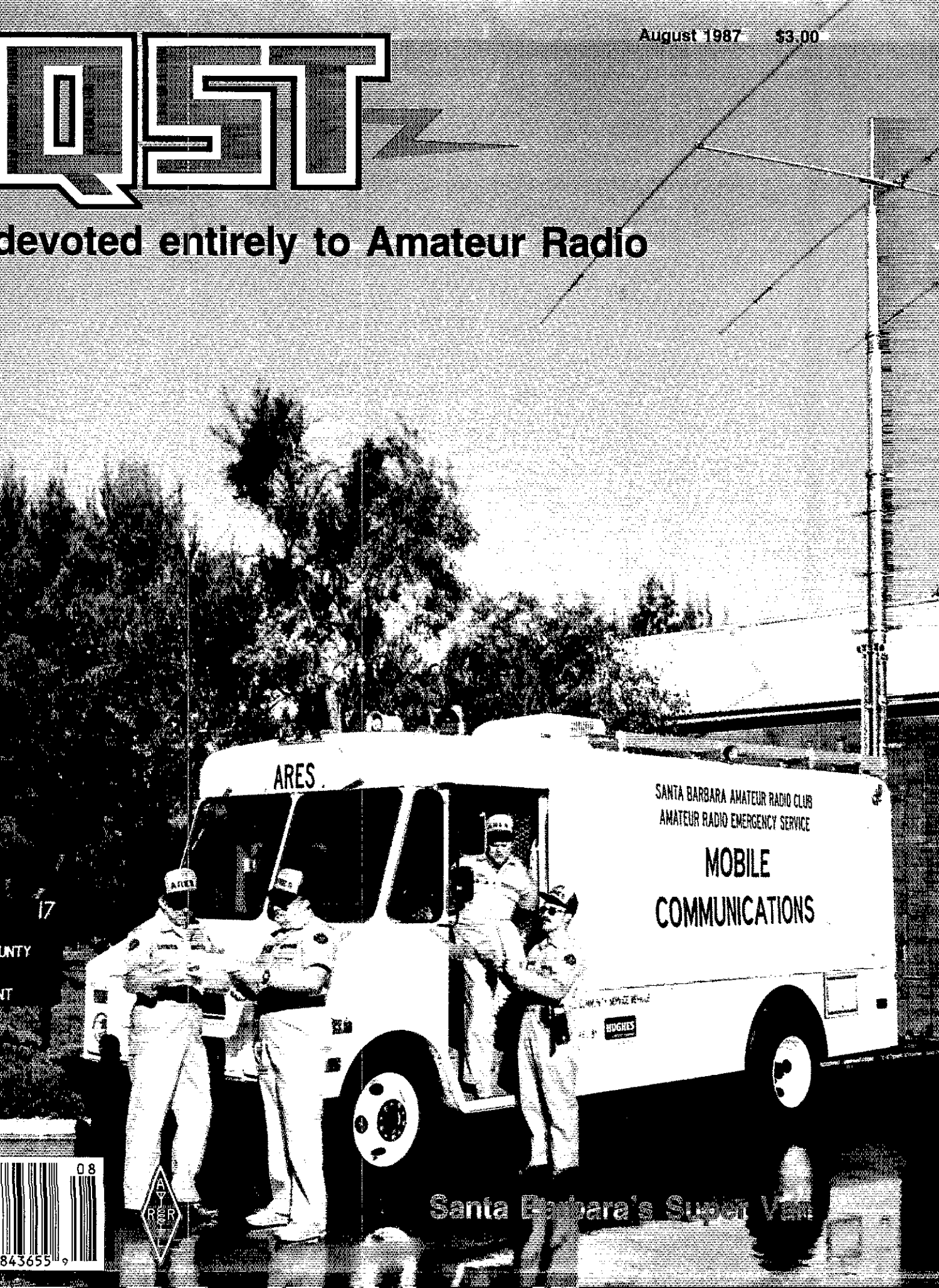
August 1987 $3.00

QST

devoted entirely to Amateur Radio



Santa Barbara's Super Van

08
843655 9

the tempo S-15

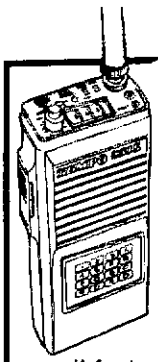
...a no nonsense radio that provides more power, broader frequency range and simplicity of operation

...the kind of hand held most people want...simple rugged, reliable, easy to use. The S-15 offers a full 5 watts of power...power that extends your range and improves your talk power. Its state-of-the-art integrated circuitry provides far more reliability and ease of maintenance than conventional circuitry.

Consider these features before you decide on any hand held:

- 5 watt output (1 watt low power switchable)
- 10 MHz frequency coverage: 140-150 MHz (For export only: B version 150-160 MHz, C version 160-170 MHz)
- Electrically tuned stages. Receiving sensitivity and output power are constant over entire operating range.
- Three channel memory. (1 channel permits non-standard repeater offsets. 200 micro amp memory maintenance (standby)).
- A new "easy remove" battery pack
- One hour quick charge battery supplied (450 ma/HR)
- Plug for direct 13.8 volt operation
- Speaker/microphone connector
- BNC antenna connector and flex antenna
- Extremely small and light weight (only 17 ounces).
- Ample space for programmable encoder.
- Fully synthesized
- Extremely easy to operate
- Its low price includes a rubber antenna, standard charger, 450 ma/HR battery (quick charge type) and instruction manual.

OPTIONAL ACCESSORIES: 1 hour quick charger (ACH 15) • 16 button touch tone pad (S 15T) • DC cord • Solid state power amplifier (S-30 & S-80) • Holster (CC 15) • Speaker/mike (HM 15)



now available!

...the proven Tempo CS-15, plus three new commercial mode Tempo synthesized radios

The CS-15 is a fine quality radio with 5 watt output, 10 MHz receiver coverage, is fully synthesized, and is 10 channel internally programmable. It's also sturdy, compact and affordable.

The new Tempo FMH-15S, FMH-44S & FMT-25S (mobile)
...all feature 16 channels, CPU controlled EPROM PLL, CTCSS encode/decode programmable per channel, priority scan to Channel 1, and time-out-timer.

FMH-15S... 138-174 MHz (10 MHz) frequency coverage
1 watt (low)/5 watts (high) RF power output

FMH-44S... 400-512 MHz (20 MHz) frequency coverage
1 watt (low)/4 watts (high) RF power output

FMT-25S... 138-174 MHz (10 MHz) frequency coverage
25 watts RF power output

Available at your local Tempo dealer or from..

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Henry Radio

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KENWOOD

220 MHz TM-321A Coming Soon!

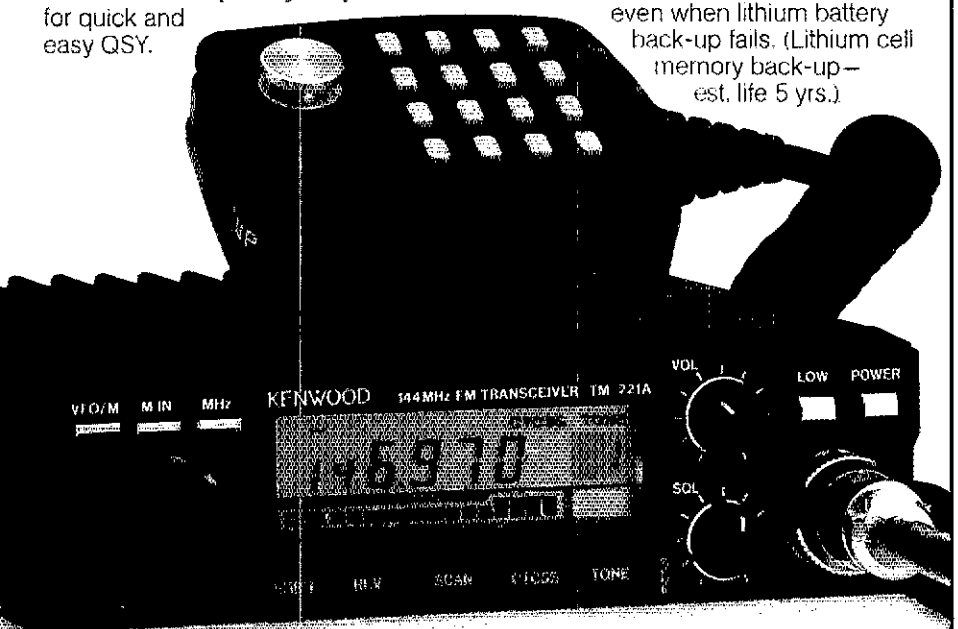
Here's One for You!

TM-221A/321A/421A

2 m and 70 cm FM compact mobile transceivers

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

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



RC-10 Remote Controller

For TM-221A/321A/421A. Optional telephone-style handset remote controller RC-10 is specially designed for mobile convenience and safety. All front panel controls (except DC power and RF output selection) are controllable from the RC-10. One RC-10 can be attached to two transceivers with the optional PG-4G cable. When both transceivers are connected to the RC-10, **cross band, full duplex repeater** operation is possible. (A control operator is needed for repeater operation.)

Optional Accessories:

- **RC-10** Multi-function handset remote controller
- **PG-4G** Extra control cable, allows TM-221A/TM-421A full duplex operation
- **PS-50/PS-430** DC power supplies
- **TSU-5** Programmable CTCSS decoder
- **SW-100A** Compact SWR/power/volt meter (1.8-150 MHz)
- **SW-100B** Compact SWR/power/volt meter (140-450 MHz)
- **SW-200A** SWR/power meter (1.8-150 MHz)
- **SW-200B** SWR/power meter (140-450 MHz)
- **SWT-1** Compact 2 m antenna tuner (200 W PEP)
- **SWT-2** Compact 70 cm antenna tuner (200 W PEP)
- **SP-40** Compact mobile speaker
- **SP-50B** Mobile speaker
- **PG-2N** Extra DC cable
- **PG-3B** DC line noise filter
- **MC-60A, MC-80, MC-85** Base station mics.
- **MC-55** (8-pin) Mobile mic. with gooseneck and time-out timer
- **MA-4000** Dual band antenna with duplexer (mount not supplied)
- **MB-201** Extra mobile mount

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

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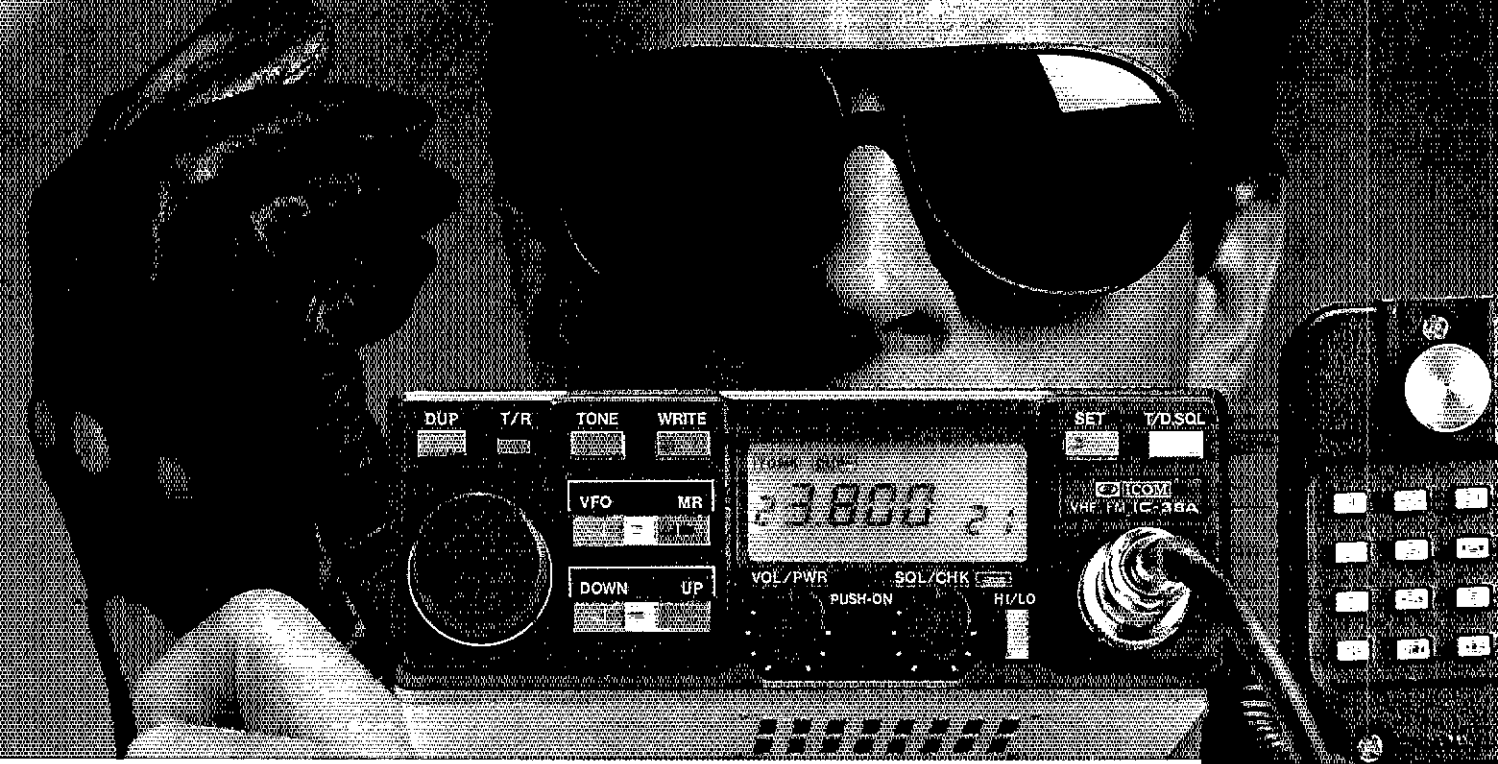

HIGH PERFORMANCE

ICOM has a commitment to high performance 220MHz gear. That's why we're the only manufacturer who can offer you a full line of 220MHz equipment...whether it's a mobile, handheld, base station transceiver, or fiber optic multi-bander.

Handhelds. Choose the full-featured five-watt **IC-03AT** with 10 full function memories capable of storing odd offsets and subaudible tones, scanning and DTMF direct keyboard entry. Or select the **IC-3AT** easy-operate handheld featuring thumbwheel switch frequenc selection.

Mobiles. ICOM offers the **IC-38A**, which sports a larg LCD readout, 21 memories, scanning, and memory lock-c The slim-line **IC-37A** features an LED readout, nine mem ories capable of storing offset and subaudible tones anc both memory and band scan.

Base Station. The **IC-375A** is a 220MHz all mode op tor's dream...25 watts output, an internal power supply, memories, scanning, and all subaudible tones built

Multi-Bander. The ne est addition to ICOM's 220MHz family...the **IC-90** fiber optic controlled six-band mobile, which has a 220MHz optional band un

Quality. High Perform ance. That's ICOM 220MH

IC-3AT Handheld

IC-03AT Handheld

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IC-37A Mobile

IC-38A Mobile

ICOM 220MHz

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August 1987 *Volume LXXI Number 8*

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

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

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

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

OUR COVER

When the Santa Barbara ARC decides to pursue a project, they do it right! Their communications van not only serves the community in times of emergency, it's also been a top-notch public-relations tool. Your group can do it, too. The story begins on page 40. *(photo courtesy Ron Fehr, N6HKY)*

CONTENTS

TECHNICAL

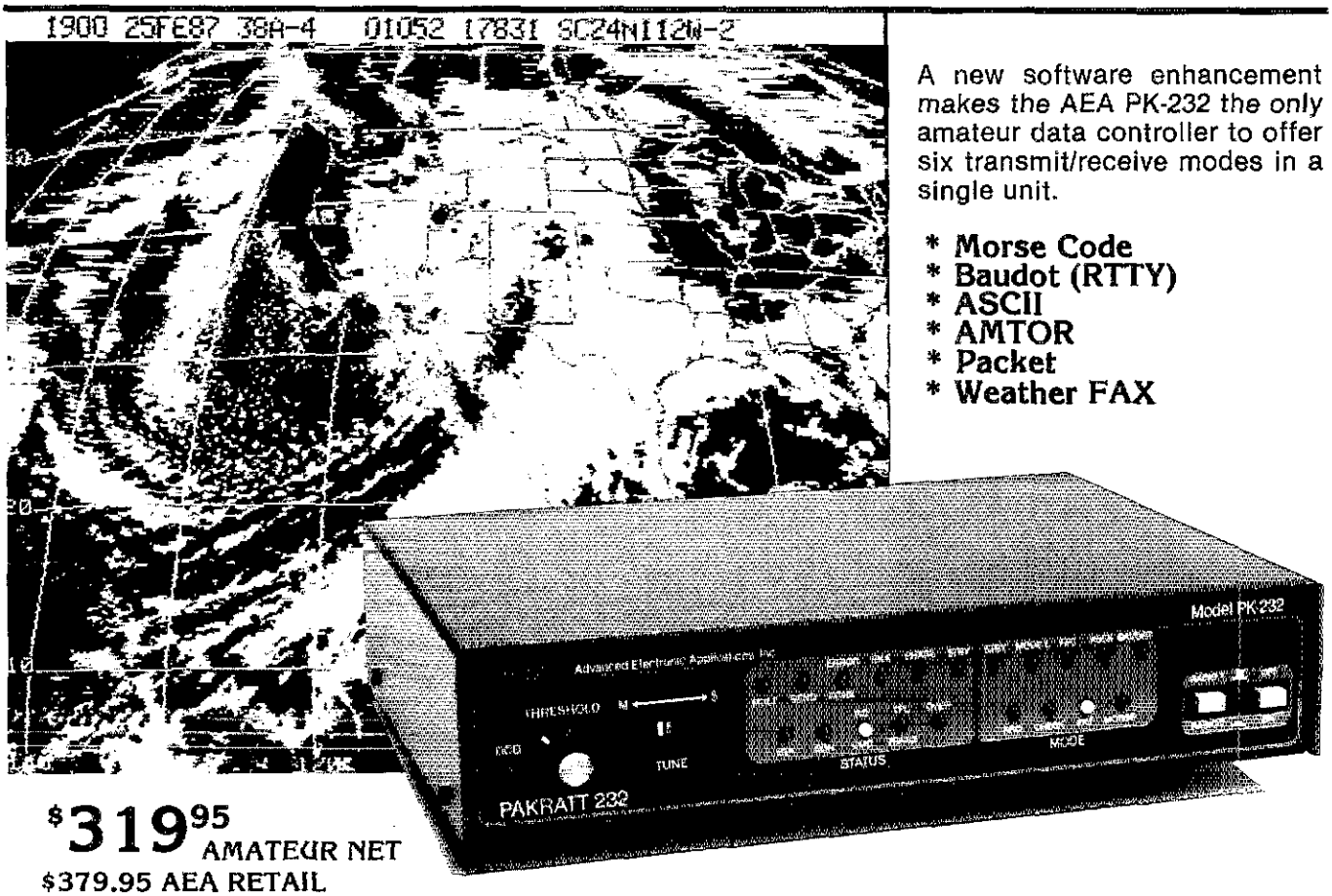
NEWS AND FEATURES

OPERATING

DEPARTMENTS

New PK-232 Breakthrough

Six Digital Modes - Including Weather FAX



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

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

$319.95 AMATEUR NET
$379.95 AEA RETAIL

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

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

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

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

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

AEA Brings you the Breakthrough

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THE BEST IMPROVEMENT IN YOUR STACK

4218XL
2 METER BOOMER

Boomer XL is "the antenna for 2 meter DX". More than 3 years of design, antenna range tests, and on-the-air contesting have been combined to produce the 4218XL's higher gain and cleaner pattern. This antenna is designed to survive. It features step tapered boom, tubular support braces and all stainless steel hardware. The new 4218XL is the only antenna with this great combination of features to make your 2 meter activity more successful and satisfying.

SPECIFICATIONS

frequency range 144-145 MHz, 18 elements, boomlength 28.8 ft., typical SWR 1.2:1, 50Ω T-match, beamwidth 2 x 13°.

turn radius 16.7 ft., windload 3.5 ft.², weight 14.3 lbs. Excellent gain

SHOULD BE ON THE TOWER

ANOTHER BOOMER FIRST

Bill Duval, K5UGM of Irving, Texas, created VHF history on June 14, 1987, by making the first ever 220 MHz sporadic E contact during the June VHF QSO party. He contacted W5HUQ/4 in Florida at 1544 UTC.

Bill used the high performance Cushcraft 220B "Boomer" to make this record breaking contact. Proof once again that Cushcraft leads all antenna manufacturers in developing the newest technology for Ham Radio. We offer more results to make your hobby more fun.

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KENWOOD

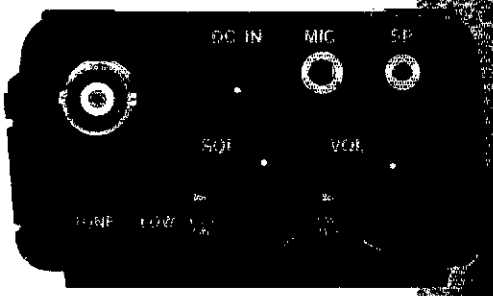
220 MHz TH-315A Coming Soon!

This HT Has it All!

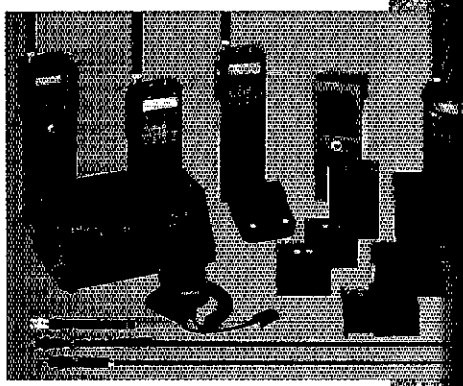
TH-215A/315A/415A

Full-featured Hand-held Transceivers

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



- **Wide receiver frequency range.** Receives from 141-163 MHz. Includes the weather channels! Transmit from 144-148 MHz. Modifiable to cover 141-151 MHz (MARS or CAP permit required).
- **TH-415A covers 440-449.995 MHz.**
- **5, 2.5, or 1.5 W output, depending on the power source.** Supplied battery pack (PB-2) provides 2.5 W output. Optional NiCd packs for extended operation or higher RF output available.
- **CTCSS encoder built-in.** TSU-4 CTCSS **decoder** optional.
- **10 memory channels store any offset, in 100-kHz steps.** Each memory channel can store frequency, frequency step, offset, **reverse switch position,** and CTCSS frequency.
- **Nine types of scanning!** Including new **"seek scan"** and **priority alert.**
- **Intelligent 2-way battery saver circuit extends battery life.** Two battery-saver modes to choose, with power save ratio selection.
- **Easy memory recall.** Simply press the channel number!
- **12 VDC input terminal for direct mobile or base station supply operation.** When 12 volts is applied, RF output is 5 W!
- **New Twist-Lok Positive-Connect™ locking battery case.**
- **Frequency entry by keyboard or UP/DWN keys.**
- **Priority alert function.**
- **Monitor switch to defeat squelch.** Used to check the frequency when CTCSS encode/decode is used or when squelch is on.
- **Large, easy-to-read multi-function LCD display with night light.**
- **Audible beeper to confirm keypad operation.** The beeper has a unique tone for each key. DTMF monitor also included.
- **Supplied accessories:** Belt hook, rubber flex antenna, PB-2 standard NiCd battery pack (for 2.5 W operation), wall charger, dust caps.



