7AZU 9, K7CLL 8, WA7TWB 7, N7FXM 4, Category 2: KD7ME, KD7G, K7RL.

PACIFIC DIVISION

EAST BAY: SM, Bob Valitto, W6RGG—ASMs: W6ZF, N6DHN, SEC: W6LKE, STM: K6APW, OOC: NY6Z, TC: N6AMG. HARC has a ten week Novice course running under the direction of KB6RKR, NA6Q and KE6VS. They recently welcomed new member Tommy Silas. BARC members collected and donated school supplies and clothing for two orphanages in Mulege, Baja Sur, Mexico. They also managed to include some Christmas toys for the kids who are cared for in the orphanage. SEC W6LKE spoke on the history of RACES and ARES at EBARC's latest meeting. They have obtained the donation of a tower and Yaqui for erection at their WA6JSO memorial station at the Richmond Red Cross annex. MDARC's "The Carrier" listed K6IWX, N6LJM, N6MWB, W7JKH, W6W6K, WA6CHJ, N6VV, W6CPO, KD6DA, KA6SQN, AA6DL, KB6KZ and N6LGB to be applauded for their work on the fire lines during our long hot summer. LARK is getting involved in DFFing and T-junts, and published an excellent list of "QST" and "HR" articles on the subject. October Traffic: WB6DUX 114, WB6UZX 31.

NEVADA: SM, Joe Lambert, W8IXD—SNARS reports that the Oct. brunch drew 30 attendees. 9 candidates took the Reno Novice exam. 3 passed both parts, 3 one part. Thanks K7HRW and K7VY. Next VE exam Feb. 20, contact K7HRW. SNARS is providing communication support for Western States Motorcycle Racing Assn. Winnemucca off-road race in November. TARA held its annual Xmas party Dec. 12 at the Lake Tahoe. It was good to see several Nevada hams at the party. LVRAC held its Xmas party Dec. 18 at Port Jack in L.V. A public-awareness demonstration at the Meadows Mall (LV) featured working rigs and info on ham radio. Thanks KA7YK and LVRAC. N7GWR did a great job organizing volunteers for the Walkathon 10/24. PLANS HAVE STARTED FOR RENO HAMFEST, TENTATIVELY AUG 20, 1988. WB6BPU organized a No. Nev. SET, extremely successful scoring over 225 points with over 35 hams participating. WA7XO-1 packet now on Mt. Potosi—145.36. KA7EUA reports Nev. Wx Net doing great. Check in if you can: 0600, 3993, Mon-Sat. Assistance needed from Northern Nev hams in the Nevada State Winter Special Olympics at the 1989 International Winter Special Olympics. Contact WA7MOF for info.

PACIFIC: SM, Army Curtis, AH6P—Aloha and hafa adai to all of the Pacific. Activity continues on Guam with WA6ACN, K7HAKA, K7H2C, W7YFQ, K7H2B, and K7H2P. A K72B partying down for their local triathlon. Excellent from Kauai, KH6S, KH6PH, KH6FK, KH6JJC, NH6JA, NH6FJ, KH6E, NH6HR, and AH6EC participated in the SET. Also comes word that Jerry Hill, KH6HU, led an effort to put Waimea High School on the air for the CQ WWDX contest, with 587 QSO's from the 8 licensed stations who participated. Now that's something! Can any other school beat that next year? How about some competition? From Maui, congrats to upgrades AH6HW, NH6FT, and WB6BQV. KH6JJS is heading the team on Maui planning classes for early 1988. Contact Howell for more info. Traffic: KH6S 49, KH6H 24, KH6B 9.

SACRAMENTO VALLEY: SM, Bob Watson, W6IEW—This first report of my second term as your SM is a good time to cover the Section staff. All top positions are filled, thanks to the efforts of many, particularly Mari, NB7JJ who has been Asst. SM for recruiting. Al Blegier, WA6WJZ, is Section Traffic Manager; Jettie Hill, W6RFF, wears two hats, one as Affiliated Club Coordinator and the second as Technical Coordinator. Jim Pratt, K6S, is our State Emergency Liaison. Larry Blegier, the Official Observer and Amateur Auxiliary to the FCC's Field Operations Bureau is John Canans, WY6O, the Official Observer Coordinator. Ron Murdock, WB5FX is Bulletin Manager and there are Two Public Information Officers. Art Fingler, WA6UZR, in the southern part of the section and Mark Nelson, AA6DX, in the northern part. Finally, the one whose staff has been so busy, and doing such great work with recent fire emergencies - Deane Coats, NR6A, the Section Emergency Coordinator. With great regret, I announce the resignation of two of Deane's top men: Jack La Fless, KF6KJ, District Emergency Coordinator of the Northern Counties and Bob Cloud, WB6CP, DEC for the Metro Sacramento Counties. Both YOU MUCH LOVE BOTH AND BOTH AND AND AND SERVICE! Wait Cross, K6E8B has taken over as DEC, Northern Counties and Phil Batson, N6MSZ is in Wall's old spot as Butte County EC. TRAFFIC: N6LUY 280, WA6WJZ 177, K6SFF 129, WB6BQZ 51, W6RFF 31, WB6BQZ 4.

SAN FRANCISCO: SM, Bob Smith, NA6T—VOMARC is in building stages of the New Emergency Bus for City of Sonoma, really looks good. The RFD has a new man, and a new one, called "SUN-SPOTS" a good title for an active "small" DX Club. SCRA is still in the Lottery Business, \$100 in the Membership lottery, and all you have to do to win is come to the club meeting, what a deal! DNARC has changed its meeting nite to the FIRST TUESDAY, at the "point of a gun," attend the meeting and find out the particulars! SHARC in S. Humboldt Co. Placed 4th Nation-wide in Field Day This Year, they're a small but very ACTIVE Club, 2 digis, a 2 meter voice rpt, es emergency communications, etc. GSLPRC is re-establishing the radio club room at 180 New Montgomery, the furniture is in place, now comes the equipment and

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antennas. Need your SBAW or VUCC validated in the SF Section? Contact Steve, W8LJL, in Santa Rosa or Jackson, K8BJR, in Mill Valley. This is just another service provided by TWO Active SSC Clubs in the Section. Is all the Traffic in the SF Section being handled on Auto-Forward PACKET? What happened to all the traffic reports? Did all you traffic handlers give up, or just move?

SAN JOAQUIN VALLEY: SM, Charles McConnell, W6DPD, SEC-W6BUJ, 6TM:W6AWH, TC:W6EXV, ACC-W6DPD. Asst.SMs:W6TRP and K6YK. Emergency Coordinators are still needed in Madera, Mariposa and Mono Counties. ALL appointees are reminded that a monthly report of activity is necessary in order to keep the appointment. The Fresno ARC operated W6TO from the Sequoia Council Fall Camporee during the Jamboree-on-the-air. Many Scouts had the opportunity to talk to Scouts in other parts of the country. W6XPX is a SILENT KEY. Joe was the trustee of W6TO for many years. K6LJE is Extra. N6PZU, W6LUT, K84HTF, and K6DYC are Advanced, N6QJY and N6QHE are General. K6ETOV, K6B6QH, and K6APPS are Tech. W6FCG and N6JSN have TM 221As. I hope that 1988 brings you all the happiness and prosperity that you desire. Traffic: N6MAY 84, W6YAB 48, N6MXG 9, (Sept.) N6EJG 557, K6PR 156, K6BTIR 132, W6KPZ 63, K6AGJN 42, N6POF 28, K6SDH 26, N6QX 20, W6A6N 15, N6TBJ 12, W6TJG 80, W6DFA 8, K6BTLA 8, K6TIFR 8, N6KDH 6, A6AGM 5, W6LQC 4, N6OVI 2, W6GIW 2, N6KHS 2, W6AOP 1, N6AWH 1.

SANTA CLARA VALLEY: SM, Glenn Thomas, WB6W—SEC: W6OCV, TC: W6PWW, 6TM: N6JLJ, PIO: W6BOML, ASM: N6JQJ & NS6N. ACC: W6MKM, BM: N6JQJ OOC (vacant). As many of you are aware, the SET generated much more NTS traffic than has been the case in the last several years. For those of you who are interested, approximately 1000 test H&W messages were originated. Each of these test messages (addressed to various ARRL Division Directors, Vice Directors, and SMs) included a request that a reply (ARRL SEVEN) be sent to yours truly. Of the 1000 messages, at least 300 were sent via packet radio and an unknown number by other means (HF CW & phone, presumably). The section traffic total is 464 this month, so presumably not all of the thousands were sent. How many were actually delivered? I don't have any way of knowing, however, I did receive about thirty response messages via NTS. It is clear that ARES/RACES and NTS need to work together more closely in our section. Indeed, in some areas they need to become acquainted! Of course, in Monterey County, the SET was composed of a real event, a fire in a canyon where the CDF radios didn't work very well. I don't believe I have any "traffic totals" from them as they were too busy doing the job to bother to count such things. . . Thanks to all of you who did participate. . . Doc W6ZJL has bought his new HF radio and packet system running and is on packet on NV6Z, N6CN on CW and WPSWESCAR/ California WX net. Doc is also NCS for PAN. . . our SM Andy N6JLJ spoke to both the West Valley ARC and the SPECS group on NTS. . . the next Emergency Responders Institute (ERI), to be held on March 26&27, 1988, is filling up fast. If you are interested in participating, send your \$20 registration (made out to SVECS-ERI) to our ASM Dave N6JQJ. His address is 766 El Cerrito Way D, Gilroy, CA 95020. . . the Stanford ARES group is putting up their second (I) 1.2 GHz repeater. Seems that they couldn't agree on which of two sites to use, so they used them both! . . . the Friday afternoon lunch has moved to Harveys Holbrau on Saratoga Avenue in Santa Clara. This venue is usually starting at about noon or so, is an excellent place to meet some of the people you talk to on the air. Our division director K6ZV, your SM, and a large number of other local ARRL officials usually show up. Anyone who is interested is more than welcome to attend. . . Those of you on packet radio are invited to send me your station reports via the WestNet BBS system. Address them to W6BW via N6JLJ. Sure beats the heck out of the mail! . . . I hope you all have had the happiest of holidays and wish you every happiness in the new year. . . 73 de Glenn WB6W PSNR: N6JLJ, NR7E, W6KZJ, BPL: N6JLJ, October: N6JLJ 233, NR7E 79, W6KZJ 74, W6PRI 28, W6ZJ 17, K6SXW 16, K6BASV 10, K6B6W 9, W6HAD 8, (Sept.) W6KZJ 99, W6HAD 2, W6PRI 32.

ROANOKE DIVISION

NORTH CAROLINA: SM, Rae Everhart, K4SWN—SEC: SGL, 6TM: K4LNK, ACC: WC4T, PIO: W4AOBR, TC: K4ITL, SGL: K4EML. HAPPY NEW YEAR to everyone from Section Staff. Make your resolutions now and enjoy HAM RADIO this year. This month shows its time for the VHF SWEPESTAKES. League affiliated clubs are eligible for the awards. Get your club/group and equipment ready for the fun. Check Dec QST for details. Hope this month is not a repeat of last Winter regarding bad weather. Just a reminder to keep your emergency operation kit ready for action. Keep your batteries charged and all equipment in good operating order. N4PYV, a very young operator, calls a good SKYWARN Net in Piedmont. ASAS is the Section Packet Traffic Mgr. working with STM K4NLK and if you packet operators have any ideas on packet traffic handling please let both of them know. Send copy to SM too. SEC AB4W advises that the SET performed extremely well in 87 and many more reports have come in already. This indicates a very high interest in emergency preparedness and a high number of participants. This will set an all time high for our Section. Thanks to all who made this possible. Remember be sure to send in your report by 31st of THIS month. If you need forms let SEC or SM know pronto. K4EML SGL presented an interesting program on insurance for amateur radio equipment. For what it offers and the cost THE LEAGUE INSURANCE or members can get the best investment. THIS also covers repeaters and your computers and packet equipment. K4SNF has a super satellite station. Work him during the SWEPESTAKES. Plans are being made to have a hamfest in Winston-Salem in June. Watch for later details. Another contest this month is the NOVICE ROUND-UP. It's a lot of fun and this SM would like to encourage all Novices and Technicians in Section to participate. There has been a lot of DX on in the Novice/Tech 10 M band. Do you have your DXCC yet? WANTED: Amateur Radio operators who handle traffic to help with messages from Armed Forces personnel. If you have some spare operating time, then MARS is for you. Contact KJ4AE AFMYW/B4MXG NAVY/KO4A AIR FORCE for membership application. SILENT KEYS: W4BOH, K4BYV, K4B4H, Traffic: K4B4H, SEC: W4B4H, 254, AA4TE 252, AA4ZV 158, KA4EYF 131, K4RWW 131, AA4PM 126, W4D4TE 108, K4ATLC 91, N4TN 82, W4WII 79, K4YV 65, W4MNR 44, K4SWN 43, W4N4N 41, N4MNM 38, N4JRE 35, K4FWL 32, N4EJ 32, W4EHF 26, A4JF 13, W4D4H 11, W4CYN 11, K4B4W 11, W4MDR 11, W4B4TOP 11, W4EQK 6, N4CJ 5, AK1E 5, K4AST 4. Totals: 30 SARs, 2181 traffic.

SOUTH CAROLINA: SM, Jimmy Walker, W4HLZ— I would like to thank W0IKT for the assistance he has provided me over the past year. As you know, my job has required me to spend a great portion of time away from home, the SC Section and Amateur Radio over the past year. In October 1986, I asked John if he would write Section News for me. He said yes, and his first article appeared in February. The pressure

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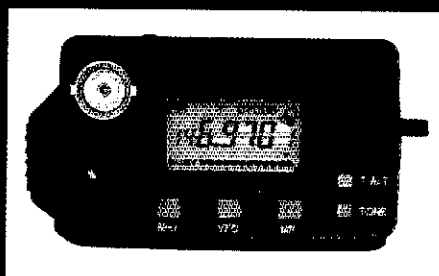
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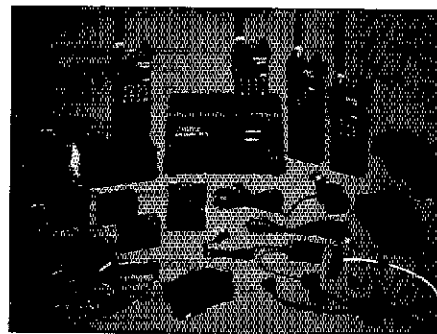


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AL-80A LINEAR AMPLIFIER

The Ameritron AL-80A combines the time proven 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 Pi-L output circuit for 80 and 160 gives full band coverage and exceptionally smooth tuning.

The AL-80A will provide a signal output that is with 1/2 "S" unit of the signal output of the most expensive amplifier on the market—and at much lower cost. Size: 15 1/2" D. x 14" W. x 8" H. Weight: 52 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. The ATR-15 has a peak reading watt meter, SWR bridge and a dual ratio balun. Size: 6" H. x 13 1/4" W. x 16" D.



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TM-221A/321A/421A

2 m and 70 cm FM compact mobile transceivers

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

• **TM-221A** provides 45 W, **TM-321A**, 25 W. The **TM-421A** is the first 35 W 70 cm mobile! All three models have adjustable 5 W low power.

• **Selectable frequency steps** for quick and easy QSY.

• **TM-221A** receives from 138-173.995 MHz. This includes the **weather channels!** Transmit range is 144-148 MHz. Modifiable for MARS and CAP operation. (MARS or CAP permit required.) (Specifications guaranteed for Amateur band use only.)

• **TM-321A** covers 220-224.995 MHz. The **TM-421A** covers 438-449.995 MHz.

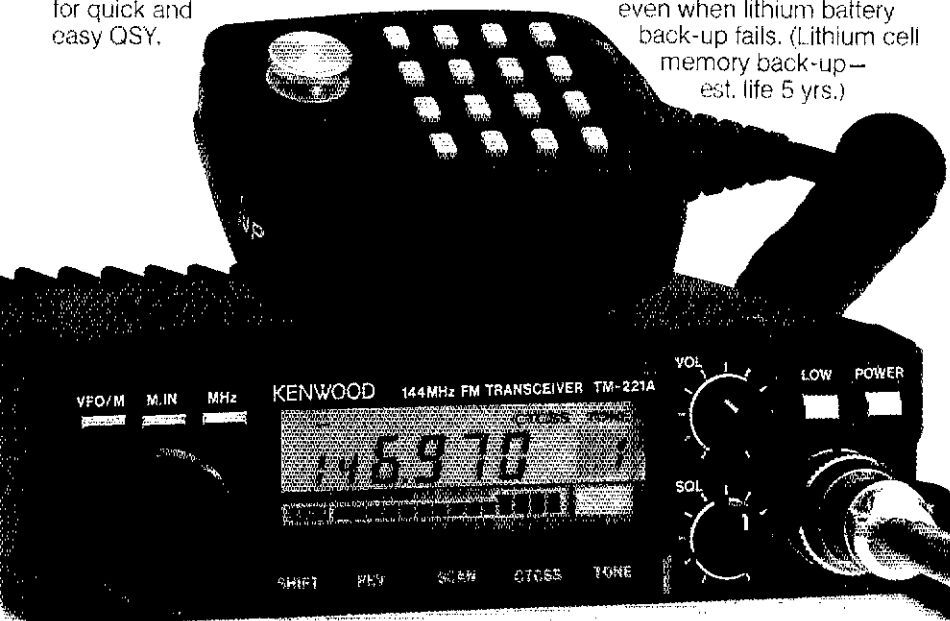
• **Built-in front panel selection of 38 CTCSS tones.** TSU-5 programmable decoder optional.

• **Simplified front panel controls—** makes operating a snap!

• **16 key DTMF hand mic., mic. hook, mounting bracket, and DC power cable included.**

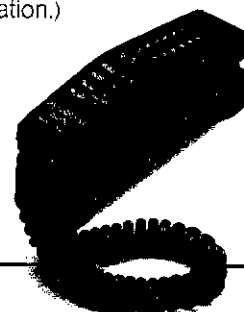
• **Kenwood non-volatile operating system.** All functions remain intact even when lithium battery back-up fails. (Lithium cell memory back-up—est. life 5 yrs.)

- **Packet radio compatible!**
- **14 full-function memory channels** store frequency, repeater offset, sub-tone frequencies, and repeater reverse information. **Repeater offset on 2 m is automatically selected.** There are **two channels** for "odd split" operation.
- **Programmable band scanning.**
- **Memory scan with memory channel lock-out.**
- **Super compact:** approx. 1-1/2"Hx5-1/2"Wx7"D.
- **New amber LCD display.**
- **Microphone test function on low power.**
- **High quality, top-mounted speaker.**
- **Rugged die-cast chassis and heat sink.**



RC-10 Remote Controller

For TM-221A/321A/421A. Optional telephone-style handset remote controller RC-10 is specially designed for mobile convenience and safety. All front panel controls (except DC power and RF output selection) are controllable from the RC-10. One RC-10 can be attached to two transceivers with the optional PG-4G cable. When both transceivers are connected to the RC-10, **cross band, full duplex repeater** operation is possible. (A control operator is needed for repeater operation.)



Optional Accessories:

• **RC-10** Multi-function handset remote controller
• **PG-4G** Extra control cable, allows TM-221A/TM-421A full duplex operation • **PS-50/PS-430** DC power supplies • **TSU-5** Programmable CTCSS decoder • **SW-100A** Compact SWR/power/volt meter (1.8-150 MHz) • **SW-100B** Compact SWR/power/volt meter (140-450 MHz) • **SW-200A** SWR/power meter (1.8-150 MHz) • **SW-200B** SWR/power meter (140-450 MHz) • **SWT-1** Compact 2 m

antenna tuner (200 W PEP) • **SWT-2** Compact 70 cm antenna tuner (200 W PEP) • **SP-40** Compact mobile speaker • **SP-50B** Mobile speaker • **PG-2N** Extra DC cable • **PG-3B** DC line noise filter • **MC-60A, MC-80, MC-85** Base station mics. • **MC-55** (8-pin) Mobile mic. with gooseneck and time-out timer • **MA-4000** Dual band antenna with duplexer (mount not supplied) • **MB-201** Extra mobile mount

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

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ALL BAND ANTENNAS

MULTI BAND TRAP ANTENNAS

TRAP DIPOLES				
Model	Bands	Traps	Length	Price
D-42	10/15/20/40	2	55'	\$64.95
D-52	10/15/20/40/80	2	105'	69.95
D-56	10/15/20/40/80	6	82'	114.95
D-68	10/15/20/40/80/160	8	146'	149.95

TRAP VERTICALS-"SLOPERS"-*				
Model	Bands	Traps	Length	Price
VS-41	10/15/20/40	1	28'	49.95
VS-52	10/15/20/40/80	2	49'	64.95
VS-53	10/15/20/40/80	3	42'	74.95
VS-64	10/15/20/40/80/160	4	73'	94.95

*Can be used without 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 - Tuner usually never required - For all Transmitters, Receivers & Transceivers - For all class amateurs - One feedline works all bands - Instructions included - 10 day money back guarantee!

SINGLE BAND DIPOLES (Kit form):

Model	Band	Length	Price
D-10	10	16'	\$17.95
D-15	15	22'	18.95
D-20	20	33'	19.95
D-40	40	66'	22.95
D-80	80/75	130'	25.95
D-160	160	260'	34.95

Includes assembly instructions, Deluxe center connector, 14ga Stranded CopperWeld Antenna wire and End Insulators.

• 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'	\$6.00	\$11.95
RG-58	90'	12.00	16.95
RG-4	50'	20.00	25.95
RG-4	100'	33.00	39.95

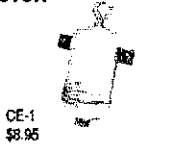
ALL BAND-LIMITED SPACE ANTENNA

- Sealed, weatherproof lightweight short-ener utilize NO rust terminals
- Perfect match for your Antenna Tuner with balanced line output
- Handles Full Power
- Works with all transmitters, transceivers, receivers, etc.
- Completely Factory assembled—Ready to install—NO adjustments necessary
- INCLUDES 100 feet of 450Ω Feedline
- Feedline can be shortened
- Only 70 feet overall length!
- Works All Bands 160 thru 10 Meters
- Perfect for ALL classes of Amateurs
- Install as Flat-top, Sloper, Inverted V, or almost any configuration
- Shorteners provide full 135 feet electrical length; with only 70 feet physical length
- Utilizes Heavy 14 gauge stranded CopperWeld (CopperWeld) antenna wire, 100% copper; 70% high-strength steel! NO rust, Will not stretch like copper

Model AS-2 \$49.95 (U.S. Postpaid)

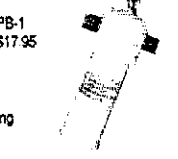
DELUXE CENTER CONNECTOR

- NO RUST Brass Terminals
- NO Jumper Wires Used
- NO Soldering
- Built-in Lightning Arrestor
- With SO-239 Receptacle
- Handles Full Power
- Completely Sealed & Weatherproof
- Easy Element Adjustments
- Commercial Quality



"PRO-BALUN"

- 1:1 For Dipoles, Beams & Slopers \$17.95
- Handles Full legal power
- Broadband 3 to 35 Mhz.
- Lightweight, Sealed & Weatherproof
- Deluxe connectors require NO soldering
- NO jumper wires
- Minimizes coax & harmonic radiation



DELUXE ANTENNA TRAPS:

- 1 1/4" Diameter
- Completely Sealed & weatherproof - Solid brass terminals - Handles Full Power - NO jumpers - NO soldering. Instructions included.
- For 4-band Dipole Ant. 40/20/15/10 \$38.00pr.
- For 5-band Dipole Ant. 80/40/20/15/10 \$38.00pr.

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of this job is not so great when you have volunteers such as John who will help when you ask. THANKS JOHN!! A second individual I would like to thank is WB4UDK. Aubrey is the guy on the other end of your radio with those silly jokes and the one willing to help if he can. He collected your reports for me and held them until I returned home. THANKS AUBREY!! Some of you have asked me—Why don't you write Section News articles the same length as NC or VA? The answer is simple. The number of lines is allocated by the number of ARRL members in your Section. If you want me to write longer articles, RECRUIT more MEMBERS. Traffic: K4ZN 185, W4AKN 116, KB4BZA 104, WB4UDK 50, K4ALHM 46, K4AYEA 38, W4DRF 22, NETS (Mar to Oct): SCSSB 7078/556, York 4629/832, GPD 4044/534, Lancaster 1033/100.

VIRGINIA: SM, Claude Felleg, W3ATQ—STM: KB4WT. SEC: N4EXQ. ACC: NT45. OOC: W4HU. BM: AB4U. TC: WB4MAE. SGL: W4UMC. PIO: A44VP.

VIN	1 PM	3807	KB4NGO
VSN	6 PM	3947	K4IBR
VN	8:30 PM	3680	N4KSO
VN (EARLY)	7 PM	3680	N4GHI
VN (LATE)	10 PM	3680	WB4KSG
VLN	7:15 PM	3947	K4JMF
STATES	10 PM	146.82	NT45
		146.77	J4T

Welcome to the Massanutten Amateur Radio which meets at the Eastern Mennonite College under the sponsorship of Curt K9CH, a former staffer of League headquarters who is now located at the college. WB4ZTR, EC for Frederick county operates a FB SET exercise for the county ARES group.

Likewise, KB4OPR, sez the Gloucester ARES members participated in a simulated "Lost Person" search. K4ZIM was the lost person who was tracked by the hounds and the ARES members supplied the communications. The Rappahannock club operated a Special Events station under the call AA4HQ at the Urbana Oyster Festival. W4HU, our OOC, appointed N4QJA as an "OO." To date, 35 ANNUAL reports have been received from ARRL affiliated clubs this is about an 80% response. If your club has not submitted a 1987 report you are subject to being placed in a non-affiliated status. If report forms are needed contact the SM or NT45. WB4ZTR has qualified for the PSHR certificate. To receive this award one must qualify for the PSHR Honor Roll for 12 consecutive months, or for 18 months out of a 24-month period. AA4AT is busy coordinating the VE exam schedule for the Tidewater area in 1988. Thanks to NK4U for the exam schedule for northern Virginia. Feb. 6, Shenandoah Valley ARC, Middletown-contact NC4B. Feb. 20, Vienna Wireless Soc, Vienna-contact NK4U Traffic activity for the month continues strong with 46 stations reporting a traffic count of 4414. K4DOR and N4GHI qualify for BPL. To date Gen, N4GHI, has qualified for the BPL for 33 consecutive months, an OUTSTANDING record. She has missed qualifying for BPL only 3 months since May 1984, with all of you a very Happy and Merry holiday season.