Optional Accessories:

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

TH-215A shown

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

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

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New 220 MHz

220: FM for All!

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

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

TH-315A
Full-featured HT

TM-321A
Compact mobile transceiver

TH-31BT/31A
Pocket-held HT

New

New

TM-3530A
Full-featured mobile transceiver

A complete line of accessories is available for all models.

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

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THE AMERICAN RADIO RELAY LEAGUE, INC

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

ARRL is an incorporated association without capital stock chartered under the laws of the State of Connecticut, and is an exempt organization under Section 501(c)(3) of the Internal Revenue Code of 1954. Its affairs are governed by a Board of Directors, whose voting members are elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is noncommercial, and no one who could gain financially from the shaping of its affairs is eligible for membership on its Board.

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

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

Membership inquiries and general correspondence should be addressed to the administrative headquarters at 225 Main Street, Newington, CT 06111 USA

Telephone: 203-666-1541 Telex: 650215-5052 MCI. MCI MAIL (electronic mail system) ID: 215-5052

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"It Seems to Us . . ."

Another WARC?

Once or twice a year, representatives of the member-countries of the International Telecommunication Union meet together in a Regional or World Administrative Radio Conference (RARC or WARC) to review specific aspects of the international Radio Regulations. The agendas of these Conferences are published a couple of years in advance, and are generally quite limited in scope—usually involving a single radio service, possibly in just one part of the world. Most have no direct bearing on the Amateur and Amateur-Satellite Services, although the International Amateur Radio Union has found it useful to send one or more observers at least part-time to monitor the proceedings and to be available to answer delegates' questions about Amateur Radio. IARU also encourages its member-societies to monitor and participate as appropriate in preparations for such Conferences by their respective governments, to identify trends that may eventually affect us.

Once in a great while, the ITU member-countries identify a need for a World Administrative Radio Conference with a much more comprehensive agenda—a "general" WARC. The most recent general WARC was held in the last quarter of 1979; the one before that, in 1959. Some of the WARC-79 decisions are not scheduled for implementation until 1994, which will give you an idea of the time frames involved in a major international conference of this kind. Amateur Radio, worldwide, prepared in a big way for WARC-79 because it represented the ultimate challenge to our lifeblood: our frequency allocations. Those preparations are chronicled in *QST*s from the mid-'70s through the February 1980 issue, and the story is well worth spending a rainy afternoon in a library sometime if you're not familiar with it.

WARCs are expensive; general WARCs, horrendously so. WARC-79 tied up about 2000 people for 11 weeks in Geneva, a city not known for bargain prices. And that was just for the Conference itself; hundreds of people attended a four-week Special Preparatory Meeting of the CCIR, a technical advisory body of the ITU, the year before. And that's only the tip of iceberg; untold millions (yes, millions) of man-hours were devoted to preparation at home, and to bilateral discussions between administrations beforehand. Amateur Radio's preparations alone cost hundreds of thousands of dollars (one of the many things your membership dues, and those of the members of our IARU sister-societies, are used for), and it would have been in the millions had we not been able to rely heavily on expert volunteers.

And if its purpose (as it presumably must be) is to provide for more rational and efficient use of the radio spectrum, worldwide, there is reason for skepticism as to whether a general WARC can truly succeed. One need only examine the number and complexity of the hundreds of footnotes in the international Table of Frequency Allocations, most of which were expanded or added at WARC-79, to appreciate the difficulty of achieving consensus among 165 sovereign nations even on purely technical issues.

So, no one is anxious for another general WARC. But a growing number of administrations believes that the international Table of Frequency Allocations should be reexamined, to at least a limited extent—and this could have serious consequences for Amateur Radio.

Earlier this year, a WARC for the Planning of the HF Bands Allocated to the Broadcasting Service adopted a recommendation which could be the first step toward the holding of another WARC, around the year 1992, to consider "...the possibility of extending the HF frequency spectrum allocated exclusively to the broadcasting service." A WARC for the Mobile Services to be held this fall will consider adopting a similar recommendation for a WARC in the same time frame, this one "...to revise certain parts of the frequency allocation table ...in the range 1-3 GHz with a view to providing the necessary spectrum for the mobile-satellite services...as well as for the mobile services."

New and expanded allocations for radio services can only come at the expense of other services, either in the form of reduced bands or additional sharing. Thus, while neither Conference is at this point a certainty, the prospect of their being held must be taken very seriously.

So, when should preparations for Amateur Radio begin? Actually, they've already begun.

The IARU machinery that was created for WARC-79 and earlier challenges has been refined and kept well-oiled through the 1980s. The IARU Administrative Council, which brings together representatives of the three regional organizations and the International Secretariat (the ARRL), initiated "future WARC" preparations in 1985. Since then, the subject has been addressed at a complete round of conferences of the three IARU regional organizations. Partly as a result, IARU member-societies the world over are stepping up their contacts with their administrations, doing what they can to improve relations.

In his "IARU News" column this month, IARU President Dick Baldwin, W1RU, answers the question you may be asking yourself: "What can I do?" As an allocations conference moves closer to becoming a reality there's a lot we'll be asking you to do, just as there was before WARC-79. For now, like the Fire Department, *it's enough that you be* ready to answer the call.—*David Sumner, K1ZZ*

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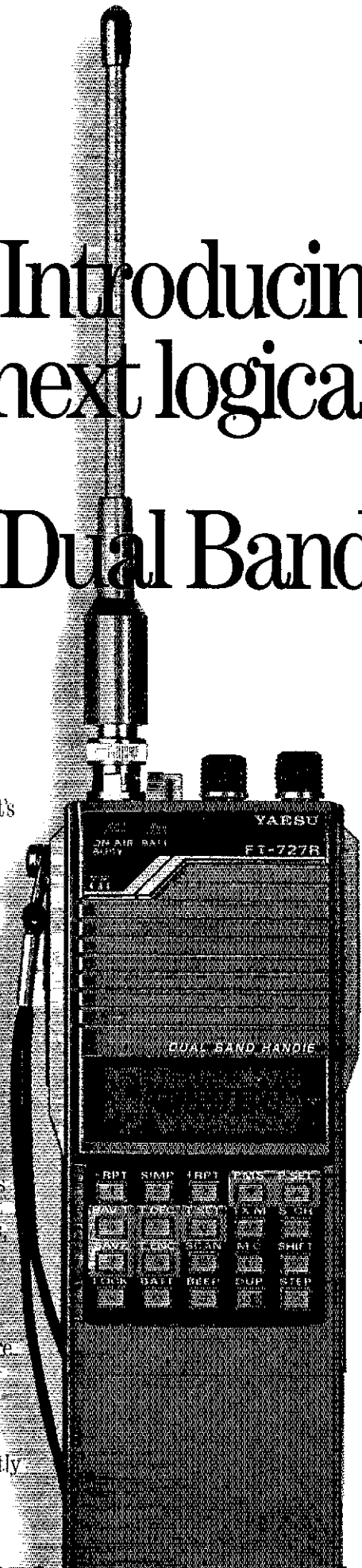

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UP FRONT in QST

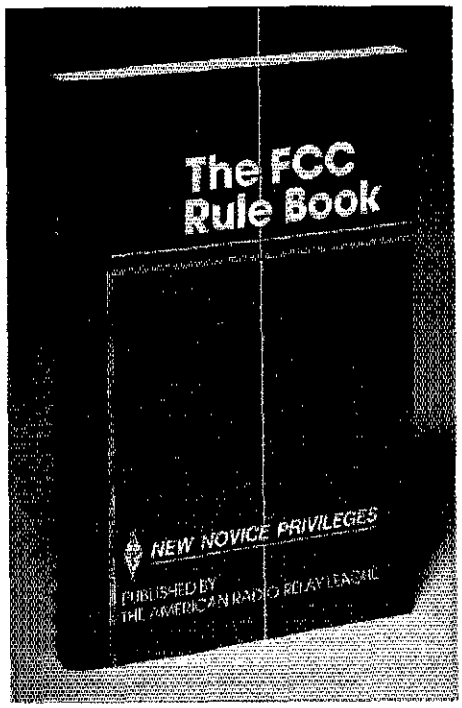
Philadelphia
The City of Brotherly Love

Amateur Radio Celebrates
The Bicentennial of the United States Constitution

Let Freedom Propagate: A series of special-event stations in Washington, DC, Philadelphia and each of the 13 original states has served as a warm-up to Amateur Radio's celebration of the Bicentennial of the US Constitution. This distinctive QSL card is one of the series that confirms contacts made in May, on July 4 and during upcoming activities in September. More details in next issue of *QST*.

SES		
ARS	Date	Time
Frequency	Mode	RST
73's		

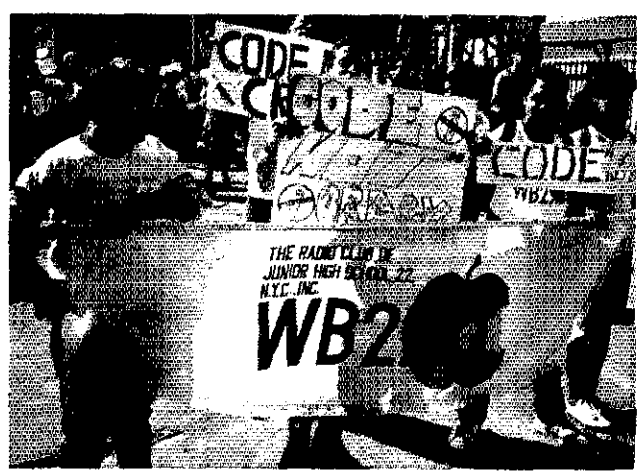
Officially Recognized by the Commission of the Bicentennial of the United States Constitution



Perplexed?: If the changes brought by Novice Enhancement (or other regulatory matters) have you muddled, grab a grape. Not the kind on the supermarket shelf; try the bookshelf for the most-recent vintage of *The FCC Rule Book*. It's the best way of keeping au courant with the rules and regs of Part 97. See page 152, this issue, for ordering information.

Swede Earns 5BWAS: Congratulations to Hakan "Hawk" Eriksson, SM5AQD, who is the first Swedish radio amateur to qualify for the ARRL 5-Band Worked All States Award. Hawk's impressive operating location in Studsvik, 50 yards from the Baltic Sea, includes a bobtail curtain for 80 meters, three elements on 40 meters and five elements on 20 meters. Eighty meters presented the greatest challenge, particularly working Idaho, Montana, Nevada, Utah and North Dakota. Hawk says, "I have to thank all my friends back in the USA for all the nice QSOs. You are really nice people."

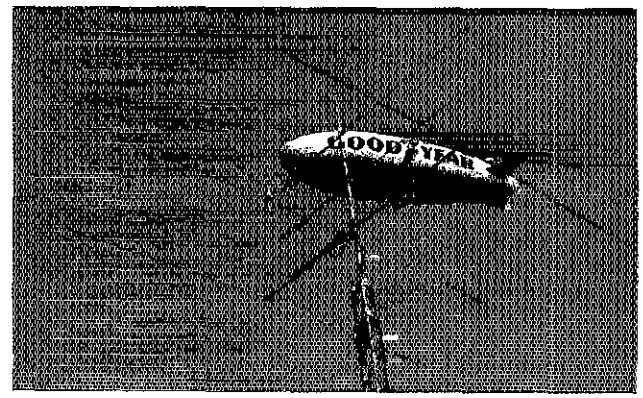
Just say yes—to ham radio: The theme of the parade was "Get High on Life," and over 200 members of The Radio Club of Junior High School 22, New York City, took to the streets of Manhattan's Lower East Side on June 1 to demonstrate just how they go about getting their high. Chanting "code, not crack" and praising RST instead of LSD, the kids were joined by several thousand other antidrug marchers representing civic and religious groups. The parade was a huge success and probably will become a regular springtime event. The "Crew at 22" are proud to have been part of this effort—to say no to drugs. For them, getting high is easy: just a mike or a key, some wire and a rig.
—*Joe Fairclough, WB2JKJ, president, RC of JHS 22*



Haste makes wait: You've finished working the last grid square for VUCC. Impatiently, you wait for that confirming QSL card. It finally arrives. You rush through the application, dash to the post office, open the outgoing mail slot and—wait, wait! Is all in order? Following the procedures detailed in "VUCC: The Right Way" on page 50 can make the difference between prompt attention to your application and delays.

Carriers with Chirp: Combining the modern modes of today's communications technology with one of the oldest, the Tamaqua (PA) Transmitting Society staged a unique activity at their May hamfest. Two cages of carrier pigeons were released at different times to return to their home base at Hazleton. The birds were numbered, and the race results were relayed back to the hamfest site via the Anthracite 2-meter repeater. Hamfest Program Chairman Bill Shellhamer, N3CDE (at left), and Danny Yakubisin, KA3OPX, owner of the pigeons, watch the first group wing their way homeward.

Good Year for Blimps: *Although this antenna array* appears to be a docking scaffold, Gary Sutherland, KM4X, of Marion, Virginia, assures us that his beam is up only 40 feet (although like most hams he'd love to have a beam as high as blimp airspace). Blimp and Field Day met this year with the Goodyear blimp *Enterprise* participating in a first-ever, official special-event station KA4KVI/AM above Pompano Beach, Florida. Hundreds of contacts were made, primarily on the new Novice bands. Details in a future issue.

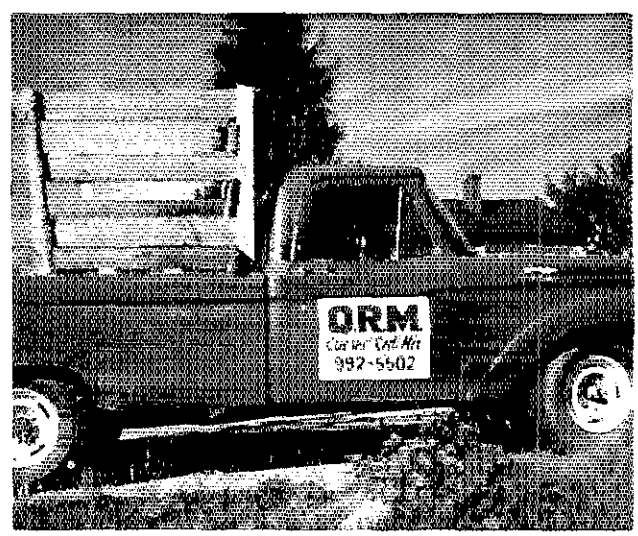


Autumn Means School Days for Amateur Radio

Is your club holding a Novice or upgrade course this fall? If you register the class with the ARRL Club Services Department, they'll be able to help direct prospective hams to your club by including yours on our computerized list of classes.

QRQ, Anyone?

Interested in sponsoring an official ARRL code competition at a hamfest or convention? Send an SASE to Field Services Department, ARRL, for a copy of the guidelines.



It's everywhere, it's everywhere: You think the QRM goes away after you throw the switch? Not so, says Floyd Gribben, VE7XN of Burnaby, British Columbia. Floyd spotted this truck parked in front of a neighboring house. Guess the driver just got back from dumping his load of interference.

League Lines

87-14 update: Reply comment period extended. ARRL President Larry Price, W4RA, and Washington Area Coordinator Perry Williams, W1UED, met with FCC Commissioner James Quello and other FCC officials on June 17. President Price explained the amateur viewpoint on Docket 87-14, and answered numerous questions concerning 220-MHz activity.

The FCC has extended the deadline for reply comments in 87-14 until July 31. The deadline was extended, according to the FCC news release, "...due to the high volume of comments" which resulted in delays in assembling the public reference file at FCC.

The ARRL filed over 45 pages of reply comments on June 19 and included a footnote reserving its right to file supplemental reply comments. In its reply comments, ARRL said: "The Amateur Radio Service has established, by its thousands of comments in this proceeding, a unified expression of righteous indignation at the proposed deprivation of two megahertz of critical support spectrum at 220-222 MHz...The Comments of the amateur community establish without exception, that the Commission's proposal to take 40 percent of the 220-225 MHz band from amateurs is based on an absolutely incorrect premise—that the 220-222 MHz segment is 'not significantly used' by amateurs. The amateur comments are highly critical of the Commission's reference to the League's *Repeater Directory* as a basis for that premise, and rightly so; the *Directory* was never intended to be a listing of other than repeaters...It contains essentially no information concerning non-repeater uses in the 220-225 MHz band."

ARRL also noted the lack of comments from individual land mobile users and said this reflected lack of interest in the proposal.

The Sixth ARRL Amateur Radio Computer Networking Conference will be held on August 29 at TRW, Redondo Beach, California. Most out-of-towners will be staying at the Torrance Marriott, tel 213-316-3636. For more information, call Maty Weinberg at HQ.

Proceedings of the Central States VHF Conference, held July 24-26, will be available in early August from HQ for $10 plus $2.50 shipping and handling. This book is a collection of articles of interest to experimenters and operators from 50 MHz through 10 GHz and higher. There is a limited stock available. Contact the Publication Sales Branch at HQ to order or for additional information.

The National Contest Journal, known for its technical reviews on contesting equipment design as well as general interest contesting information, ***is now being published by the ARRL.*** The publication's editorial content will remain intact, and professional typesetting will add a flair to its style. Yearly subscription rates for six issues will continue to be: US $10 (first class); Canada $11 (first class); international $12 (airmail).

The first confirmed 220-MHz Sporadic-E QSO occurred during the June VHF QSO Party on June 14, at 1544 UTC. The contact, which took place on 220.100 MHz, was made between W5HUQ/4 near Jacksonville, Florida and K5UGM in Irving, Texas. W5HUQ's station consisted of 20 watts to a 14-dB-gain Yagi, and K5UGM's station 600 watts to a 14-dB-gain Yagi. Signal strengths during the contact were S9. WB5LUA was also heard by W5HUQ/4 but no QSO resulted.

To the best of our knowledge, this is the highest frequency on which Sporadic-E propagation has been observed by anyone, including scientific investigations.

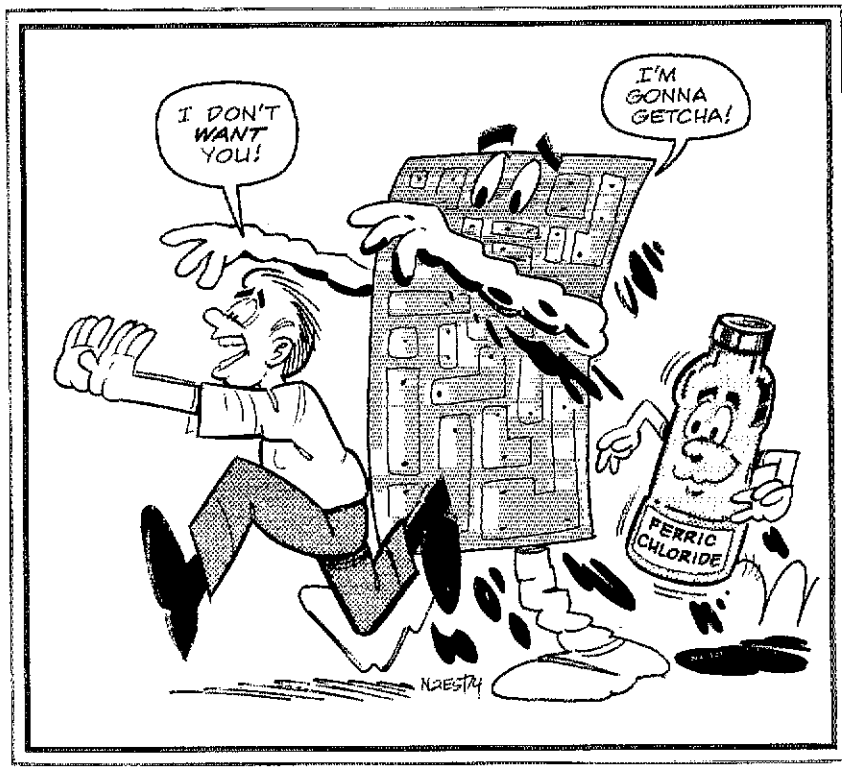
The ARRL will be citing this contact, which is illustrative of Amateur Radio experimentation on the 220-MHz band, in supplementary reply comments to the FCC NPRM 87-14. Anyone having additional Sporadic-E band opening information should contact the 220-MHz Task Force at HQ.

New ARRL membership service: Commencing with the August ARRL membership expiration notices, members are now being reminded of their ***FCC license expiration date.*** Amateur licenses are renewed by filing FCC Form 610, which is available from HQ for an SASE. Remember, there is no fee charged to renew an amateur license.

Job opening at HQ. HQ has an immediate opening for the Assistant Contest Manager. The Assistant Contest Manager works with the Contest Manager in administering the League's contest program, including the scoring of logs, preparing *QST* results, and conducting the ***Special Events*** and ***Contest Corral*** columns in *QST*. Applicants should be thoroughly interested and knowledgeable in the League's varied contest program. An amateur license, PC familiarity and some writing skills preferred. Accuracy is a must. The starting salary range is $13,754-16,510. For further information, contact Billy Lunt, KR1R, at HQ.

Attention net managers! The 1988 ARRL *Net Directory* registration deadline is September 1. If your net is listed correctly in the 1987 edition, it will be run again automatically in the 1988 edition. If your net is not listed, or the information has been updated, ***please complete a net registration card (FSD-85, available from HQ) and send it to HQ by September 1.***

Homemade Circuit Boards—Don't Fear Them!



Simple, low-cost circuit boards can be made without using messy chemicals. But even if etching fluids are used, the job need not be a dreadful experience. These hints may be helpful to you.

By Doug DeMaw, W1FB
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How many times have you heard a friend say, "I can't lay out a circuit board," or "I can't afford the equipment to make my own PC boards"? The fact is that many hams knock PC board fabrication without ever having tried it. The task seems beyond their capability, so they simply give up before they start. Many hams are willing to build projects at home, but they rely on by-mail sources for the circuit boards of interest. I can't blame anyone who subscribes to that philosophy if the PC board is large and complex. Layout can be a challenge, and it may be more cost-effective, in terms of hours invested, to buy a ready-made circuit board. I know about this, because I have done it myself! But, etched-circuit boards for simple projects are easy to make, inexpensive and entirely suitable for our purposes. I have seen homemade boards that had a commercial look, while others were as grotesque as the portrait of Dorian Gray. Nonetheless, the circuits worked nicely in either version, and once the boards were mounted foil side to chassis, the lack of artistic flair was hidden from observers.