WB4AT, hope Santa has been good to you and brought you, your dream equipment. I wish you the best for the coming year, I am looking forward to another year of amateur operating with you. Again, if you have any comments on the operation of the section please let me know. Just received—Gil, K4JST, has resigned as 4RN Net Mgr. and will assume the post of 4RN Packet Mgr. K4WJR is the new 4RN Net Mgr. for cycles 3 and 4 effective Dec. 1, 1987. Traffic: K4DOR 536, N4GHI 510, W3ATQ 285, W4JLS 236, AA4AT 232, WD4FTK 199, WB4PNY 170, KB4WT 159, K4MTX 155, K4JST 154, NG2H 108, WB4KSG 108, K4TMI 107, WB4EDB 105, N4EXQ 93, KB4NGO 83, W4JUM 87, K4BZU 86, W4OCV 84, W4AALY 74, K4JH 70, AA4GL 61, WB4ZTR 57, W4TCZ 56, N4KSO 52, K4BGZ 50, KB4JA 46, K4JIM 43, W4ALTO 37, K4KDJ 36, N4NQC 33, WB4ZBN 33, KB4OPR 32, K4K4V 27, NT4S 27, NN41 23, K4JW 17, K4AXF 12, K4MLC 12, K4GH 10, N4FNT 9, WB4KIT 9, W4ATVS 6, W4YE 0, K4VWKK 2.

WEST VIRGINIA: SM, Karl S. Thompson, K8KT—SEC: K8QEW. STM: N8FXH. SGL: K8BS. ACC: W8ACT. Rpt Coord.: W8BOZT. N8HIO is now K8EOK. Nice call, Joe. Regret to report K8ZNX and K8CYW have become Silent Keys. W8YP is much better and agn active on nets. Tri-counties club ran special event station on Nov. 11 from Nitro WWI Memorial.

Net	Freq	Time	QNI	OTC	Sess	NM
WVFN	3865	6:00	992	115	31	WBYP
WVMD	7235	11:45	671	43	31	WBZFP
WVIR	3640	6:30	266	32	31	K8LJ
Hillbilly	14290	noon	Su	110	4	WBYP
WVNN	3730	5:30	99	39	28	WB8DL

Traffic: K8BWN 263, K8BTK 252, KBTFP 224, W8BDDHC 201, K8DEW 86, W8FZP 76, K8UQY 67, N8FXH 59, W8YP 57, K8BFI 54, K8WXX 54, W8JWV 34, K8KT 3, K8AGGF 12, NC8G 7.

ROCKY MOUNTAIN DIVISION

COLORADO: SM, Bill Sheffield, KQBJ—ASM: K8MQA. SEC: WB8TUB. STM: K8BZ. ACC: WB8DUV. OOC: K8BUD. PIO: N8DZA. TC: WB8J. SGL: WB8FQB. 1987 saw a major change in Amateur Radio with the Novice Enhancement Program, and as a result, many new 220 MHz repeaters have been going into operation along the front range. If you have 120 or 10 meter capabilities, get on the air and welcome the new Novices to the Amateur ranks. I would like to thank all of the Section appointees for your efforts in ARES, NTS and many numerous public-service events. My thanks also to the many Volunteer Examiners for the numerous VE Tests throughout the Colorado Section. We also have had two fine upgrade schools here in the Metro Area. ARN and DRC Amateur Radio Schools. Novice classes have been run for amateurs by most of the major repeater clubs in the state. My thanks also to the editors of the club newsletters for including me on their mailing list. This has been a tremendous help in keeping me informed of the activities going on in the various communities. From the Section Leaders, we wish all a Happy New Year. 73, KQBJ. Nets: QNI 146, OTC 146, SGL 146, EBS 146, QNI 255, QTC 146, QNI 463, 40 SESS, SGT: QNI 57, QTC 146, QNF 257, 27 SESS, Col: QNI 1157, QTC 59/137, QNF 1034, 31 SESS, HHN: QNI 1947, QTC 116/571, QNF 1929, 31 SESS, Traffic: K8QNI 334, N8HFZ 246, K8HQA 148, N8HMR 126, K8BZ 102, WB8FFV 93, WB8BSZ 62, W8NFW 18, K8WIE 50, K8BFI 7, WD8AIT 2.

NEW MEXICO: SM, Joe T. Knight, W5PDY—ASM: K5BIS. SEC: K5YEJ. DEC: W5DHC. STM: NDST. NMs: W5UNO. K6LL W5QNR. TC: WBGY. ACC: K5BEM. Southwest Net (SWN) meets daily on 3533/7083 at 0230 UTC and handled 1171 checks. New Mexico Roadrunner Net meets daily on 3939 at 0100 UTC and handled 81 msgs with 1171 checks. New Mexico Breakfast Club meets daily on 3939 at 6:30 AM and handled 155 msgs with 1077 checks. Yucca 2-mtr Net 78/18 handled 41 msgs with 379 checks. Caravan Club 2-mtr Net 66/08 handled 130 checks. SCAT Net 66/08 handled 8 msgs with 694 checks. Info Net 13/73 with 90 checks. Our good rapport with AZ continues as some 1300 hams gathered in Scottsdale for the ARRL W5 Div. Convention with many New Mexicans attending. VERA Winter, Vice Dir. RMD, AF5E, W5FJE & K5TL. Will certainly miss them all. ABQW (K5TU-1) new Mt Taylor DIGI working FB. SAM (N0FZM-1)

new San Antonio Mt DIGI working FB. New 8-day dipole ant on 34/94 Mt. Taylor. Traffic: NDST 566, KN5D 74, W5DAD 72 & KB5UL 52.

UTAH: SM, Jim Brown, NA7G—SEC: Rich Fisher, NS7K. STM: John Sampson, W7OCX. New OOC: Bill Bradford, K7EA. Congrats to N7JLC in upgrading to Extra. SL Emergency Services Net meets each Wed. at 8 PM on 147.54 (1st Wed. of Month on 146.88 rpt.) N7BQE reports ARES activated for missing family between Page and Las Vegas. They were found safe. W4VYJ reports FB cooperation between W7OHR and W4PKL clubs in UT Co. I CARW will be linking into Salt Lake by next summer. 73 de N7G. Traffic: W4KHE 65, W4JLC 54, N7JLC 43, NA7G 25, NS7K 24, N7JUN 12, W7OCX 38, N7BQE 2.

WYOMING: SM, Jim Ralsier, N7GVV—ASM: Steve Cochran, W4TH. SEC: Jim Anderson, W7TVK. W7KRF reports that the Carbon County ARES conducted a simulated drill on Sept. 13 at the EOC in Rawlins. The drill involved a chemical spill in the North Platte. The amateurs providing communications for authorities who were monitoring pollution levels. 80 M, 2 M and packet radio were used. The test was successful. K47SGQ, W7KF, K7F8U, W4TFLT, K4USUJ, K7HBB, K7EXE, and W4YWA participated. Great job, and their report receives an A. Want a copy? N7NH wrote me a very good write up with lots of recommendations. The Campbell County ARC held their 3rd annual Halloween Patrol aiding the local Police. The Sheridan RRL held a special SET in a public parking lot, helping advertise our service, and Chet up Cody way made the headlines with Boy Scouts the guests at his ham shack. Area 4 ARES is now operating covering 5 of Wyoming's Counties and that's a lot of coverage. Traffic: N7NH 217, K7JZS 25, State ARES sessions: 138 QNI, Sweetwater ARES-4 sessions, 49 QNI, Area 4 ARES-9 sessions, 53 QNI, Albany ARES-4 sessions, 25 QNI, Cowboy-22 sessions, 759 QNI, 6 QTC. Gillette held its first VEC thanks to W47B. W47D and N7CR. (Sept.) N7NH 448. Cowboy Net held 22 sessions with 656 QNI and 8 QNC.

SOUTHEASTERN DIVISION

ALABAMA: SM, Joseph Smith, W4ARNP—STM: N4JAW. SGL: K4AALQ. BM: K4FAT. OOC: AL4AAB. TC: N4JAW. ATC: W4BYV. ACC: W4ARNP. SEC: W4ARNP. Here are the new officers of the enterprise are: President N4JAG, Rick Paulsich; Vice President W4A4KG, Cliff Ohlenburger; Secretary KB4BMA, Jim Garrison; and Treasurer W4FOS, C.W. Pate. I am glad that the "B" net late session is in place. So check in at 10 PM local time at 3575 and try your first at cw traffic handling. I have a Silent Key report this month: K4WHZ, Willie G. Edwards of Talladega. He will be missed. Traffic: cand reports 697 messages in 31 sessions with DRN5 Rep 100% by W4AJDH, and W4KCS. DRN5 reports 673 messages in 62 sessions with Alabama Rep 98% by W4AJDH, W4KCS, W4M4X, W4PIM, and W4IBU. RNS reports 522 messages passed in 62 sessions with Alabama Rep 94% by W4AJDH, W4KCS, W4M4X, W4PIM, and W4IBU. W4ALQ, W4JJD, W4FAT, and W4PIM. AENB reports 30 messages passed in 30 sessions with other Nets rep by W4AJDH, W4KCS, W4QAT, and N4DCS. AENB reports 67 messages passed in 45 sessions with RNS rep by W4AJDH, W4KCS, W4X4I, N4RT, W4B4LQ, W4AZPZ, W4PIM, and W4QAT. AENB reports 104 messages passed in 35 sessions. BRASS POUNDERS LEAGUE: W4AJDH, PSNR: W4AJDH, W4KCS, W4PIM, and W4ARNP. Totals: W4AJDH 270, W4PIM 278, W4KCS 162, W4ARNP 63, K4HJX 56, W4AZPZ 37, W4DGH 28, K4AOZ 14, and WB4TVY 4. Very Seven Three Joe.

GEORGIA: SM, Eddy Kosobucki, K4JNL—ASM & ACC: W4AABY. SEC: NC4E. STM: W4B4WQ. Asst. STM (Packet) W4QCO. BM: W4B4ZJ. OOC: N441. PIO: W4B4DEB. SGL: WB4UVV. TC: W4PAH. NC4E informs me that the section had a very successful SET & that activity was FB throughout the state. TNX for the efforts. I see get them reports into Jack, if I haven't done so. At the W4B4WQ, I saw the Ga. Coordinator Net leader Pres: WAHON, VP: K4DNH, Sec/Treas: W4A4UQ. Packet in the Ga. section is at an all time high. Jim, W4QCO, informs me that Packet traffic is flowing into the Atlanta area very well, but other areas should arrange liaison. Contact him for further details. W4QCO also publishes 32 page Georgia Traffic Routing Guide. \$4.00 P.P. to Callbook address. I have one & they are informative. Once again the Colquitt County HRS participated in Sunbelt "87 EXPO." If I'm interested in farm equipment that's the place to go. I couldn't attend but the S.E. DX club did it again. DXPO '87 was another huge success. GUD going gang. The Ga. section clubs & groups publish some of the finest newsletters in the country. From Janur to mid June, I am offering three plaques for the best in the section. In order to make the judging fair, I have asked our Section Director, W4RH to be one of the judges & an SM from one of the surrounding sections. That will make three of us. So editors you all have done a good job, so let's keep it up & let's see who the three top placers are. I had the opportunity to attend the Hamfests at Rome, Warner Robins & Lawrenceville. All had good attendances & FB weather. I'm going to mention this anymore this year but if I'm planning one for '88, NOW is the time to contact Mrs. Bernice Dunn at ARRL, 225 Main Street, Newington, CT 06111 for the necessary paperwork if you desire an ARRL sanctioned HAMFEST. HAMFEST NEW YEAR TALL. Traffic: W4QCO 180, W4B4WQ 19, W4MLE 75, W4PG 5, K4JNL 28, K4B4I 28, K4N4Z 10, K4A4HE 24, W4AAB 18, K4B4I 16, W4HON 14, N4ZU 10.

NORTHERN FLORIDA: SM, Roy Mackey, N4ADI—ACC: Giff W4ARIC. ASM: Bill, KB4LB. OOC: Davy N4GMI. PIO: Patey W4A4UQ. SEC: Rudy, W5PUP. SGL: John, KC4N. STM: Rip, AA4HT. TC: Ed, W4RAO. There's a change in our Section with N4GMI coming to help with the On-the-Air Bulletins, and to help get them out to cover the Section. He takes over from KB4LB who has done this job for a number of years, and for his fine efforts we wish to thank him! He will still be our ASM, and for that I am very grateful. Three times this year Wimpy has filled in for me, and we didn't miss a step. We wish Dave, N4GMI, good luck and success in getting more stations to assist as OFFICIAL BULLETIN STATIONS and to have them all send their monthly reports which he needs to report our activity to ARRL. If you would like to assist this important endeavor, send me a SASE for an official application form. This is the time of the year when a lot of us are helping with Public Service activities, such as hamfests, flea markets, parades, festivals, message centers in malls and numerous other good deeds. Please send to your ECs get a write-up covering these events so that they may report it to ARRL. We need to document all our Public Service involvement, since that is one most important reason for us to have and hold Licenses from the FCC. Thanks to all the EDITORS who are mailing their club newsletters to me. We wish all of you a very happy holiday season, and all good wishes for a prosperous New Year. 73, ROY. N4ADI. Traffic: W4H4 524, N4PL 449, W4AQXT 373, W4D4IO 270, AA4HT 268, KC4VX 144, KB4LS 141, N4GMI 132, W4C4D 122, W7WYF 117, N4J4Q 109, K4AYLH 97, K4CY 79, W4B1E 76, AA4QO 7, W4PUP 70, W4M4UI 50, W4J4E 39, W4M4YU 38, K4B 38, W4U4E 38, W4A4H 52, N4J4H 50, W4DTP 29, WB4TZR 28, N4C4D 39, K4A4KH 22, K4CQ 22, N4U 20, N4ADI 20, W4D4Y 19, N4OP 18, W4A5SXW 17, N2AOX 15, N54C 14, K4JNL 12, W4B4AWG 12, K4JHS 12, K4F4G 12, N4IIP 12, W4B4WPI 9, K4JRD 9.

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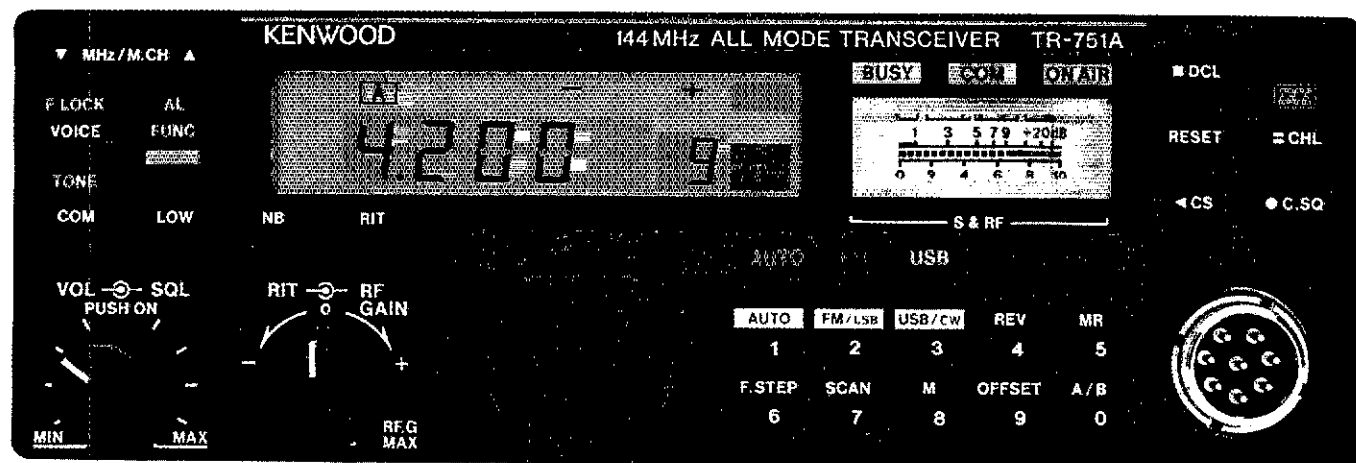
- Optional front panel-selectable 38-tone CTCSS encoder
- Frequency range 142-149 MHz (modifiable to cover 141-151 MHz)
- High performance receiver with GaAs FET front end
- VS-1 voice synthesizer option

- 25 watts high/5 watts adjustable low
- Programmable scanning—memory, band, or mode scan with "COM" channel and priority alert
- 10 memory channels for frequency, mode, CTCSS tone, offset. Two channels for odd splits.
- All mode squelch, noise blanker, and RIT
- Easy-to-read analog S & RF meter

- Dual digital VFOs
- Semi break-in CW with side tone
- MC-48 16-key DTMF hand microphone and microphone hook included
- Frequency lock, offset, reverse switches
- Digital Channel Link (DCL) option

Optional accessories:

- CD-10 call sign display
- PS-430, PS-30 DC power supplies
- SW-100A/B SWR/power meter
- SW-200A/B SWR/power meter
- SWT-1 2 m antenna tuner
- SWT-2 70 cm antenna tuner
- TU-7 38-tone CTCSS encoder
- MU-1 modem unit for DCL system
- VS-1 voice synthesizer
- MB-10 extra mobile mount
- SP-40, SP-50B mobile speakers
- PG-2N extra DC cable
- PG-3B DC line noise filter
- MC-60A, MC-80, MC-85 deluxe base station mics.
- MC-43S UP/DOWN mic.
- MC-55 (8-pin) mobile mic.
- MA-4000 dual band antenna with duplexer



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TR-851A

70 cm SSB/CW/FM transceiver

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See the TR-751A product review in our March 1987 issue.

SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PFFK—SEC: WA4SS, STM, K4ZK, TC: K4JT, BM: WD4KBW, PIO: WA4WYR, SGL: KC4N, OOC: W4TAH, ACC: K4EUK, WD4KBW reports 65 bulletins received and 114 sent by AA4BN 22, W4DL 47, WA4EIC 37, WT4F 20, WD4KBW 11, K4IEK 13, and WA4RLV 29. The following stations, clubs, nets reported their SET activities to me: KA4NXX, K4YHS and the SEFTN, WB4AID and FMTN, Lake Wales Repeater, WA4EIC, K4SCL, WB8VLR, W4GPL, WT4F, W4YIT reported that the Dade County ARES/RACES conducted their SET with great turnout during Hurricane Floyd. W4VBQ, Hurricane Center Coordinator for the National Hurricane Center, reports that the Center was activated at 1000 Z October 12th for Hurricane Floyd and secured at 1200 Z on October 13th. Over 100 pieces of info were received from Hurricane Watch members and given to Center forecasters. All bulletins from the Hurricane Center were broadcast to net. Ten operators manned the station with excellent results. Congrats to WA4QXT who has been named manager of 4RN, Cycle Two. Had a note from AA4WJ who has volunteered to take over the newsletter for the Brandon ARES. He is looking for a good used HF rig to get back on the air. AA4WJ also says he'll see us on QFN or Miami, whichever comes first. KB4XE sent a radiogram stating that local Amateurs assisted Coral Springs with their Our Town Festival October 24th. Hams served as parade marshalls while communicating on a simplex net with net control at the two-meter ham rig in the police department. Hams participating were: WA4BC, WB4BDE, K4AZ, W4CUM, K4KENS, K4OAGM, K4HDE, AA4JG, W4BSJFM, W4MCL, W4AJL, W4NFJ, K4ANO, N4NRC, KE4PT, WB4QLN and KB4XE. Had a note from W4JM saying he is getting over an operation, feeling great and his antennas are all re-done for the season. WA4HHD hopes to have his book on the history of QFN published in about six months. He has been unable to locate K4EHY or K4NVD, both former bulletin editors. WA4HHD IS STILL IN NEED OF 1984 BULLETIN OR OTHER INFORMATION SOURCES FOR THAT YEAR. If you have ANY information that would make this book more complete, please contact WA4HHD as soon as possible. He is in FL. Myers, and can be found on QFN Tuesday nights where he has been NCS for over twenty two years. You may remember that several months ago W4LCA reported that he was doing phone patches for the RV Knorr when the ship discovered the Titanic. W4LLA now reports that the RV Knorr left October 30 for a year trip all over the world and he is once again running phone patches for the ship. The ship's radio officer is Butch Smith, K1HO, from Davis, Florida. W4LLA has been running patches for the Knorr since 1970! Thanks for a job well done, Gill! The following is from the Palmetto ARC newsletter, Bug Juice: Quote HOW I BECAME A "HAM" by Jonathan K4AU. When I was 13 years old in 1921, my older brother bought a crystal set and a pair of Baldwin earphones from a ship operator who lived near us. We became good friends and he taught me how to make crystal sets that cost 60 cents in material and sold for \$18. He also took me over to his home and showed me how to construct a transmitter and license so I began to study the code. In 1925 with the help of Joe Goldstein, 2CRB who lived ten blocks away from me, I passed the code and the written exam and got my first license, 2APD. I found out why it took me so long to learn code. I memorized the letters EISH with E one dot, etc. and the letters TMO and you can figure that one out. My first rig was a crystal set, a Ford spark coil, a helix and a long wire for an antenna. That is how I "worked bootleg" 2CRB and met him. He gave me code practice until I learned how to copy 12 wpm. I think it was 12 at that time and was changed to 13 because it is an unlucky number. So that is how I became a ham. Unquote. Remember to check in to and/or listen to the APRIL Information Net, Saturday, October 20, 1984 KHz. 73 de WA4PFFK, 1st. W3GUL 2300-2330W 886, K4SCL 397, WA4PFFK 331, WA4RUE 310, K4ZK 244, K4ANXF 244, WA4SS 198, WA4RLV 192, K4FZI 168, W4NFK 167, AA4BN 157, WB4WYG 145, W4V5Z 136, K4IA 124, WA4VND 120, K4EUK 117, W3TLV 116, K4YHS 114, WD4KBW 111, WA4EIC 101, KB4KXV 88, KB4MON 88, N4ET 85, W4TAH 81, W4DL 73, WB4AID 60, N4KB 55, K4ZW 54, K4ASIH 47, N4MML 46, K4JWJ 44, WT4F 43, KB4UIA 42, N4ORZ 42, KF4RL 41, WB4GCK 32, K4RGY 28, N4COI 26, K4FOU 21, KB4FO 20, K4AMC 20, K4JI 19, K4YV 17, N4PFO 16, AA4CH 16, WA4HDI 16, W3JR 15, WA4VWJ 15, WD4EAP 14, K4RUL 13, W4NIX 12, N4XG 12, K4SAKY 11, KB4YJF 10, K9ALX 9, WA4PIL 7, KB4EWO 7, W4NSY 7, N4QER 6, W4DWN 6, W4MFD 4, K9EHP 4, K4AGR 4, K4AGDU 4, N4QGX 3, W4K4Y 3, W4MPV 3, N4PSV 3, N4RHJ 2, WA4LGT 2, N4LLZ 2, K4Y8Y 1, W4TKQ 1, (Sept.) K4IA 151, K4FQU 24, K4YV 14.

WEST INDIES: SM, Jose A. Purcell, Jr. KP4IG—PIO: NP4XM, SEC: KP4JV, BM: KP4EW, TC: KP4ARY, SGL: WP4CSG, NM-WINS: KP4DJ, NM-WINE: VP2VI. The WINC Net has been closed temporarily due to several reasons. Please route your traffic through WINS on 3710 kHz. Congrats to NP4QI as new Pres. of the FRAPR. Our best wishes of success to Marcos and his staff. Special Thanks to KP4JW and NP4WI for their outstanding contributions to the West Indies. Both Wilfredo and Eric have some difficulties to perform their respective duties with the league in PR Nets—WINS: 31 sessions, QNI 112, QTC 7, WINE: 29 sessions, QNI 69, QTC 2.

SOUTHWESTERN DIVISION

ARIZONA: SM, Jim Swafford, W7FF—STM: W7EP, NMS: K6LL, K7POF, WB7CAG. Congrats to Jim Cushing, KD7FW, Chairman, and all the rest of the gang at Scottsdale ARC for hosting the SW Division Convention Oct. 9-11. It was a great show with approx. two thousand attendees including Barry Goldwater, K7UGA, Larry Price, W4RA, Dave Sumner, K1ZZ, Jay Holladay, W6EJJ, Chris Imlay, N3AKD, Fried Heyn, W6WZO, Wayne Overbeck, N6NB, and other League Directors and Section Managers. Quite an impressive gathering of league officials. Good technical program and APRIL forum including a two-hour session on antenna restriction legislation. SET test in Pima Co. went well under leadership of K7KYV, DEC. Ninety-two stations participated in the drill with one hundred third-party messages handled with both Pima and Cochise Co. hams involved. Congrats to Gary K7RDH reports that Gert, W7KQY, is back home recovering from another stroke. She is monitoring ZIA daily plus 146.94 and would like to hear from her many friends on two meter FM. ARA reports supporting the Palos Verde Nuclear Generating Stn. Siren Test on Oct. 14 using forty-two hams operating HT's and mobile rigs. Good work. We have only two SSC (Special Service Clubs) in this Section. These are Green Valley ARC and Coconino ARC. There are extra benefits for clubs that qualify for SSC such as Awards Management. For info contact SM or ACC, Bob Drake N7ECE. W7YS still giving VE tests in Flag and reports local ARES net meets 7 PM local on Wednesdays at 147.08. K7MUL made BPL again in October. Congrats, Mike. Your SM back at home QTH in Tucson for the winter. Send me your reports and news of your activities. 73, JIM

NET	QNI	QTC	SESSIONS
SWN	247	119	31
ACN (HF)	703	73	31

GENERATION GAP?