Laying out a Circuit Board

Development of a PC-board pattern seems to be the principal deterrent to amateurs who are afraid to make etched circuit boards. It can be fun rather than drudgery if you regard the process as you do the solving of a puzzle. Remember that your PC artwork need not have the commercial look. I remember vividly a comment made by the late George Grammer, W1DF (former ARRL Technical Editor), as he examined a homemade PC board made by an ARRL staffer: "That pattern looks dreadful. It looks like someone's liver!" That PC board eventually became part of a very popular *QST* project, despite the less-than-attractive etched-foil pattern. The important point is that it worked just fine, even though it had odd-shaped, somewhat ragged foil elements.

The principal objective in developing a PC pattern is to keep the parts placement orderly, and to strive for short leads when dealing with signal paths. The traces for dc circuits may be long, and they may wind through the various pads on the board. The ground-bus lines need to be fairly wide and short for signal circuits, and they should be joined to one another wherever practicable to minimize ac and RF ground loops (RF-hot ground conductors).

These are the steps I follow when designing a PC-board pattern:

1) Draw the schematic diagram. Check it carefully to ensure there are no errors.

2) Gather all of the parts that mount on the circuit board.

3) Determine the size of the board, then draw its boundaries on a piece of grid paper (quadrille pad). It is best to use a pencil when laying out your board pattern. This permits you to make changes and corrections more easily as you develop your layout: Ink is rather permanent! The finished pattern may be transferred later to the copper surface of the PC board with the use of carbon paper.

4) Commence at one end of the circuit (input or low-level port) and choose a corner of the predrawn boundary from which to start. I always view my PC layout from the etched-foil side of the board. This requires working with the mirror image of the pattern. Be sure to view your transistors and ICs from the bottom when using this layout procedure. If you do not, the pinouts will be reversed!

5) Place the components on the layout sheet for each stage you plot. This permits you to provide sufficient space for each part, and it enables you to place a dot where each hole will be drilled. Be careful to avoid layout errors that will cause two parts to be in conflict (one resistor crossing over another resistor, for instance).

6) Continue sketching the pattern until you fit all of the circuit on the board. Try to keep the stages in a straight line rather than having the circuits wind to and fro within the boundaries of the board. This helps to prevent unwanted interaction between stages. In other words, strive to isolate the input and output circuits from one another.

I like to begin my layout exercise by drawing a ¼-inch-wide border around the outer perimeter of the board pattern (along the boundary). This serves as the tie point for all of my ground foils within the PC pattern. It also makes grounding the circuit board to the chassis simpler by having

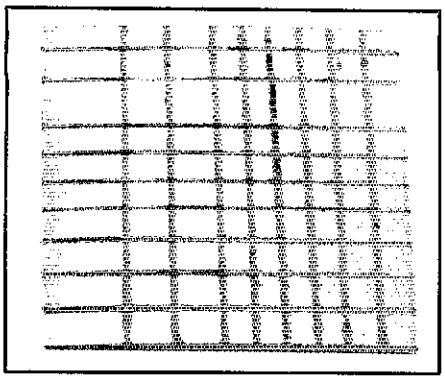


Fig 1—Photograph of a circuit board consisting of square and rectangular isolated pads. The etching was done with a hobby motor and miniature grinding bit.

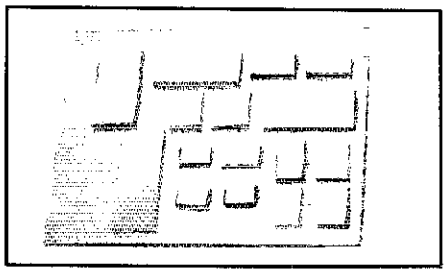


Fig 2—Photographic view of homemade piggyback circuit boards. Squares and rectangles of circuit-board material are glued to a PC-board foundation to provide isolated pads for component mounting.

a mounting hole at each corner of the board. (This grounding method calls for the use of metal spacers between the PC board and the chassis or cabinet wall). Try to allow 1/16 to 1/8 inch of space around each circuit-board pad or line. The copper in these areas will be removed from the board during the etching process.

You may compact your layout by mounting components vertically. This is a great space-saving method, but in critical circuits it may introduce unwanted stray inductance because one lead of each vertical component is considerably longer than when flush-mounted. I do not recommend standing the parts on end in a VHF or UHF circuit.

Simple Grid-Style Boards

Here is a technique for making the equivalent of etched-circuit boards quickly and easily. Lew McCoy, W1ICP, and I introduced it to *QST* readers in the 1960s. It calls for using a hacksaw blade to cut through the board copper to form a grid of squares or rectangles (see Fig 1). This provides isolated pads on which to build a circuit. I find these boards useful as breadboards when testing new circuits. They are suitable also as foundations for permanent circuits. Now, rather than using a hacksaw to cut the grooves, I employ a hobby motor tool for the job. I use a small, cone-shaped grinder bit to remove the unwanted copper; a steel straight-edge serves as a cutting guide. It took exactly three minutes to complete the board shown in Fig 1. Pass the grinder bit lightly across the board, then follow up with a second cut while applying slightly more pressure. This helps to keep the lines straight and shallow. The board in the photograph is 3 × 3 inches. The smallest pads are ¼ inch square.

Piggyback Circuit Boards

Fig 2 shows another technique for making a quick-and-easy circuit board. I got the idea from Wes Hayward, W7ZOI, some years ago, and I have used this method a number of times since. Squares, circles or rectangles of PC-board stock are first cut to size. This may be done with a hobby saw, saber saw or heavy-duty paper cutter. Caution: Phenolic board may shatter if you try to cut it with a paper cutter! Glass-epoxy board cuts nicely this way, however.

Affix the small pieces of copper-clad stock to a blank piece of circuit board. W7ZOI uses hot-melt glue. I prefer to attach my "islands" to the main board with quick-setting epoxy cement because I find that they adhere longer under stress than is the case with hot-melt glue. The main PC board may now be used as the circuit ground, while the islands provide sites for the above-ground circuitry. Bear in mind that each island exhibits capacitance to the ground plane. A ¼ × 1 inch length of stock, when mounted on the copper-clad foundation board (ground), exhibits approximately 10 pF of capacitance to ground. Therefore, in critical circuits it is wise to use small pads in order to minimize parasitic capacitance. Double-sided PC board with piggyback pads should not be used for VFO circuits, or any high-impedance circuit above the HF spectrum.

Piggyback circuit boards do not require a copper-clad base. The pads may be attached to any kind of conductive or nonconductive material. For example, you may use a scrap of Formica® or thin wood as a base for your circuit board. If this is done, it will be necessary to include some extra copper-clad islands for use as circuit ground points.

Still another method for making this type of board is to cut strips of flashing copper to size and glue the pieces to a nonconductive base board, such as Formica. This provides a neat, low-profile circuit board.

Mechanical Etching

Here are more ways to make one-shot circuit boards without using an etching chemical. Fig 3 illustrates how to develop a pattern on paper (A) then transfer it to the board stock with the use of carbon paper. The pads and lines are formed by using a hobby motor and a small cone-shaped abrasive bit (Fig 3B).

The resulting artwork might have been

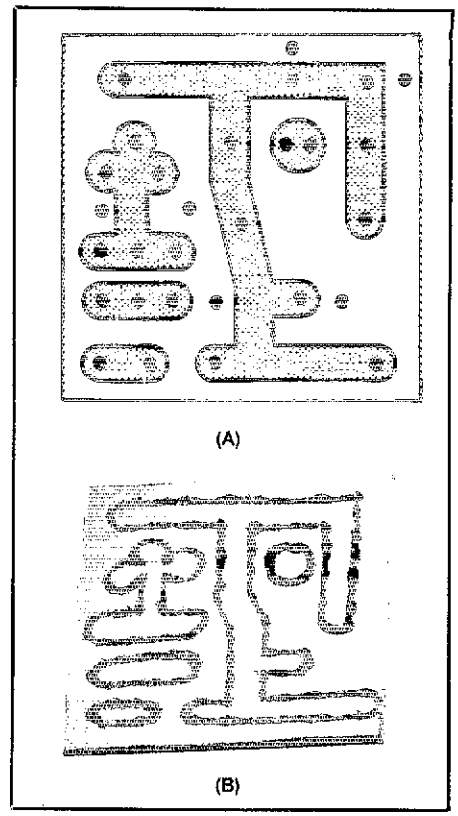


Fig 3—Drawing A represents a hand-drawn circuit-board pattern. The completed board is shown at B. The islands were cut from the copper with a hobby motor and small abrasive bit.

scorned by Picasso, but I assure you it will work nicely. It took me four minutes to cut and etch the board in Fig 3, not counting the time for layout and image transfer to the copper. You may want to adopt this method for your next project, provided you don't plan to dazzle your fellow hams with a work of art! This technique is not satisfactory for creating PC boards that contain ICs or other components with closely spaced pins.

Simple Layouts for Chemical Etching

Well, what about chemically etching circuit boards? You'll need ferric chloride or ammonium persulphate to do this. Ferric chloride is my choice, even though it looks unsightly and leaves a stain on nearly everything it comes in contact with! Ammonium persulphate, on the other hand, is a clear solution. It leaves only a white residue when dry. I find that ferric chloride is the faster etchant, hence my preference. Ammonium persulphate is available in powder form. It must be mixed with distilled water before it is used. Some etchant kits include a mercuric powder to use as an activator agent. Check your ammonium persulphate package for a small envelope of activator.

You may cover the copper surface of a blank PC board with masking tape (wide roll preferred) or some other short-term

chemical-resistant material. Fig 4 illustrates a board that has a coating of transparent tape that I purchased from the post office. This tape is used also by United Parcel Service (UPS) for protecting the shipping labels on boxes. The tape is applied to the copper side of the circuit board, pressed firmly in place, then trimmed around the edges of the board. The circuit pattern is drawn on the tape with a laundry-marking pen. I use a Pilot SC-UF fine-point pen (black), available at most office-supply stores. The ink from these pens works rather well as an etch-resist material if the PC board is not kept in the etchant bath for too long.

After the circuit-board pattern is placed on the clear film, use a sharp hobby knife to cut out the sections where etching is desired. The darkened circuit-board elements on one side of the photograph in Fig 4 represent the area where I removed some of the tape for illustrative purposes.

You may find that some types of tape will leave a residue of adhesive material on the copper after the tape has been removed. Be sure to clean the bare copper thoroughly before etching it. I use nail-polish remover or lighter fluid for this purpose and apply it lightly with cotton. Too long an exposure to the solvent may loosen the film that must be retained on the board. Solvent may also creep under the resist tape; this will cause ragged edges on the circuit elements.

If masking tape is used as an etch resist, the circuit pattern may be traced onto it with carbon paper. It's a good idea to polish all circuit-board copper with a fine grade of steel wool before doing pattern transfers or etching. This will remove oxidation and allow uniform etching to occur.

Several manufacturers offer etch-resistant PC board layout tape and pads. Check with your local drafting-supplies dealer about Bishop and Datak drafting aids designed for this purpose.

Photo-Etch Process

A complete description of the photo-etch technique would take considerable space. Therefore, let's discuss only the general principles of the process. The master artwork is prepared on clear plastic sheeting by using layout tape and donut pads. A green negative is made from the master, using a floodlight. The negative is placed over the copper surface of a photosensitized PC board and exposed to the rays from a floodlight. This process causes a chemical action within the PC-board photosensitive coating, rendering the circuit traces etch-resistant. Professional-quality boards result from this process. It is a good method to use when you wish to make several boards from one pattern. Photo-etch kits are available from Kepro Corp.[1]

Silk-screening kits are also available from Kepro. They are useful for making thousands of circuit boards from one pattern. The PC pattern is formed on the silk or nylon screen. The blank circuit board is placed under the silk screen, and etch-resist paint is spread over the screen with a rubber squeegee to force the paint onto the PC board through the screened pattern. Paint adheres to those areas where the copper must be retained, but not to the areas where etching will occur.

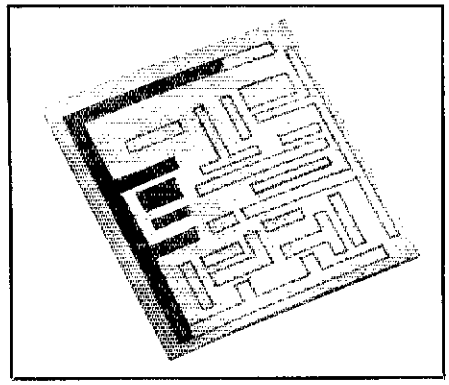


Fig 4—Adhesive-backed clear plastic has been applied to a blank PC board. The circuit elements were drawn on the plastic with a laundry pen (see text). A hobby knife is used to remove the plastic over those areas to be etched. The dark elements indicate an area where the plastic has been removed from around the PC-board foils.

Meadowlake Tec-200 Process

A relatively new and inexpensive process became available recently. It allows us to make one-shot pattern-transfer sheets on clear film with a plain paper photocopy machine. Scale templates with good black/white contrast (such as those in *QST* and *The ARRL Handbook)* can serve as the pattern masters, but only after image reversal. That is, the process requires that a mirror image of the pattern be placed in the copy machine. Tape layouts on clear plastic may also be used as masters; these may be flopped 180° in the copy machine, thus solving the mirror-image problem.

Once the mirror-image master is put in the copy machine, a sheet of Meadowlake Corp Tec-200 film is fed into the machine in place of a paper sheet.[2] The image is then photocopied to the Tec-200 film; the exposed film is placed over the copper surface of the PC board (dull side toward the board) and ironed onto the copper. This requires a household iron set for moderate heat. Pass the iron back and forth three or four times to ensure complete image transfer. Use a thin piece of cloth between the iron and the film to prevent the film from melting and sticking to the iron. After the iron is set aside, carefully peel the plastic sheet from the circuit board. The pattern image will be seen on the circuit board. The black areas will resist the etchant, while the clear areas will not.

Although I have used Tec-200 successfully, I did run into a few problems. The iron temperature is critical. Too little heat will prevent complete pattern transfer. Too much heat will smear the pattern and ruin the work. Also, some of the circuit pattern does not come off the film when it is peeled away. This requires a touch-up job with etch-resist ink or a similar substance. Similarly, the exposure density in the copy machine is critical. A midrange setting on my Canon PC-10 copier seems to be best. You will want to experiment with small pieces of Tec-200 film to determine the best exposure times and proper iron temperature. The process is inexpensive and generally acceptable for amateur applications.

The Etchant Bath

If you've worked in a photo darkroom, you know that the temperatures of the processing solutions are critical. The same is true of etching fluids. I try to maintain a bath temperature of 90 to 110 °F. This range permits rapid etching. Too cool a bath slows etching and gives the etchant time to get through the etch-resist material. The end result of a slow etch may be missing copper pads and ragged trace edges.

(continued on page 23)

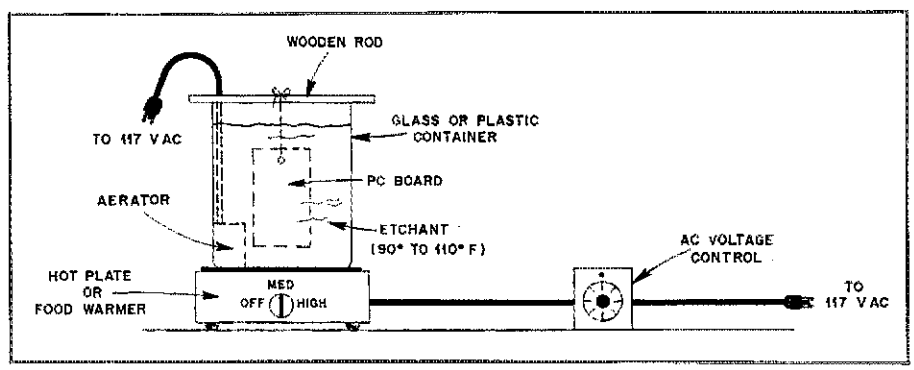
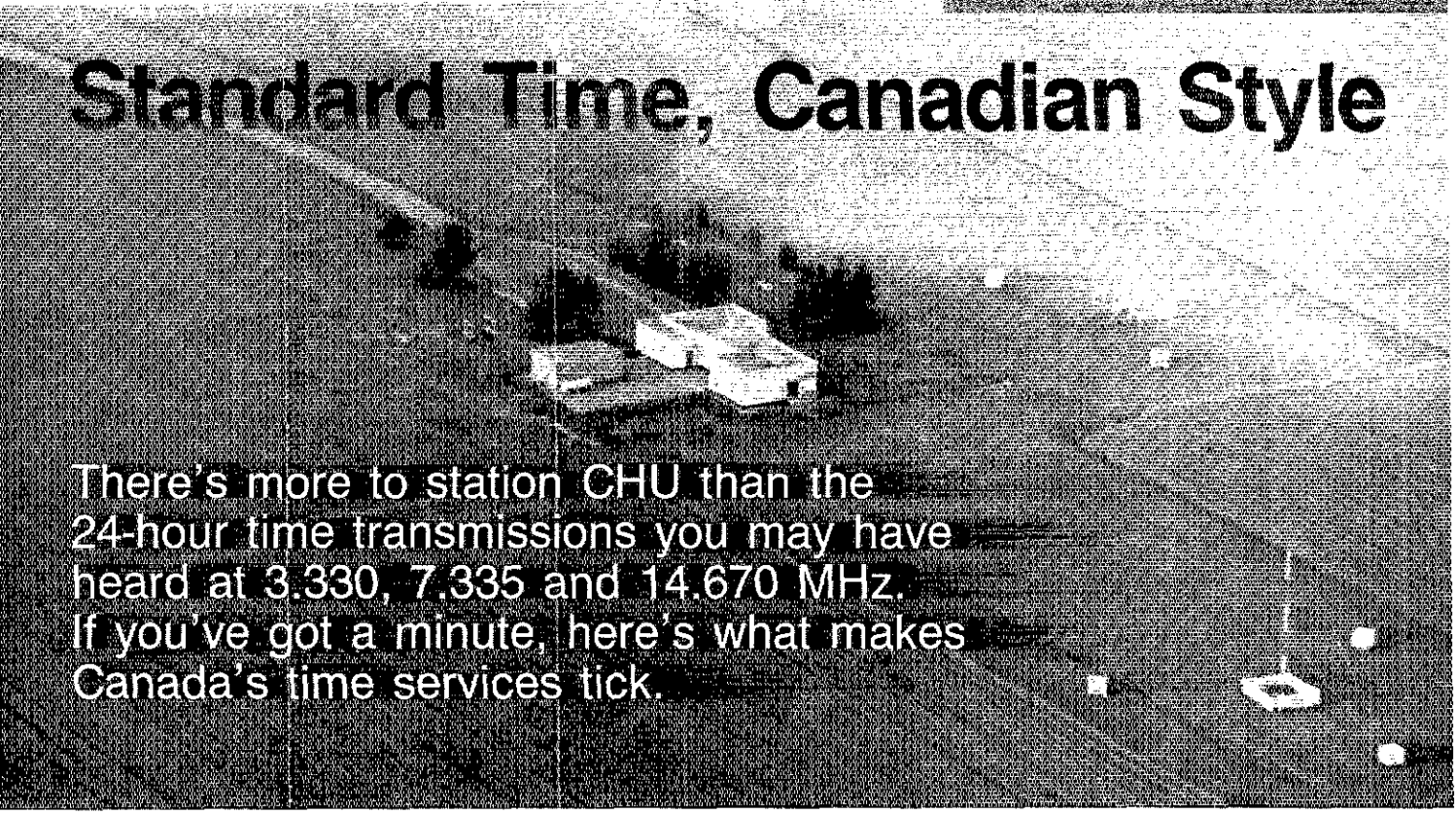


Fig 5—Illustration of an etchant tank with an aerator. A hot plate or warming tray keeps the bath between 90 and 110°F. The ac line voltage is controlled by a variable autotransformer. Ferric chloride or ammonium persulphate may be used as the etchant fluid.

[1]Notes appear on page 23.

Standard Time, Canadian Style



There's more to station CHU than the 24-hour time transmissions you may have heard at 3.330, 7.335 and 14.670 MHz. If you've got a minute, here's what makes Canada's time services tick.

By Rus Healy, NJ2L
Assistant Technical Editor, ARRL

Canada's National Research Council (NRC), the governmental department responsible for legal time in Canada, provides several time-of-day services operating to varying degrees of precision. Because HF propagation and equipment limitations can at times keep us from using WWV or WWVH as a time and frequency standard, CHU Canada is a valuable alternative. The CHU transmitting frequencies are close enough to the 80, 40 and 20-meter ham bands that many amateur rigs can be used to receive them.

CHU Time Transmissions

The Canadian Government began their first time service in April 1914. These early signals were used by navigators in the calculation of latitude and longitude. In March 1928, a station was set up to transmit regular time signals on 52.5 meters (roughly 5.7 MHz) on a daily basis from 2:55 to 3 PM, signing the call 9CC. Soon thereafter, the call sign was changed to VE9CC. The transmitting equipment at this station used a DeForest tube running about 250 watts input. In 1929, the station call was changed again, this time to VE9OB.

Quartz-crystal control was used for the first time in 1933. Up to that time, an LC oscillator was used to determine frequency, yielding poor stability. Canada's radio time service also began transmitting time signals continuously in 1933. A third call sign change occurred in 1938, when the call letters CHU were assigned.

Some frequency changes were made in the early years as well. The current CHU frequencies were decided upon largely because they were in bands that were free of interference from broadcast signals, and because the 14-MHz signal is the second harmonic of the 7-MHz signal. (This permitted the use of a single oscillator to control both frequencies.)

CHU time signals are now transmitted continuously on 3.330, 7.335 and 14.670 MHz at output power levels of 3, 10 and 3 kW, respectively. The emission mode used is upper sideband with carrier reinserted. This mode was chosen because CHU's carrier frequencies are frequency standards and because it was in keeping with the trend toward SSB. It has the additional benefit of allowing for reception with either an SSB receiver or by means of envelope detection with an AM receiver (with no BFO).

Antennas

The antenna system used for CHU transmission consists of three verticals (see the lead photo), one for each transmitter. The 3-MHz antenna is ¼ λ high, the 7-MHz antenna is ¾ λ high, and the 14-MHz antenna is ½ λ high. All three antennas are fed with Hardline coaxial cable (between 7/8 and 1⅛ inches in diameter) and employ ground-radial systems to improve efficiency.

Time Announcements and Station Identification

CHU's identification and time announcements are performed by a pair of magnetic-drum-type recorders that are synchronized with the NRC primary clocks. Different sections of the drums are used for each part of the station and time announcements. One of the recorders handles time and station announcements in English, and the other carries the French versions. (Eastern Standard Time is always given.) Both units carry bilingual time announcements so that if one fails, the other still gives the station announcement (either in English or French) and the time announcement in both languages at two-minute intervals. The NRC has plans to replace the drum system with digital voice recording/playback equipment by late this year. This will allow the use of less cumbersome backup systems, and will eliminate the possibility of mechanical failure—two trouble areas with the current system.

Keeping CHU "On Time"

Four main cesium atomic clocks provide time standards for Canada's time services. These are primary clocks that maintain their extreme accuracy by comparing the frequency of a precision quartz oscillator

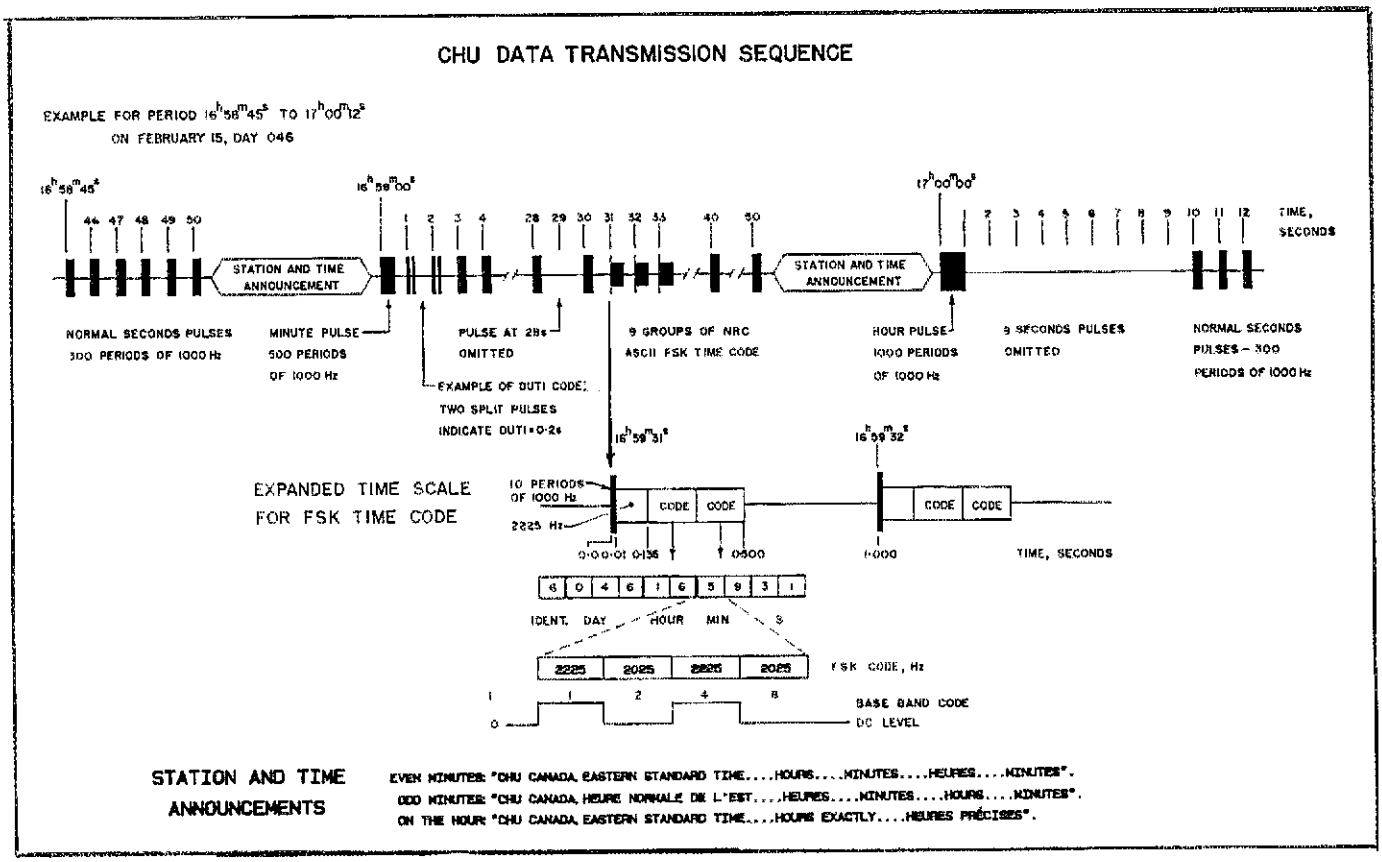


Fig 1—CHU transmits time information both by voice and by a modified ASCII code. The order in which this information is sent is detailed here, with an example time period showing the data format and content.

to the microwave resonance of a beam of cesium atoms. This is done in an environment that allows the resonant frequency of the beam to be very accurately known. Any variation in the oscillator frequency is detected by changes in the resonant frequency of the beam of cesium atoms and is corrected automatically. The difference between the NRC's primary clocks and commercially available cesium atomic clocks is that NRC's primary clocks are actually time *standards* that do not require any periodic adjustment from outside sources. Even though commercial atomic clocks keep very accurate time, they are not actually *standards*. They must be set initially and adjusted based on primary clocks such as those at the NRC.

The physical size difference between the standards and commercial clocks is interesting to note: The NRC's primary clocks stand almost as high as a man and are several yards long, while a typical commercial cesium clock fits in a 19-inch rack.

These primary clocks were designed, built and are maintained by the NRC's Main Time Laboratory in Ottawa. Two cesium clocks located at the transmitter site are used as time and frequency references for the time-announcement equipment and the transmitters. These clocks are compared daily with the NRC primary cesium clocks. The clocks located at the transmitter site have typical time and frequency accuracies of ± 0.1 millisecond and $\pm 5 \times 10^{-12}$ with respect to the primary clocks, which are typically within 10 microseconds and 1×10^{-13} of those for UTC. For example, the frequency accuracy of the 7.335-MHz transmitter is typically within $5 \times 10^{-12} \times 7.335$ MHz $= 3.67 \times 10^{-5}$ Hz of the primary clocks.

Other Time Services

NRC makes several other time services available to the public in addition to CHU. Among these are two telephone time services: One is a voice announcement of time, given every 10 seconds. The other is a digital time code (see below). Both of these services are accurate to the millisecond. NRC reports that the voice service receives about 7000 calls per day, most of these during the peak hours from 7 to 9 AM and 4 to 7 PM. Eight telephone lines are used for the service, and separate telephone numbers are used for English and French announcements.[2]

In-house calibration of timing equipment is another service provided by the NRC.

Coordinated Universal Time

Coordinated Universal Time (UTC) is a close approximation of the astronomical time scale, UT1, which denotes the position of the Earth with respect to the average position of the sun. UTC is based on the average of more than 100 atomic clocks in other countries, and is steered according to three sources: the primary clocks at the NRC and the Physikalisch-Technische Bundesanstalt (PTB) in West Germany, and the primary frequency standard at the US National Bureau of Standards in Boulder, Colorado.

Because time signals are critical to astronomical observations used in celestial navigation, UTC is kept within 0.8 second of UT1 by periodic corrections of exactly 1 second. The difference between UTC and UT1—DUT1—is transmitted on all standard radio time transmissions in an internationally accepted code so that UT1 can be calculated by adding DUT1 to or subtracting it from UTC. CHU transmissions make use of a split *second* pulse to indicate the value of DUT1 in tenths of seconds. The first through the eighth *second* pulses of each minute are split to indicate a positive value of DUT1, and the ninth through the sixteenth pulses are split to denote negative values of DUT1. If, for instance, DUT1 were +0.3 second, the second, third and fourth *second* markers in each minute of the normal time transmissions would be split (see Fig 1). If DUT1 were −0.5 second, the ninth through the thirteenth *second* markers of each minute would be split.

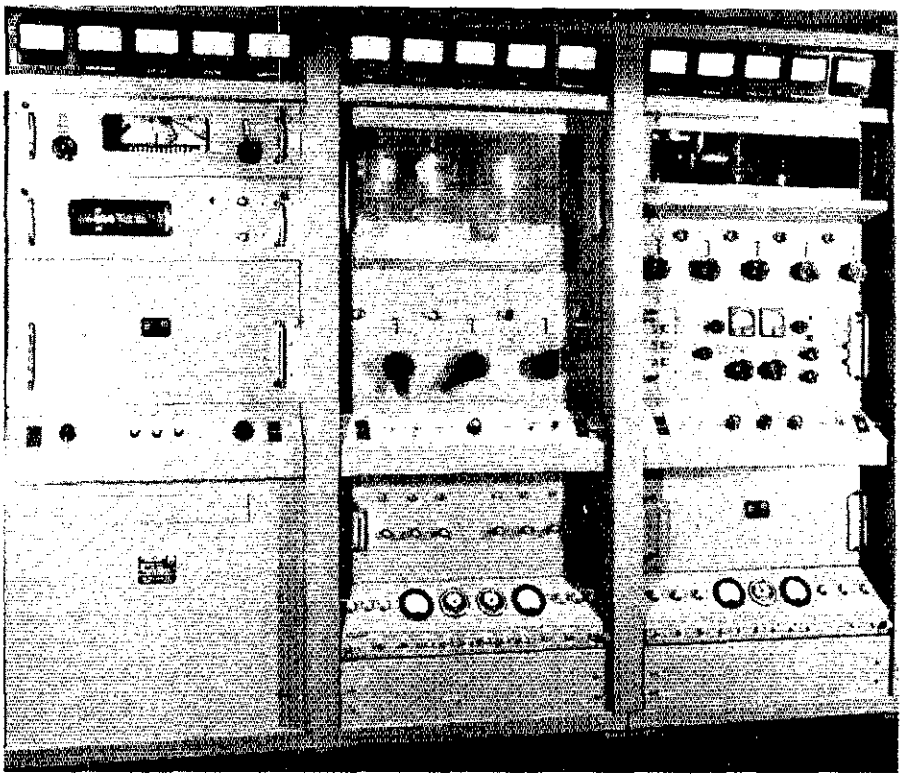


Fig 2—This photograph shows one of the transmitters used at CHU near Ottawa, Ontario.

Time calibration can be done at the NRC's main laboratory using the four primary cesium clocks and various radio signals received at the laboratory as direct references, with a precision of 1 nanosecond. Frequency calibrations can also be provided to an accuracy of $\pm 2 \times 10^{-12}$. Many outside organizations requiring accurate calibration of timing equipment make use of this service. Fees collected for these in-house calibrations are based upon the time required to complete them.

The NRC Digital Time Code

The digital code used in both the CHU radio transmissions and the NRC telephone time services uses the Bell-standard 103 300-baud FSK system with mark and space frequencies of 2225 and 2025 Hz, respectively, and can be received by a modem operated in the "originate" mode. Each 11-bit character consists of 8 data bits; 2 BCD digits of 4 bits each—nibble reversed (the MSD is sent first), preceded by 1 start bit and followed by 2 stop bits.

The first character sent is always the number 6, which provides a means of error trapping and protects against code inversion. Nine more characters are then sent, which represent the day of the year (1-365/366), hour (00-23), minute (00-59) and second (00-59). The time code is then repeated so the receiving equipment can check the code for discrepancies and reject or accept the results accordingly.

Digital Code Transmitting Sequence

The telephone digital time service provides this code on a continuous basis, and it is also sent during certain parts of every minute in the CHU transmissions. The time code is sent from the 31st through the 39th second of each minute. Immediately before the code is sent each second, a 0.01-second, 1-kHz pulse and a space tone (2025 Hz) of 0.125-second duration are sent. These signal the receiving equipment that the time information is about to be transmitted. During the remainder of each minute, a specific data transmission sequence is followed. See Fig 1 for a typical illustration. In this example, the 16:59 minute begins with a "minute pulse," which is a ½-second tone of 1 kHz. This pulse is immediately followed by the DUT1 correction code. (See the sidebar on UTC.) The normal 0.3-second pulses are sent during the remaining seconds up to and including 16:59:28. The 29-second pulse is omitted, and the 30-second pulse is a normal 0.3-second-long pulse of 1 kHz. The digital time code is sent for the next nine seconds, as discussed earlier, and the normal pulses are sent between the 40th and 50th seconds. The bilingual voice announcements are given during the last 10 seconds of the minute, and then the sequence repeats.

The single exception to this pattern occurs during the first minute of each hour, in which the first pulse is a full second long and the 2nd through 9th pulses are omitted. Normal pulses are sent from the 10th second on, and the sequence discussed in the previous paragraph begins, as shown in Fig 1.

Our brief tour of Canada's time services ends here, but don't be surprised if you find yourself listening in on CHU on the 3, 7 or 14-MHz bands from time to time. If your ham equipment doesn't cover CHU frequencies, you can build a simple converter for a pocket-size medium wave receiver to pull in CHU at 7.335 MHz.[1]

The Physics Division of the National Research Council is part of the Canadian Federal Government. Within the Physics division, CHU is part of the Time Standards Section. The material presented here was extracted from an information package produced by NRC. Additional information was kindly provided by Dr Rob Douglas of NRC, who lent historical insights about the Canadian time services, and Murray Skinner, VE3OWZ, who provided many of the technical details about the transmitting equipment used at CHU.[3]

CHU Transmitting Equipment

CHU uses three main transmitters for their time transmissions. They are located in a rural location about 12 miles from downtown Ottawa. A small building houses the transmitting equipment, spare parts, backup power systems, and all the necessary test and measurement gear to keep the transmitters on the air. The main transmitters for 3.330 MHz and 14.670 MHz are model GPT10K rigs, made by Technical Materiel Corp (TMC). They are rated at 10 kW PEP output, but are run at 3 kW output (2-kW carrier and 1-kW sideband). The 7.335-MHz transmitter is a TMC GPT40K, rated at 40 kW PEP output and run at 10 kW out (6.67-kW carrier and 3.3-kW sideband). These are multistage PAs driven by TMC MMX-type low-power (about 1 watt) synthesized exciters. The GPT10K is a three-stage transmitter, with a 6CL6 at the input driving an 8295A and finally a 4CX5000. The amplifier stages run in a grounded-grid configuration. The 7-MHz PA is identical with the exception of another final stage, a 6697. A spare GPT10K is kept on hand for use when one of the main transmitters is being serviced.

Three backup transmitters are also kept at the CHU site in case of equipment failure. These are all TMC type HFLM transmitters rated at 3 kW PEP. Backup power is provided by a 125-kW generator and a bank of storage batteries.

Notes

[1]D. DeMaw, "WWV and CHU in Your Workshop," *QST*, Oct 1986, pp 42-44.

[2]The telephone numbers are as follows: English announcements—613-745-1576; French announcements—613-745-9426.

[3]More information on CHU and the Canadian NRC can be found in *The Beginning of the Long Dash: A History of Timekeeping in Canada*, by Malcolm M. Thomson (Toronto: University of Toronto Press, 1978).

RF Path Selection

Have you ever tried to figure out the minimum power required for good communication to the new repeater? There is a better way than by trial and error.

By Jon L. VanDonkelaar, WB8EAF
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Bellbrook, OH 45305

You can determine in advance the minimum power required for a chosen radio path. In this article, we will do just that; we will select a reliable radio path requiring a minimum of power and, as a bonus, a minimum of tower height. The method shown here is applicable to any frequency above 100 MHz.

As the use of control stations, remote operation and data transmission increases, radio paths between two fixed locations will become more important to the radio amateur. The contacts must be reliable and noise free, but must use a minimum of power and an inexpensive tower. In order to determine how much power and tower height we need, we first have to look at the RF propagation along our intended path, taking into consideration the curvature of the earth and other physical obstructions.

RF energy in the VHF, UHF and microwave ranges tends to travel in a straight line. People who belong to the Flat Earth Society think this is great, since their world is flat, but for those of us who live on a round world, this creates a problem. If we are to have a line-of-sight path with no obstruction losses, then we must clear the bulge of the earth between our two towers. This is shown in Fig 1. The height of the bulge is easily calculated by the equation

$$h = \frac{d1 \cdot d2}{1.5\ k} \qquad \text{(Eq 1)}$$

where

h = height of the bulge in feet
d1 and d2 = distance in miles
k = a constant, usually between 0.66 and 1.33

The constant k allows us to vary the equation for differing atmospheric effects. In hot, humid climates, such as the Gulf Coast, a factor of 0.66 would be used; but in dry regions, such as the desert, a factor of 1.33 would be used. Changing the factor has the effect of varying the radius of the earth to allow for the bending of the RF wave by the atmosphere. Using a k factor of 1.0 works well for temperate climates like Ohio.

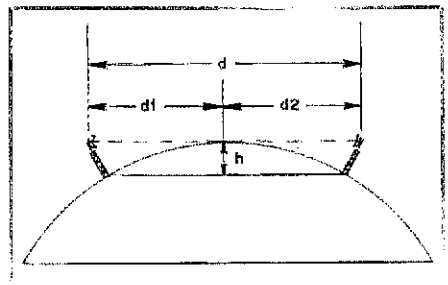

Fig 1—As a function of tower heights, the earth's curvature prevents two widely separated stations from communicating by a line-of-sight path. See text for computing dimension h.

One might reasonably expect that as long as there is a clear line-of-sight path between the two stations, all is well. This is not always the case, however. Signals reflected from the ground or from other objects may arrive at the receiving antenna in any phase relationship with the main signal, tending to cancel it or add to it. In Fig 2A, for example, assume the reflected signal path is one-half wavelength (180°) longer than the main signal path. Then, since there is also a 180° phase reversal at the reflection point, the signals are in phase and add, thereby increasing the received signal level. [A 180° phase shift will occur from a horizontal reflecting surface for a horizontally polarized signal, and from a vertical reflecting surface for a vertically polarized signal.—Ed.]

Fresnel Height and Fresnel Zones

The distance from the center of the RF path to the reflection point is called the Fresnel height, and all of the points that satisfy this in-phase criterion form a three-dimensional envelope around the main signal path called the first Fresnel zone. This means that the reflecting point could be the earth below the main path, or it could be an object to the side. See B and C of Fig 2.

The second Fresnel zone is the distance for which the reflected path length is one wavelength (360°) longer than the main signal path. Since there is a phase reversal of the reflected signal at the reflection point, the reflected signal will arrive at the receiving antenna out of phase with the main signal by 180°, and they will tend to cancel. As can be seen in Fig 3, the main signal is canceled if the obstacle clearance is an even Fresnel number, and the received signal level is increased for odd Fresnel numbers. A conservative path selection would use a Fresnel path clearance distance of 0.6 times the first Fresnel zone. This clearance gives a line-of-sight path with minimum height and the greatest reliability.

It is important to keep in mind that the received signal level decreases by 6 dB for each halving of the tower height, once the Fresnel height is under 0.6. This generalization depends on the reflectivity of the earth, but is close enough to use in practice until obstacles start obscuring the RF path. We will discuss decibels in a section to follow.

Now that we understand the concept, let's try an example path. Suppose we want to send a signal from our location to the local ATV repeater. First, we plot the two locations on a topographical map obtained from our local outdoors store, city or county engineer, or state map department. We then connect the two points with a straight line and mark it every inch. This gives us a reference point every 2000 feet. We graph the elevation of each of these points, along with any known obstructions, and now we have a profile of the path. Our path profile looks as if we had cut the earth like an apple along our transmission path, and looked at it from the side. Unfortunately it is not a round apple at this point. See Fig 4. We need to adjust the elevations of the path and obstacles to correct for the curvature of the earth and the 0.6 Fresnel zone. The height addition increases toward the middle of the path and decreases at the towers, similar to the bulge

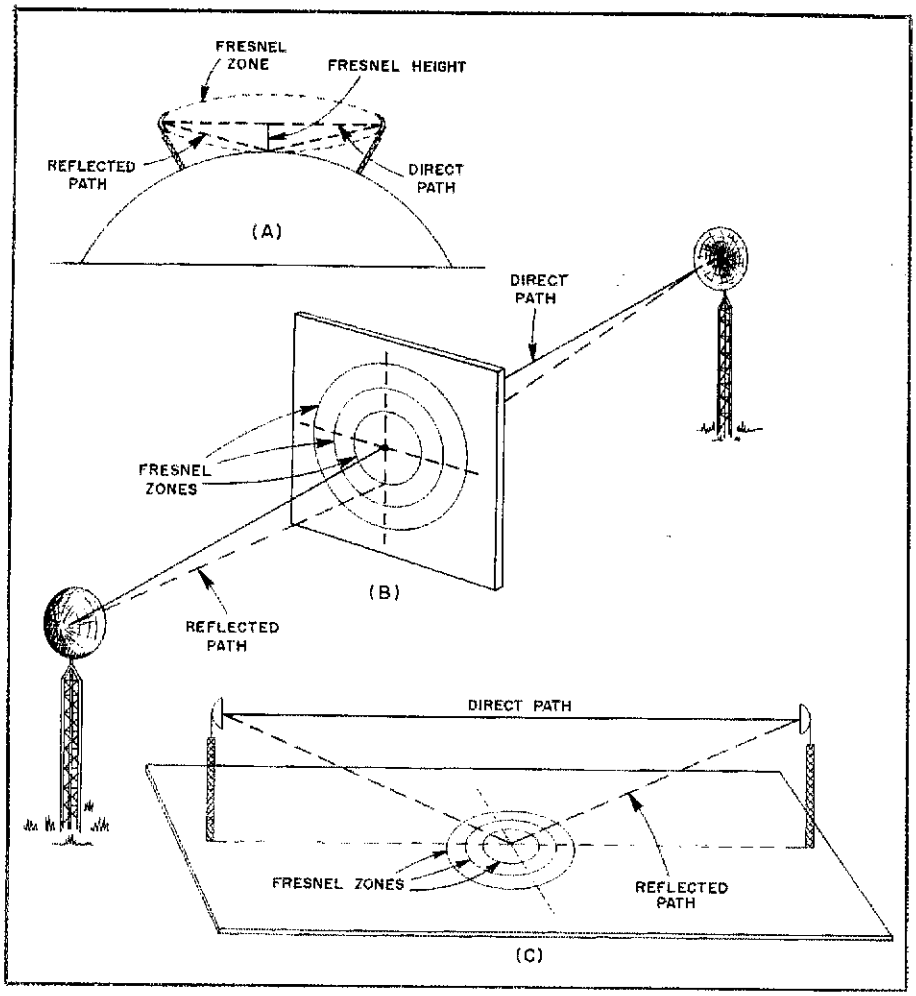

Fig 2—A illustrates the Fresnel height, the distance from the center of the RF path to a reflection point. That point may be the earth or any other reflecting object, as illustrated by the concentric circles at B and C. Each Fresnel zone is actually three-dimensional, having the shape of a football. B and C show the 1st, 2nd and 3rd Fresnel zones, progressing outward from the center.

in Fig 1. The amount to be added is calculated by the formula

$$\Delta h = 0.6\sqrt{\frac{\lambda \cdot d1 \cdot d2}{d}} \qquad \text{(Eq 2)}$$

where

Δh = the height to be added
λ = wavelength for the frequency in use, feet
d, d1 and d2 are the distances as in Fig 1, but in feet

For a frequency of 439.25 MHz, the height of the building in Fig 4 is adjusted up by 88 feet. The adjustment does not have to be calculated for every point on the path, but only for the high points and a few points near the center of the path. Since the repeater antenna height is known, we can draw a line from this point across the adjusted obstacle points and read the necessary tower height at our location (80 ft) directly from the scale on the left side of the graph.

Had we been installing new towers on both ends, we would have drawn the RF path to give us the cheapest combination of towers. It is not necessary to have the RF path level. In fact, if the terrain under the RF path is extremely smooth, such as water or desert, then the RF path should be high on one end and low on the other, to minimize reflections. Don't think that since this clearance is good, more must be better. Remember that as the clearance goes through the even Fresnel zone the received signal is canceled. The actual RF path will vary up and down with changes in atmospheric conditions, and the 0.6 Fresnel zone gives the best protection from fade-outs. Notice also that the clearance is determined by the wavelength of the signal.