I don't believe that any of the similar-appearing amplifiers that have shown up over the past 17 years has even approached the ruggedness and reliability of an ALPHA. ETO's three-year limited warranty and personal, responsive service is still pretty much in a class by itself, as are many of our technical innovations—such as RF interlocked QSK. But now I think the ALPHA 86 has opened up a whole new generation gap between itself and other amateur amplifiers by introducing a number of useful capabilities that you probably won't soon find elsewhere.

- Serious operators have for years recognized the advantages of silent, super-fast PIN diode T/R switching. *But only the ALPHA 86 offers the convenience of built-in PIN T/R and QSK that's easy to use with any popular transceiver.*
- Even though FCC power rules now are stated unambiguously in terms of peak RF output, linears that actually display peak output are rare. *Only ALPHA 86 provides multiple LED bargraphs that let you simultaneously keep an eye on PEP output, reflected power, and grid current... plus HV or plate current at the touch of a button!*
- No doubt some old timers at first will miss meter needles swinging away, but d'Arsonval movements are rapidly going the way of slide rule dials—replaced by more functional and mechanically less temperamental new techniques.

- ETO specifies unequivocally that the '86 will deliver 1.5 kW RF output—SSB/PEP, CW, or carrier—with no time limit. The only conditions are that it be connected to a load impedance within its ratings and tuned properly. I doubt that you can get that kind of statement in writing for any other self-contained desk top amplifier.

- A very special transformer allows the ALPHA 86 to deliver 1,500 watts of CCS RF output from a one cubic foot box. Our transformers use unique winding techniques and insulation systems that are labor intensive and thus very expensive. We could buy very good transformers for less than half the price, but these help make ALPHAs exceptional—so we pay the premium.



IT WON'T DO THAT

Several readers have asked if the ALPHA 86 actually will deliver 1,500 watts output in *STANDBY* as a previous ad seemed to suggest. No. The photographer didn't follow instructions, we didn't catch his goof, and a little embarrassment serves us right.

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One of the popular DX newsletters commented a few years ago that ALPHA amplifiers exemplify ham equipment designed by people who know what serious operators want. Until a few years ago I did most ALPHA design work myself. The results reflected many hundreds of hours previously spent home-brewing amplifiers because nothing available commercially met my needs for DXing and contesting.

The ALPHA 86 embodies more than 65 years of professional electronic engineering and 130 years of amateur radio experience. It reflects fundamental ETO philosophies and incorporates many ETO-proven components and techniques. It's unquestionably the most thoroughly tested and evaluated ALPHA we've ever introduced. All of us at ETO are proud of the ALPHA 86—our new, all-out, no compromise *BIG GUN*.

73,



Dick Ehrhorn

Dick Ehrhorn,
W4ETO

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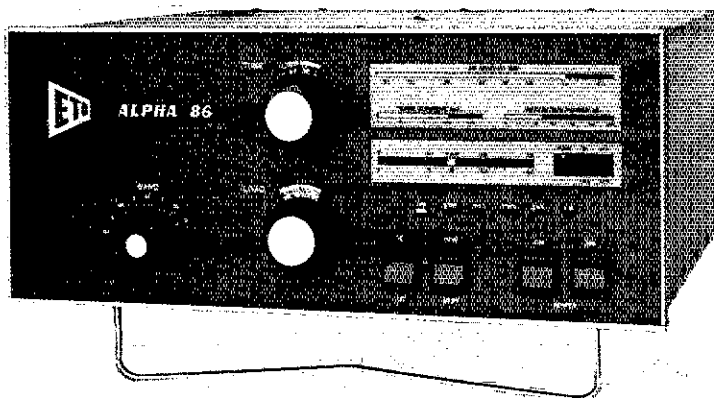
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 W7EP 95, WB7CAG 90, K7NB 75, W7KCM 67, K7JUM 48,
 N7ETP 36, K7POF 28, K7RDH 25, W7GAQ 16.

LOS ANGELES: SM, Phineas J. Icenbier, Jr. WB6F—The Los Angeles County population is now over 8.3 million and the LA County Fair is the largest county fair in the World. Pat McNulty, N6GXZ was the spark plug who spearheaded the Educational booth at the Fair and she is already working on next years show & tell for Amateur Radio. Special Certificates and QSL cards are scheduled to be distributed. The Los Angeles Council of Amateur Radio Clubs (23 LA Clubs) was the official sponsor. Approximately 17 LA County Radio Clubs worked this event and our congratulations are in order to each and every one who put in booth time. The new ARRL Video tape was shown continuously during the fair. Please call Pat now so that your Club can have a day reserved where your club members can have a day together at the fair with free parking and other perks. The operation so impressed Fair Officials that Pat was granted a permanent booth space assignment at no cost for the LA Clubs. W6YAR, John's daughter is TL8DN. Margie has been on the FRIENDLY E T DX Net several times during the last few months (usually Thurs.). My neighbor George, WA6WXP, has been speaking to Ham groups about his extended trip to Russia and Siberia, where he set up a Ham Radio station. Joseph H. Cira is the LA ARRL Affiliated Club Coordinator (818) 584-9071 or 304-1239. Joe is the guy who publishes the FCC Exam Schedules for the Los Angeles Area. Joe has accepted the new job of GENERAL CHAIRMAN for the ARRL S.W. Division Convention 1989, yes 1989! THE HAMCON 88 is Sept. 2/4 at the Disneyland Hotel, Anaheim, CA. Joe needs help now so please call him if you can help. The So.CA. Six Meter Club would like to announce that they now have a 10 meter Net on Tues. 8:30 PM pst on 28.4 MHz SSZ. W6AE, Fred president of the DX Club has lots to say but doesn't want it printed. He did say, even when, everything is perfect he receives a few complaints. The DX repeater is well and the meetings have returned to the Q.W. & Power thanks to TEX, N6AHV. According to the So. California Community Club, Ron Boan AK5Y, SEC for the LA Section was on a panel at the SCARRC meeting for Earthquake Disaster Communications along with Vi Barrett W6BCA, and Terry Knott, W6QMP director of Communications at the Whittier Red Cross. Our latest new hams in LA are N6QBW, Robert S. Sawyer Long Beach and N6QCA, Philip L. Baird, Woodland Hills, congratulations! The SECTION MANAGER needs more good hams who will and can work! STM News: Band conditions have been up and down recently due probably to weather conditions. The traffic gang has been doing a great job. Holidays will be upon us soon, and we need all the help we can get. W6VPY had rig problems, but back on the net now. New operators recently are VE6AW and W6TH both very excellent operators. Let's keep it up. We need you. Traffic: K6UYK 621, N6LHE 456, W6INH 253, N7CZF 124, W6TH 114, W6NKE 17.

ORANGE: SM, Joe H. Brown, W6UBQ—ASM: Bob, W6LKN 14 886 3828, Riv Co. ASM: Ralph, W6BAC 14 76 9272, Riv Co. ASM: Tony, W6BQB 14 981 1838 SB Co. ASM: W6LBB RACES Officer and DEC for SB Co. has completed the New RACES plan for that county using state OES Guidelines. The VIP program is also being activated. Good work, Perry. In Riv Co the rewritten RACES plan was approved by Emergency Services Division and the Riv Co Fire Dept. In Orange Co., the RACES plan is on hold, but the ARES Group under Corky, N6HQL, is moving forward. Pacific Telephone is setting up an Amateur response unit and will be headed by an ARRL Emergency Coordinator. Congratulations to W6FKN and the 145.45 repeater. I think every EC in the Orange Section monitored the machine and passed info to public service people during the Oct 1st shake. Fun time club activity. Fred, W6TKV, has won the first Circle City Contest, CA QSO Party. A diamond and ruby studded solid-gold trophy was presented. (I don't believe it.) The Leo DeForest HC has a Packet committee chaired by Donna, N6OKS. She is the gal that put Riv Co on the map. A request from FEMA at Los Alamitos to pass three mgs to Washington DC and two other locations. Well, Donna handled all on packet and Dick, K6CID, did the SSB bit on 20 M. The success of this assignment was because of your efforts. TNX NTS News STM, Dan W6FO. The Silverado fire saw an integration of packet, cw and voice along with interaction between NTS, ARES/RACES and MARS. A portable packet station was set up by ARES/RACES at Irvine Park to generate welfare msgs for fire victims. The portable station was WA6VKZ who forwarded traffic to W6FO-1 acting as the NTS Gateway. Approx 75 messages were handled. Traffic was routed to NTS CW/Voice Nets, packet networks, and MARS. SCN stations were N6LHE and K6UYK. This was a successful and fun operation. Have been working with Don, N6BA, and Jim, K6YK, on updating the NTS/Packet Interaction (Jim & Don) do most of the work. Besides supporting NTS addressing and forwarding, the Westnet BBSs are being coded to recognize zip code forwarding. Also, we now have NTS section BBSs. SCN stations should be checked daily by SCN stations. NTS BBSs are W6LXU Santa Barbara Section, AJ6F-Los Angeles Section, KD6G-2 Orange and N6QOW San Diego Section. PSHR, W6FO, WA6QCA, KA6HJK, KA6TND, WB6QBZ, N6QBJ. For NTS info, call 714 778 8496.

NET FREQ TIME Z SES ONI QTC NM
 SCN1 3598 0230 31 308 302 W6FO
 SCN2 3598 0415 28 156 69 W6FO
 SCNV 146.645 0500 31 327 236 WA6QCA
 BBS Messages forwarded, KD7XG-1 121, KD6SQ 327. Traffic: W6FO 590, WB6QBZ 136, KA6HJK 131, K6ZCE 106, AD8A 88, WA6QCA 76, N6GOT 70, KA6DND 20, WB6CPB 26, N6QBZ 22, W6SX 14, KA6GND 11, W5ZTN 6, W6NTN 5.

SAN DIEGO: SM, Arthur R. Smith, W6INI—SEC: W6INI. PIO: K6GLE. TC: N6JZE. STM: N6GW. N7HAW spearheaded the Amateur Radio support of the Red Cross during the Palomar Mtn. fire, Oct. 3 thru 12, with the Palomar ARC rpt (148.73) providing flawless communications. Others assisted the Humane Society Animal Rescue Reserve in removing endangered animals. W6FQN, N6JZ, W6IB, W6VE, KA6AL, N6JZ stood by the Red Cross and 220 Club regulator when the site was threatened. W6VE and NAKRA originated 83 welfare mgs by packet at Palomar Mtn fire. If you held a license in 1982 and now are licensed (not necessarily continuously) you are eligible for membership in QCAW. Contact W6INI, 273-1120. Upgrades: K6ZM to Extra, K6PE to Advanced, K6BSAG to Tech. Congrats to the SD DX Club for achieving 100% ARRL membership - first in the SD Section. ARC of El Cajon is confirmed as a Spl Svc Club. Liaison between NCTN and NTS packet bulletin board (N6CQW) has been improved due to K6HAV, W6VK, N4KRA, K6SMU. NCTN met 30 times, handled 35 mgs. Traffic: N4KRA 98, N6GW 80, N6LWD 6.

SANTA BARBARA: Thomas I. Geiger, W2KVA—New EC in Santa Maria is Bulletin Manager Frank Gibson, K16XG,

attended the Scottsdale convention and saw few SBAR hams. If you weren't there you missed a good convention and the steaks were ALMOST as good as Santa Maria BBQ. (No bias here!) It was worth the trip just to hear K7UGA, Barry Goldwater, speak. Division business discussed at Sunday lunch with Dave Sumner, ARRL Executive VP. Results: SMS concerns relayed to Board of Directors; a Pacific and Southwestern Division Joint Section Managers meeting is being scheduled for Jan/Feb with SBAR to host. WE DESPERATELY NEED MORE OFFICIAL OBSERVERS to help keep things running smoothly. Please contact me if you're interested. That's all for this month. Hope you all have super holidays and great New Year. 73 de W2KVA. Traffic: W6NOR 244, K6BEC 38, N6FOU 26. (Sept.) K6BKCW 8.

WEST GULF DIVISION

NORTH TEXAS: SM, Phil Clements, K5PC—Asst SM: K5MXQ. SEC: W5GPO. STM: W5VMP. PIO: K5HGL. OOC: W5JB. BM: W5QXK. TC: W5LNL. ACC: W5URI. 45 operators from Wichita County provided comm for the 4th annual "Hotter 'N Hell" Bicycle Ride Aug 29th. There were over 12,000 riders this year, and Amateur Radio played a vital part in the organization and coordination of the event, as well as tactical and emergency communications. A mammoth job well done by the Wichita Co. gang! The Temple ARC has been reactivated by ACC W5URI after a two-year absence. Welcome back, Temple! Also, the Harlan ARC Special Service Chapter was presented by W5URI, Oct 26th. Lots of packet radio activity out Graham way. NVSP, K5EIR, and N5FPZ have systems installed, and on the air, with help from W5OJP, A5E8, and W5OYS. Congrats to the Dallas ARC for winning Division 3A in the 1987 Field Day! The Temple ARC provided communications for Scott & White's "Option-100 Bike Race" on Oct. 3rd. 21 Amateurs participated in the operation. The District 7 ARES Net began operations Oct 1st. The Net will meet each 1st and 3rd Monday night on the 145.15 rpt. Net control is N0AJJ in Waco. Twenty stations from Dist. 7 checked in on opening night. Public Service Honor Roll for Oct: K5BCKQ AJ5K K5UPN W5VMP W5YQZ K5MXQ K5BADE and K5QYV. K5QYV has upgraded to Extra. Congrats, Jim! Traffic: W5VMP 365, W5OJP 135, AJ5K 202, KD5AD 100, W5YQZ 186, W5VMP 130, W5UPN 133, W5OJP 104, W5ZSN 100, K5MXQ 93, K5BADE 73, N5GFV 64, K5AZK 61, K5QYV 42, W5EJZ 37, W5GSG 15, K5GNS 15.

OKLAHOMA: SM, William Goswick, K5WG—A "roast" was held for Adrian "Preacher" Ray, W5DRZ on 5 October 1987 in Tulsa. The event was attended by many of Preacher's friends who told several interesting stories about his career in Amateur Radio. Preacher took the brunt of more than a few jokes and humorous stories but took them well and later retaliated with a few of his own. Preacher received certificates of appreciation from the ARRL as well as other awards. Thanks again, Preacher for all that you have done for the League and Amateur Radio. If you weren't at the Texoma Hamarama on 24-25 October you missed an outstanding hamfest. The code proficiency program was reinstituted and Dana Knight, W5ZN, took top honors by copying 30 wpm. The ARRL Forum was ably handled by the West Gulf Director Jim Haynie, W5JB, and Lou McFadin, W5DID, NASA, presented an interesting program at the banquet Saturday evening on the future space station project. Congratulations to Bert Gunn, W5FU who received a beautiful red granite plaque designed by J.R. Willis, W5ATO commemorating Bert's dedicated service to the QCAW. Traffic: WA5OUV 67, N5IKN 85, K5BGN 67, K5YX 65, W5RB 60, K5FRD 53, W5AS 34, W5VLW 29, WA5GOC 26, W5VOR 25, WA5ZOO 25, K5CAY 19. Public Service Honor Roll: K5FRD.

SOUTH TEXAS: SM, Art Ross, W5KR—ASM: N5TC. SEC: K5UG. STM: K5QEW. PIO: WA5UZZ. ACC: W5YDD. BM: K5CVD. TC: N5ZU. SGL: K5JUN. OOC: WA2VJL. Golden Crescent ARC, El Campo, has a folksy bulletin called HAMBONES; the Nov issue puts in plugs for OO volunteers, help for the dedicated ops of NTS, plus other ARRL services. Williamson County ARC, Georgetown, reports W5XD completed his "cool" 8877 linear amplifier. HACKnews, San Benito ARC, reports club has been granted tax exempt status; requested ops for the annual Xmas parade. 7290 NM KA5AKZ reported 410 messages passed in 49 Oct sessions with 2 NTS liaison ops per session. PIO WA5UZZ and BM K5CVD held a PIA/OBS workshop at Houston ComCon/Venue; this pair quite active, visiting clubs in the area to "carry the word" on various ARRL activities and services. Disaster-Communications Action Team (D-CAT), Houston, put up new antenna system for handicapped Hams W5EPA and W5FQU; signal reports greatly improved; D-CAT also set up new antenna farm for club use at EOC NM W5YDD reports DRN5 passed 673 messages in 62 Oct sessions; STX represented 100% by W5CTZ, N5DFO, W5KLV, K5DKQ, K5QEW, W5SHN, W5EPA, W5FQU, W5HJZ, K5E8Y, WA5ZJY, W5YDD. PIA N5IKW, San Houston County ARC (SHARC) 4042, reports club had an Amateur Radio booth at San Jacinto County Fair; enrolled 8 candidates for Novice class. PIA N5ZJ, Seguin, reports KA5BOA upgraded to Advanced; that's great! The Bexar (pronounced BARE) Wire, San Antonio ARC, gave a good report on Amateur Radio activity during the visit of Pope John Paul II; over 100 ops spent nearly 5,000 men/woman hours and utilized personal radio equipment valued at more than \$95,000! PIA N5FIX reports hams in Fayette County have formed a new ARES group; W5UJ heads the team; most activity centers around La Grange; ARES group in Spring/Tomball area is officially recognized by Emergency Management officials and will be notified in event of emergency requiring communications support. VARIAN Valley Amateur Radio InterAction Committee (a coalition of Rio Grande Valley clubs), again performed yeoman duty in providing communication for the Confederate Air Force annual air show of WWII aircraft in Harlingen; South Texas Amateur Repeater Society (STARS) operated special event station N5CAF during the four days of the affair. Asst NM W5YDD reports CAND passed 697 messages in 31 Oct sessions; DRN5 represented 100%. STX stations were K5ZV, K5DKQ, W5YDD, W5KLV, N5DFO, N5XV, W5EPA, W5FQU. Texas Southmost ARC, Harlingen, held good VE session at TST; four amateurs upgraded. Plenty of room for more station appointments; contact SM or Amateur in charge of apt field you desire. Now is the time for all good hams to join the ARRL Field Crew. Traffic: K5YV 408, W5J 315, W5SHN 291, W5GKH 215, W5CTZ 118, W5EPA 56, W5RO 47, WA2VJL 46, N5D 39, WA5UZZ 35, N5VL 24, W5BGE 20, W5FQU 20, N5ZJ 10, KA5UYVIT 3.

WEST TEXAS: SM, A. Milly Wynn, W5OVH—DEC W5SDUQ of Lubbock advised on Sept 9 that the National Weather Service activated Lubbock SKYWARN Net reported a tornado forming and touching ground. 22 hams responded. Lives are being saved by close relationship between Amateurs, Nat. Weather Service and news media. If some of your news is not printed, it's because I received more news than the 24 lines allotted to me. Jim, W5QMJ, was honored in Houston by National Weather Service for his efforts in designing and maintaining the WTX Connection. Childress "Prairie Dog

Chatter" advises Hurricane Net can be monitored on 14325, night time 7268, and 3940. Oct 30 El Paso ARES/RACES hams participated in El Paso Wide Nat. Med Disaster System with all El Paso Hospitals and Ft. Bliss Army Med Units. Snyder ARC now has repeater with call K5QHK. Amateur Radio played a part in the 58 hour Saga of Jessica McClure who was trapped in a well in Midland. W5MVC & W5BXXA & other hams provided phone patches and comm. 20 to 30 hams in El Paso provided comm. for the Amigo Air Show 87, EP Juarez International Classic, and SET 67. Abilene ARES had SET at Matthews Ranch along with Boy Scout Jamboree. NTS Traffic picking up in Abilene, Lubbock, Midland and Odessa areas. Traffic: A5E1 56, K5SVH 11, W5OVH 10, N5KUC 6.



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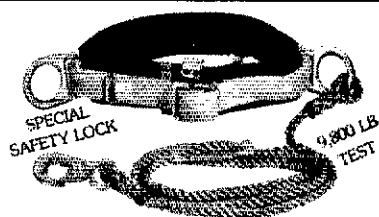


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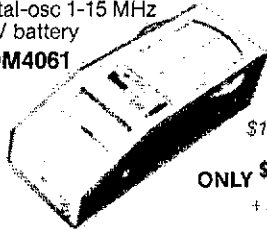
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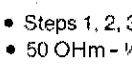
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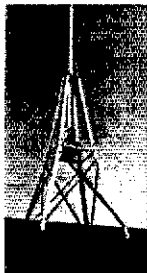
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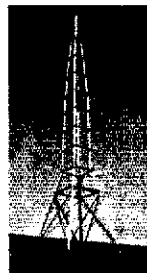
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CR-30	9'10"	27 @ 90 MPH	39"	1,322	33
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#303 Thrust Bearing For CR-18, CR-30, and CR-45
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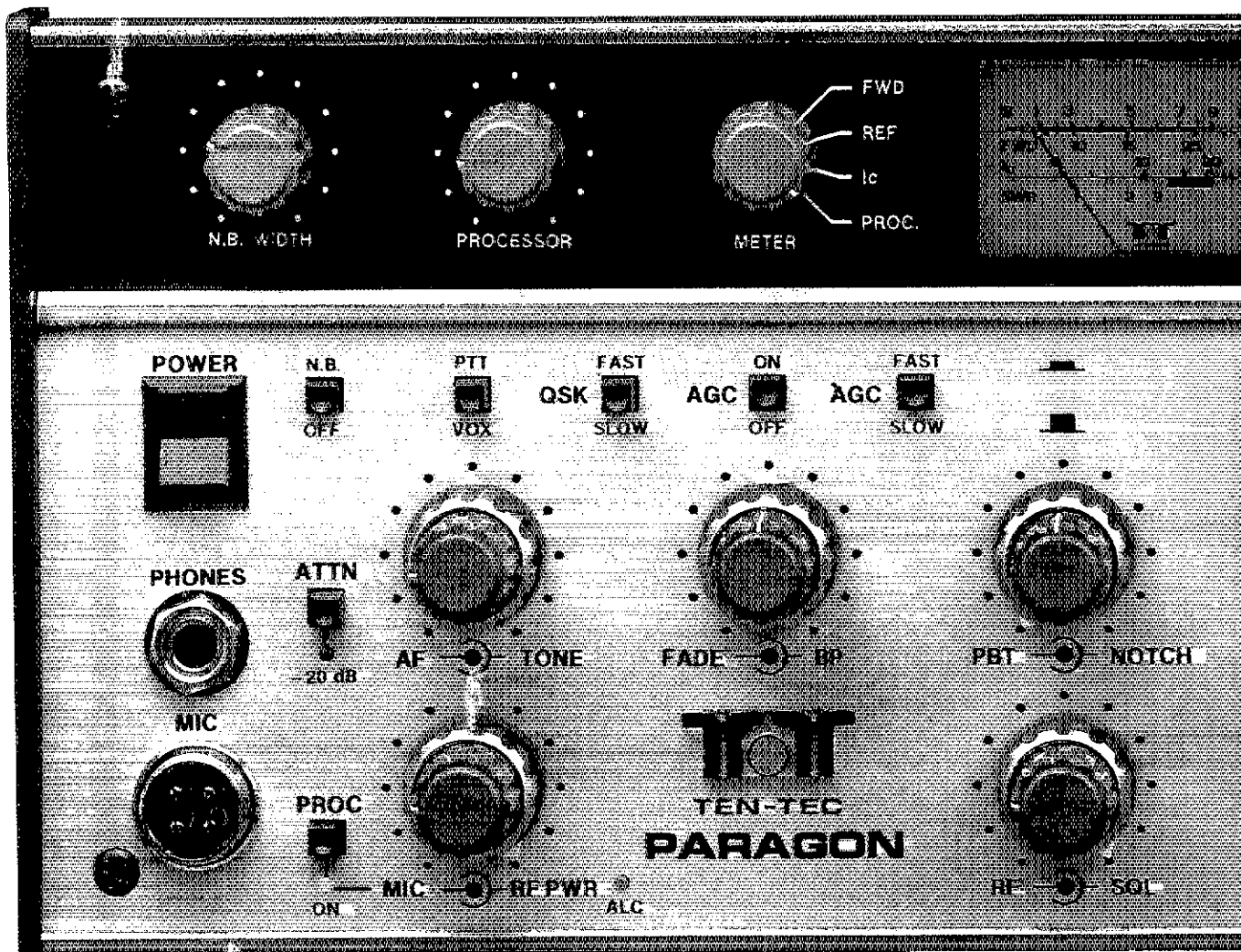


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The construction is impressive too. All circuit boards are glass epoxy (G-10) and all of them can be removed without desoldering. The front panel is hinged to provide access to all sections of the chassis. All aluminum construction keeps the weight of the rig reasonable too. And of course, the front panel is a spacious arrangement which makes the critical controls easy to use.