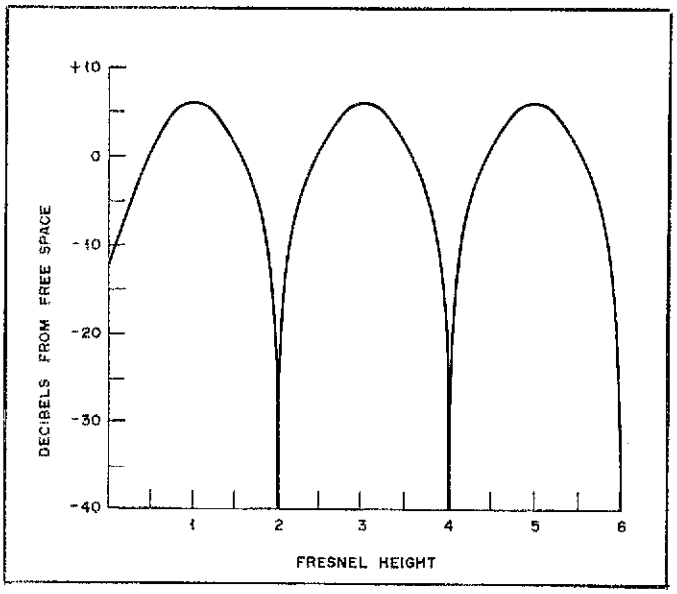

Fig 3—Signal enhancement and cancellation as a result of Fresnel height. Lossless reflections and 180° phase shift (horizontal polarization) are assumed.

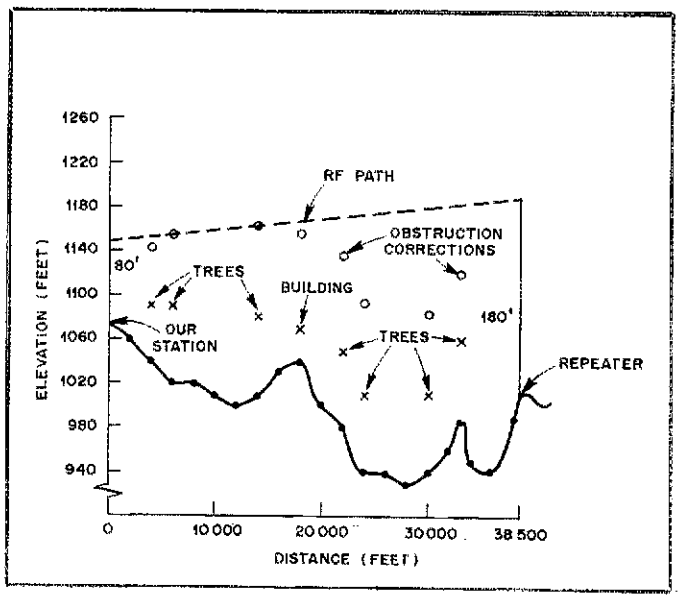

Fig 4—Profile of an example radio path. The elevation data is taken from a topographical map. Obstruction corrections for height are discussed in the text.

This means that as the signal frequency goes up, the required clearance distance goes down.

Using Decibels to Simplify Calculations

Let's examine some terms that will make our job easier before we go on. The process of adding and subtracting power gains and losses is made much easier by expressing quantities in decibels rather than watts. Simply put, a decibel value is the comparison of two quantities with the result taken on a logarithmic scale. This allows us to use small numbers when comparing large quantities and simply add and subtract gains and losses instead of multiplying and dividing. As I have said, the decibel is a comparison, so when we use it, we have to know what we are comparing to, so that we can compare apples to apples. In most radio work, the symbol dB means we are comparing watts to watts or volts to volts. When we use dBm, we are comparing watts to milliwatts. It is necessary, when making voltage or current comparisons, to take your readings across or through similar impedances.

When we use dBi with antennas, we are comparing the gain of the antenna to that of an isotropic radiator. This is simply an antenna that radiates equally well in all directions. Normally, dB is used to indicate a gain or loss, and dBm is used to indicate sensitivity or power output.

Let's do some examples. If we put 10 watts into a length of coax and get 5 watts out, then the loss is 10 log (5/10) = −3 dB. Had we put 10 volts into an amplifier and measured 5 volts at the output, then the loss would have been 20 log (5/10) = −6 dB. If a transmitter has 1 watt of output power, then it has a 10 log (1/0.001) = 30 dBm output. When dealing with receiver sensitivity, we first have to convert the input voltage across the input impedance to power and then to dBm. So if we have a receiver sensitivity of 0.2 μV, it converts to

$$\frac{(0.2 \times 10^{-6})^2}{50} = 8 \times 10^{-16} \text{ watts}$$

which converts to

$$10 \log \left(\frac{8 \times 10^{-16}}{0.001} \right) = -121 \text{ dBm}$$

Since we have already done our path profile, we know that we have a 7.3-mile path with an 80-foot tower at our location, and a 180-foot tower at the repeater site. Table 1 lists the components of the path and their associated performance characteristics. Let's find out what kind of received signal level we have at the repeater site. First, we convert the 10 watt output of our transmitter to dBm.

10 log (10/0.001) = 40 dBm

This signal goes through 80 feet of coax on the tower plus a 20-foot run into the house, which reduces the signal by 4.2 dB. This gives us 35.8 dBm at the antenna connection. If we have an antenna with a gain of 3 dBi, then we have 38.8 dBm of effective isotropic radiated power (EIRP) at our location.

Table 1
Equipment List for Path Selection Example

Equipment	*Our Station*	*Repeater*
Transmitter power	10 W	70 W
Receiver sensitivity	1 μV	1.5 μV
Tower height	80 ft	180 ft
Transmission line type	RG-8	7/8-in Hardline
Transmission line length	100 ft	200 ft
Transmission line loss per 100 ft	4.2 dB	0.89 dB
Antenna gain	3 dBi	6 dBi

Table 2
Factors for Eq 4

Terrain	*Value for a*
Very smooth including water	4
Average roughness	1
Mountainous	0.25
Climate	*Value for b*
Gulf Coast—hot, humid	0.5
Normal inland temperature	0.25
Very dry or high altitude	0.125

To find out how much signal we lose during propagation, we use the equation

$$A = 36.6 + 20 \log d + 20 \log f \qquad \text{(Eq 3)}$$

where

A = path attenuation (or loss), dB
d = path length or distance, miles
f = frequency, MHz

For 7.3 miles at 439.25 MHz, this works out to be 106.7 dB of loss. So at the receiving antenna we have −67.9 dBm of signal, but we still have to allow for the repeater antenna and coax. If the antenna gain is 6 dBi, we then have −61.9 dBm of signal at the top of the coax. The loss for 180 feet of ½-in Hardline and the 20-foot run into the repeater shack is 1.8 dB, so we have a received signal level of −63.7 dBm at the repeater. This is shown graphically in Fig 5.

Fade Margin and Path Outage

The repeater receiver has a sensitivity of 1.5 μV for 12 dB SINAD (signal to noise and distortion). This converts to

$$10 \log \left[\frac{(1.5 \times 10^{-6})^2}{50 \times 0.001} \right] = -103.5 \text{ dBm}$$

and gives us 39.8 dB of fade margin between the actual received signal level and the minimum level required. This is a good fade margin, but, how much is enough? To answer this question we need to look at two factors, availability and usability. We can calculate the downtime caused by fading from the fade margin, the type of terrain and the type of climate. This is done with the equation

$$U = a \times b \times 0.07884f \times d^3 \times 10^{\frac{-fm}{10}} \qquad \text{(Eq 4)}$$

where

U = time the path is out, seconds per year
a and b = factors taken from Table 2
f = frequency, MHz
d = distance, miles
fm = fade margin

Assuming our path is in Ohio, then a = 1, b = 0.25, and U will equal 0.353 second per year. An outage time of 32 seconds is considered normal for most medium-length commercial paths. Notice that if we increase the frequency, the outage time goes up proportionately; but if we increase the distance, the outage time goes up by the cube of the increase.

We can get very technical about usability, or we can use some good rule-of-thumb standards. Let us define the 12 dB SINAD point as the location where the

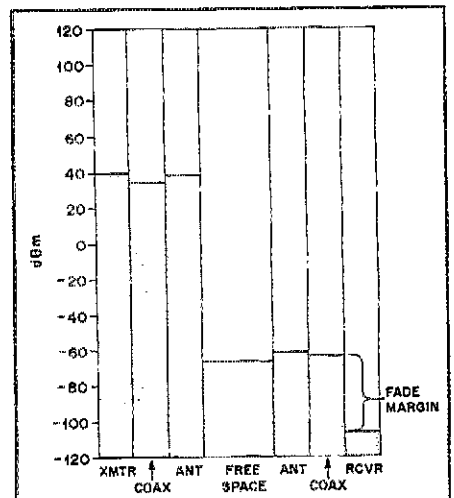

Fig 5—Graphic representation of signal-level changes for the text example, your transmitter to a nearby ATV repeater. The complete signal route is shown, including antenna gains and transmission-line losses at each end of the path. The fade margin at the repeater receiver input is 39.8 dB.

carrier is 10 dB greater than the noise. If we lower the signal below this point, the noise rises abruptly to a high level. But if we increase the signal at this point, the noise decreases 1 dB for every 1 dB increase in received signal level. This tells us that our signal-to-noise ratio (SNR) is 10 dB at the SINAD point, and increases by 2 dB for every dB in received signal level above that point. Since our fade margin was the difference between the received signal level and the 12 dB SINAD point, all we have to do is double it and add 10 dB to get the signal-to-noise ratio.

From Table 3, we see that for broadcast video quality, a 50 dB signal-to-noise ratio is required. Our signal-to-noise ratio is $39.8 \times 2 + 10 = 89.6$ dB, so we could cut our received signal level by $(89.6 - 50)/2 = 19.8$ dB and still have a broadcast-quality signal. This is accomplished by changing the gains and losses in our RF path. In this case, we could reduce our transmitter level by 19.8 dB, from 40 dBm to 20.2 dBm (105 mW). This power reduction is not free, however. We have to pay for it in reliability. Our fade margin, which was 39.8 dB, is now 20 dB. Our outage time has risen to 32 seconds per year, which is where we wanted it.

Table 3

Relationships Between Signal Quality and Signal-To-Noise Ratio for Various Modes of Operation

Video Mode (4.5 MHz AM)	*SNR, dB*
Broadcast quality	50
No snow	45
Barely perceptible snow	35
Nonobjectionable snow	29
Objectionable snow	25
Voice Mode (5 kHz FM)	*SNR, dB*
Broadcast quality	40
No white noise	30
Some white noise	25
Barely copyable	10
FSK Mode (Bandwidth ≃ Bit Rate)	*SNR, dB*
1 in 100 bit error rate	12.1
1 in 1000 bit error rate	14.2
1 in 10,000 bit error rate	15.5
1 in 100,000 bit error rate	16.5
1 in 1,000,000 bit error rate	17.7
1 in 10,000,000 bit error rate	18.0

I might emphasize at this point that fading is a continuous process. Shallow fades of a few dB will occur frequently whereas fades deep enough to squelch the receiver will occur only occasionally. That is why the broadcast SNR levels are so high. They allow room for the frequent shallow fades without degrading the signal quality. Allowing a 10 dB margin in your SNR will cover 50% of the fades likely to be encountered. This level of fading will not be exceeded for more than 20% of the worst month of the year.

Now we know how to plan a reliable radio path with sufficient received signal level, using a minimum of transmitter power and antenna height. This might seem like a lot of work at first, but, it boils down to three straightforward steps:

1) Determine how much SNR and reliability you want.

2) Lay out your path and calculate the gains and losses involved.

3) Sum the gains, losses and desired received signal level. This gives you the required transmitter power.

Once you have gone through the procedure, it becomes easy. The reward is avoiding the disappointment of connecting up a system only to find that the signal is unusable.

Homemade Circuit Boards . . .

(continued from page 16)

The bath temperature may be set and maintained at, say 100°F by placing the etching tank on an electric food warmer or hot plate. The operating voltage of the hot plate is controlled by means of a variable transformer such as a Variac® or Powerstat® . Fig 5 shows the method I use. The aquarium aerator shown in Fig 5 keeps the etchant moving and prevents the oxidized copper from remaining on the copper beneath it during the etching process. The agitation decreases the etching time.

The chemical bath should be fresh for best results. Used etchant will remove the copper very slowly, or not at all. Ferric chloride becomes very dark (almost black) when exhausted. I find that eight ounces of etchant is good for three or four 3- × 3-inch PC boards, or a total of 30 square inches of board. How quickly the etchant is exhausted depends upon the thickness of the copper and the amount of copper being removed from each board. Etching time also depends on the copper thickness. Boards made to military specifications have thick copper, whereas commercial-quality board, such as Radio Shack sells, has rather thin copper.

The etching tank must be made of glass or heat-resistant plastic. A Pyrex® bowl is good, as are heavy-duty polyethylene food containers. The boards being etched should hang vertically in the bath, as shown in Fig 5. The bottom of the PC board is suspended an inch or more above the bottom of the tank. (I recommend this because the residue from the etched copper collects near the bottom of the bath.) I drill a small hole in the upper end of the PC board, then suspend it in the etchant with a string or nonmetallic cord. A piece of dowel rod laid across the open end of the tank serves as a support for the PC board and its string.

Boards with thin copper (in fresh etchant) will be finished in 15 to 30 minutes at a bath temperature of 100°F. Heavier circuit board material may take up to 45 minutes for complete copper removal.

Finishing Touches

The etched board should be rinsed thoroughly with clear, warm water. Chemical residues discolor the copper. Always wear rubber gloves when handling etchants, and avoid getting them into contact with your skin, mouth and eyes. Caution: Exhausted etchant fluid should be stored in plastic containers until it can be disposed of properly. Never pour the etchant down the drain, and don't pour it on the ground. Take it to a licensed waste-disposal facility and indicate to the operator that the material is hazardous. Treat your etchants as you would any toxic waste.

You may finish your etched circuit board with a coating of tin. The tin plating will help retard tarnishing, and it will cause the solder to flow easily. Tin-plating solution may be purchased from Kepro Corp. The clean etched circuit board is immersed in room-temperature plating solution for 15 to 30 minutes, after which the board copper will be tin colored and shiny. Rinse the plating solution from the board with clean, warm water. The solution may be reused until it becomes exhausted, at which time the plating action will cease.

Copper that has not been plated may be protected from corrosion by coating the foil side of the assembled board with clear spray lacquer or polyurethane varnish. Remove all solder resin from the joints before applying the protective coating.

In Closing

I trust you have gleaned some short-cut information from this article. I have tried to reflect my practical experiences in making circuit boards the simple way. There is no need to fear the enjoyable task of making your own PC boards. Do it! You'll be glad you did.

Notes

[1]Kepro Circuit Systems, 630 Axminster Dr, Fenton, MO 63026, tel 314-343-1630. Catalog available.

[2]Meadowlake Corp, 25 Blanchard Dr, Northport, NY 11768, tel 516-757-3385.

A UHF Amplifier—from Scratch

Combine PC-board material, transistors and glue—what do you get? Two watts in and 45 watts out at 435 MHz!

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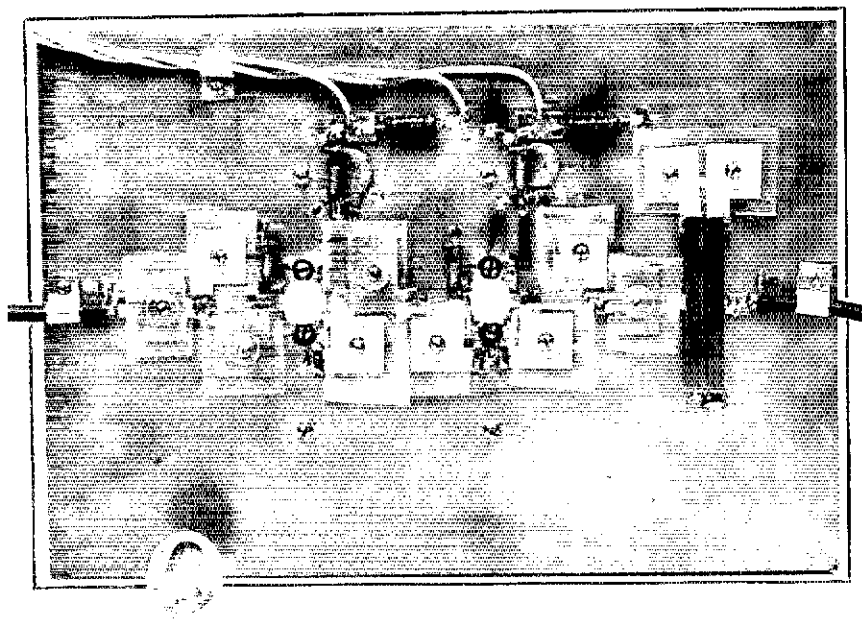


Most UHF RF equipment designs involve undefined reactance. For example, the self-inductance of a variable capacitor, or simply the method of attaching a 50-ohm cable to the circuit may constitute reactance that is critical to the operation of the circuit. The result is that complete success in duplicating a circuit is not likely unless the components and layout are exactly the same as in the original. This is nearly always a limiting factor for the do-it-yourselfer wanting to duplicate a project. This class-C UHF amplifier project uses homemade components that anyone can assemble. Tests show that their use has resulted in little or no compromise in the performance of the amplifier over a design using far more expensive commercial parts. My amplifier shows more than 45 W output with less than 2 W input at 435 MHz. The output stage efficiency is approximately 60%, and includes a double-tuned filter for improved spectral purity.

The key to this design is the glue-down stripline technique I have used in many other UHF projects.[1] This method permits easy modification of stripline parameters for optimizing circuitry. Striplines are cut from double-sided, glass-epoxy PC board having the same dimensions that you would choose using the etched-PC-board method. One side of the stripline is smeared with glue (Radio Shack all-purpose adhesive, 64-2307) and firmly pressed against the common base PC board. Parts can be soldered to the stripline immediately

[1]Notes appear on page 27.

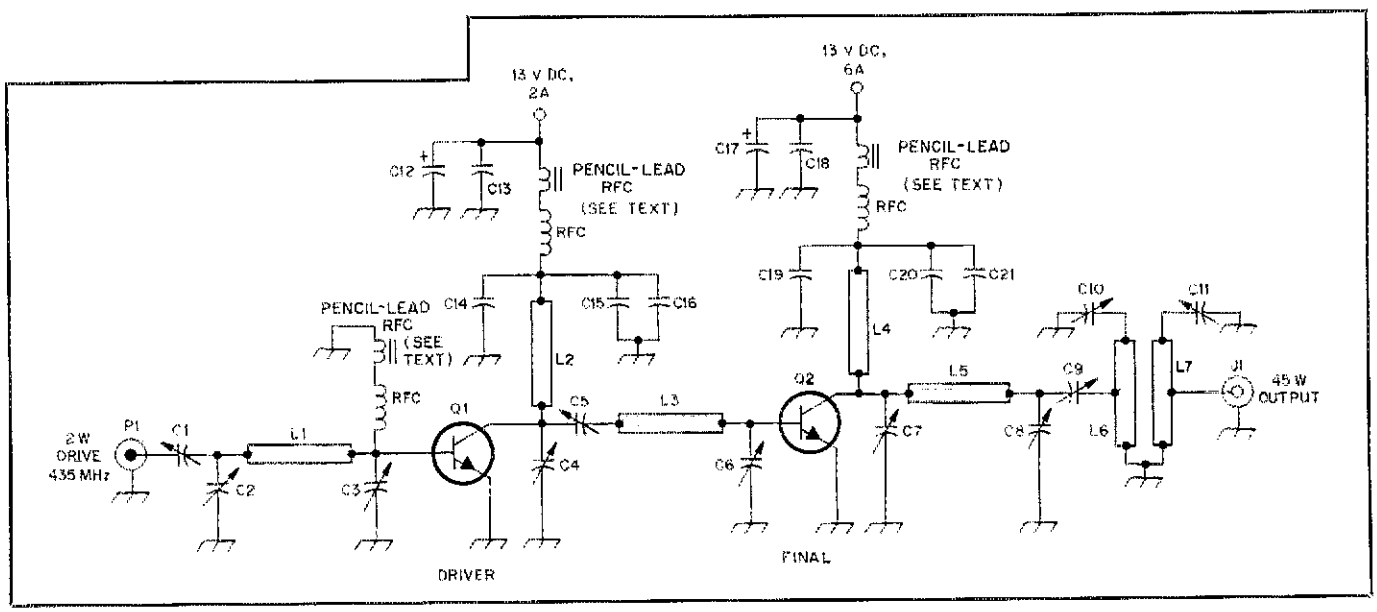


Fig 1—Schematic of the 435-MHz 45-W amplifier.

C1-C11—Homemade capacitors; see text and Fig 2 for details.
C12, C17—4.7-μF, 35-V electrolytic.
C13, 15, 16, 18, 20, 21—0.001-μF, 50-V disk ceramic.
C14, 19—0.1-μF, 50-V disk ceramic.
J1—Female BNC connector.
L1-L5—Glue-down striplines; see text and Fig 3 for details.
L6, L7—Air-gap striplines; see text and Fig 4 for details.
P1—Male BNC connector.
Q1—MRF641.
Q2—MRF646.
RFC—10 turns, no. 26 enameled copper, air-wound, 3/16-in diameter.

(without waiting for the glue to dry). No dc connection is required between the glue-line foils, and changes can be made within minutes by lifting the glue-down stripline with a knife and replacing it with one having altered dimensions. This project gives another example of how stripline parameters can be varied to optimize a circuit: homemade variable capacitors.

Circuit Details

See Fig 1. The two-stage amplifier uses an MRF641 (driver) and an MRF646 (final).[2] They were chosen primarily because of their availability in the surplus market. These are controlled-Q devices with a combined minimum gain of 12.6 dB. Although the output stage is rated at 45 W, typical saturated output with a 13.6-V collector supply is about 60 W (including drive power).

The home-brew compression-type variable capacitors, shown in Fig 2, dictated the overall design. I made them as small as possible (to minimize self-inductance), but kept them large enough to provide the necessary capacitance. The nominal 5/8-inch-square compression plate results in a maximum capacitance of about 10 pF. The material used for the capacitor plates is 0.031-inch-thick Reynolds sheet aluminum, which is available at most hardware and home-supply stores. [Hobby store sheet brass works well in this application, is also commonly available, and is far easier to solder; it is a good alternative to aluminum—Ed.] The capacitor dielectric material is 2.7-mil polyethylene from a Dow Ziploc® heavy-duty freezer bag. Although I have tested this dielectric at a much higher voltage than it is subjected to in this application (at a high-impedance point in a vacuum-tube VHF amplifier), double thickness is used as a safeguard. The insulator between the adjustment screw and compression plate is made from plastic polymer. Most clear plastics used for miscellaneous household applications are of this type. I use plastic from a box used in packaging a tube of Grumbacher acrylic artists paint. Glass-epoxy insulation will work also, but at the higher-voltage applications (especially at C10 and C11) there will be some loss and component heating.