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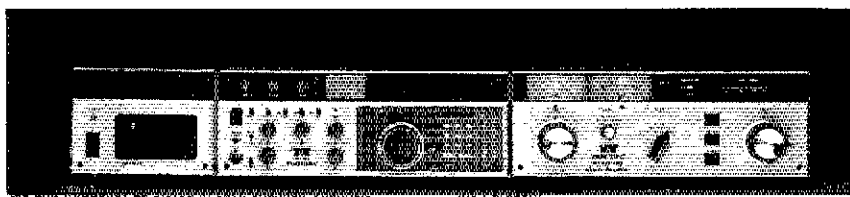
GENERAL SPECIFICATIONS

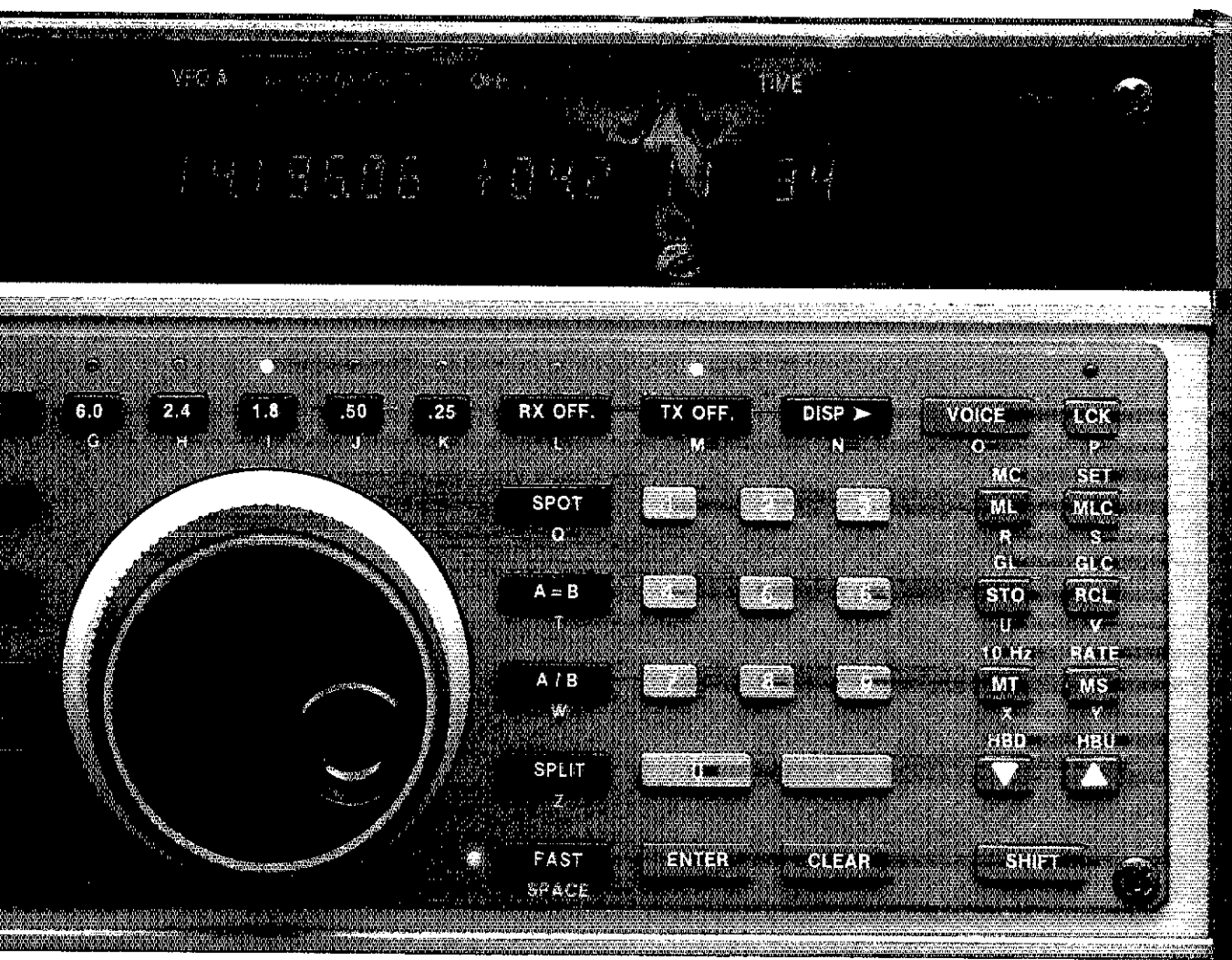
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CW/USB/LSB/FSK	20 Hz 9.6 kHz per turn	50 Hz 24 kHz per turn
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Antenna Impedance: 50 ohm unbalanced.
PC Boards: 14 double-sided, 9 single-sided .062" glass-epoxy.
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CW Offset: 750 Hz automatic.
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Modes: USB, LSB, CW, FSK, AM, (FM optional).
Sensitivity:

	.1 - 1.6 MHz	1.6 - 29.999 MHz
SSB/CW/RTTY	5 μ V	15 μ V
AM	3.5 μ V	1.0 μ V
FM	1.0 μ V	3 μ V

Selectivity:

	6 dB BW	-60 dB BW	Shape Factor
Standard AM	6.0 kHz	11.25 kHz	1.875:1
Standard SSB	2.4 kHz	3.36 kHz	1.67:1
Opt. 1.6 kHz SSB (Model 288)	1.6 kHz	2.9 kHz	1.60:1
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Standard FM	15 kHz	30 kHz	2.00:1

Attenuator: -20 dB for 1.6 to 29.999 MHz, -10 dB for .1 to 1.6 MHz.

I-F Frequencies: 1st = 75 MHz, 2nd = 9.0 MHz, 3rd = 6.3 MHz (FM 3rd = 455 kHz).

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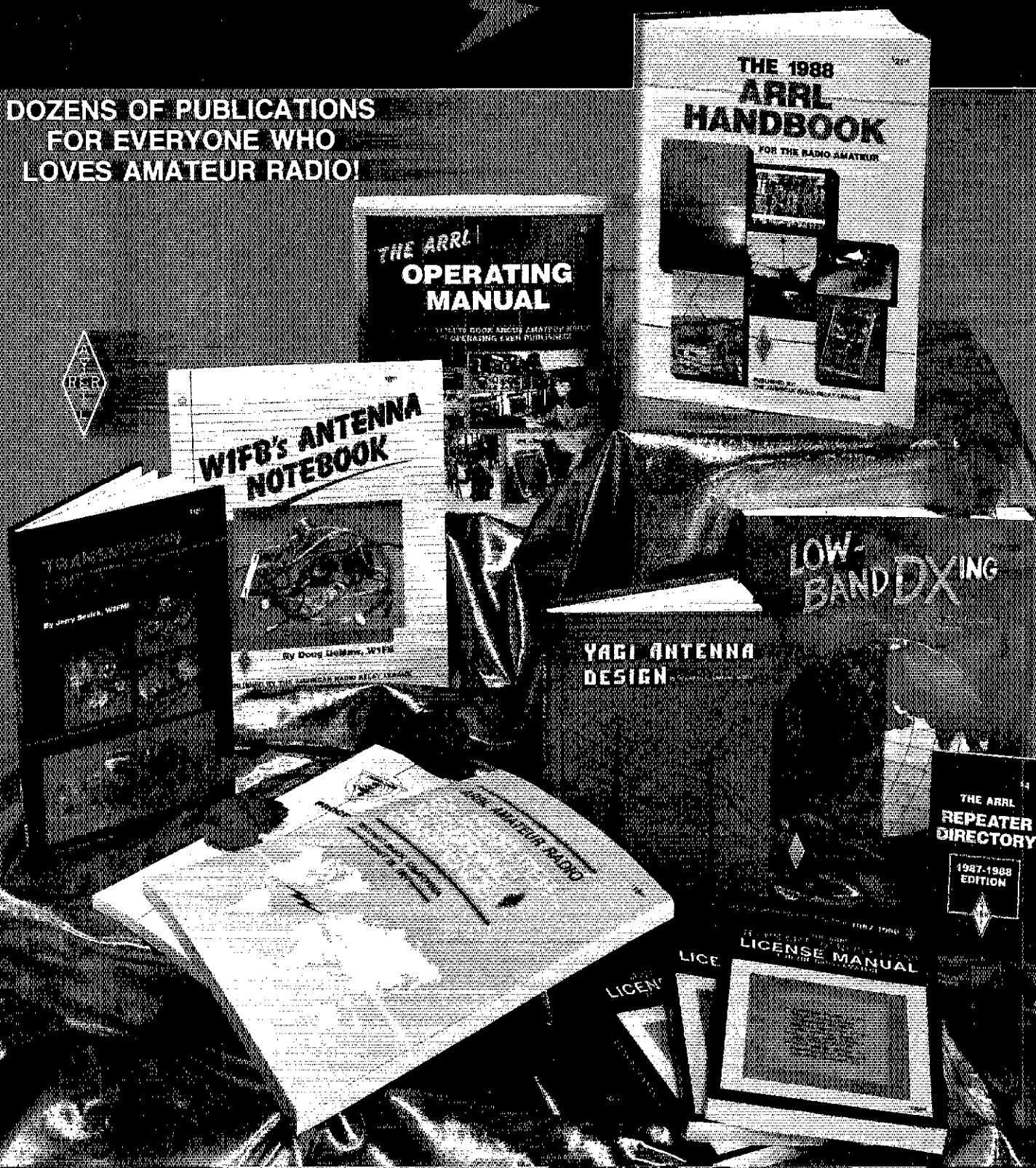
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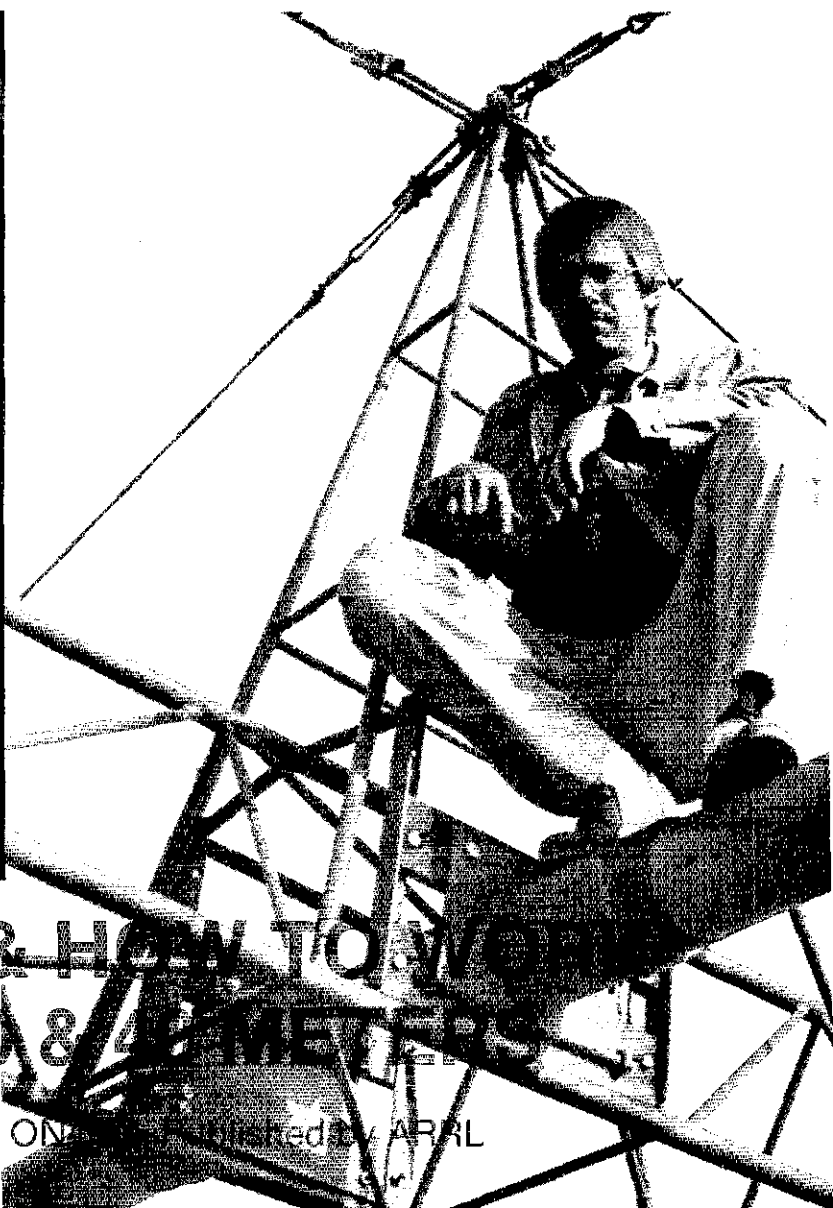
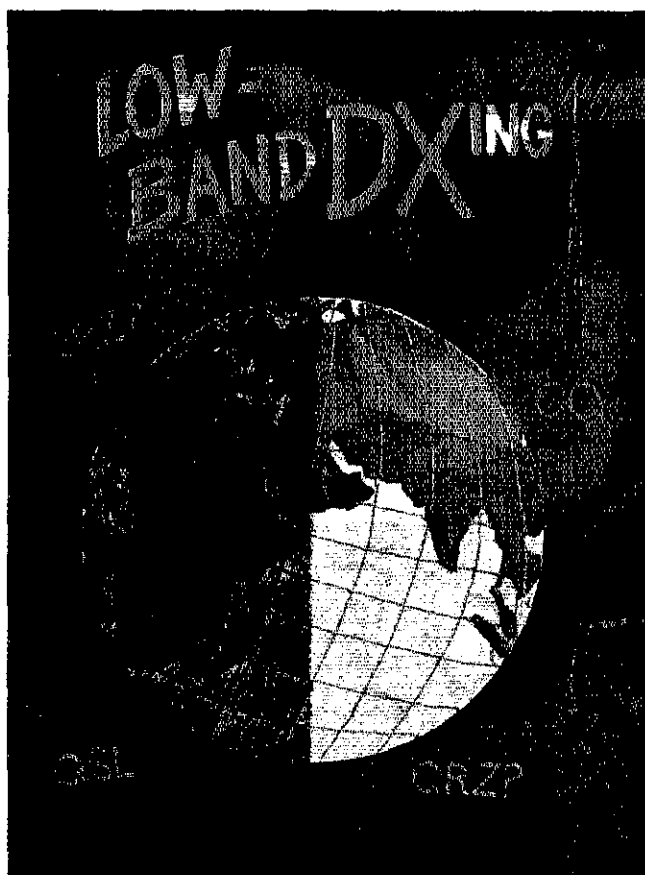
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WHEN, WHERE & HOW TO WORK DX ON 160, 80 & 40 METERS

Written by John Devoldere, ON4UN, Published by ARRL

It's the first really brisk day of autumn, and the trees have begun to shed their leaves. It's been crisp and clear for the past couple of days and there is not hint of rain in the forecast, so there should be no QRN. Propagation bulletins are predicting low absorption. It's going to be a great night for Low Band DXing!

This is an over-simplification. Radio amateurs know practically by instinct that 160, 80 and 40 meters "open up at night." But anyone in the Eastern U.S. who has worked Western Australia on 40-meters in the middle of the afternoon or West Coast amateurs who work into the Middle East on 80 meters just after daybreak know that, depending on the time of year, these bands have many secret hiding places for their DX-treasurers! Now, John Devoldere, ON4UN, has put together a treasure map in the form of a 210-page book published by ARRL where he completely explores the 160, 80, and 40-meter bands.

John draws on his vast knowledge and years of experience, as well as that contained in over 500 references which are listed in their own chapter. A large portion of the book is devoted to the design and building of efficient antennas for these frequencies. Receiver, transmitter and transceiver characteristics are also covered. The propagation chapter is the key to understanding when to work DX. The operating chapter tells where to find DX and gives tips on maximizing the effectiveness of your station for low band work. There is also a chapter of interesting and useful BASIC programs. But you don't have to keyboard these programs; there is inexpensive software that can be purchased separately which is available for use on many popular personal computers.

This new ARRL publication is copyright 1987. It is available in softcover only for \$10 plus \$2.50 (\$3.50 for UPS) shipping and handling from ARRL.

The New 688-page ARRL Operating Manual is **HOT...**



On July 8, 1986, a railroad tanker carrying toxic phosphorous derailed and caught fire near Miamisburg, Ohio. The success of the Monsanto Amateur Radio Association's emergency plan in helping local authorities deal with this potential disaster is documented in November 1986 *QST*. The photograph above which was taken over the scene by Mike Carter, WD8BSI, shows what could happen in your backyard! Would you be ready for such a situation? The Emergency Communications chapter by Richard Regent, K9GDF, in the new *ARRL Operating Manual* tells how to prepare for such an eventuality. Emergency Communications and efficient message handling go hand-in-hand. Maria Evans, KT5Y, tells all about this subject and how you can become a part of the National Traffic System in the expanded Traffic Handling chapter.

Over forty percent of the radio amateurs licensed today were at one time or still are shortwave listeners. With modern transceivers, it's possible to hear what is going on outside our ham-bands. David Newkirk, AK7M, adds his enthusiasm for this closely related hobby in the SWL chapter. On a related subject, Paul Rinaldo, W4RI, tells us about the characteristics of the Amateur Radio Spectrum and how our bands are assigned.

Most hams are interested in just getting on the air and talking to someone. Even so, ham radio is a lot more than talking into a microphone or pound-

ing a telegraph key. Carol Smith, AJ2I, and Bill Jennings, K1WJ, have prepared a chapter on Basic Operating. It is just what the newcomer needs in order to get started, and it's good review for some of us who have been away from ham radio for a while. Almost everyone can qualify for the Rag Chewer's Club Certificate, but do you realize that there are hundreds of Amateur Radio awards from throughout the world? Well you can see dozens of these awards in *full color* along with their requirements in the Awards chapter by Bob Halprin, K1XA.

Clarke Greene, K1JX, tells all about competitive operating. Clarke has won almost every major contest, HF, VHF/UHF, from home and away, using full power and QRP. Now he tells how it's done!

Almost everyone seems to be interested in digital communications these days. Stan Horzepa, WA1LOU, covers Packet Radio in detail; while Larry Wolfgang, WA3VH, covers RTTY and other digital modes in a separate chapter. If you find SSTV or ATV of interest, Bruce Brown, WA9GVK, has put together a fantastic chapter on Image Communications.

If you still need to work the countries represented by the QSLs below, you're not alone; but you can pickup some good tips on working DX from well-known DXer and author Bob Locher, W9KNI. DX-peditioner Carl Henson, WB4ZNH, gives advice on how to operate from the "rare ones"

without catching malaria or worse! You can find out when to work DX at anytime during the sunspot cycle by referring to the propagation tables which were newly incorporated in this edition. You'll also find sunrise-sunset tables for working DXCC countries around the world, and there is a great chapter on Antenna Orientation by *ARRL Antenna Book* editor Jerry Hall, K1TD.

Besides "packet," WA1LOU tells what is new in the area of FM and Repeater operation. This chapter is "must" reading for Novices who want to use repeaters for the first time or for those who want to upgrade their existing repeater operations. There is a lot doing these days on weak signal VHF/UHF work and Mike Owen, W9IP, shows how it's done from moonbounce to meteor scatter. Will you be ready for the OSCAR launch that may take place later this year? Dick Jansson, WD4FAB, captures us with his satellite operating techniques.

You'll also find numerous handy tables and charts in the third edition of *The ARRL Operating Manual*. It is edited by Robert J. Halprin, K1XA, Deputy Manager of Membership Communications at ARRL HQ. The new edition is available at your dealer or from ARRL for \$15. (Please add \$2.50, \$3.50 for UPS for shipping and handling.)



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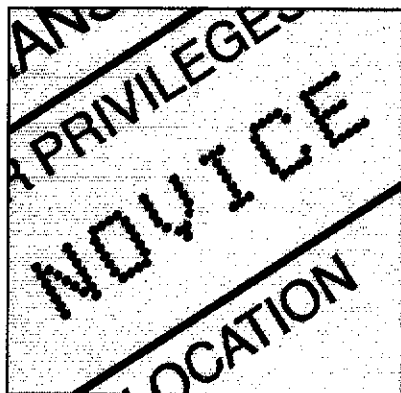
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W1FB's Antenna Notebook

This is one of the most readable books about antennas ever published. It's not really a novel about antennas, but *W1FB's Antenna Notebook* is far from being a dry lecture on the properties of wire and vertical antennas. Instead, we can imagine ourselves being invited over to Doug DeMaw's hamshack to chew the rag about antennas. Have a seat in the easy chair in front of the fireplace while Doug grabs his *Antenna Notebook* off the shelf. Listen intently as we discuss what this new ARRL publication is about.

While the adage, "the bigger and higher the better" might be true for those with unlimited pocketbooks, lots of real estate, and plenty of technical and mechanical knowledge, most of us are constrained in some ways. From putting up vast arrays of heavy metal wire antennas are inexpensive, can be unobtrusive, and give good performance if designed properly. Verticals don't have to be "equally weak in all directions," and we learn how to overcome this so-called "curse." That bargain coat that you picked up at the local flea market may look good, but is it? The first chapter describes a simple test to find out for sure, as well as telling us about the hidden traps of traps, what conditions cause baluns to do some very nasty things, and a brief discussion on SWR (or VSWR if you prefer.)

The second chapter is devoted to the dipole and its variations: the inverted-V, G5RV, trap dipoles, folded dipoles, multi-band dipoles, and dipole look-alikes. Chapter three covers the care and feeding of end-fed wires. Doug tells how to treat them properly so they won't bite! He will also make your day by telling you how to terminate true longwires—painlessly (so that most of the radiation will be in just one direction.)

During the time that W1FB was *QST* Technical Editor, he lived on a typical suburban lot in Newington, Connecticut. He had a tri-bander for 10, 15 and 20 meters on a 55-foot tower. Since Doug lacked the space to "go out" he decided to "go up" by optimizing his tower and beam for use on the lower amateur bands—especially 160-meters. You'll learn from his experience in one of the most

informative chapters on vertical antennas ever written.

Since Doug used to live only 2 blocks from League HQ, he had to cope with over 1 volt of RF at the receiver antenna terminals when W1AW was on the air. With code practice and bulletins being sent on 7 bands, the result was the generation of all sorts of mixing products in many receivers. (This was before the time "bullet-proof"

solid-state devices had been developed for receiver front ends.) All of this noise made reception difficult at best! The chapter on Special Receiving Antennas is the result of the author's experience using receiving loops and other types of antennas to overcome this problem. Of course, the antennas described offer a solution to other forms of man-made noise as well.

Wire antennas come in two models: the basic street model, like the dipole, and high performance "off road" configurations. The latter actually provide gain over a dipole in certain directions and are described as length: loops (in almost all geometric configurations,) collinear arrays, and cloud warmers (for effective short-range communication.)

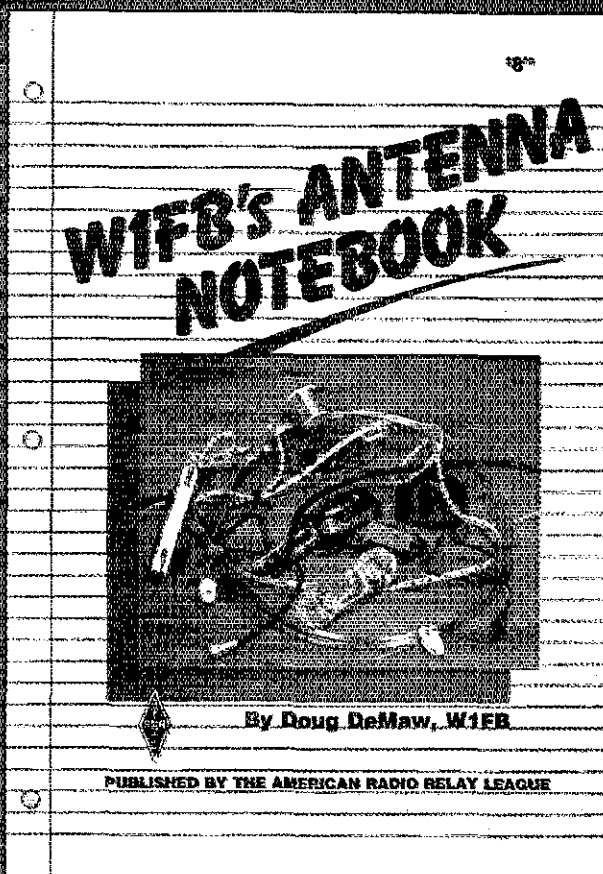
We know of a local amateur who worked 200 countries from his apartment using a 33-foot end-fed invisible antenna running from the window to a nearby tree. He used a black

plastic comb as an insulator on the far end. Chapter 6 is devoted to limited-space and invisible antennas including flag poles, TV antennas (the guy lines are the antenna) and the half sloper.

Need a match? The chapter on matching techniques has circuits ranging from simple L-networks to complete Transmatches.

The final chapter is devoted to measurements. It tells how to build and use such useful devices as field strength meters, SWR bridges, noise bridges, dip meters and a current sampling meter for verticals.

That is *W1FB's Antenna Notebook* in a nutshell. This 122 page publication is available for \$8.00 at your dealer or directly from ARRL. Please add \$2.50 (\$3.50 for UPS) for shipping and handling.

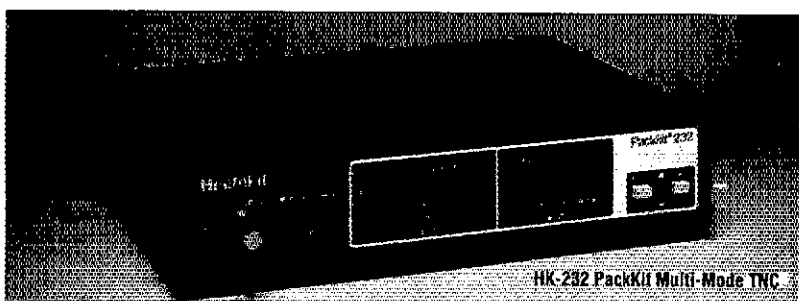


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STAN HORZEPA, WA1LOU



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What is packet radio good for and what uses does it have for the “average ham?” How can I be sure I have the proper equipment and how do I set everything up? What are these things called protocols? Where is packet radio headed on VHF/UHF and HF? How has the “braap” of a packet of data sent to a bulletin board replaced the clatter of a radioteletype machine in the autostart mode? Why is packet great for message handling especially in emergency situations? What uses can the computer hobbyist, contester or DX'er find using “packet.” This new 205-page ARRL publication has the answers!

Each of the following chapters is written to make understanding packet radio a breeze: The Radio Hacker, History, Theory of Operation, TNCs, Installation, Selecting TNC Parameters, Operating Procedures, VHF and UHF Communications, HF Communications, Time-Shifting Communications, Public Service Communications, Space Communications, and The Network. In addition there are these appendices: TNC 1 and 2 Commands, TNC 1 and 2 Control Characters, TNC 1 and 2 Messages, TNC Command Compatibility, ASCII Character Set, Bibliography and Sources, Glossary. Price of *Your Gateway to Packet Radio* is \$10 plus \$2.50 (\$3.50 for UPS) shipping and handling.

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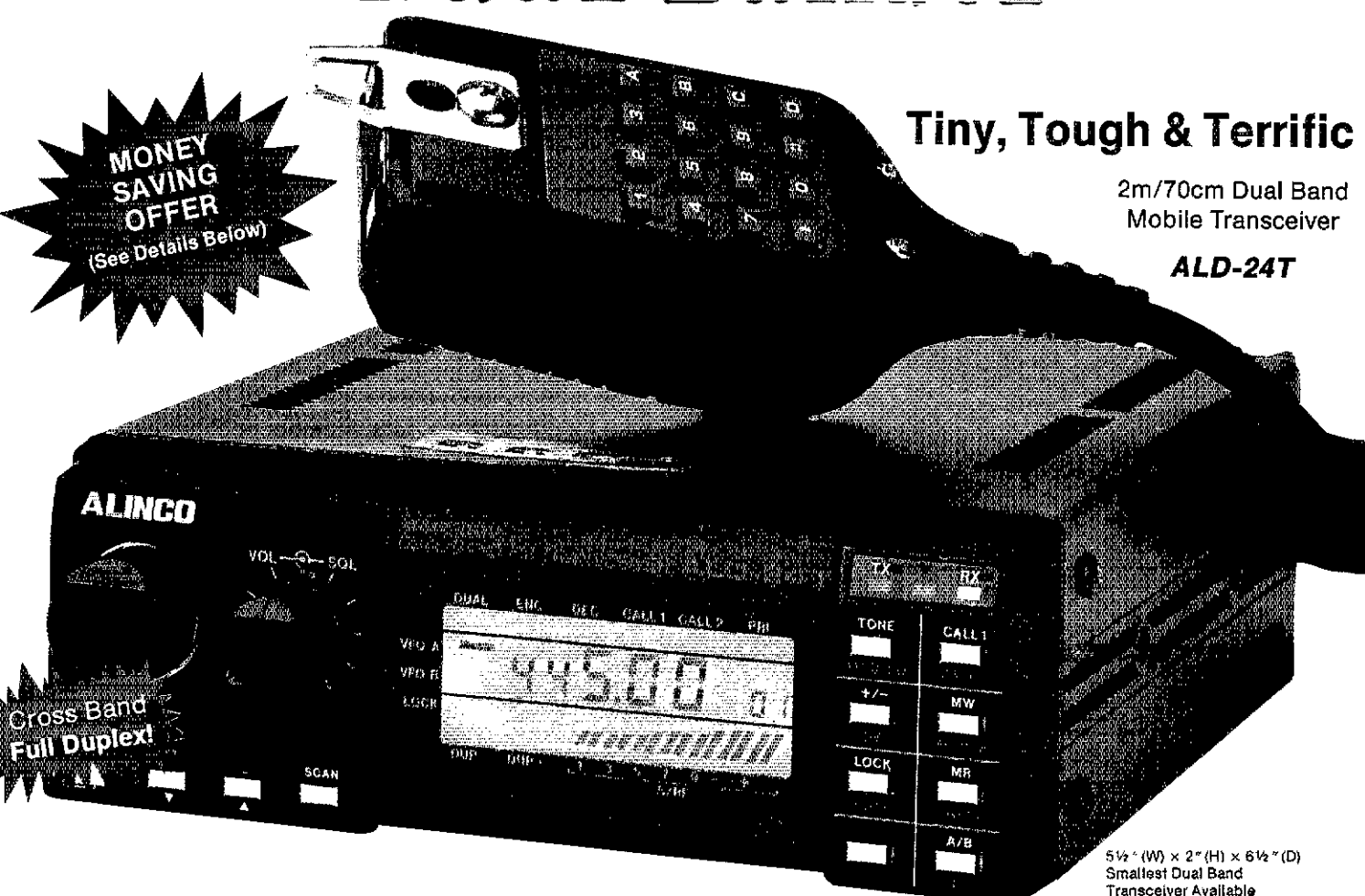
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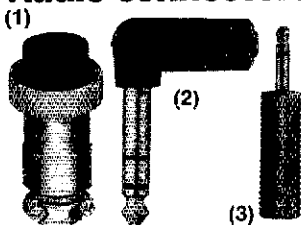
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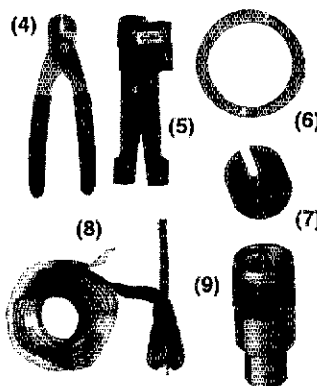
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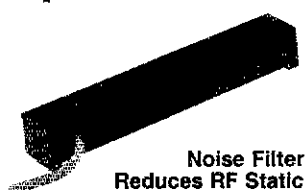
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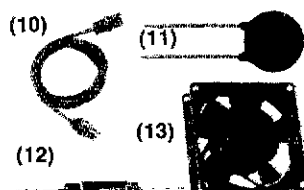
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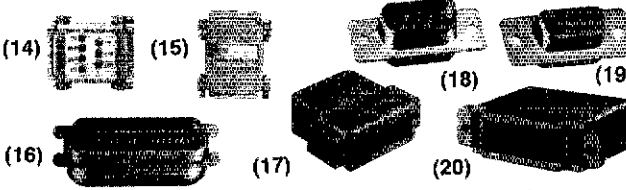
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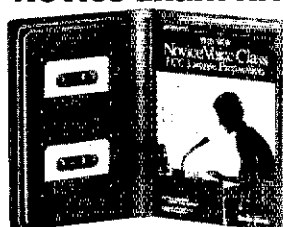


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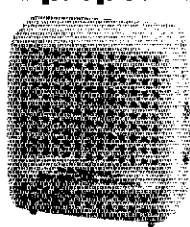
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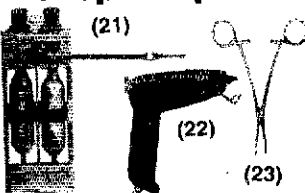
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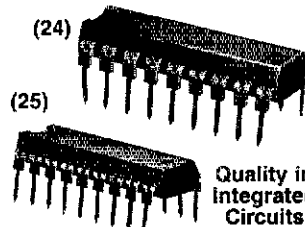
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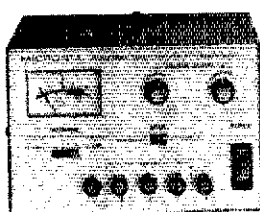
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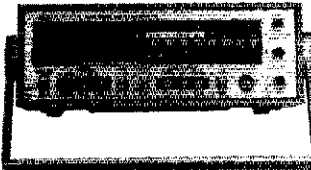
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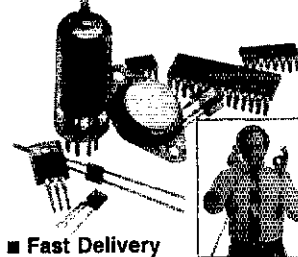


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Drive frequency is continuously monitored by the processor and adjustments made to ensure maximum amplifier output at all times. As you talk, the amplifier's tuning is constantly adjusted as required. Powerful gearhead motors drive the bandswitch, tuning, and loading capacitors.

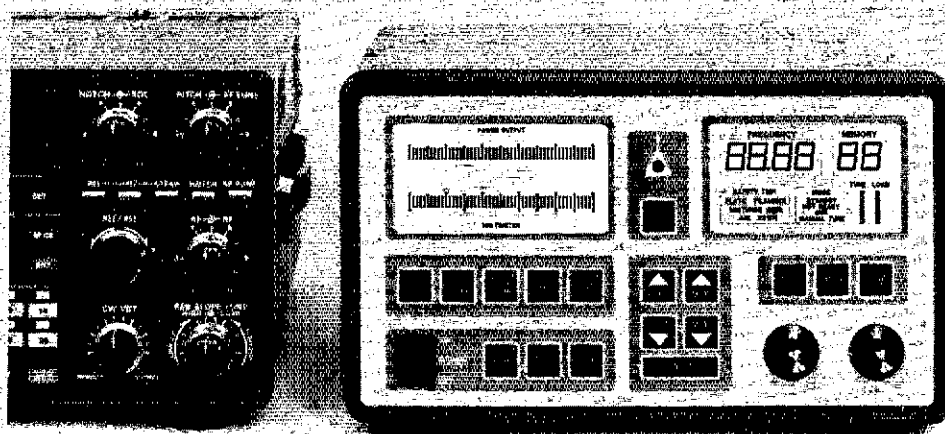
HIGH QUALITY. The 230A is manufactured to the same standards as the 230C, the commercial/military version.

VERSATILITY. The RF/power supply may be remotely located near your AC source and/or antenna cables. The small microcontroller takes little room at the operating position.

PROTECTION. The processor monitors tube parameters to ensure ratings are not exceeded. The operator is alerted if any parameter is getting close to a safety trip point.

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Pair of EIMAC 3CX800A7's for high efficiency, low distortion operation. Pi-L output for high harmonic suppression.



230A Microcontroller by
ADVANCED RADIO DEVICES
Remote RF/power supply
deck is not shown.

TS 940 courtesy of EEB, Vienna, Va.

FEATURES

- Two custom, easy-to-read, back-lighted LCD displays which provide all metering, alarm and status information.
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- HEAVY DUTY hypersil power transformer with full wave rectification and Radio Switch 86 series bandswitch.
- Automatic safety monitoring for VSWR, grid and plate current, airflow, filament voltage, and efficiency.
- Easy modification for 10 meters if you qualify.
- Remote control. Place RF/power supply deck up to 250 feet from the microcontroller with optional cable. (15 foot cable furnished.)
- Modular construction for ease of maintenance.

Factory direct sales for lowest cost.

Introductory prices: 230A, \$3695. 230C, \$5500.

1 year guarantee.

SPECIFICATIONS

FREQUENCY. All amateur bands from 1.8 to 21 Mhz (to 30Mhz for export)

DRIVE. 50-80 watts for full power.

INPUT VSWR. 1.5:1 or less on all amateur bands. Slightly higher for WARC.

HARMONIC SUPPRESSION. -55dB

INTERMOD PRODUCTS. -35dB down.

DUTY. Continuous on all modes including RTTY.

ALC. Full ALC with exciter to prevent exceeding power limits.

INPUT POWER. 220-250VAC, 60Hz, 20 amperes max.

DIMENSIONS.

Microcontroller: 10 wide x 6 high x 8 deep (inches).

RF/power supply deck: 14 wide x 22 high x 13 deep (inches)

Production deliveries scheduled for January.

All interconnect cables are furnished for ease of set up.

In addition to the above, the 230C provides continuous frequency coverage from 1.8 to 30 Mhz with a no time output rating of 2250 watts PEP. Three 3CX800A7's are utilized.

Please call or write for additional information. We love to talk about these amplifiers!

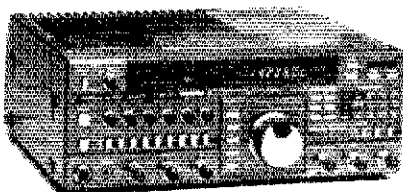
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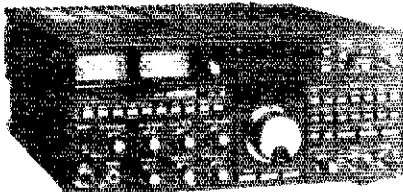
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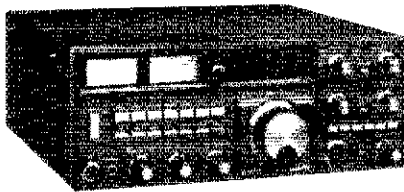


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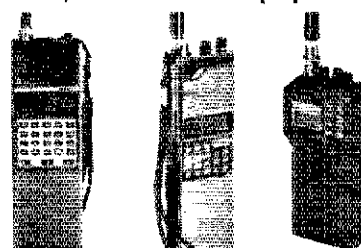
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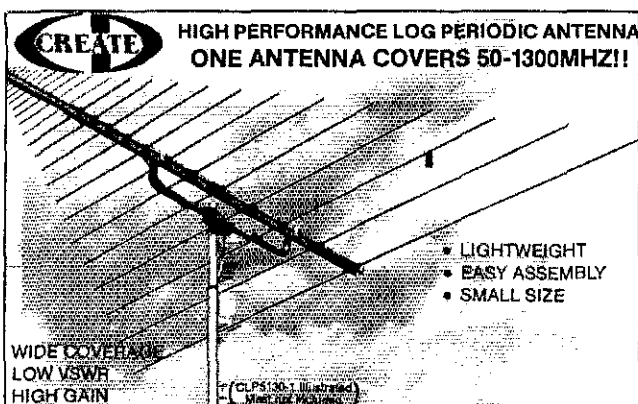
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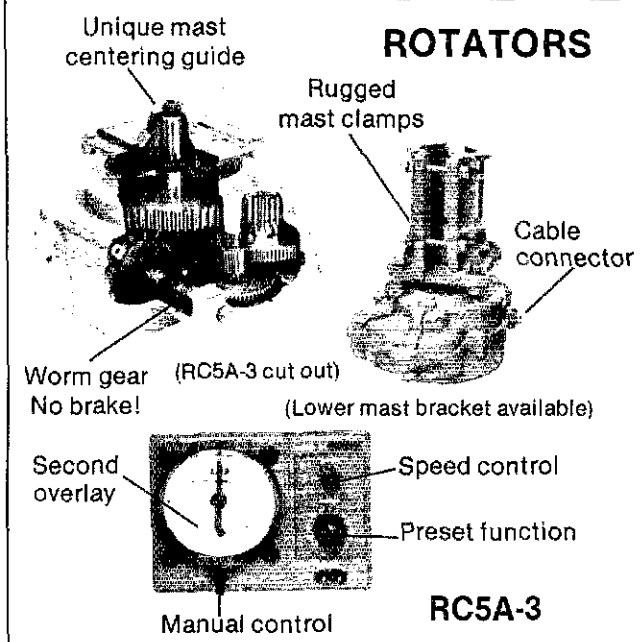
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(All rotators are UPS shippable)

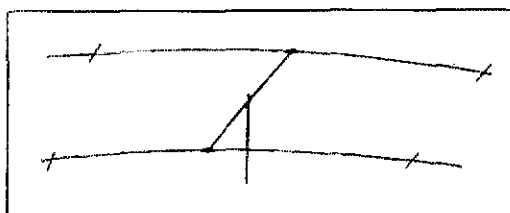
See Lew McCoy's Review In August 1987 Issue Of CQ.



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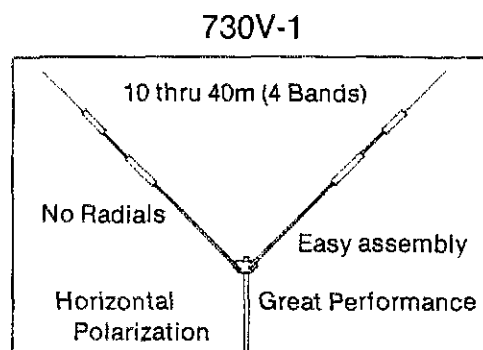
CV-48 \$251 UPS AD-385 (adaptor) \$63



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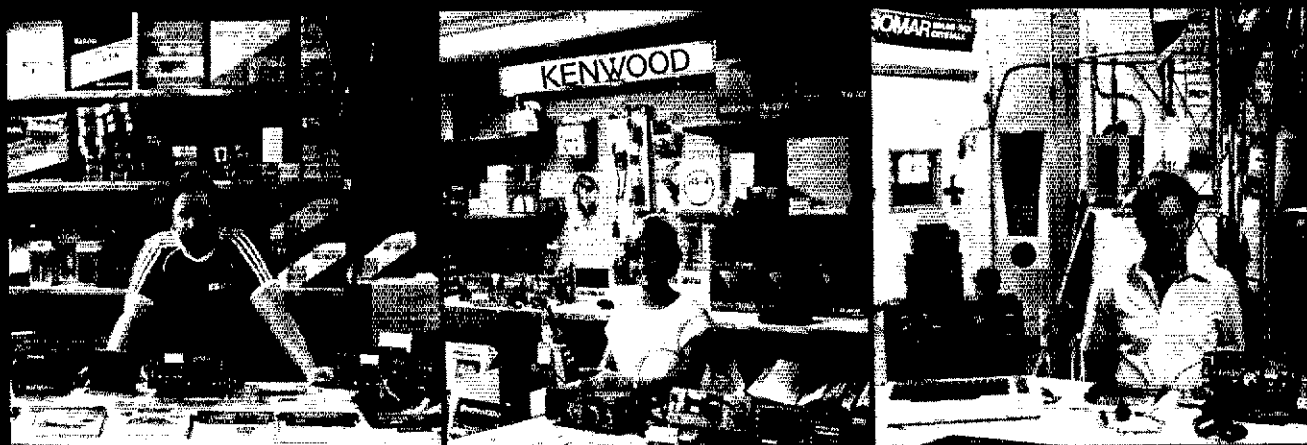
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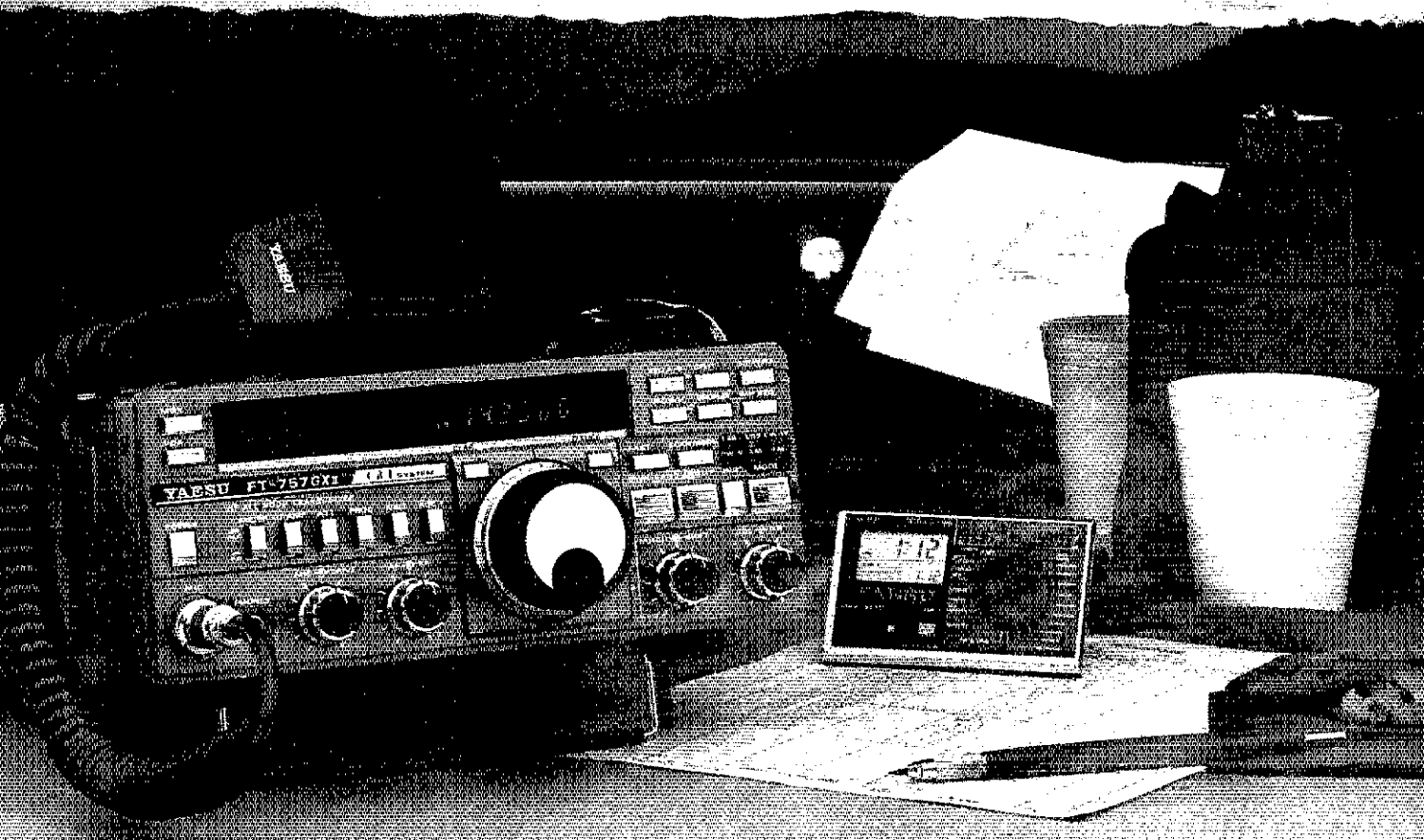
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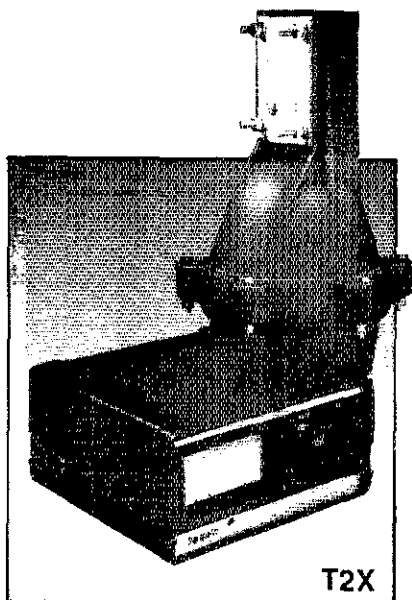
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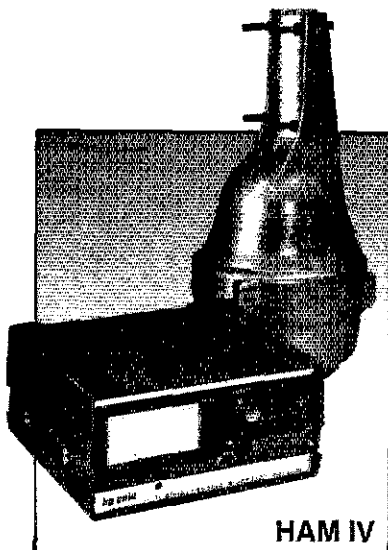