Once I settled on the capacitor configuration, the input and output stripline characteristics were determined experimentally for optimum matching to Q1 and Q2. The related glue-down stripline and pad details are shown in Fig 3. The L2 L4 1/8-inch-wide striplines act as RF chokes, making the inductance associated with the subsequent disc-ceramic capacitors uncritical. The pads include a number of the capacitor stators (C1, C4, C5, C6, C7 and C9). Foils which contact stator-adjustment screws are reamed out to approximately 1/8-inch diameter to isolate the no. 2-56 screw from the stator. I did this with a large drill (3/8-inch). Screw contact with the bottom

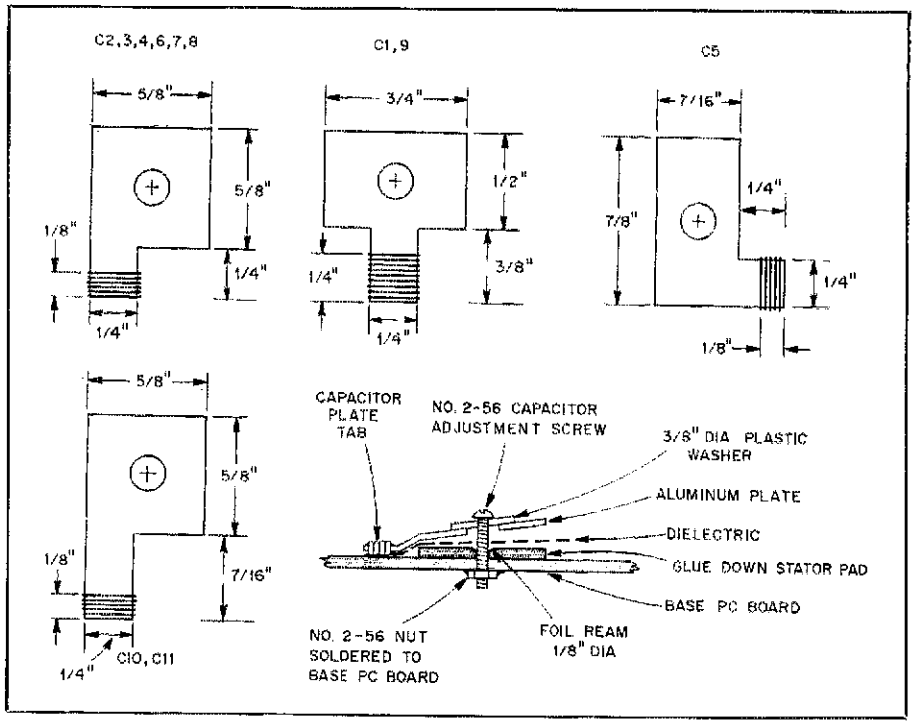


Fig 2—Variable-capacitor construction details. The "rotor" plates are made from 0.031-inch Reynolds aluminum sheet stock and polished with 320-grit sandpaper to ensure that no burrs are left that may puncture the dielectric material. Plate center holes are 3/16-inch diameter. Connections are made to the capacitors by means of no. 26 tinned copper wire, tightly wrapped (and crimped in a vise) around the tab on the capacitor and soldered to the appropriate circuit board connection. Make these connections carefully to ensure good electrical contact. See text for details on the dielectric and washer materials.

foil may also cause adjustment irregularities, so the foil was reamed appropriately. The stator plates must be completely deburred to prevent puncturing the plastic-bag dielectric.

The amplifier output is coupled through C9 to a 1:1 inductively coupled, double-tuned filter. This 50-ohm filter consists of two striplines that are mounted parallel to each other and close together above the base PC board, as shown in Fig 4. Their close positioning establishes the necessary mutual coupling. Each line is tuned to resonance with a variable capacitor.

As indicated in Fig 1, dc-supply decoupling is identical for both stages. The 0.1-μF disk capacitors eliminate a bothersome low-frequency instability mode. RF chokes following these capacitors include two-turn sections with pencil-lead cores to minimize the possibility of parasitics. The 4.7-μF capacitors eliminate low-frequency power-supply instability problems.

Assembly

The transistor-lead configurations are slightly modified to accommodate the glue-down striplines. Both the base and collector leads are bent up into an S shape so that the lead will overlap the stripline by approximately 1/16 inch when the transistor and stripline are mounted flush with the base PC board. The leads are only 0.005-inch thick and can be bent easily with long-nose pliers. Care must be taken to minimize stress at the lead-ceramic junctions. Also, 3/32 inch of each emitter lead must be cut off with scissors to allow room for the glue-down pads.

Details of the mounting arrangement are shown in Fig 5. My transistor mounting method was dictated by the dimensions of an old 1/8-inch-thick aluminum panel (with many miscellaneous holes), which I pressed into service as a heat sink. First, I mounted each transistor on separate aluminum sub-bases. I then fastened the sub-bases to the heat sink. Thermally conductive compound is used between the transistors and the sub-bases and between the sub-bases and the heat sink. This arrangement permits removal of the heat sink without disturbing the transistor mountings when I need access to the bottom PC-board foil. Note that the base PC board cutout includes notches at the base and collector leads of the transistors to prevent shorting to the common foil.

Detailed assembly like that shown in Fig 6 is easy once the transistors are mounted. Simply smear glue on the pads and fit them into position. Start by positioning L1, followed by the C1 stator, then C1, C2 and C3. Drill holes in the base PC board for the no. 2-56 capacitor-adjustment screws as you go along. At the same time, solder the no. 2-56 nuts on the reverse side (using a screw to hold them in position). Bend the capacitor tabs to make

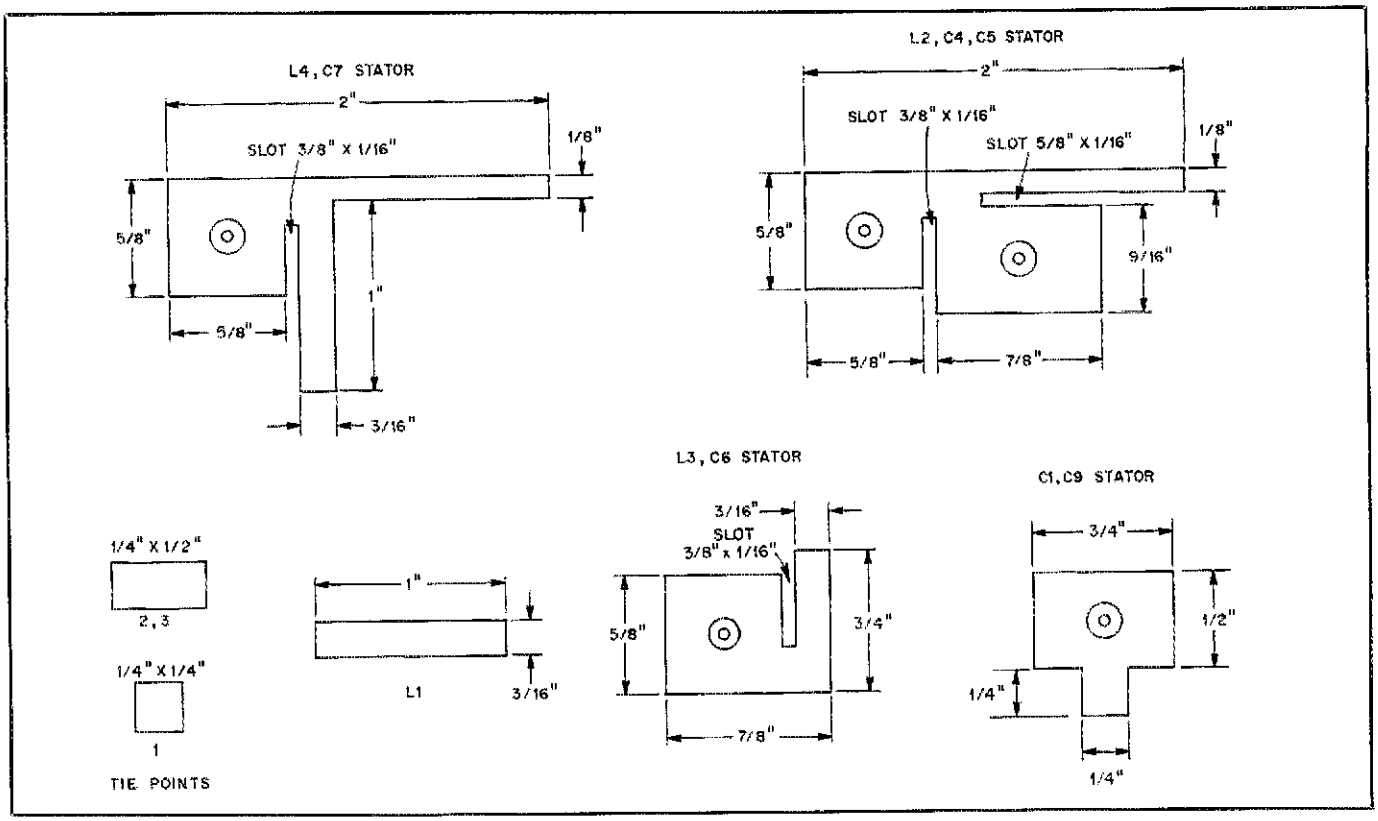


Fig 3—Glue-down stator pad construction details. Slots are cut with a hacksaw and then polished with a pattern file. The material is 0.062-inch-thick double-sided glass-epoxy circuit board material.[6] After cutting and filing, the pads must be polished with fine steel wool to remove any burrs.

certain the plates will be flush with the stator, inserting the capacitor dielectric as the final step. Make certain the dielectric has been pushed in between the capacitor plates as far as possible (maximum safety margin), and use an awl to puncture the dielectric at the adjustment-screw position. The adjustment screw can then be easily started through the dielectric.

Operation

UHF transistors are great devices, but they can be damaged permanently with just one voltage transient. For example, an accidental short by a probe during a troubleshooting exercise, or the discharge of a probe capacitor at the transistor's base lead can be disastrous. Another common problem is instability that causes self-oscillation and excessive collector voltage (no instability modes are evident in the amplifier described here). These possible failure modes can be avoided by limiting the collector supply to 5 V (or less) during tune-up, as practically all instability modes will be evident at this lower potential (particularly if the input drive is varied over a wide range). Following alignment at 5 V, it is surprising how little readjustment is required when the collector potential is increased to 13 V. (If you can't reduce your power supply voltage, you may want to use a 2N3055 as a pass transistor, driving it with an LM317T regulator [Radio Shack 276-2041 and 276-1778, respectively].) This low-voltage test procedure is mentioned in Motorola Application Note AN-548A.[3]

Initial Tune-Up

The dummy load/power-measuring assembly and narrow-band peak detector pick-off assembly used in tune-up are the same as the ones that I used with my 15-W transmitter.[4] The dummy load consists of ten ½-W resistors connected in parallel and arranged in a circle to minimize self-inductance. Power measurements were made by calibrating dummy-load

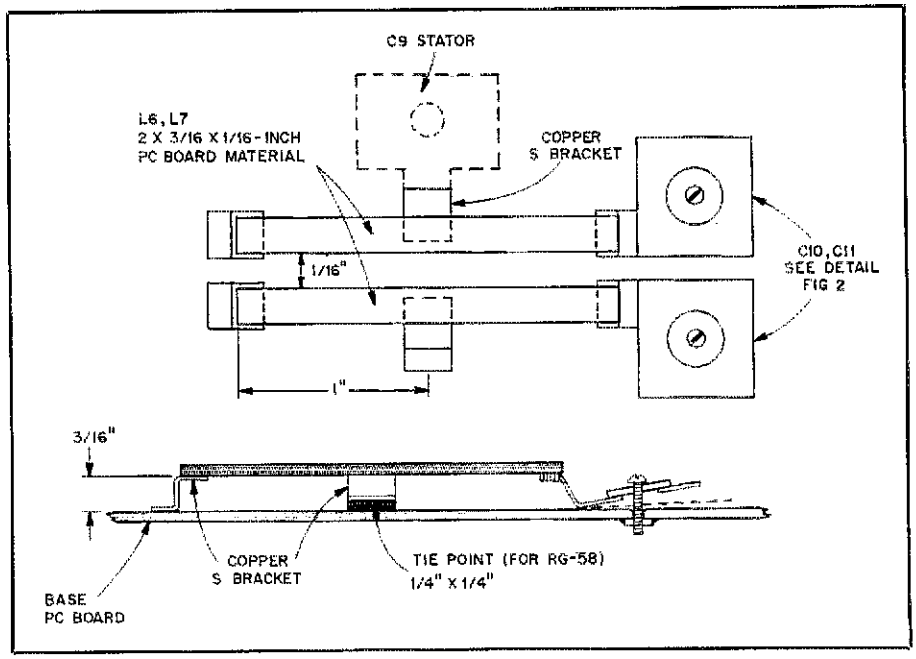


Fig 4—Construction details of the double-tuned output filter. The assembly is supported by copper brackets and parts of the variable capacitors.

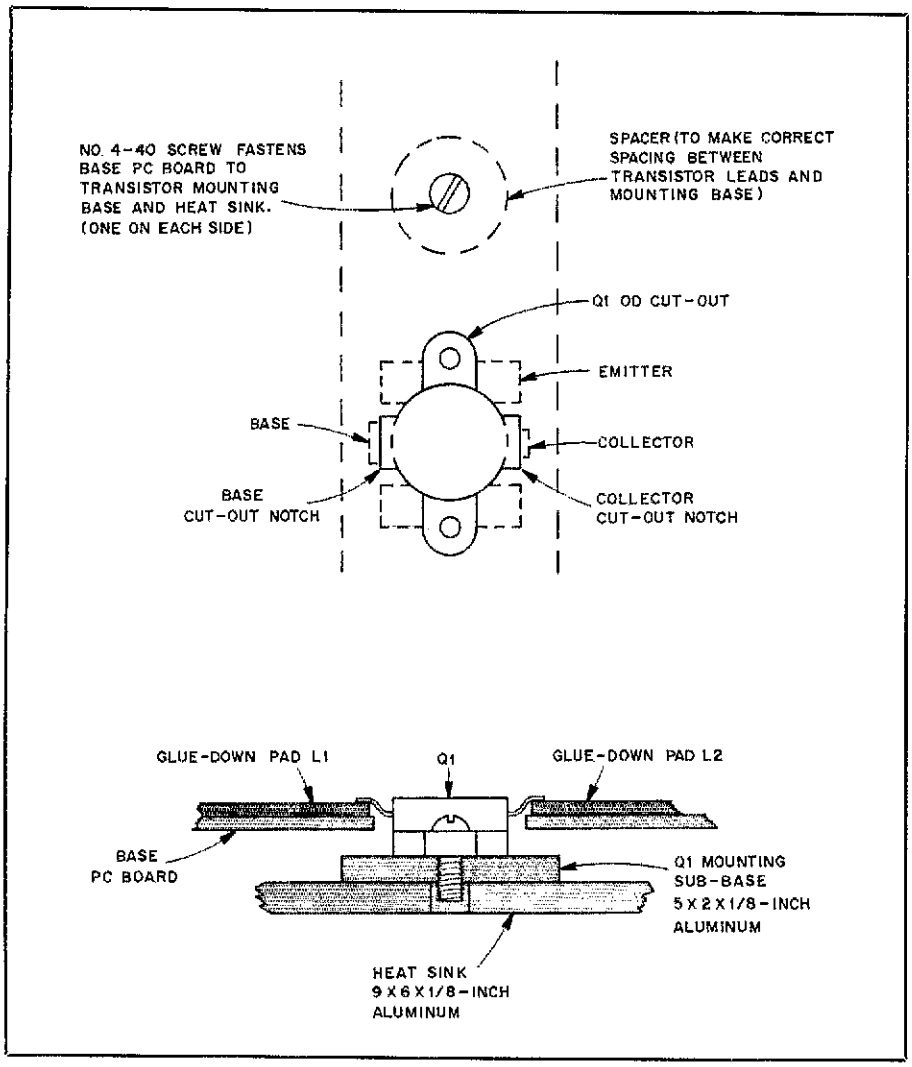


Fig 5—Pictorial of transistor mounting method. The same scheme is used for both the driver and final transistors.

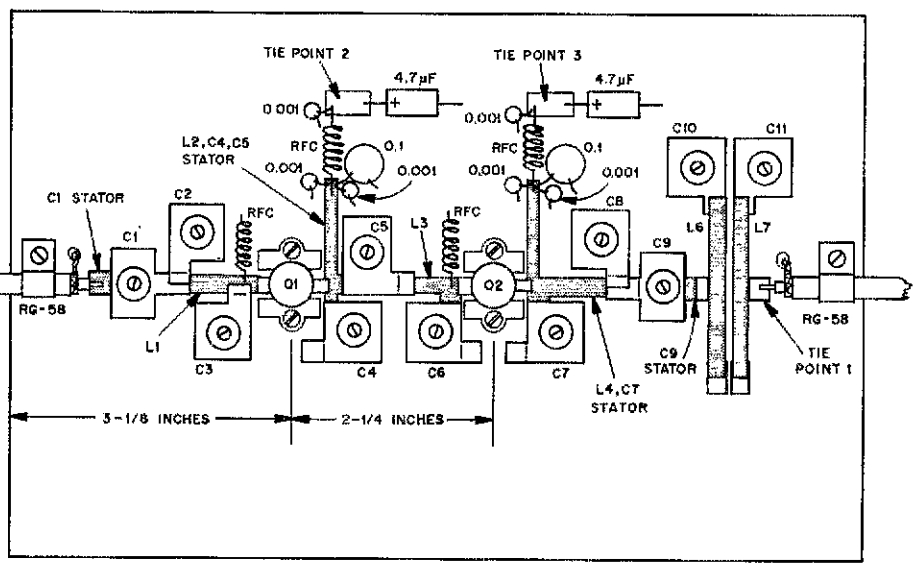


Fig 6—Circuit board layout of the completed amplifier. Begin construction by measuring the center-to-center distance from Q1 to Q2 and then mount the transistors, working away from them as you mount the other components. Use great care when mounting and soldering the transistors into the circuit to avoid damaging them. The PC board measures 9½ in. × 6 in., and is made from double-sided, glass-epoxy material (Meshna PCB28—see note 1).

temperature rise with a dc input (ambient air-temperature conditions, no forced-air cooling). This information is then compared to the temperature rise of the dummy load resulting from the RF output of the amplifier. The "thermistor" used for measuring the temperature rise is a 1N34A (reading the reverse resistance).

Under key-down conditions during alignment, I place a blower at the chassis end to assist the limited heat-sink capabilities of the amplifier. Also, the dummy load requires forced-air cooling, as it becomes very hot in about two minutes under key-down conditions.

Miscellaneous lengths of RG-8/M and RG-58 were used as attenuators to increase power measurement capability of this system.[5] In testing the 45-W amplifier, I used a total cable attenuation of 6.4 dB. This increases the power-measurement capability by 4.4 times.

With a 5-V collector supply and 2 W of drive, first tune the input capacitors for maximum Q1 collector current, then tune the remaining capacitors for maximum power output. The output should be about 8 W. Increase the collector supply to 13 V; minor readjustment will probably be required. My final measurements showed an output of 48 W.

Summary

This is a well-behaved amplifier. After completing an experimental version on the breadboard, I built a new assembly using the data in this article. Alignment of this final model was completed without any problems, and operation is flawless. The glue-down stripline technique is very reliable in this application, and is simple to use.

Notes

[1]J. Reed, "A Simple 435-MHz Transmitter," *QST*, May 1985, pp 14-18, 45.

[2]These transistors are available from RF Parts Company, 1320-16 Grand Ave, San Marcos, CA 92069, tel 619-744-0728.

[3]This note is reproduced in *Motorola RF Device Data* (fourth edition, first printing, 1986) on pages 6-61 through 6-65. This book is available from Motorola Literature Distribution, PO Box 20912, Phoenix, AZ 85036, tel 602-994-6561. Cost is $4.75 (plus 15 percent of the total for shipping).

[4]See note 1.

[5]My 435-MHz measurements indicated that the RG-8/M I used has an attenuation of 9.0 dB per 100 feet (specified as 7.5 dB per 100 feet at 400 MHz); the RG-58 has 15.3 dB per 100 feet (specified as 12.0 dB per 100 feet at 400 MHz).

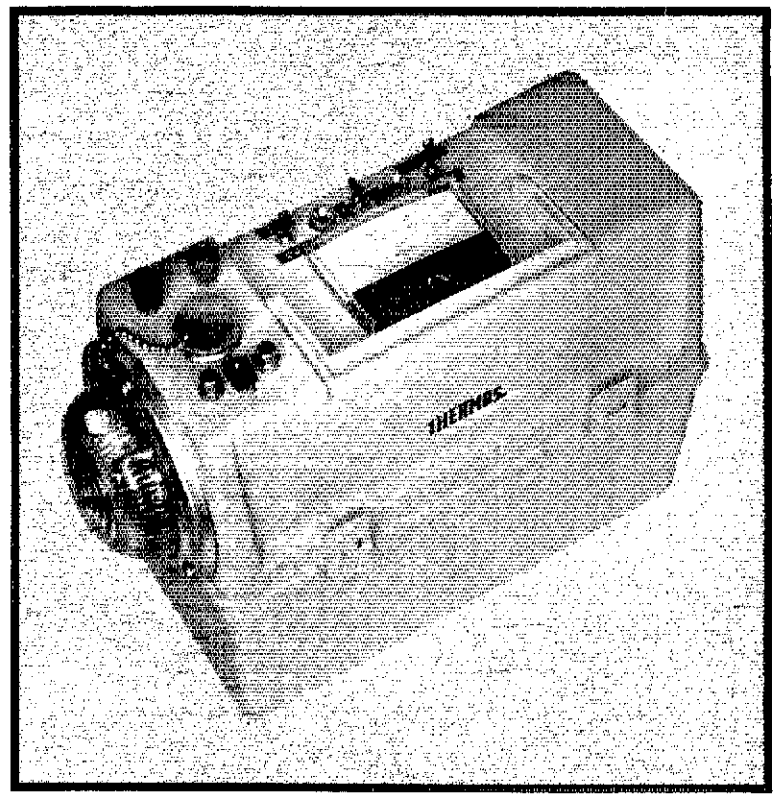
[6]Available from John J. Meshna, Jr, Inc, 19 Allerton St, Lynn, MA 01904, tel 617-595-2275.

John Reed was licensed as W6IOJ in 1933. His first QST article, published in 1942, was "Practical Microwave Oscillators." From 1942 to 1946, John worked at the MIT Radiation Laboratory as an Electrical Engineer with the Radar Beacon Group. John worked as an Electronics Engineer (Group Head) with the Air Force Cambridge Research Laboratory, where his work included upper-air research measurements using the V-2 rocket at the White Sands Proving Ground. In 1956, John went to work as a Program Manager at the Santa Barbara Research Center (subsidiary of Hughes Aircraft Co), where he was involved with telescope development for the Synchronous Meteorological Satellite (now known as the GOES program). John was responsible for nine patents between 1946 and 1980. He is currently involved with encouraging do-it-yourself activities in Amateur Radio, through 12 articles he has authored on the subject since 1982.

The Lunchbox

This lunch packs a punch.

By George Murphy, VE3ERP
ARRL Contributing Editor
63 Second St, Apt 1
Orillia, ON L3V 4B3, Canada



Do you need a portable 12-V dc power supply that can operate either independent of, or in conjunction with, a 117-V ac wall plug? Of course you do—and the Lunchbox is it! It can power your QRP rig, your hand-held transceiver, your mobile rig, your 12-V razor, and anything else that eats 12-V at not too many amps. It can also provide emergency lighting when you need it.

Over the years I have done a fair amount of portable operation, and have never found anything simpler or more efficient than a battery as a source of power for my portable rigs. There were only three problems—car batteries are uncomfortably heavy, they drain quickly when used with a tube-type transmitter, and there is a potential explosion hazard from the inflammable fumes emitted when they are being charged. When I finally graduated to a solid-state rig, I solved the first two problems by using a motorcycle battery that only weighed a few pounds, had sufficient capacity for solid state rigs, and cost me a whole lot less than a standard car battery.

Then modern technology came up with the lead-acid gelled-electrolyte storage battery, which weighs less and costs less than a motorcycle battery, doesn't give off noxious vapors when being charged, doesn't spill acid if it gets knocked over, and has far more capacity per pound and per dollar than a NiCd battery. Its only minor limitation is that while a lead-acid battery can be recharged with almost anything capable of forcing volts into it, a gel

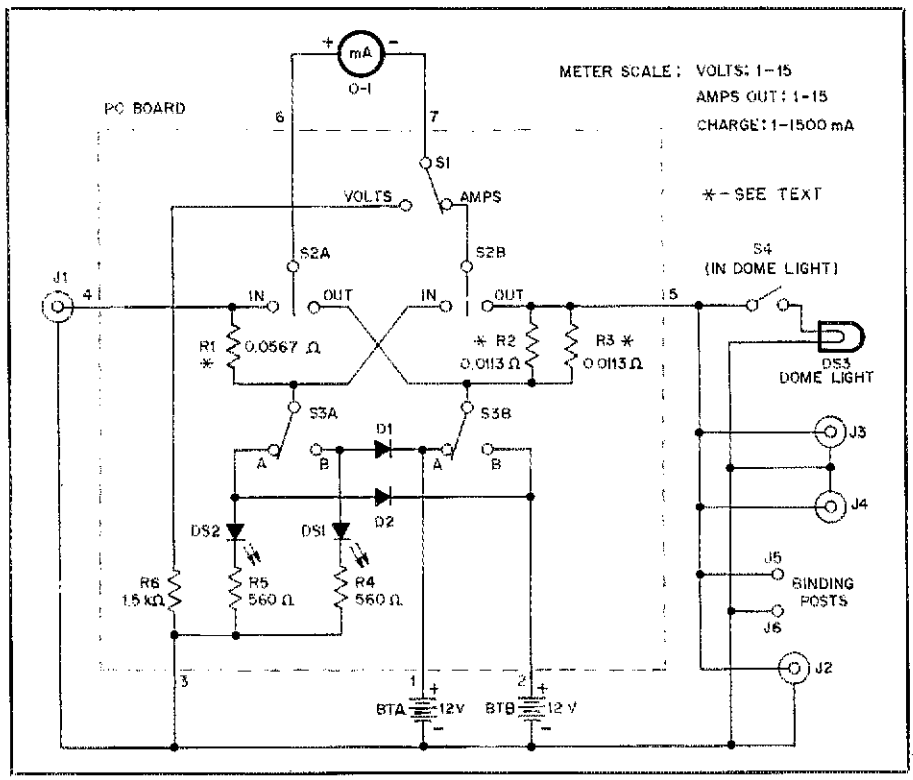


Fig 1—Lunchbox schematic diagram. Numbers in parentheses in the parts list are Radio Shack.
D1, D2—1N4001 diode (276-1101).
DS1, DS2—LED in chrome-plated holder (276-068).
J1—Power connector (247-1565).
M1—0-1 mA, 85-ohm internal resistance meter, 1-15 scale (270-1754).
R1—41.3 inches no. 22 solid hookup wire (see text).
R2, R3—20.9 inches no. 18 solid hookup wire (see text).
R4, R5—560-ohm, ¼-W resistor.
R6—1500-ohm resistor (comes with M1).
S1—SPST switch (275-635)
S2—DPDT spring return to center off switch (275-637)
S3—DPDT switch (275-636).
Miscellaneous
Project box (270-221).
DS3—Dome light from the family Cadillac or whatever.
J2-J4, incl—You're on your own.
J5, J6—Binding posts (274-661).

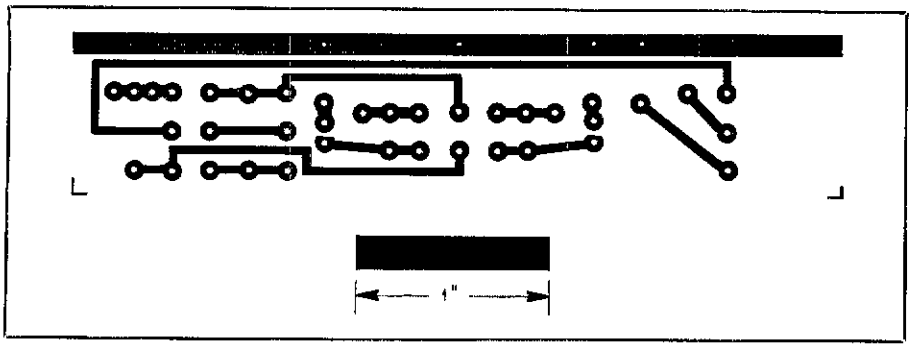


Fig 2—Circuit-board etching pattern for the Lunchbox. The pattern is shown full-size from the foil side of the board. Black areas are unetched copper foil.

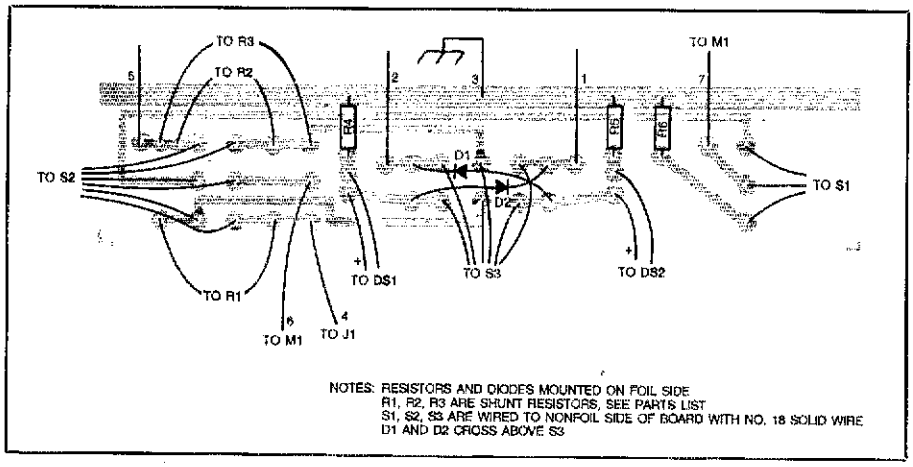


Fig 3—Parts-placement guide for the Lunchbox. Parts are mounted on the foil side of the PC board; the shaded area represents the copper pattern.

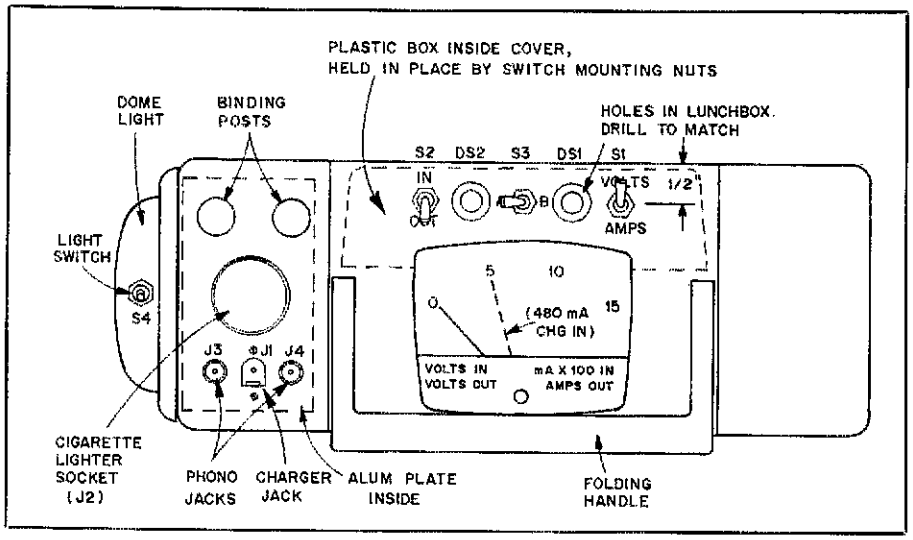


Fig 4—Layout of the Lunchbox lid, showing component placement.

battery requires a constant voltage/constant current charger. If you want to build such a charger then read the article by Michael R. Wright.[1] Otherwise, a source for an inexpensive, but adequate, charger will be shown later.

The Lunchbox consists of two 3-ampere-hour (3 Ah) gel batteries inside a plastic lunchbox with a meter for monitoring voltage and current, storage space to carry a hand-held rig and/or electric razor and/or a ham-on-rye-hold-the-pickles. It also doubles as a portable lantern to check your sandwich for pickles in the dark.

[1]Notes appear on page 31.

Operation

This is a real handy device. If your battery runs down, you always have a spare. If you are near an ac outlet, you can charge one battery while using the other. The charging rate is about 450 mA, which works out to about 2.2 hours per Ah. So, if your average load does not exceed this figure you can go on forever by switching batteries whenever the one you are using gets low.

The whole system is controlled by three switches. One switch selects either battery A or battery B. In position A, battery A is connected to the output jacks, and battery B is connected to the external charger. In position B, battery A gets charged and battery B carries the load. There are two meter switches—one selects either a voltage or current reading on the meter, and the other selects that reading from either the charger circuit (IN) or the battery currently in use (OUT).

Circuit Description

Fig 1 shows the basic circuit. Feel free to revamp it to suit your own needs. A and B are the 12-V gel batteries, and M1 is a Radio Shack panel-mount dc meter. R6 is the resistor that comes with the meter. S1 is the volts/amperes selector switch, and S2 selects either the charger or the battery in use for meter readings. R1, R2 and R3 are meter shunts. Two shunt resistors are used in parallel in the output circuit to split heavy load currents. LEDs DS1 and DS2 let you know which battery is being charged. D1 and D2 prevent the LEDs from being lit by the batteries when they aren't being charged.

J1 is a jack to match the output plug on your battery charger. J2 is an automotive-type cigarette-lighter socket into which you can plug any 12-V dc device, such as your mobile rig, electric razor, small fan or one of those baby-bottle warmers that are so handy on Field Day for warming up a tot of toddy. J3, J4 and as many other jacks as you care to add are 12-V dc outputs to suit the plugs of whatever power cords you will be using to plug things in. A pair of universal binding posts is also included in the output hardware.

Circuit Board

Fig 2 is a full-size pattern for the circuit board, and Fig 3 shows placement of parts on the foil side of the board.[2] I used Radio Shack wire for shunt resistors R1, R2 and R3, and found the meter readings were a little off. By dexterous application of a micrometer to the wire, I discovered the Radio Shack wire diameters were not strictly in accordance with those shown in the wire tables in the *ARRL Handbook*. It might be a good idea to cut these resistance

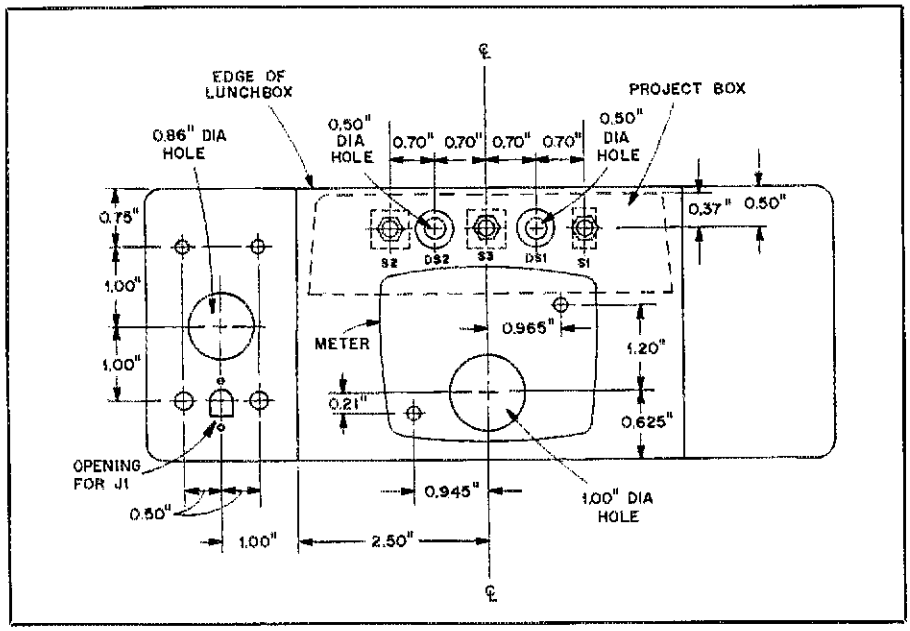


Fig 5—Hole pattern for the Lunchbox lid.

wires about 10% longer than specified, and trim 'em back later when you get a chance to compare the Lunchbox meter readings with a known accurate meter.

Wind the resistance wires into small coils or bundles so they will fit inside the box and mount all the components on the *foil* side of the circuit board, including the seven wires that go someplace else—make these wires about 12 inches long. D1 and D2 do a criss-cross act at S3, so mount them high enough off the board to provide room for a soldering iron to get at the S3 connections. Slip some spaghetti tubing (I use soda straws from Charlie's Diner) over the leads of D1 and D2 to prevent the criss-cross from becoming doublecrossed when you stuff everything into the project box.

Construction Notes

Plastic lunchboxes come in a variety of shapes and sizes, so the layout of your Lunchbox will depend on what kind of lunchbox you can find. Most of them are made of a soft plastic that is cut easily with an X-acto® knife. The switches and LEDs are mounted in one side of the project box inside the Lunchbox, and the electronic components are mounted on the circuit board, which is then suspended in space by short wires to the switches. Fig 4 shows the layout of all the bits and pieces in a Thermos® lunchbox, and Fig 5 gives all the dimensions for the holes in both the lunchbox lid and the project box inside.

Working space is a little cramped inside the lunchbox, so you can save yourself a lot of fussin' and cussin' by following this procedure:

Mount the meter and install the output hardware and light on the top and end surfaces of the lunchbox lid, backed up by an L-shaped sheet of scrap aluminum inside the lid, which acts as a common ground for all the output hardware. Mount the switches and LEDs in the project box. Don't scrunch down too hard on the switch mounting nuts—these will be removed during final assembly. Solder no.18 *solid* (not stranded) wires about 1 inch long to all the switch contacts and bend them so they all extend straight back from the switches. Now comes the tricky part. Starting at one end of the box, trim all the wires (including the LED leads) progressively shorter (not too short!), then thread the circuit board with the plain side facing the switches onto the wires one at a time until the board is about ½ inch behind the switches. If you didn't trim the wires as you were told, you will find yourself trying to thread a whole gang of needles at once—good luck! Solder all the leads to the board, and cut off all excess wire. Stuff the three long-wire shunt resistors into the box. Carve slots in the lip or cover of the box to let out the seven connecting wires. (Two go to the meter, and the other five go all over the place. See Fig 6.) Remove the switch mounting nuts, install the box in the cover of the Lunchbox, and secure it in place with the switch mounting nuts.

Run the connecting wiring as shown in Fig 6 and bundle it with garbage-bag ties or spiral wire-wrap, leaving enough slack to allow the lid to be opened and closed. Use flexible stranded wire, no. 18 or larger (lampcord will do nicely), and where wires cross the Lunchbox hinge, you can fasten

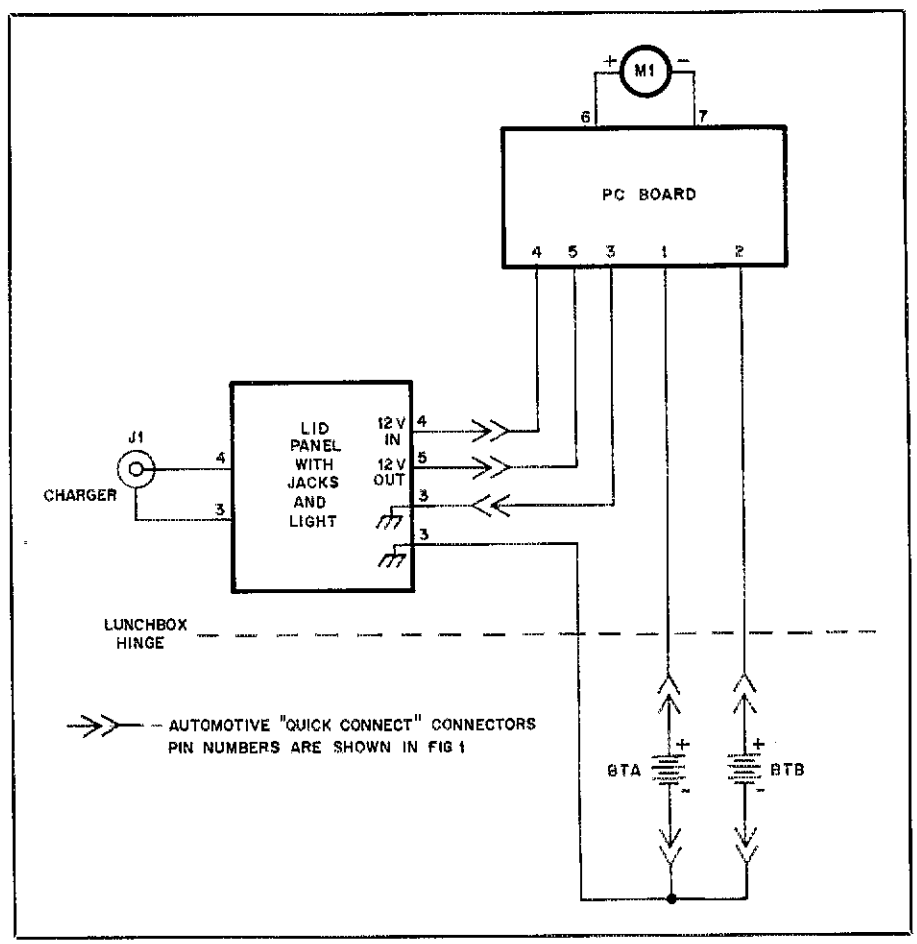


Fig 6—Interconnection wiring diagram.

them to the Lunchbox walls with transparent sticky tape. To protect the exposed wiring in the lid from whatever cargo you may transport in the Lunchbox, fashion some sort of heavy cardboard panel that can be attached to the wall of the project box with self-tapping sheet-metal screws.

You can let your creativity run rampant when it comes to the main body of the Lunchbox. Using scraps of thin wood (such as wall paneling), heavy cardboard or pieces cut from a corrugated carton, you can partition it off into spaces for the batteries, your hand-held rig and whatever else you can make room for.

Sources of Supply

I snatched my plastic lunchbox from a little kid whose mother now has to send him to school with enough money for a Big Mac. DS3 and J2 came from the local auto-supply emporium. The batteries and charger are from Dick Smith Electronics, Inc.[3] Everything else came from Radio Shack.

Conclusion

I built my Lunchbox primarily as a power supply for my QRP rig. When I go portable I use the space inside to pack a hand-held transceiver, cables for the QRP rig and whatever else I can cram in. I also take it along to ham gatherings because there is always someone who wants to sell me something but can't prove that it works because he "forgot" to bring a power supply. When I go on these safaris, my Lunchbox could also contain, would you believe, my lunch. If you would like to meet me, then next time you go to a gathering of hams just look for the one with a 2-m mobile rig slung over one shoulder, a "rubber duckie" stuck in his ear, and carrying a bright-orange Lunchbox.

Notes

[1]M. R. Knight, "Universal Battery Charger," *Radio-Electronics*, Jul 1986.

[2]Printed circuit boards may be obtained from Bill Kirby, VE3DJO, RR 1, Allliston, ON L0M 1A0, Canada.

[3]12-V, 3-Ah gel batteries (cat no. S-3320) and chargers (cat no. M-9521) are available from Dick Smith Electronics, Inc, PO Box 8021, Redwood City, CA 94063, tel 415-368-8844, and at all Dick Smith stores throughout Australasia.

We are trying to assemble an up-to-date biographical file on George Murphy. Those of you who follow this effort will be happy to learn that George has recently been elevated to the exalted position of ARRL Contributing Editor. While he is still not allowed to operate W1AW for fear of embarrassing us on the air, he has been given a key to the Executive Washroom and official ARRL Press Pass.—Ed.

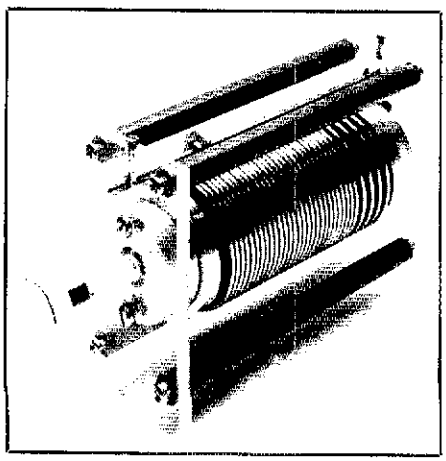
New Products

NEVADA COMMUNICATIONS "ROLLER COASTER" VARIABLE INDUCTORS

☐ Nevada Communications, of Great Britain, is offering the model RC 26 "Roller Coaster" variable inductor in the US. Designed by Ernie Quinnell, G4JEV, the unit is intended for use in high-power antenna matching networks and transmitter output stages.

The design features a unique roller suspension system that minimizes the often-encountered problem with used military-surplus roller inductors: contact bounce and poor contact between roller and moving coil. Losses in the coil are minimized by using silver-plated wire and a special RF transparent Tufnol former.

The Roller Coaster is designed to mount between Nevada Communications' 250 pF and 500 pF high-power air-variable capacitors (not shown) to provide a low-cost 1-kW antenna matching network covering 1.8 to 30 MHz. These capacitors are constructed of brass, ultra high-grade aluminum with gold anodizing and high-voltage acrylic end plates.



Specifications:

Power handling: 1 kW.
Inductance: 30 μH, max.
Size: 2¼ × 4¼ × 6¼ in.
Weight: 1.25 lb.