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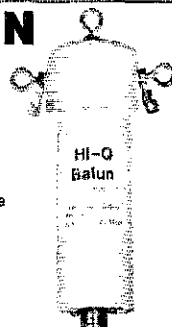
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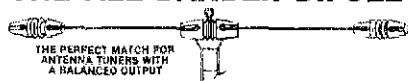
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D-10	10	18'	25.95
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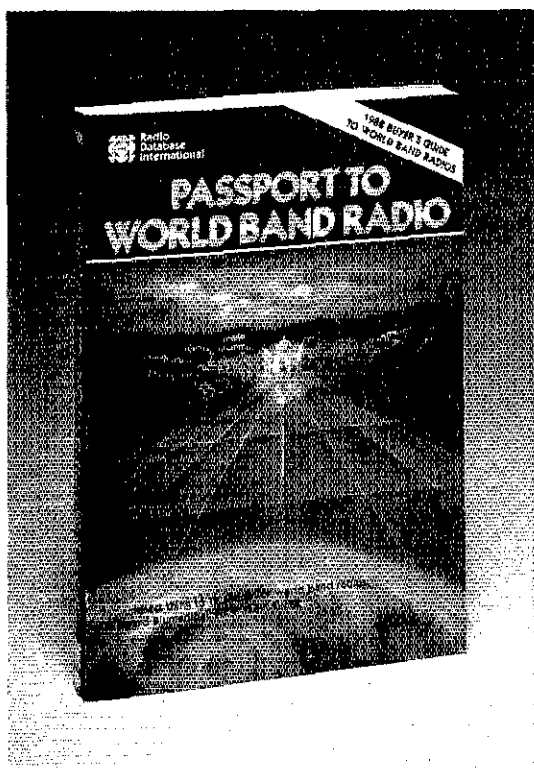
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			YK-88C 500 Hz CW filter		79.95
			YK-88CN 270 Hz CW filter		79.95
			YK-88S 2.4 KHz SSB for dual filtering		79.95
			YK-88SN 1.8 KHz SSB filter		79.95
			AT-250 External 200w 9-band auto tuner		399.95
			AT-230 9-band tuner/SWR, pwr meter		249.95
			AT-130 8-band compact antenna tuner		199.95
			MB-430 Mobile mounting bracket		29.95
			MC-43S Extra 8-pin hand mic w/up-down		39.95
			MC-60A 8-pin amp desk mic w/up-down		119.95
			MC-80 8-pin electret desk mic w/up-down		74.95
			MC-85 Multi-function 8-pin elect desk mic		129.95
			IC-10 IC kit for computer control		29.95
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			YG-455C-1 500 Hz CW filter (2nd IF)		129.95
			MC-43S Extra 8-pin hand mic w/up-down		39.95
			MC-60A 8-pin amp desk mic w/up-down		119.95
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			MC-85 Multi-function 8-pin elect desk mic		129.95
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			TS-830S 9-band digital Xcvr		1199.95
			SP-230 External spkr w/audio filters		89.95
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			YK-88C 500 Hz CW filter (1st IF)		79.95
			YK-88CN 270 Hz CW filter (1st IF)		79.95
			YK-455C 500 Hz CW filter (2nd IF)		119.95
			YG-455CN 250 Hz CW filter (2nd IF)		139.95
			AT-230 9-band tuner/SWR, pwr meter		249.95
			MC-30S 4-pin hi-Z hand mic		39.95
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			YK-88SN 1.8 KHz SSB filter		79.95
			AT-250 External 200w 9-band auto tuner		399.95
			AT-230 9-band tuner/SWR, pwr meter		249.95
			AT-130 8-band compact antenna tuner		199.95
			MB-430 Mobile mounting bracket		29.95
			MC-43S Extra 8-pin hand mic w/up-down		39.95
			MC-60A 8-pin amp desk mic w/up-down		119.95
			MC-80 8-pin electret desk mic w/up-down		74.95
			MC-85 Multi-function 8-pin elect desk mic		129.95
			IC-10 IC kit for computer control		29.95
			IF-232C Level translator		89.95
			AC-10 AC adapter for IF-232C		19.95
			TU-8 CTCSS tone unit		36.95
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			TS-680S 9-band Xcvr w/6m/mic		999.95
			PS-50 Heavy duty power supply		224.95
			PS-430 Compact AC power supply		189.95
			SP-430 External speaker		59.95
			AT-250 200w 9-band automatic ant tuner		399.95
			AT-230 9-band tuner/SWR, pwr meter		249.95
			AT-130 8-band compact antenna tuner		199.95
			MB-430 Mobile mounting bracket		29.95
			IF-10C Computer interface unit		44.95
			IF-232C Level translator		89.95
			AC-10 AC adapter for IF-232C		19.95
			YK-455C-1 500 Hz CW filter (1st IF)		89.95
			YG-455C-1 500 Hz CW filter (2nd IF)		129.95
			MC-43S Extra 8-pin hand mic w/up-down		39.95
			MC-60A 8-pin amp desk mic w/up-down		119.95
			MC-80 8-pin electret desk mic w/up-down		74.95
			MC-85 Multi-function 8-pin elect desk mic		129.95
			TU-8 CTCSS tone unit		36.95
			TS-830S 9-band digital Xcvr		1199.95
			SP-230 External spkr w/audio filters		89.95
			VFO-240 Analog remote VFO		219.95
			YK-88C 500 Hz CW filter (1st IF)		79.95
			YK-88CN 270 Hz CW filter (1st IF)		79.95
			YK-455C 500 Hz CW filter (2nd IF)		119.95
			YG-455CN 250 Hz CW filter (2nd IF)		139.95
			AT-230 9-band tuner/SWR, pwr meter		249.95
			MC-30S 4-pin hi-Z hand mic		39.95
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			MC-50 4-pin hi/lo-Z desk mic		69.95
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			R-5000 100 KHz-30 MHz digital receiver		949.95
			SP-430 External speaker		59.95
			YK-88A-1 AM filter		79.95
			YK-88C 500 Hz CW filter		79.95
			YK-88CN 270 Hz CW filter		79.95
			YK-88S 2.4 KHz SSB for dual filtering		79.95
			YK-88SN 1.8 KHz SSB filter		79.95
			AT-250 External 200w 9-band auto tuner		399.95
			AT-230 9-band tuner/SWR, pwr meter		249.95
			AT-130 8-band compact antenna tuner		199.95
			MB-430 Mobile mounting bracket		29.95
			MC-43S Extra 8-pin hand mic w/up-down		39.95
			MC-60A 8-pin amp desk mic w/up-down		119.95
			MC-80 8-pin electret desk mic w/up-down		74.95
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			MC-85 Multi-function 8-pin elect desk mic		129.95
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			YG-455CN 250 Hz CW filter (2nd IF)		139.95
			AT-230 9-band tuner/SWR, pwr meter		249.95
			MC-30S 4-pin hi-Z hand mic		39.95
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			TL-922A 2kw PEP linear (3-500Zs)		1599.95
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MB-430 Mobile mounting bracket	29.95
MC-43S 8-pin hand mic w/up-down	39.95
MC-48B Up-down 8-pin TTP microphone	64.95
MC-60A 8-pin amp desk mic w/up-down	119.95
MC-80 8-pin electret desk mic w/up-down	74.95
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BH-5 Swivel mount	24.95
BT-5 Alkaline battery case	15.95
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TH-45AT 2.5w 440 FM HT/batt/cgr/TTP	TBA
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BC-11 Rapid charger	TBA
BT-6 AAA battery case	TBA
DC-1/PG-2V DC adapter	TBA
HMC-2 VOX/boom mic headset	49.95
PB-5 Extra 200ma 7.2v (2.5w) battery	TBA
PB-6 600ma 7.2v battery	TBA
PB-7 1100ma 7.2v battery	TBA
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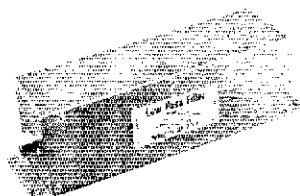
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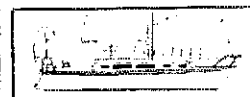
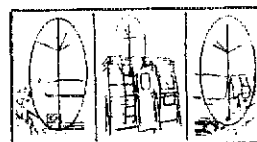
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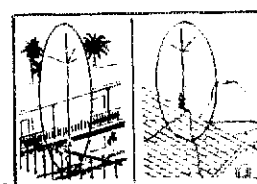
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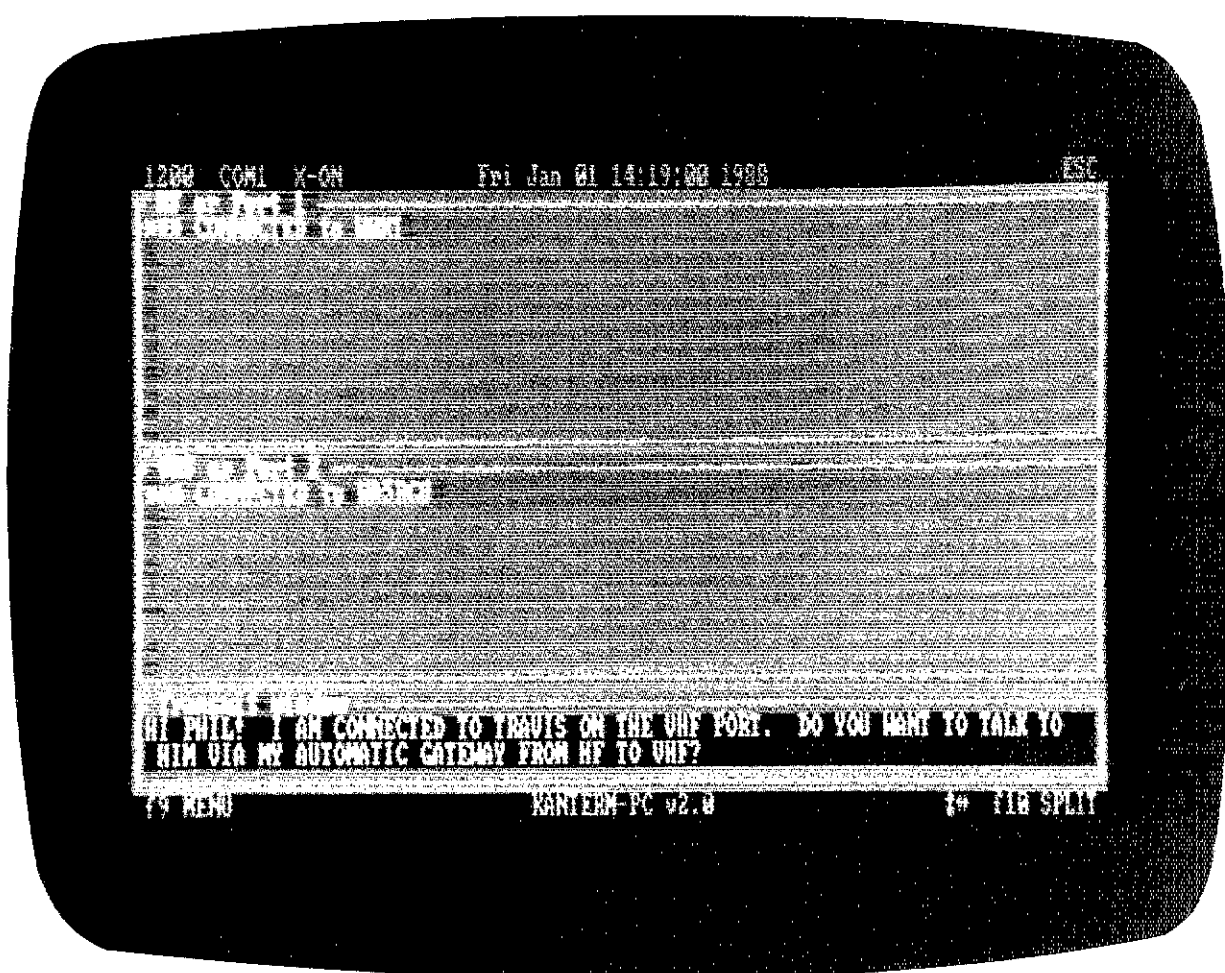
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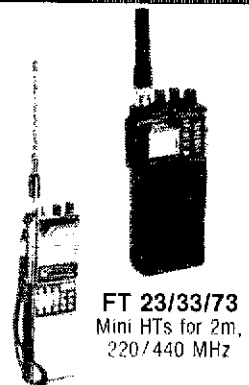
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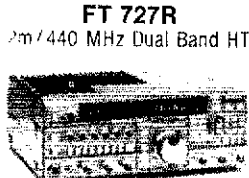
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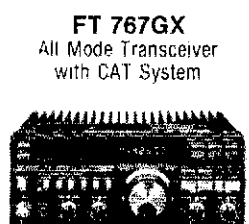
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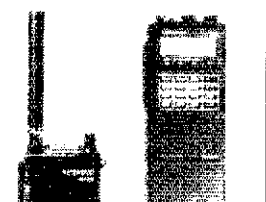
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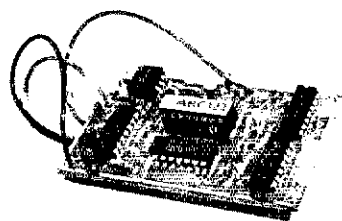
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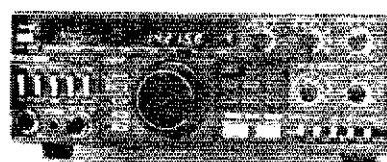
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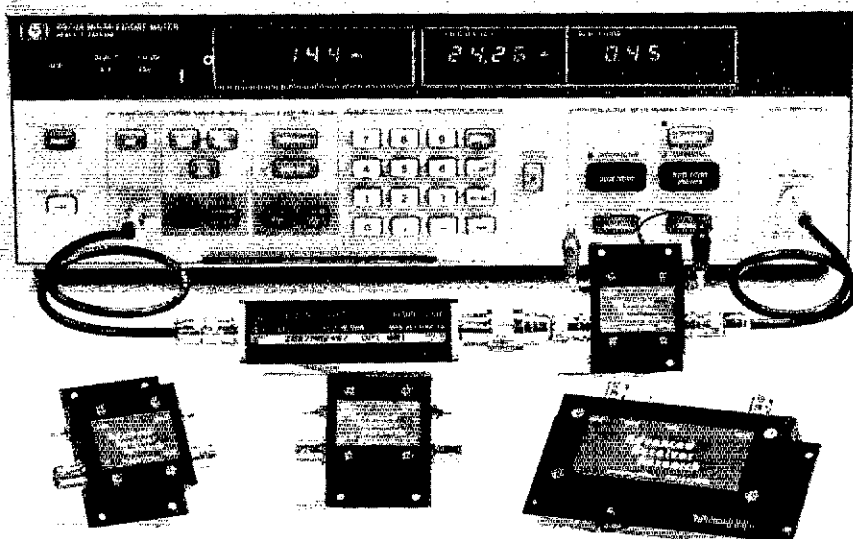
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P144VD	144-148	<1.5	15	0	DGFET	\$29.95
P144VDA	144-148	<1.0	15	0	DGFET	\$37.95
P144VDG	144-148	<0.5	24	+12	GaAsFET	\$79.95
P220VD	220-225	<1.8	15	0	DGFET	\$29.95
P220VDA	220-225	<1.2	15	0	DGFET	\$37.95
P220VDG	220-225	<0.5	20	+12	GaAsFET	\$79.95
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P432VDA	420-450	<1.1	17	-20	Bipolar	\$49.95
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SP144VD	144-148	<1.6	15	0	DGFET	\$59.95
SP144VDA	144-148	<1.1	15	0	DGFET	\$67.95
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SP220VD	220-225	<1.9	15	0	DGFET	\$59.95
SP220VDA	220-225	<1.3	15	0	DGFET	\$67.95
SP220VDG	220-225	<0.55	20	+12	GaAsFET	\$109.95
SP432VD	420-450	<1.9	15	-20	Bipolar	\$62.95
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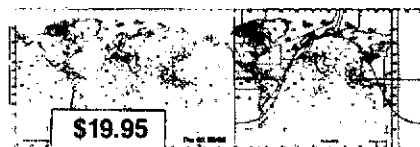
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(2) The Ham-Ad rate is 85 cents per word. This includes firms or individuals offering products or services for sale. A special rate of 25 cents per word applies to individuals seeking to dispose of or acquire personal station equipment, and to hamfest 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 January 14 through February 13 will appear in April QST. If the 13th falls on a weekend or holiday, the Ham-Ad deadline is the previous working day.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A last name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permitted in QST advertising.

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The League reserves the right to decline or discontinue advertising for any reason.

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PROFESSIONAL CW operators, retired or active, commercial, military, gov't., police etc. invited to join Society of Wireless Pioneers—W7GAQ/6, 146 Coleen Street, Livermore, CA 94550.

IMRA - International Mission Radio Association helps missionaries by supplying equipment and running a net for them daily except Sunday, 14 280 MHz, 1:00-3:00 PM Eastern Time. Rev. Thomas Sable, S.J., University of Scranton, Scranton, PA 18510

THE Veteran Wireless Operators Association, a non-profit organization of communications people founded in 1925, invites your inquiries and application for membership. Write VWOA, Ed F. Pleuler, Jr., Secretary, 46 Murdock Street, Fords, NJ 08863.

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JOIN The Old Old Timers Club, an international non-profit organization. If you operated a radio station, commercial, amateur or Armed Forces 40 or more years ago, and have an Amateur license at present you are eligible. Join the real pioneers of ham radio. Write O.O.T.C., 20933 Brant Avenue, Long Beach, CA 90810.

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.

ATTENTION!!! Any Amateur Radio Operators interested in forming a new type of Amateur Radio Club. For information please send \$2 to cover postage to KAJRET, P.O. Box 98, Uniontown, PA 15401.

LIMARC HAMFEST Sunday February 14th. Indoors at the Electricians Hall, 41 Pinelawn Road, Melville, Long Island. Doors open 9 to 3. Admission \$4 to all regardless of age. \$3 after 11:30 AM. Sellers 4' x 6' tables are \$12 or bring your own at \$1.50 a foot, 6 foot minimum. helpers pay admission. Registration in advance only, check payable to LIMARC. L.I.E. Route 495 to Exit 49 North 1/4 mile right turn onto Pinelawn Road. Talk in 146.85. Info Hank Wener, WB2ALW, 516-484-4322, 53 Sherrard Street, East Hills, NY 11577 or Mark Nadel, NK2T, 516-796-2366.

INDIANA: South Bend Swap & Shop, Jan. 3 at the Century Center downtown, on US 33, One-way North between St. Joseph Band Building and the River. Four lane highways to door from all directions. Tables: \$5/5 ft. Round: \$15/8 x 2.5 ft. Rectangular: \$20/8 ft. Wall locations. Talk in 52-52 & area Repeaters. Sponsored by Repeater Valley Hamfest Committee. Contact: Wayne Werts, K9IXU, 1889 Riverside Drive, South Bend, IN 46616, telephone 219-233-6307.



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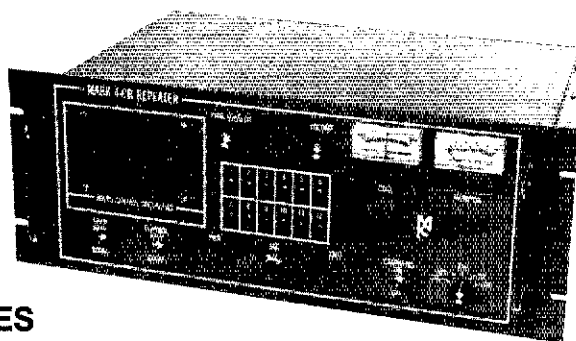
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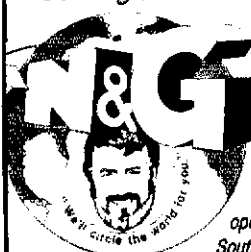
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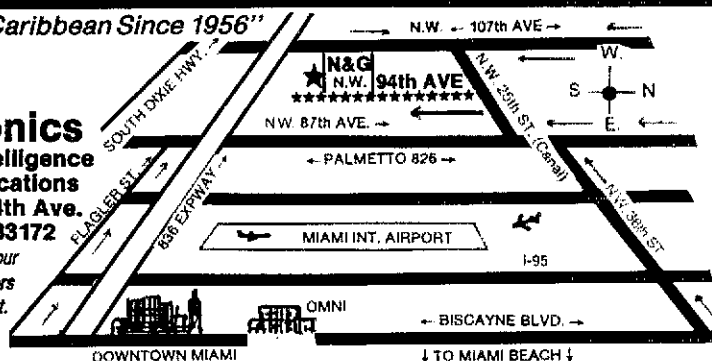
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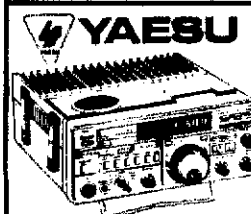
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MRF644	25W 407-512	24.00	54.00
MRF646	40W 407-512	26.50	59.00
MRF648	60W 407-512	31.00	69.00
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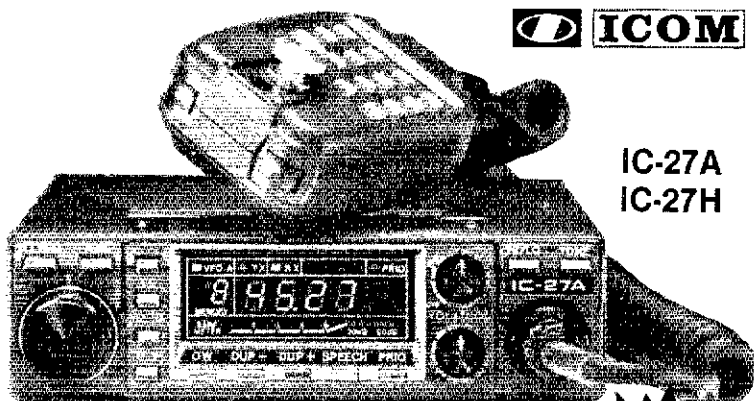
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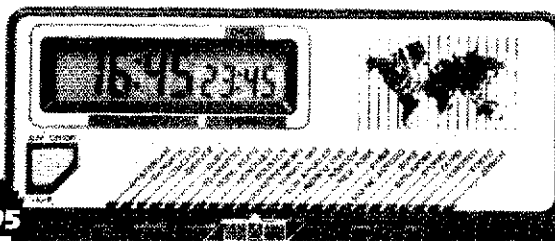
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Displays LOCAL plus 24 Cities/Zones around the world. Set to LONDON for GMT/Universal for easy QSO logging. Both displays show 24-Hour Zulu. Compensates for Intl. Date Line world-wide + or — from local date. Special Summer/Daylight Savings Time switch memorizes changes Zone by Zone.

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Ingenious new quartz digital design runs on one oscillator. Long life AAA batteries included. Excellent accuracy important in ham radio. Compact size (2" x 4.5" x .5"). Great for your station, DXpeditions or travel. Sharp, easy to read digits. Set alarm for schedules. Folding easel stand. Black leather-like travel pouch.

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MFJ TUNERS

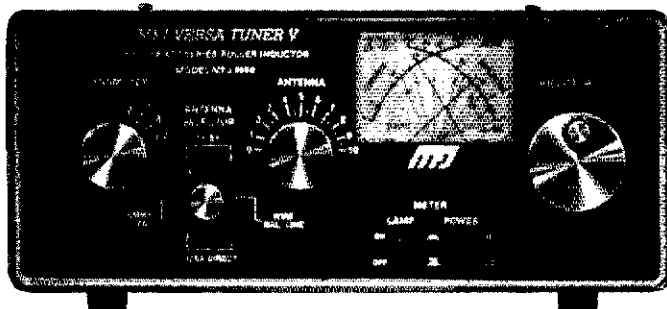
This may be the world's most popular 3 KW roller inductor tuner because it's small, compact, reliable, matches virtually everything and gives you SWR/Wattmeter, antenna switch, dummy load and balun — all at a great price!

Meet "Versa Tuner V". It has all the features you asked for, including the new smaller size to match new smaller rigs—only 10 3/4" W x 4 1/2" H x 14 7/8" D.

Matches coax, balanced lines, random wires—1.8 to 30 MHz, 3 KW PEP—the power rating you won't outgrow (250pf-6KV caps).

Roller inductor with a 3-digit turns counter plus a spinner knob for precise inductance control to get that SWR down to minimum every time.

Built-in 300 watt, 50 ohm dummy load, built-in 4:1 ferrite balun.



MFJ989B **\$349.95**

Lighted Cross-needle Meter reads SWR, forward and reflected power all in one glance. Has 300 and 3,000 watt ranges. Meter light requires 12 VDC.

6 position antenna switch (2 coax lines, through tuner or direct, random/balanced line or dummy load). SO-239 connectors, ceramic feed-throughs, binding post grounds.

Deluxe aluminum low-profile cabinet with sub-chassis for RFI protection, black finish, black front panel with raised letters, tilt ball.

MFJ's Fastest Selling TUNER

MFJ-941D **\$99.95**



MFJ's fastest selling tuner packs in plenty of new features. **New styling!** Brushed aluminum front. All metal cabinet. **New SWR/Wattmeter!** More accurate. Switch selectable 300/30 watt ranges. Read forward/reflected power.

New antenna switch! Front panel mounted. Select 2 coax lines, direct or through tuner, random wire/balanced line or tuner bypass for dummy load.

New airwound inductor! Larger more efficient 12 position airwound inductor gives lower losses and more watts out. Run up to 300 RF power output.

Matches everything from 1.8 to 30 MHz! dipoles, inverted vee, random wires, verticals, mobile whips, beams, balanced and coax lines.

Built-in 4:1 balun for balanced lines. 1000 V capacitor spacing. Black. 11 x 3 x 7 inches. Works with all solid state or tube rigs. Easy to use anywhere.

MFJ's 1.5 KW VERSA TUNER III

MFJ-962B **\$229.95**

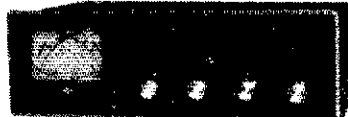


Run up to 1.5 kw PEP and match any feedline continuously from 1.8 to 30 MHz: coax, balanced line or random wire.

Lighted Cross-needle Meter reads SWR, forward and reflected power in one glance. Has 300 and 3,000 watt ranges. 6 position antenna switch handles 2 coax lines, wire and balanced lines. 4:1 balun. 250 pf, 6 kv variable capacitors. 12 position ceramic inductor switch. New smaller size matches new rigs: 10 3/4" x 4 1/2" x 14 7/8" inches. Flip stand for easy viewing. Requires 12V for light.

MFJ's Best VERSA TUNER

MFJ-949C **\$149.95**



MFJ's best 300 watt tuner is now even better! The **MFJ-949C all-in-one Deluxe Versa Tuner II** gives you a tuner, cross-needle SWR/Wattmeter, dummy load, antenna switch and balun in a new compact cabinet. You get quality conveniences and a clutter-free shack at a super price.

A new cross-needle SWR/Wattmeter gives you SWR, forward and reflected power—all at a single glance. SWR is automatically computed with no controls to set. Has 30 and 300 watt scale on easy-to-read 2 color lighted meter (needs 12 V).

A handsome new black brushed aluminum cabinet matches all the new rigs. Its compact size (10 x 3 x 7 inches) takes only a little room.

You can run full transceiver power output—up to 300 watts RF output—and match coax, balanced lines or random wires from 1.8 thru 30 MHz. Use it to tune out SWR on dipoles, vees, long wires, verticals, whips, beams and quads.

A 300 watt 50 ohm dummy load gives you quick tune ups and a versatile six position antenna switch lets you select 2 coax lines (direct or thru tuner), random wire or balanced line and dummy load.

A large efficient airwound inductor—3 inches in diameter—gives you plenty of matching range and less losses for more watts out. 100 volt tuning capacitors and heavy duty switches gives you safe arc-free operation. A 4:1 balun is built-in to match balanced lines.

Order your convenience package now and enjoy.

2 KW COAX SWITCHES

MFJ-1702 **\$19.95**



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. White markable surface for antenna positions.

\$29.95 MFJ-1701



MFJ's Smallest VERSA TUNER

MFJ-901B **\$59.95**



MFJ's smallest 200 watt Versa Tuner matches coax, random wires and balanced lines continuously from 1.8 thru 30 MHz. Works with all solid state and tube rigs. Very popular for use between transceiver and final amplifier for proper matching. Efficient airwound inductor gives more watts out. 4:1 balun for balanced lines. 5 x 2 x 6 inches. Rugged black all aluminum cabinet.

MFJ's Random Wire TUNER

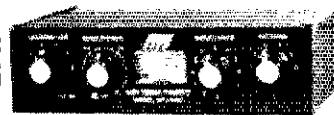
MFJ-1601D **\$39.95**



MFJ's ultra compact 200 watt random wire tuner lets you operate all bands anywhere with any transceiver using a random wire. Great for apartment, motel, camping operation. Tunes 1.8-30 MHz. 2 x 3 x 4 inches.

MFJ's Mobile TUNER

MFJ-945C **\$79.95**



Designed for mobile operation! Small, compact. Takes just a tiny bit of room in your car. SWR/dual range wattmeter makes tuning fast and easy. Careful placement of controls and meter makes antenna tuning safer while in motion.

Extends your antenna bandwidth so you can operate anywhere in a band with low SWR. **No need to go outside and readjust your mobile whip.** Low SWR also gives you maximum power out of your solid state rig—runs cooler for longer life.

Handles up to 300 watts PEP RF output. Has efficient airwound inductor, 1000 volt capacitor spacing and rugged aluminum cabinet. 8x2x6 inches. Mobile mounting bracket available for \$5.00.

ORDER ANY PRODUCT FROM MFJ AND TRY IT-NO OBLIGATION. IF NOT SATISFIED, RETURN WITHIN 30 DAYS FOR PROMPT REFUND (less shipping).

• One year unconditional guarantee • Made in USA
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800-647-1800

Call 601-323-5869 in Miss. and outside continental USA Telex 53-4590 MFJ STKV



MFJ-931 creates artificial RF ground with random wire also, electrically places far away ground directly at your rig



MFJ-931
\$79⁹⁵

- **Creates artificial RF ground with random length wire**
- **Electrically places a far away ground directly at your rig**
- **RF ammeter makes tuning for maximum RF ground current easy**
- **Eliminates "RF bites", RF feedback, TVI/RFI and other problems due to inadequate RF ground**
- **Improves radiation pattern distorted by poor RF ground**

Don't we all sometimes have problems getting a good RF ground?

Unpleasant problems. Problems like RF "hot spots" that "bite" our lips or fingers when we transmit; like RF feedback that causes our rigs to quit working on certain bands; like excessive RF coupling to AC lines that causes everything to quit working; like our neighbors screaming about TVI and RFI; like our computers computing jibberish; or like being unable to talk across town because of extreme ground losses or radiation pattern distortion.

"Hey, my rig is on the second floor. There's no way I can get a good ground," you're thinking, or "I already have an excellent ground but the long ground connection wire causes reactance and acts like a high impedance circuit, isolating my rig from true RF ground."

What to do

Use the new MFJ-931 to create an artificial RF ground! It resonates a random length of wire thrown along the floor and

produces a tuned counterpoise. This artificial ground effectively places your rig near actual earth ground potential even if your rig is on the second floor or higher with no earth ground possible.

Also, the MFJ-931 electrically places a far away RF ground directly at your rig - no matter how far away it is. The MFJ-931 reduces the electrical length of the ground connection wire to virtually zero by tuning out its reactance.

How it works

The MFJ-931 connects between the ground connection of your transmitter or antenna tuner and a random length of wire thrown along the floor. Two knobs are adjusted for maximum RF ground current using its built-in RF ammeter. This resonates the random wire, converts it into a tuned counterpoise and presents an effective low impedance near ground potential to your rig, thus creating an artificial RF ground.

To electrically place a far away ground directly at your radio equipment simply connect the

MFJ-931 between your rig and the connecting ground wire and adjust its two knobs for maximum RF current using its RF ammeter. This tunes out the reactance of the connecting wire, reduces the electrical ground lead length to virtually zero and electrically places your far away ground directly at your rig.

Get an effective RF ground

Get an effective RF ground. Eliminate "RF bites", RF feedback TVI, RFI and many other annoying problems due to inadequate RF ground, *and* -- at the same time -- improve your radiation and radiation pattern for more DX.

The MFJ-931 covers 1.8 to 30 MHz and has a built-in RF ammeter for indicating RF ground current. It's ruggedly built in an all aluminum cabinet with a brushed aluminum front panel and measures 7 1/2 x 3 1/2 x 7 inches. It comes with a one year unconditional guarantee.

It's available only from MFJ. MFJ-931, \$79.95.

Order any product from MFJ and try it -- no obligation. If not satisfied return within 30 days for prompt refund (less shipping).
• One year unconditional guarantee • Add \$5.00 each shipping/handling • Call or write for free catalog, over 100 products.



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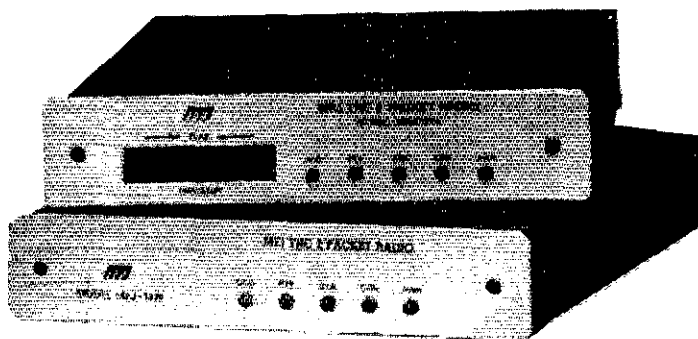
MFJ . . . making quality affordable

New MFJ-1274 lets you work VHF and HF packet with built-in tuning indicator for \$169.95 . . .

. . . you get MFJ's latest clone of TAPR's TNC-2, TAPR's VHF/HF modem and built-in tuning indicator that features 20 LEDs for easy precise tuning

MFJ-1274
\$169⁹⁵

MFJ-1270
\$139⁹⁵



Now you can join the exciting world of packet radio on both VHF and HF bands with a precision tuning indicator . . . for an incredible \$169.95!

You get MFJ's top quality clone of the highly acclaimed industry standard TAPR TNC-2. We've made TAPR's modem selectable for both VHF and HF operation, added their precision 20 segment LED tuning indicator, a TTL serial port, an easily replaceable lithium battery for memory back-up and put it all in a new cabinet.

If you don't need the tuning indicator or the convenience of a switchable VHF/HF modem, choose the affordable MFJ-1270 for \$139.95.

All you need to operate packet radio is a MFJ-1274 or MFJ-1270, your rig, and any home computer with a RS-232 serial port and terminal program.

If you have a Commodore 64, 128, or VIC 20 you can use MFJ's optional Starter Pack to get on the air immediately. The Starter Pack includes interfacing cable, terminal software on disk or tape and complete instructions . . . everything you need to get on packet radio. Order MFJ-1282 (disk) or MFJ-1283 (tape), \$19.95.

Unlike machine specific TNCs you never have to worry about your MFJ-1274 or MFJ-1270 becoming obsolete because you change computers or because packet radio standards change. You can use any computer with an RS-232 serial port with an appropriate terminal program. If packet radio standards change, software updates will be made available as TAPR releases them.

Also speeds in excess of 56K bauds are possible with a suitable external modem! Try that with a

machine specific TNC or one without hardware HDLC as higher speeds come into widespread use.

You can also use the MFJ-1274 or MFJ-1270 as an excellent but inexpensive digipeater to link other packet stations.

Both feature AX.25 Level 2 Version 2 software, hardware HDLC for full duplex, true Data Carrier Detect for HF, multiple connects, 256K EPROM, 16K RAM (expandable to 32K with optional EPROM), simple operation, socketed ICs plus much more.

You get an easy-to-read manual, a cable to connect your transceiver (you have to add a connector for your particular radio), a connector for the TTL serial port and a power supply for 110 VAC operation (you can use 12 VDC for portable, remote or mobile operation).

Help make history! Join the packet radio revolution now and help spread this exciting network throughout the world. Order the top quality and affordable MFJ-1274 or MFJ-1270 today.



MFJ-1273, \$49.95

Now you can tune in HF, OSCAR and other non-FM packet stations fast!

This MFJ clone of the TAPR tuning indicator makes tuning natural and easy -- it shows you which direction to tune. All you have to do is to center a single LED and you're precisely tuned in to within 10 Hz. 20 LEDs give high resolution and wide frequency coverage.

The MFJ-1273 tuning indicator plugs into the MFJ-1270 and all TNC-1s, TNC-2s and clones that have the TAPR tuning indicator connector.

Order any product from MFJ and try it -- no obligation. If not satisfied return within 30 days for prompt refund (less shipping).
• One year unconditional guarantee • Add \$5.00 each shipping/handling • Call or write for free catalog, over 100 products.

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DAYTON Hamvention

April 29, 30, May 1, 1988

Early Reservation Information

- Giant 3 day flea market • Exhibits
- License exams • Free bus service
- CW proficiency test • Door prizes

Flea market tickets and grand banquet tickets are limited. Place your reservations early, please.

Flea Market Tickets

A maximum of 3 spaces per person (non-transferable). Tickets (valid all 3 days) will be sold IN ADVANCE ONLY. No spaces sold at gate. Vendors MUST order registration ticket when ordering flea market spaces.

Special Awards

Nominations are requested for 'Radio Amateur of the Year', 'Special Achievement' and 'Technical Achievement' awards. Contact: Hamvention Awards Chairman, Box 964, Dayton, OH 45401.

License Exams

Novice thru Extra exams scheduled Saturday and Sunday by appointment only. Send FCC form 610 (Aug. 1985 or later) - with requested elements indicated at top of form, copy of present license and check for \$4.35 (payable to ARRL/VEC) to: Exam Registration, 8830 Windbluff Point, Dayton, OH 45458

Hamvention Video

VHS video presentation about the HAMVENTION is available for loan. Contact Dick Miller, 2853 La Cresta, Beavercreek, OH 45324

1988 Deadlines

Award Nominations: March 15

Lodging: April 2

License Exams: March 26

Advance Registration and banquet:

USA - April 4 Canada - March 31

Flea Market Space:

Orders will not be processed before January 1

Information

General Information: (513) 433-7720

or, Box 2205, Dayton, OH 45401

Flea Market Information: (513) 898-8871

Lodging Information: (513) 223-2612

(No Reservations By Phone)

Lodging

Reservations received after Housing Bureau room blocks are filled will be returned along with a list of hotel/motels located in the surrounding areas of Dayton. The reservation will then become the responsibility of the individual.

HAMVENTION is sponsored by the Dayton Amateur Radio Association Inc.

Lodging Reservation Form

Dayton Hamvention - April 29, 30, May 1, 1988

Reservation Deadline - April 2, 1988

Name _____

Address _____

City _____ State _____ Zip _____

Phone _____

Arrival Date _____

☐ Before 6 pm ☐ After 6 pm

Departure Date _____

Rooms: ☐ Single ☐ Double (1 bed, 2 persons)

☐ Double Double (2 beds, 2 persons)

Deposit required - Room deposit must be paid directly to the hotel or motel by date shown on the confirmation form sent to you. Use canceled check for confirmation.

Mail to - Lodging, Dayton Hamvention, 1880 Kettering Tower, Dayton, OH 45423-1880

(PLEASE SEPARATE)

Advance Registration Form

Dayton Hamvention 1988

Reservation Deadline - USA-April 4, Canada-March 31

Name _____

Address _____

City _____ State _____ Zip _____

How Many

Admission _____ @ \$8.00* \$ _____

(valid all 3 days)

Grand Banquet _____ @ \$16.00** \$ _____

Women's Luncheon _____

(Saturday)

@ \$6.75 \$ _____

(Sunday)

@ \$6.75 \$ _____

Flea Market \$25/1 space

(Max. 3 spaces)

\$50/2 adjacent

Admission ticket must \$150/3 adjacent \$ _____

be ordered with flea market tickets Total \$ _____

* \$10.00 at door ** \$18.00 at door, if available

Make checks payable and mail S.A.S.E. to - Dayton Hamvention, Box 2205, Dayton, OH 45401

1988 CALLBOOKS



The "Flying Horse" sets the standards

Continuing a 67 year tradition, we bring you three new Callbooks for 1988.

The North American Callbook lists the calls, names, and address information for 478,000 licensed radio amateurs in all countries of North America, from Canada to Panama including Greenland, Bermuda, and the Caribbean Islands plus Hawaii and the U.S. possessions.

The International Callbook lists 481,000 licensed radio amateurs in countries outside North America. Its coverage includes South America, Europe, Africa, Asia, and the Pacific area (exclusive of Hawaii and the U.S. possessions).

The 1988 Callbook Supplement is a new idea in Callbook updates, listing the activity in both the North American and International Callbooks. Published June 1, 1988, this Supplement will include thousands of new licenses, address changes, and call sign changes for the preceding 6 months.

The 1988 Callbooks will be published December 1, 1987. See your dealer or order now directly from the publisher.

- North American Callbook
incl. shipping within USA \$28.00
incl. shipping to foreign countries 30.00
- International Callbook
incl. shipping within USA \$30.00
incl. shipping to foreign countries 32.00
- Callbook Supplement, published June 1st
incl. shipping within USA \$13.00
incl. shipping to foreign countries 14.00

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LITTLE Big Horn Net Sundays: 14.067 MHz, 2200 UTC & 21.176 MHz 2300 UTC. Native American Indians welcome. SASE WA2DAC.

QSL CARDS/RUBBER STAMPS/ENGRAVING

CANADIANS QSL samples \$1 (refundable) M. Smith, VE7FI, Box 1376, Delta, BC V4M 3T3.

DON'T buy QSL cards until you see my free samples or draw your own design. I specialize in custom cards. Send black and white sketch: will give quote. I would also like to introduce you to our personalized QSL Business Cards. Same size as standard business cards (3-1/2 x 2). Write or call for free samples. Little Print Shop, Box 1160, Pflugerville, TX 78660, 512-990-1192.

FREE samples—stamp appreciated. Conner, 522 Notre Dame Ave., Chattanooga, TN 37412.

QSLs: 1) FAMOUS K0AAB custom collection. 2) Railroad employees and railfan's specials. 3) Front report styles. 4) Multiple callsigns. 5) Ham business cards. State your sample wants. 39 cents self addressed business size envelope required. Marv Mahre, W0MGI, 2095 Prosperity Ave., St. Paul, MN 55109-3621.

BE SURPRISED - get a variety of cards - 100 for \$8 or 200 for \$13. Samples \$1 refundable. All three colors, fast service, satisfaction guaranteed. Constantine, 1219 Ellington, Myrtle Beach, SC 29577.

FREE, 100 QSLs with first order. Samples 50¢. Gazebo Press, Rt. 4 Box 4148, LaPlata, MD 20646.

ENGRAVING: CALLSIGN name badges by W0LOV. SASE for price sheet. Box 4133, Overland Park, KS 66204.

CADILLAC of QSLs—Completely different! Samples \$1. (refundable). Mac's Shack, P.O. Box 43175, Seven Points, TX 75143.

PICTURE QSL CARDS of your shack, etc. from your photo or black ink art work. 500 \$25.50; 1000 \$39.50. Also non-picture cards. Customized cards, send specifications for estimate. Send two stamps for illustrated literature. Generous sample kit \$2; half pound of samples \$3. Raum's, R.D. 2, Orchard Road, Coopersburg, PA 18036. Phone 1-215-679-7238

QSLs QUALITY and Fast Service for 28 years. Include Call for Decal. Samples 50¢. Ray, K7HLR, Box 331, Clearfield, UT 84015

QSL CARDS - Look good with top quality printing. Choose standard designs or fully customized cards. Better cards mean more returns to you. Free brochure, samples. Stamps appreciated. Chester QSL's, Dept. B, 310 Commercial, Emporia, KS 66801.

QSL SAMPLES send \$1 (refundable with order) Box 1262, Point Roberts, WA 98281.

QUALITY QSLs, Samples 50 cents. Olde Press, WB9MPP, Box 1252, Kankakee, IL 60901.

COLORFUL QSLs by WA7LNW - Improve your QSL returns! Revolutionary printing process combines brilliant rainbow colors with sparkling metallic inks. The ultimate QSL! Samples \$1 (refundable) COLORFUL QSLs, P.O. Box 5358, Glendale, AZ 85312-5358.

QSLs, QSLs, Rusprint QSLs quantities of 100, 200, 300 or more. Full color of Old Glory and cartoons. Also parchment, golden eagle and others. SASE appreciated. Rusprint, Rt. 1, Box 363-QST, Spring Hill, KS 66083.

QSL Samples - 25 cents. Samcards, 48 Monte Carlo Drive, Pittsburgh, PA 15239.

EMBROIDERED Emblems, custom designed club pins, medallions, trophies, ribbons. Highest quality, fastest delivery, lowest prices anywhere. Free info: NDI, Box 6665 M, Manetta, GA 30065.

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FULL COLOR Custom QSLs made from your slide-photo. \$84.75 thousand. B/W 250 \$23. Samples. Picture Cards, 3806 NE 24th, Amarillo, TX 79107, 806-383-8347.

POST CARDS QSL Kit—Converts Post Cards, Photos to QSL's! Stamp brings circular. My Type Shop, P.O. Box 172, Leeds, NY 12451.

CONTESTERS, QSL Managers... Save money and send a quality QSL. Send for free samples and see for yourself. QSLs by W4MPY, 705 Audubon Circle, Belvedere, SC 29841.

QSLs by "Sam" (samples \$1). Sam's Print/Wheels, P.O. Box 55, Petersburg, NY 12138-9729.

QSL CARDS. 100 for \$8. Fast service. High Quality. Free samples. Shell Printing, KD9KW, P.O. Box 50, Rockton, IL 61072.

QSL CARDS - Look good with top quality printing. Choose standard designs or fully customized cards. Better cards mean more returns to you. Free brochure, samples. Stamps appreciated. Chester QSL's, Dept. B, 310 Commercial, Emporia, KS 66801.

MAGNETIC Callsign... 2" x 8". Instant transfer car to car! Your call in lettering Black, Blue, Green or Red (white background). Each sign only \$8.50 ppp. Sign-On, Dept. T, 1923 Edward Lane, Merrick, NY 11566.

ANTIQUA-VINTAGE-CLASSIC

WANTED: Old microphones for my mic. museum. Also mic-related items. Write Bob Paquette, 107 E. National Ave., Milw. WI 53204.

HALLICRAFTERS Service Manuals. Amateur and SWL. Write for prices. Specify Model Numbers desired. Ardco Electronics, P.O. Box 95, Dept. Q, Berwyn, IL 60402.

WANTED: Radio, magazines, horn speakers, etc. PRE-1960. W6THU, 1545 Raymond, Glendale, CA 91201, 818-242-8961.

WANTED: QST VOLUME 1. W6ISQ, 82 Belbrook Way, Atherton, CA 94025.

SCHEMATICS: Radio receivers 1920's/60's. Send Brand-name, Model No., SASE Scaramella, Box 1, Woonsocket, RI 02895-0001.

TELEGRAPH Bugs and old keys wanted. Donations appreciated. John Hensley, WJ5J, 5054 Holloway Avenue, Baton Rouge, LA 70808.

WE MAY HAVE the tubes you need. (Thousands in stock). Send SASE for our list. Fala Electronics, P.O. Box 1376-1, Milwaukee, WI 53201.

WANTED, BOOKS: Pre-1900 Electricity and Telegraphy, Pre-1925 Radio, Pre-1940 Television. Books, Magazines or any other related literature. Jim Kreuzer, N2GHD, 6270 Clinton St., Elma, NY 14059, 716-681-3186.

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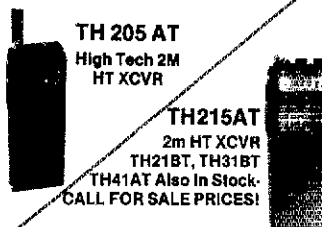
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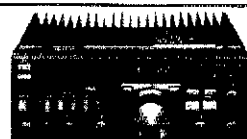
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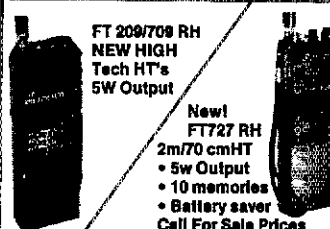
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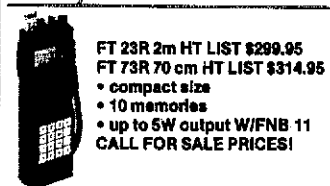


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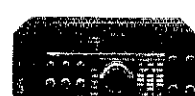
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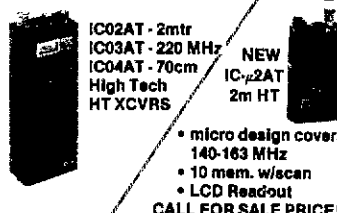
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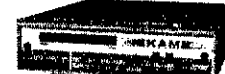


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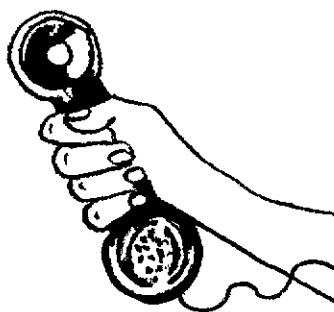
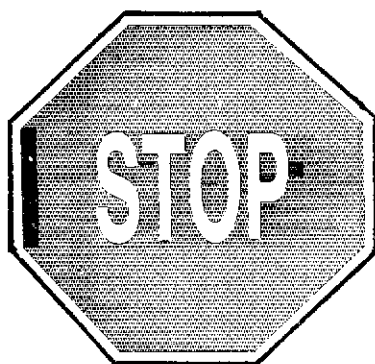


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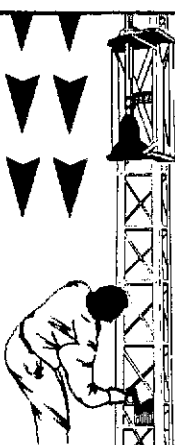
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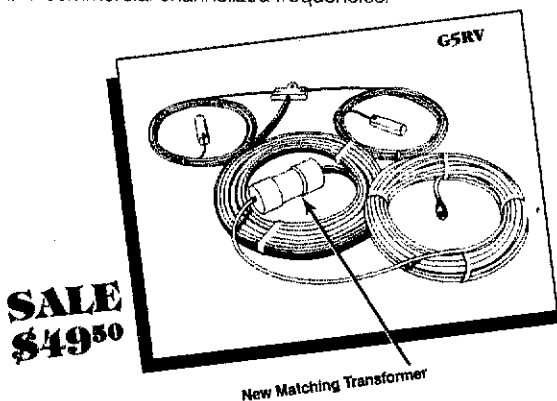
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RF Output SSB 1.5 KW PEP continuous, CW 1.2 KW Average continuous, RTTY, SSTV 1 KW Average 1.5 KW PEP.

Plate Voltage: RTTY/AM/SSTV/CW/SSB 3.2 KV DC

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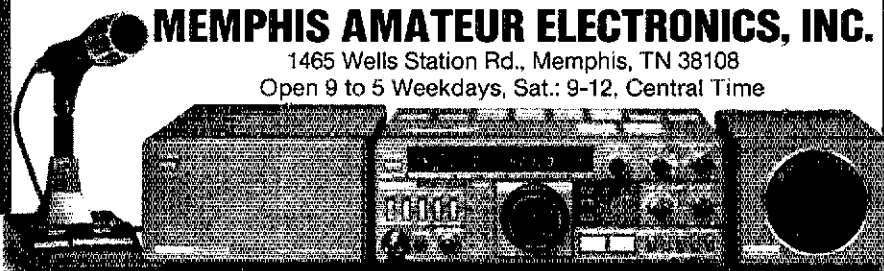
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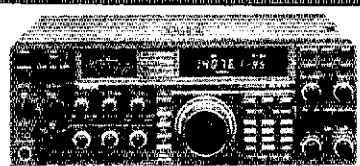
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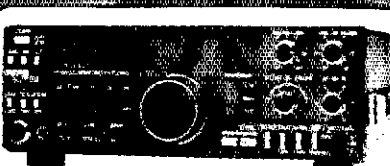
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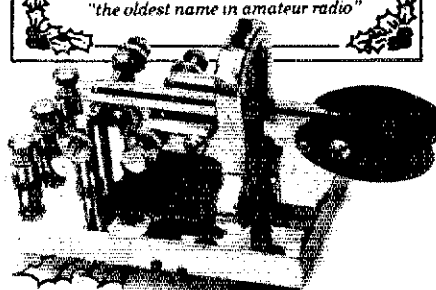
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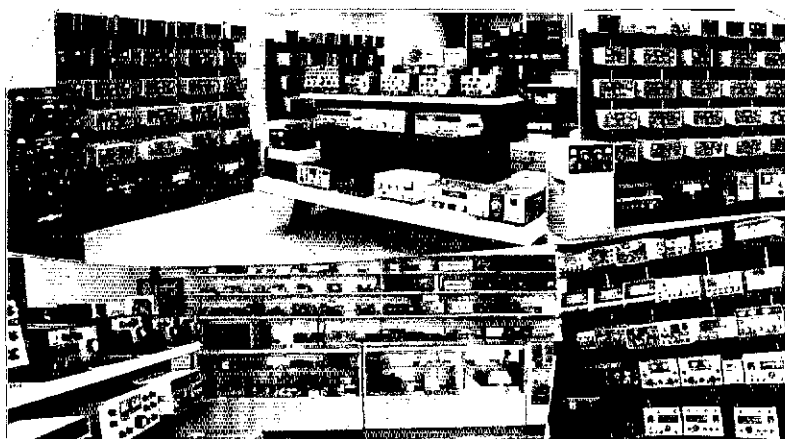
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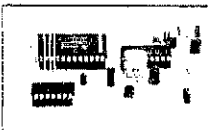
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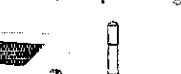
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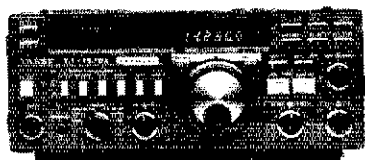
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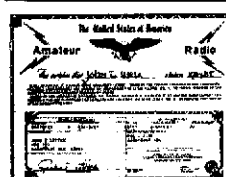
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INFO-TECH M-300C RTTY/CW Keyboard \$175, DGM MKB-2000 CW/RTTY Keyboard \$175, Curtis EK-430 Keyer \$65, Drake TR-4CW Transceiver \$275, MN-2000 Tuner \$225, Drake-Tono Theta-7000 RTTY/ASCII/CW Keyboard Terminal \$275. A. Emerald, 8958 Swallow, Ftn. Vly., CA 92708, 714-962-5940.

SELL: Drake TR4/MS4 Power Supply, "TO" Keyer \$275 Call 607-967-7296, K2MQR, Kurt.

WANTED: General Coverage Scale for HRO 60 O Coils. Frank McJannet, 700 N 117th, Seattle, WA 98133.

SELL: GPR-90-RX T.M.C. Receiver, \$175; HX50 Hammarlund Transmitter with 160, \$175; Viking II, \$95; 75A4 No. 4, 3.1, Vernier, \$375; Ameco Pelp, \$35; Viking 500, \$500; Mims-Amphenol Rotor, Selsyns, \$125; Clipperton L Amp, \$375; KLM 10-30 Log Periodic, \$450; Hy-Gain 13-30 Log Periodic, \$750; Home-Brew Professionally Built Amp, PS, 1000TX2, 2500 WDC out 160 to 20, \$1500; 100 Foot Portable Antenna Mast, \$1500; Want Trades on Mast, etc. FT-102, KW-1, RG-17, car, truck, raytrac, Swan 6M Linears, etc. K8CCV, 216-427-2303, 6-9 PM weeknights EST.

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WANTED: Collins S Line, KWM2A, 30L1, Alpha 77, Kenwood TS130S. Schaff, 807 Sunbeam, Oneida, WI 54155, 1-414-434-2938.

KENWOOD TS830S, SP230 Speaker, MC50 Mic, All Manuals, Mint Shape, \$685; Yaesu FT230R, 2M, 25W, Mobile, \$265; ICOM IC02AT Handheld, 2 Battery Packs, Charger, \$245; Drake TV-1000 HF Lowpass Filter, \$10; Shipping Extra; 4 Element 10M Beam; Jim, WB1ALR, NH, 603-668-6955.

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WANTED: Swan 250, 6 meter (tube) SSB/CW transceiver and power supply. Richard McMahon, PO Box 316, FPO New York 09518.

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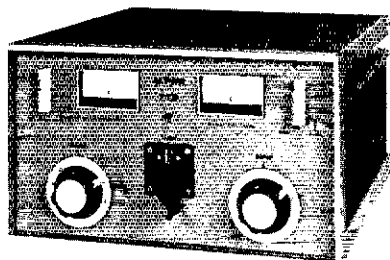


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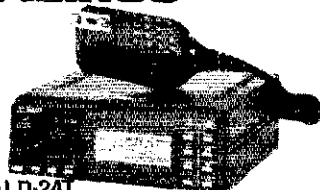
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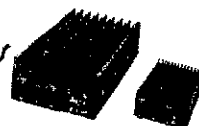
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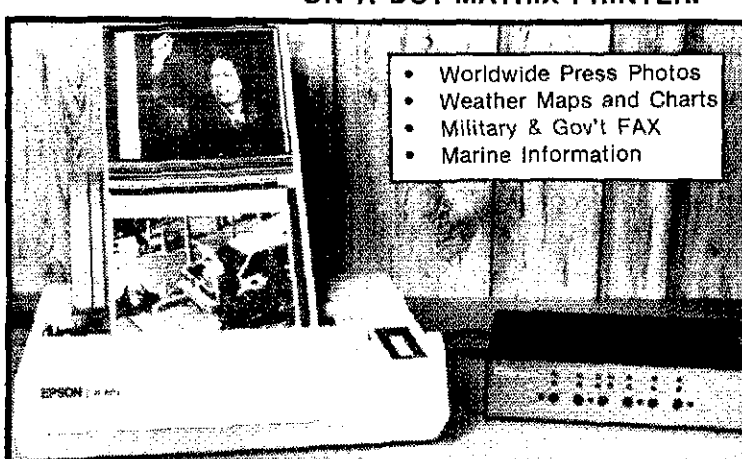
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50-100-150-200-250-300-350-400-450-500-550-600-650-700-750-800-850-900-950-1000-1100-1200-1300-1400-1500-1600-1700-1800-1900-2000-2100-2200-2300-2400-2500-2600-2700-2800-2900-3000-3100-3200-3300-3400-3500-3600-3700-3800-3900-4000-4100-4200-4300-4400-4500-4600-4700-4800-4900-5000-5100-5200-5300-5400-5500-5600-5700-5800-5900-6000-6100-6200-6300-6400-6500-6600-6700-6800-6900-7000-7100-7200-7300-7400-7500-7600-7700-7800-7900-8000-8100-8200-8300-8400-8500-8600-8700-8800-8900-9000-9100-9200-9300-9400-9500-9600-9700-9800-9900-10000-11000-12000-13000-14000-15000-16000-17000-18000-19000-20000-21000-22000-23000-24000-25000-26000-27000-28000-29000-30000-31000-32000-33000-34000-35000-36000-37000-38000-39000-40000-41000-42000-43000-44000-45000-46000-47000-48000-49000-50000-51000-52000-53000-54000-55000-56000-57000-58000-59000-60000-61000-62000-63000-64000-65000-66000-67000-68000-69000-70000-71000-72000-73000-74000-75000-76000-77000-78000-79000-80000-81000-82000-83000-84000-85000-86000-87000-88000-89000-90000-91000-92000-93000-94000-95000-96000-97000-98000-99000-100000-110000-120000-130000-140000-150000-160000-170000-180000-190000-200000-210000-220000-230000-240000-250000-260000-270000-280000-290000-300000-310000-320000-330000-340000-350000-360000-370000-380000-390000-400000-410000-420000-430000-440000-450000-460000-470000-480000-490000-500000-510000-520000-530000-540000-550000-560000-570000-580000-590000-600000-610000-620000-630000-640000-650000-660000-670000-680000-690000-700000-710000-720000-730000-740000-750000-760000-770000-780000-790000-800000-810000-820000-830000-840000-850000-860000-870000-880000-890000-900000-910000-920000-930000-940000-950000-960000-970000-980000-990000-1000000-1100000-1200000-1300000-1400000-1500000-1600000-1700000-1800000-1900000-2000000-2100000-2200000-2300000-2400000-2500000-2600000-2700000-2800000-2900000-3000000-3100000-3200000-3300000-3400000-3500000-3600000-3700000-3800000-3900000-4000000-4100000-4200000-4300000-4400000-4500000-4600000-4700000-4800000-4900000-5000000-5100000-5200000-5300000-5400000-5500000-5600000-5700000-5800000-5900000-6000000-6100000-6200000-6300000-6400000-6500000-6600000-6700000-6800000-6900000-7000000-7100000-7200000-7300000-7400000-7500000-7600000-7700000-7800000-7900000-8000000-8100000-8200000-8300000-8400000-8500000-8600000-8700000-8800000-8900000-9000000-9100000-9200000-9300000-9400000-9500000-9600000-9700000-9800000-9900000-10000000-11000000-12000000-13000000-14000000-15000000-16000000-17000000-18000000-19000000-20000000-21000000-22000000-23000000-24000000-25000000-26000000-27000000-28000000-29000000-30000000-31000000-32000000-33000000-34000000-35000000-36000000-37000000-38000000-39000000-40000000-41000000-42000000-43000000-44000000-45000000-46000000-47000000-48000000-49000000-50000000-51000000-52000000-53000000-54000000-55000000-56000000-57000000-58000000-59000000-60000000-61000000-62000000-63000000-64000000-65000000-66000000-67000000-68000000-69000000-70000000-71000000-72000000-73000000-74000000-75000000-76000000-77000000-78000000-79000000-80000000-81000000-82000000-83000000-84000000-85000000-86000000-87000000-88000000-89000000-90000000-91000000-92000000-93000000-94000000-95000000-96000000-97000000-98000000-99000000-100000000-110000000-120000000-130000000-140000000-150000000-160000000-170000000-180000000-190000000-200000000-210000000-220000000-230000000-240000000-250000000-260000000-270000000-280000000-290000000-300000000-310000000-320000000-330000000-340000000-350000000-360000000-370000000-380000000-390000000-400000000-410000000-420000000-430000000-440000000-450000000-460000000-470000000-480000000-490000000-500000000-510000000-520000000-530000000-540000000-550000000-560000000-570000000-580000000-590000000-600000000-610000000-620000000-630000000-640000000-650000000-660000000-670000000-680000000-690000000-700000000-710000000-720000000-730000000-740000000-750000000-760000000-770000000-780000000-790000000-800000000-810000000-820000000-830000000-840000000-850000000-860000000-870000000-880000000-890000000-900000000-910000000-920000000-930000000-940000000-950000000-960000000-970000000-980000000-990000000-1000000000-1100000000-1200000000-1300000000-1400000000-1500000000-1600000000-1700000000-1800000000-1900000000-2000000000-2100000000-2200000000-2300000000-2400000000-2500000000-2600000000-2700000000-2800000000-2900000000-3000000000-3100000000-3200000000-3300000000-3400000000-3500000000-3600000000-3700000000-3800000000-3900000000-4000000000-4100000000-4200000000-4300000000-4400000000-4500000000-4600000000-4700000000-4800000000-4900000000-5000000000-5100000000-5200000000-5300000000-5400000000-5500000000-5600000000-5700000000-5800000000-5900000000-6000000000-6100000000-6200000000-6300000000-6400000000-6500000000-6600000000-6700000000-6800000000-6900000000-7000000000-7100000000-7200000000-7300000000-7400000000-7500000000-7600000000-7700000000-7800000000-7900000000-8000000000-8100000000-8200000000-8300000000-8400000000-8500000000-8600000000-8700000000-8800000000-890000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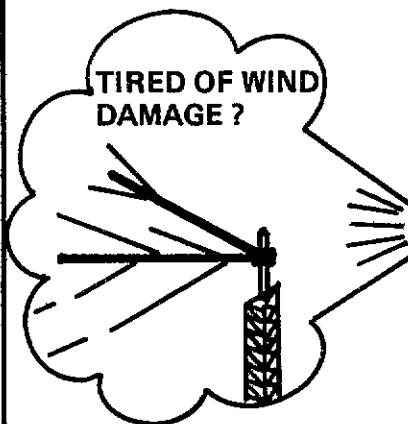
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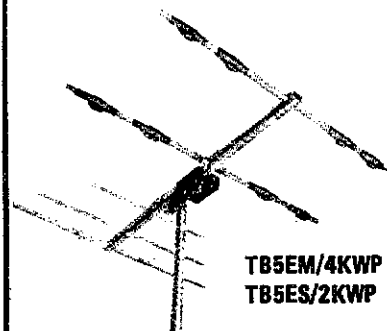
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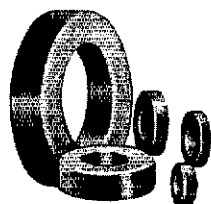
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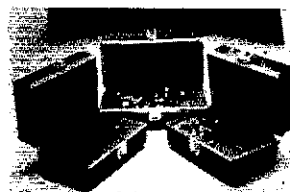
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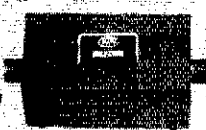
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WIREMAN**



1-800-433-WIRE

FOR ALL AMATEUR WIRE & CABLE

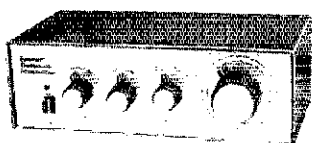
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ROUTE 2 - PITTMAN RD., LANDRUM, SC 29356

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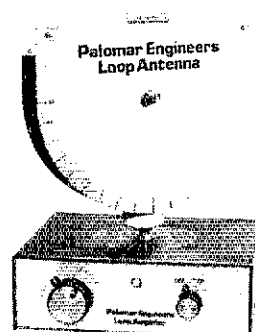


Can't hear the weak ones when conditions are bad? Receiver lacks sensitivity on 20, 15 or 10? Get the world famous Palomar pre-amplifier. Tunes from 160 to 6 meters. Gives 20 db extra gain and a low noise figure to bring out those weak signals. Reduces image and spurious responses too.

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LOOP ANTENNA



Loops pick up far less noise than other antennas. And they can null out interference. Palomar brings you these features and more in a compact desktop package. The wideband amplifier with tuning control gives 20 db gain. Plug-in loops have exclusive tilt feature for deep nulls. Loops are available for 10-40 KHz, 40-160 KHz, 150-550 KHz, 550-1600 KHz and 1600-5000 KHz.

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Index of Advertisers

Advanced Computer Controls Inc: 145
Advanced Radio Devices: 135
Advanced Receiver Research: 150
AEA: Advanced Electronics
Applications Inc: 4
Alinco Electronics Corp: 133
All Electronics: 162
Alpha Delta Communications Inc: 96
Amateur Electronic Supply: 108, 110, 136, 142, 143, 149
Amateur Radio School - KB6MT: 168
American Radio Relay League: 89, 122, 126, 127, 128, 130, 132, 141, 148, 160, 166, 167, 169, 170, 172
Ameritron: 116
Amp Supply Company: 161
Associated Radio Communications: 164
Austin Amateur Radio Supply: 95
Autocode: 148
AVC Innovations Inc: 173
Azimuth Clocks: 153
Barker & Williamson Inc: 173
Barry Electronics: 100
Bencher Inc: 144
Buckmaster Publishing: 153, 165, 168, 171
Butternut Electronics Co: 103
Certified Communications: 173
Colorado Comm Center: 160
Cover Craft: 106
Creative Design Co: 137
Curtis Electro Devices: 101
Cushcraft Corp: 5, 97
Custom QSLs: 169
C-Comm Inc: 99
Dayton Hamvention: 157
Delaware Amateur Supply: 138
Delta Loop Antennas: 102
DX Edge, The: 150
EEB/Antenna Bank: 123
EGE Inc: 147
Engineering Consulting: 101
ETO-Ehrhorn Technological
Operations Inc: 120, 121
ExpertQ: 173
Fox Tango Corp: 101
Glen Martin Engineering: 160
Ham Radio Outlet: 90, 91, 92, 93
Ham Station, The: 171
Hamrad Amateur Radio Software: 140
Heaster Co, H. L.: 169
Heath Co: 98, 131

Henry Radio Stores: Cov 11
ICOM America Inc: 2, 104, 105, 107, 109, 111, 113
ILX Equipment Ltd: 173
Jun's Electronics: 163
J. P. Export Company: 122
K2AW's Silicon Alley: 172
Kantronics: 146
Kenwood USA Corporation: Cov IV, 1, 6, 7, 114, 115, 117, 119
Larsen Electronics Inc: 94
Listeners & Friends Of Radio Peking: 101
Madison Electronics Supply: 148
Memphis Amateur Electronics Inc: 162
MFJ Enterprises Inc: 154, 155, 156
Micro Control Specialties: 152
Microcraft Corp: 100
Milliwatt Books: 164
Missouri Radio Center: 153, 176
Moli Energy Ltd: 141
Motron Electronics: 96
N & G Electronics: 152
National Tower Company: 165
Nemal Electronics Inc: 144
Norcon Engineering: 165
North Shore Communications: 94
Northeast Electronic Supply Inc: 168
Nye Co., William M.: 106, 144
Offshore Software: 94
Olympic View Graphics: 168
Oneac Corp: 169
Orion Hi-Tech: 137
Orlando Hamcation: 116
Palomar Engineers: 173, 174
Payne Radio: 170
PC Electronics: 163
Periphex Inc: 102
R & L Electronics: 103
Radio Amateur Callbook: 158
Radio Shack: 134
rf Concepts: 96
rf Enterprises: 151
RF Parts Co: 112, 153
Ross Distributing Co: 165
Rutland Arrays: 171
Sarasota Hamfest Inc: 169
Spider Antennas: 144
Spi-Ro Mfg. Inc: 118
Stone Mountain Engineering Co: 168
Telrex Communications: 140
Telrex Labs: 172
Ten-Tec: 124, 125
Texas Towers Inc: 159, 175
Timberline Electronics: 173
Tropical Hamboree: 110
Universal Amateur Radio Inc: 171
UPI Communications Systems Inc: 122
US Tower Co: 101
Van Gorden Engineering: 140
Vibroplex Co: 164, 173
W9INN Antennas: 171
Wacom Products: 103
Western Electronics: 168
Wheaton Hamfest '88: 148
Wrightapes: 153
Yaesu U.S.A.: Cov III, 10, 129, 139
E.H. Yost & Co. "Mr. Nicad": 162

ANTENNA/TOWER SALE!



HY-GAIN

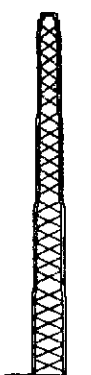
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Check these features:
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• Complete with base and
rotor plate
• Totally self-supporting—
no guys needed

Model	Height	Load	Price
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HG54HD	54 ft	16 sq ft	\$CALL
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Masts—Thrust Bearings—
Other Accessories Available
—Call! Prices Shown Are
Your Total Delivered Price
In Continental U.S.A.!



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- Galvanized Finish—Long Life
- Totally Free Standing—No
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- America's Best Tower Buy—
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- In Stock Now—
Fast Delivery

Model	Height	Ant	Weight	Delivered Price*
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HDX48	48 ft	10 sq ft	303	\$489
HDX56	56 ft	10 sq ft	385	\$569
HDX60	40 ft	16 sq ft	281	\$459
HDX48	48 ft	18 sq ft	383	\$559

*Your Total Delivered Price Anywhere in Con-
tinental 48 States. Antenna Load Based on 70 MPH
Wind.

ROHN Guyed Tower Packages

- World Famous Rohn
Quality and Dependability
 - Rugged high wind survival
provides safe installation
 - Multi purpose towers
satisfy a wide range of needs
 - Complete packages
include: guy hardware,
turnbuckles, guy assemblies,
w/rotor bars, concrete base,
rotor plate and top section
per manufacturers specs.
- Packages shown below are
rated for wind zone "B" (86
mph wind). Zone "C" (100
mph wind) design prices slightly
higher. All tower packages shipped
freight collect from our Plano, TX
warehouse, in stock for prompt
delivery.

Model 25G	Model 45G	Model 55G
50' \$ 699	\$1239	\$1529
60' 789	1399	1719
70' 829	1539	1879
80' 989	1719	2079
90' 1069	1999	2249
100' 1149	2179	2439
110' 1359	2329	2839
120' 1429	2499	3039



US TOWER CORPORATION

These rugged crankup
towers and masts now avail-
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- Check these features:
- ✓ All steel construction
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No guys needed

Coax arms, Thrust bearings
Masts, Motor drives, Re-
mote controls, Hinged
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CALL FOR SALE PRICES!

Model	Min. Ht.	Max. Ht.	Ant. load*	Sale price
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MAA50 mast	22'	50'	10 sq ft	\$ 589
TX436	22'	38'	18 sq ft	\$ 329
TX436	22'	58'	18 sq ft	\$ 1249
TX472	23'	72'	18 sq ft	\$ 3059
HDX566	22'	56'	30 sq ft	\$ 1879
HDX572	23'	72'	30 sq ft	\$ 2229

Note - US Towers Shipped Freight Collect From
Visalia, CA Factory
*Note-towers rated at 50 mph to EIA specifications

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- \$.29/ft \$279/1000 ft
Up to 800 ft via UPS
- RG-213/U—95% Bare Copper Shield
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 - Our RG-213/U uses virgin materials.
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9086

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- Select connectors below.
Helix® is a Registered Trademark of the Andrew Corp.

Cable Type	Imped.	10MHz	30MHz	150MHz	450MHz
RG-213/U	50	6	9	2.3	5.2
RG8X	52	8	1.2	3.6	5.8
9086	50	4	84	1.7	3.1
1/2" Alum	50	3	5	1.2	2.2
3/4" Helix	50	2	4	9	1.6
3/4" Helix	50	1	2	5	9

HARDLINE & HELIX® CONNECTORS

Cable Type	UHF FML UHF MALEN FMLN MALE
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3/4" Helix	\$25 \$25 \$25 \$25
3/4" Helix	\$49 \$49 \$49 \$49

COAX CONNECTORS

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- Stranded Copper 14ga. \$.10/ft.
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Van Gorden

- 1:1 Balun. \$11 Center Insulator. \$6
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Short Dipole Kits. SD80 \$35.95/SD40 \$33.95
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G5RV all band antenna. \$49.95

ALPHA DELTA

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- A3 3-el Tribander. \$229
A4 4-el Tribander Beam. \$299
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230 WB NEW 30-el 2 mtr Beam. \$229
4218 XL 18-el 2 mtr Beam. \$105
3219 19-el 2 mtr Beam. \$99
220B 17-el 220MHz Beam. \$99
424B 24-el 432MHz Beam. \$85
ARX2B 2 mtr Vertical. \$39



- Discoverer 2-el 40-mtr Beam.
Discoverer 3-el Conversion Kit.
EXPLORER-14 SUPER-SPECIAL.
DK710 30/40 mtr. Add-On Kit.
V2S 2-mtr Base Vertical.
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TH3JRS 3-el Triband Beam.
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105BAS 5-el 15-mtr Beam.
105BAS 5-el 10-mtr Beam.
204BAS 4-el 20-mtr Beam.
64BS 4-el 6-mtr Beam.
12 AVQ 20-10 mtr vertical.
14 AVQ 40-10 mtr vertical.
18 AVT/WB 80-10mtr Vertical.
18HTS 80-10 mtr Hy-Tower Vertical.
23BS 3-el 2 mtr Beam.
25BS 5-el 2 mtr Beam.
28BS 8-el 2 mtr Beam.
214BS 14-el 2-mtr Beam.
280D 80/40 mtr Trap Dipole.
580D 80-10 mtr Trap Dipole.
BN66 80-10 mtr KW Balun W/Coax Seal.

HUSTLER

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48TV 40-10 mtr Vert. \$89 G7-144 2-mtr Base \$119
G6-144B 2-mtr Base. \$89

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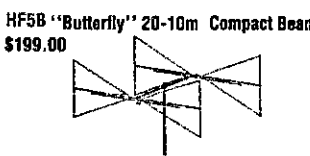
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 - STR II Stub-Tuned Radials. \$29
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 - 30m Add-on Kit. \$29
 - 20m Add-on Kit. \$39
 - 17/12m Add-on Kit. \$27

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chased w/antenna.

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Additional Motor Units. \$89
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Telex CD 4511 (8.5 sq ft rating). \$Call
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FK2558	58 ft.	13.3 sq. ft.	\$1099.
FK2568	68 ft.	11.7 sq. ft.	\$1149.
FK4544	44 ft.	34.8 sq. ft.	\$1389.
FK4554	54 ft.	29.1 sq. ft.	\$1469.
FK4564	64 ft.	28.4 sq. ft.	\$1579.

- 25G Double Guy Kit. \$279.
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*Above antenna loads for 70 mph winds w/guys at hinge and
apex. All foldover towers shipped freight prepaid in 48 states.
Prices 10% higher west of Rockies.

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1/2 x 9EJ (1/2" x 9" Eye & Jaw Turnbuckle) \$10.95
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1/2 x 12EJ (1/2" x 12" Eye & Jaw Turnbuckle) \$13.95
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25 in Wall	\$69	\$129	\$189	\$249

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BASE STATION

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- Dual VFO's
- Full CW Break-in
- Lots More Features

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- QSK to 60 WPM

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- 140-149.995 MHz/ 440-450 MHz
- 25 Watts on Both Bands
- Crossband Full Duplex
- 21 Memory Channels
- CTCSS Encoder/Decoder, Standard

KENWOOD



TS-140S AFFORDABLE DX-ing!

- HF Transceiver With General Coverage Receiver
- All HF Amateur Bands
- 100 W Output
- Compact, Lots of Features

YAESU



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- SSB, CW, FM on 2 Meters and 70 cm
- Optional 50 MHz, 220 MHz or 1.2 GHz
- 25 Watts Output on 2 Meters, 220 and 70 cm
- 10 Watts Output on 6 Meters and 1.2 GHz
- 100 Memories

ICOM



IC-735 COMPACT HF TRANSCEIVER

- All HF Band/General Coverage Receiver
- 12 Memories/Frequency and Mode
- USB, LSB, AM, FM, CW
- 100 Watts Output
- Includes HM-12 Scanning Mic

concept

2m and 220 MHz Amplifiers
GaAsFET Receive Pre-Amps
and High SWR Shutdown
Protection

MODEL	144 MHz	220 MHz
2-23	2 in/30 out	2 in/20 out
2-217	2 in/170 out	2 in/110 out
2-117	10 in/170 out	30 in/120 out
3-22		CALL
2-211		
3-312		

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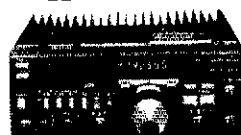
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TM-221A

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- 45W Output w/HiLo Switch
- 14 Multi-Function Memories
- TM-221A Available For 440 MHz

YAESU



FT-757 GX/II

"CAT SYSTEM"

- All Mode HF Transceiver
- Dual VFO's
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ICOM



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- Remote Controller, Interface A Unit, Interface B Unit, Speaker, Mic and Cables
- Six Band Units to Choose
- 10 Memories Per Band
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MFJ-931 ARTIFICIAL GROUND

- Eliminate RF Bites, RF Feedback, TVI/RFI
- Creates Artificial RF Ground with Random Wire
- Improves Radiation Pattern
- RF Ammeter Makes Tuning Easy
- Only \$79.95

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TH-315A FULL FEATURED 220 MHz HT



- Covers 220-225 MHz
- Ten Memory Channels
- 2.5 Watts of Power (5 Watts Optional)
- Built-in CTCSS Encoder
- TH-215A, 2 Meter
- TH-415A, Covers 440-449.995 MHz

YAESU



FT237/3R

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- 10 Memories
- 140-164 MHz, 440-450 MHz
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IC-μ2AT IC-μ4AT

MICRO HT'S
FOR 2M, 440

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- LCD Readout
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- Up to 3 Watts Output
- 32 Built-in Subaudible Tones

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Data Controller With 6
TRX/RX Modes
PACKET ASCII
MORSE CODE AMTOR
BAUDOT (RTTY) WEATHER FAX
• All You Need is a RS-232
Compatible Computer or
Terminal and Your Radio
HAM NET \$319.95

Yaesu's FT-736R. Because you never know who's listening.

Why just dream of talking beyond earth?

With Yaesu's new FT-736R VHF/UHF base station, you can discover some of the best DX happening in ham radio. Via moonbounce. Tropo. Aurora. Meteor scatter. Or satellites.

You see, the FT-736R is the most complete, feature-packed rig ever designed for the serious VHF/UHF operator. But you'd expect this of the successor to our legendary FT-726R.

For starters, the FT-736R comes factory-equipped for SSB, CW and FM operation on 2 meters and 70 cm (430-450 MHz!), with two additional slots for optional 50-MHz, 220-MHz, or 1.2-GHz modules.

Crossband full duplex capability is built into every FT-736R for satellite work. And the satel-



lite tracking function (normal and reverse modes) keeps you on target through a transponder.

The FT-736R delivers 25 watts RF output on 2 meters, 220 MHz, and 70 cm. And 10 watts on 6 meters and 1.2 GHz. Store frequency, mode, PL frequency, and repeater shift in each of the 100 memories.

For serious VHF/UHF work, use the RF speech processor. IF shift. IF notch filter. CW and FM wide/narrow IF filters. VOX. Noise blanker. Three-position AGC selection. Preamp switch for activating your

tower-mount preamplifier. Even an offset display for measuring observed Doppler shift on DX links.

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Discover the FT-736R at your Yaesu dealer today. But first make plenty of room for exotic QSL cards. Because you *never* know who's listening.

YAESU



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Yaesu Cincinnati Service Center 9070 Gold Park Drive, Hamilton, OH 45011 (513) 874-3100.

Prices and specifications subject to change without notice. PL is a registered trademark of Motorola, Inc. FT-736R shown with 220 MHz option installed.

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Affordable DX-ing!

TS-140S

HF transceiver with general coverage receiver.

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

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



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

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

Optional Accessories:

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



TS-680S

All-mode multi-bander

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



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

KENWOOD

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