The Roller Coaster is manufactured in Great Britain, and distributed exclusively by Telecomms, 189 London Rd, North End, Portsmouth, Hants PO2 9AE, UK. Telex: 869107 Telcom G. Approximate price: Roller Coaster variable inductor, $33; capacitor prices not available at press time.—*Bruce O. Williams, WA6IVC*

PHASE IV SYSTEMS' SATELLITE AUTO-TRACKER

☐ The Satellite Auto-Tracker is an automatic antenna rotator controller designed to interface between the Commodore™ C64 and virtually all rotators. The Auto-Tracker can be installed between your C64 and your existing rotator control box in just one evening. A user-friendly, public-domain software package is included with the unit.

The Satellite Auto-Tracker will control both an AZimuth and an ELevation rotator to follow any object in earth orbit. Standard Keplerian elements (available from ARRL, NASA or AMSAT) are entered for each satellite with a simple edit menu. Multiple satellites, multiple ground stations, "quick look" and window stations are all supported.

Address all inquiries to: Chris Lott, Project Engineer, Commercial Products Division, Phase IV Systems, Inc, 3405 Triana Blvd SW, Huntsville, AL 35805-4695, tel 205-535-2100. List price, $169.95.—*Bruce O. Williams, WA6IVC*

QEX: THE ARRL EXPERIMENTERS' EXCHANGE AND AMSAT SATELLITE JOURNAL

Diversity reception with small antennas is an area generally unexplored by Amateur Radio operators. Outside of using two antennas, two receivers and a dual demodulator, the nature of fading of HF signals must be understood. To learn if effective communications can be sustained during marginal fading conditions with a small-dimensioned space diversity system, several tests were conducted. The results are convincing!

The July issue of *QEX* includes articles on:

- "A Simple and Effective Filter for the 10-GHz Band," by Glenn Elmore, N6GN
- "Experiments in Signal Improvement With Fractional-Wavelength Diversity Reception," by Douglas A. Kohl, WØTHM
- "Satellite Tracking Using A Single Axis," by John C. Reed, W6IOJ

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.

Strays

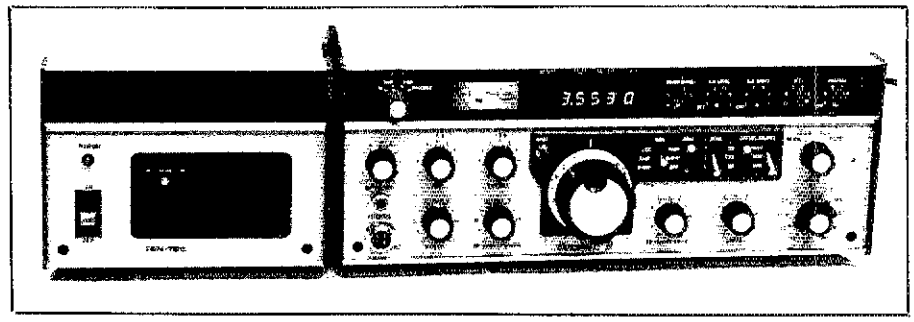
I would like to get in touch with ...

☐ anyone with a manual/schematic/parts list for a Hewlett-Packard DC VTVM, Model 412A, and for a Measurements Corp signal generator, Model 65. Jim Whittaker, KUØD, Rte 1, Box 76D, North Branch, MN 55056.

Product Review

Conducted By Bruce O. Williams, WA6IVC
Assistant Technical Editor

Ten-Tec Model 561 Corsair II HF Transceiver



The Corsair II is a 100% solid-state transceiver that covers the amateur bands from 1.8 MHz through 30 MHz, including the WARC bands, with about 40-kHz of overtravel on each band edge. The Corsair II's 30-m coverage begins at 10.0 MHz, allowing coverage of WWV. The rig contains 26 ICs, 94 transistors and 109 diodes (I didn't count the rest of the parts!) in 22 PC-board assemblies. It delivers a respectable 85 to 100 W of output (200 W input) on CW and SSB, and can also be used on RTTY and AMTOR. The Corsair II is designed mainly as a fixed-station rig, but it operates from 12-14 V dc so it can be used for portable and mobile operation. When I was offered the opportunity to write this Product Review on the Corsair II, I accepted gladly. I own a Ten-Tec Argosy I (serial no. 34!) and was anxious to get a look at its new "big brother."

The Corsair II has only 25 controls and switches. The front panel is *not* crowded, and the controls and switches are conveniently located. The KEYER SPEED, N.B. LEVEL, N.B. WIDTH, ALC and PROCESS controls have rather small knobs, and some of the other controls did not have a smooth feel, but they all operated without any problems. The transceiver is easy to use; its features are almost custom-tailored to my straightforward operating habits.

Features

The Corsair II features many of the extras that amateurs want, such as passband tuning (PBT), receive/transmit/transceive (RX/TX/TRX) offset, audio notch and bandpass filters, switch-selectable AGC and crystal filtering, a noise blanker, built-in keyer and speech processor. The six-digit display resolves frequency to 100 Hz, using yellow 0.3-inch LED numerals that can be easily seen in normal or dim lighting. Four front-panel LEDs indicate the status of the RF ATTENuator, OFFSET, speech PROCESSor, and ALC peaks. The ALC peak indicator is not as useful as a meter, but when used according to the operating instructions, it allows the transceiver to produce good-sounding SSB. The Corsair II's single meter is used as an S meter on receive, and is switch-selectable in transmit to show FORWARD and reflected (SWR) power, final transistor collector current (I_C) and the level of compression applied to the MIC input when the PROCESS control is on.

The tuning knob functions smoothly, at about 18 kHz per revolution. The entire 80-m band is covered in 27 turns of the knob. The frequency control in the Corsair II is a permeability-tuned oscillator (PTO), rather than the more common phase-locked loop. This results in better phase noise performance than is available from present synthesizer technology. The PTO is well constructed, and mechanically and thermally stable. The frequency display is *counter* based; it does not just display microprocessor commands, as is common in synthesized rigs. The two-switch OFFSET SELECT circuitry is versatile. One switch selects RX, TRX or TX offset and the second switch range selects (MAX, MIN or OFF). Because the Corsair II has a single PTO (no VFO A/B here!), split-frequency operation is limited to the TRX offset range (±4 kHz, typical). Fortunately, on CW, none of the rare and juicy DX stations that I called was listening more than 5 kHz up, so I was able to get in on the fun. I was not able to work some of the SSB stations that were using wider splits.

The Corsair II is not microprocessor controlled, so frequency memories and keypad frequency entry are not included. This might be a drawback for operators who are accustomed to using these features. I've made little use of memories on other transceivers I've operated, so I did not miss this particular feature on the Corsair II.

The rig's steel case is rugged, and has a snap-down bail stand. The speaker is located on the bottom of the cabinet, muffling the sound somewhat. The rig has an external speaker jack, however, allowing use of the front-facing speaker in the matching Model 260 power supply; this results in crisp audio. There is plenty of room on the Corsair II's rear panel for the addition of the inevitable modifications by tinkerers. The rear panel also contains two 12-V output jacks; these are useful for powering accessories.

A look inside the Corsair II reveals a well-constructed unit. Each circuit function is contained on a separate module, and the modules are interconnected with plug-in wires or cables using the same reliable push-on connectors that Ten-Tec has used for years. The connectors are numbered and keyed, so there is little likelihood of misconnection when they are unplugged and reconnected. Most of the modules are easily removed and replaced, so if you are technically inclined, you can do some of your own servicing.

The Receiver

A bandpass front end eliminates the need for front-panel preselector tuning. An optional high-pass filter may be installed if operation will be in a location that is subject to strong nearby AM-broadcast signals. A 2.4-kHz, 16-pole crystal ladder filter is supplied as standard equipment, and 1.8-kHz, 500-Hz and 250-Hz filters are available as options. Ten-Tec specifies the audio output of the Corsair as 1 W at 2% distortion.

Table 1 shows the results of receiver tests in the ARRL Lab. The receiver's minimum discernible signal (MDS) of −124 dBm on 20 m is adequate for HF operation, and the blocking dynamic range of 113 dB on 20 m is respectable. The RF GAIN/ATTN controls (really a single dual-function control) are useful in reducing interference from strong nearby stations. I used the rig for some afterhours operation at the ARRL HQ club station, W1INF, during the Phone Sweepstakes. At the same time, W1AW (just across the HQ parking lot and running over 1 kW on several bands simultaneously) was transmitting a CW bulletin. There are a few receiver "birdies" that caused me to hear W1AW at several places on the band, but in spite of the nearby multiband, multi-kW operation, most stations were heard quite well.

The Transmitter

Ten-Tec specifies the transmitter output at 85 to 100 W on all bands. The output-transistor heat sink is hefty, so it did not get too warm in casual QSOs, but the owner's manual warns that the sink may get quite hot if the transceiver is used in high-duty-cycle modes (ie, RTTY). The transmitter's broadband "no tune" circuitry allows easy band change. Ten-Tec states that the output transistors will not be damaged by "improper" antennas (high SWR), but for good efficiency Ten-Tec recommends that the SWR be 2:1 or less. The built-in SWR protection is accomplished mainly by a fast-acting overcurrent trip in the Model 260 power supply.

Ten-Tec specifies that all harmonic and spurious emissions are at least 45 dB below full output. Fig 1 shows the worst-case spectral display for full power output at 28.740 MHz. The Corsair II meets the manufacturer's specification at 102 W output. The owner's manual says that the transceiver may be operated at reduced power by decreasing the drive. On 28 MHz at 80-W output, the strongest spurious emissions were approximately 41 dB below full output, just

Table 1

Ten-Tec Model 561 Corsair II HF Transceiver, Serial No 58001721

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency range: 1.8 to 2.3, 3.5 to 4.0, 7.0 to 7.5, 10.0 to 10.5, 14.0 to 14.5, 18.0 to 18.5, 24.5 to 25.0, 28.0 to 30.0 MHz, plus 40-kHz overtravel at each band edge.	As specified.
Tuning rate: vernier, 18 kHz/rev.	As specified.
Frequency display: 6-digit, 0.3-in LED numerals.	As specified.
Frequency accuracy: ±100 Hz.	As specified.
Transmitter	*Transmitter Dynamic Testing*
RF power output: 85 to 100 W.	160 m, 92 W; 80 m, 93 W; 40 m, 97 W; 30 m, 97 W; 20 m, 97 W; 17 m, 99 W; 15 m, 101 W; 12 m, 101 W; 10 m, 102 W.
Microphone input: High or low impedance, 5-mV sensitivity.	As specified
Spurious signal and harmonic suppression: better than −45 dB relative to full output.	See Figs 1 and 2, and text
Third-order intermodulation distortion: Not specified	See Fig 3.
CW offset: 750 Hz.	Not measured.
CW keying waveform: Not specified.	Rise, 4.0 ms; fall, 2.5 ms; on delay, 3.0 ms; release delay 4.0 ms. See Fig 4.
Transmit/receive turnaround delay: 30 ms.	35 ms; see Fig 5.
Receiver	*Receiver Dynamic Testing*
Receiver sensitivity: Less than 0.25 μV for 10 dB signal + noise/noise	Minimum discernible signal (noise floor) (dBm) *80 m* *20 m* −127 −124
Receiver dynamic range: 95 dB.	Blocking dynamic range (dB) 117 Two-tone third-order intermodulation distortion dynamic range (dB) 84 80 Third-order input intercept (dBm) −1 −4
S-meter sensitivity (μV for S9 reading): 50.	160 m, 180; 80 m, 130; 40 m, 137; 30 m, 145; 20 m, 98; 17 m, 130; 15 m, 95; 12 m, 145; 10 m, 81.
Receiver audio output: 1 W into 8 ohms at 2% total harmonic distortion.	1.05 W.
RIT/XIT tuning range: Dual range, ±1.5 kHz and ±4.0 kHz.	As specified.
Power required: 12-14 V dc, 850 mA, receive; 18.5 A max, transmit.	Not measured.
Color: Two-tone gray.	
Dimensions: (HWD) 5¼ × 15 × 14 in.	
Weight: 14 lb.	

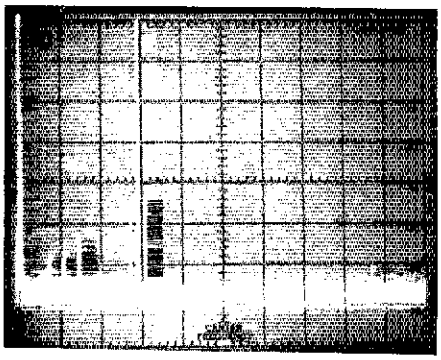


Fig 1—Worst-case spectral display of the Corsair II operating on the 10-m band. Vertical divisions are each 10 dB; horizontal divisions are each 10 MHz. Output power is approximately 102 W at a frequency of 28.740 MHz. All spurious emissions are at least 45 dB below peak fundamental output. The two taller pips on each side of the fundamental are mixing products, but are below the maximum level allowable under FCC regulations. The Corsair II complies with current FCC specifications for spectral purity at this power level.

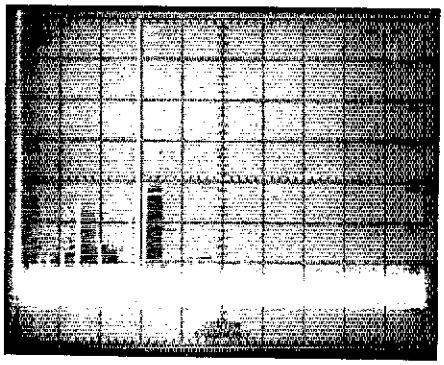


Fig 2—Spectral display of the Corsair II operating on the 10-m band at reduced power output. Vertical divisions are each 10 dB; horizontal divisions are each 10 MHz. Output power is approximately 80 W at a frequency of 28.740 MHz. The worst spurious emission is approximately 41 dB below peak fundamental output, meeting current FCC specifications.

meeting current FCC requirements (Fig 2). I did have some TVI problems (not unusual in my crowded residential area) that were eliminated with a low-pass filter.

CW Operation

My first love in radio is CW, so the Corsair II got a good workout in this mode. The transceiver is capable of full- or semi-break-in (QSK) operation. The full QSK works! PIN diodes are used to achieve fast TR switching (specified as 30 milliseconds). Other stations were able to break my CW transmissions with a single "dit," even if the stations were quite weak. The semi-QSK mode can be used if you don't like full QSK CW, but I really prefer full break-in, so I found the QSK a joy to use. The semi-QSK mode sounds smooth, with no receiver thumping. Transceive offset is normally fixed at 750 Hz. The Corsair II incorporates a SPOT front-panel push-button switch to zero beat a station easily. Amateurs with a poor sense of pitch (like me) will find this useful.

The optional 500-Hz filter was factory installed in the Product Review unit. I used this filter for most of my CW operating and did not notice any objectionable ringing. Attenuation outside of the filter bandwidth is good. I can eliminate almost all interference using this filter in conjunction with the Corsair II's pass-band tuning. Additional filtering is available from an audio-notch filter and audio-bandpass filter. The audio notch frequency is adjustable from 200 Hz to 3.5 kHz with an audio-frequency notch depth greater than 50 dB. The notch is easy to tune and is effective in eliminating a specific QRM signal. The band-pass filter is centered at 750 Hz, and its bandwidth is variable making it useful on CW and SSB. This is a lot of "selectivity power," and there will be few instances where interference can't be substantially reduced using various combinations of these filters. It took a bit of practice, but once I got the hang of it, I was able to use the various filters effectively. The Product Review unit did not incorporate the optional 250-Hz filter.

The Corsair II incorporates an internal iambic keyer with approximately 40 characters of memory. I found it convenient to use the internal keyer for most of my CW work. It sure is convenient not to have to carry a separate keyer during my portable and mobile operation! The keyer works well, but

weighting, fixed at 3:1 by the factory, is not adjustable. The KEYER SPEED control on the front panel allows a range from about 8 to 50 WPM. The speed adjustment is nonlinear, with higher speeds compressed at one end of the control rotation. The keyer memory works as specified. Users may remove a jumper plug on the rear panel to allow use of their own keyers and straight keys.

The KEYER MEM line is a single phono jack located on the rear panel. This line must be grounded to record a message. For playback of the recorded message, the KEYER MEM line must be pulsed to ground through a 33-kΩ resistor/10-μF capacitor combination. These components are not supplied with the Corsair II, and it's up to you to implement a convenient way to use this feature.

The CW output waveform is shown in Fig 4; rise and fall times are 4 and 2.5 ms, respectively. The resulting CW note is well shaped, generating a minimum of unnecessary keying sidebands. I received several reports (from amateurs who prefer "hard" keying) that the CW note seemed a bit "soft," but they were able to copy my signal at speeds of up to about 50 WPM (the maximum speed of the internal keyer). This shows that the keying characteristics are not too soft for this speed. I listened to the keying myself, and I think it makes for pleasant listening during a long "rag chew."

The CW sidetone signal is fed to the audio system. The LEVEL and PITCH controls are thumbwheel potentiometers that are adjustable through an access hole on the transceiver bottom plate. The controls are a bit awkward to adjust, but because they are "set and forget" controls, this is not a great inconvenience.

I tried using the Corsair II with a linear amplifier. Because the amplifier did not incorporate QSK capability, I used only SSB and semi-QSK CW modes. The Corsair II's internal TR relay worked well in controlling the linear-amplifier TR switching.

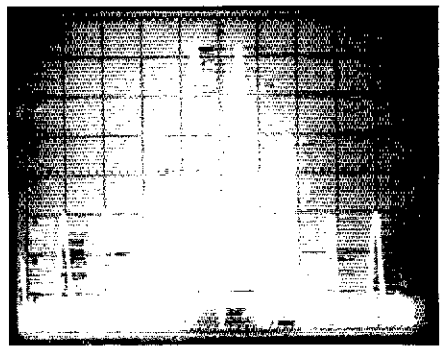


Fig 3—Spectral display of the Corsair II output during transmitter two-tone intermodulation distortion (IMD) testing. The transmitter is operating at rated output power on the 20-m band. Third-order products are 29 dB below PEP, and fifth-order products are 48 dB down. Vertical divisions are each 10 dB; horizontal divisions are each 1 kHz.

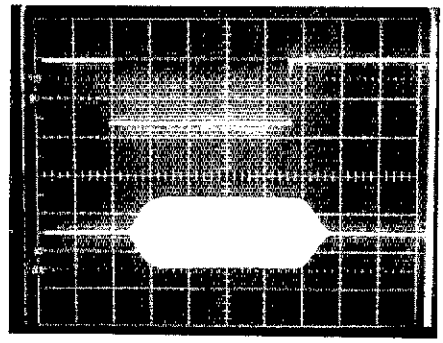


Fig 4—Keying waveform for the Corsair II. Each horizontal division is 5 ms. The top trace shows voltage at the key jack, which drops to zero at key closure; the bottom trace is the RF output.

SSB Operation

This rig gave me a good reason to be more active on SSB. The review unit did not include a Ten-Tec microphone, so I furnished my own. The DRIVE control serves as a mic gain control; there is no separate control for microphone gain. I tried the Corsair II with several different microphones, including an amplified type, and received good audio reports, so this arrangement seems to be able to handle different microphone output levels. The owner's manual cautions that the output of an amplified microphone must be adjusted so that the Corsair's microphone input circuitry is not overdriven (5 mV max).

Lower sideband is selected automatically on 160, 80, 40 and 17 meters, and USB on 20, 15, 12 and 10 meters if the MODE switch is in the SB-N position. The opposite sideband is selected by setting the MODE switch to the SB-R position.

The Corsair II can be used in either PTT or VOX operation, selectable by a front-panel toggle switch. The VOX GAIN, DELAY and ANTI-VOX controls are located on the rear panel, and once they were properly set I had no need to readjust them. The VOX action is smooth, and the TR switching is quiet even when I use headphones.

The transceiver also incorporates a built-in speech processor. The manual's detailed instructions on proper processor use and adjustment must be followed to obtain good-sounding processed audio. The processor level (PROCESS) and RF DRIVE controls interact, so take care that the ALC LED is lit only on voice peaks. I enlisted the aid of a local amateur for some on-the-air speech processor tests. With the processor level set at minimum, he could hardly tell that it was on. I tried several different settings of the processor level, and my audio never sounded distorted. When I set the processor for maximum, I sounded "just like a contester," and my signal was a bit wider than it was without processing. The ARRL Lab did not perform any tests to verify processor performance. My audio did not sound bad, and was still intelligible. The tests were performed on 75 m in heavy static, and, as expected, the processor seemed to improve my speech power.

The 2.4-kHz sideband filter works well on receive. I used the audio bandpass filter (BP FILTER) and the passband tuning (PBT) to minimize any adjacent channel splatter. The audio notch filter was effective in minimizing interfering carriers.

Mobile Operation

Because the Corsair II operates from a 12-14 V supply, and I am an avid mobileer, I just *had* to try it mobile. The rig is large and is not suitable for under-the-dash mounting in many smaller cars (my 1979 Subaru pickup included). A caution about mobile operation: The Model 260 power supply contains overcurrent protection circuitry that shuts down the power supply if the Corsair II draws too much current. The operating manual says that if the transceiver is operated from an external power supply (including batteries) similar protection must be used. A fast-blow fuse does not react quickly enough to protect the rig. The Corsair II has a push-pull power on/off switch in the AF GAIN/POWER control. Its contacts are intended for use in switching only the 117-V ac input to the power supply. The contacts are not rated to switch the 12-14 V, 18.5 A drawn in transmit. Ten-Tec recommends using their Model 1140 circuit breaker, which also contains an on/off switch, for operation from a battery or from a power source other than a Ten-Tec power supply.

The transmitter draws a lot of current, and it is possible to discharge the auto battery if the transmitter is used for long periods of time with the engine shut off. I learned this the hard way, but I had jumper cables and found someone to help me jump-start my pickup! The Corsair II only draws 850 mA in receive, so it is possible to listen for quite a while without draining the vehicle battery.

As soon as I was ready to go mobile, I checked into the CW County Hunter's net. The County Hunters know me pretty well, so they were happy to help me check out the new setup. My signal reports ranged from S2 to 30 dB over S9. A few European stations gave me S9 signal reports. To put this account into proper perspective, I should add that 20 m was in good shape with most stations booming in. With my pickup's engine off, the transceiver was rock steady, with no frequency instability or chirp observable by me or the stations I was working. In-motion results were also good. I went over some pretty bumpy roads in Rhode Island and was told that the frequency remained steady. I did some of this mobile operation during the winter (brrrrr!). I didn't notice any drift as the heater warmed up the pickup. I repeated some of my stability experiments on SSB, specifically asking other stations to look for drift, or "FMing." The reports I received indicate that the rig is clean for mobile SSB use.

My home location is unsuitable for the CW and Phone Sweepstakes contests (no outside antennas allowed), so I operate both contests mobile. On the 1986 CW weekend I worked over 200 stations, and for the first time ever, I worked a KH6 in the Sweepstakes. I didn't have much time for the phone weekend, but I put in about 6 hours mobile on 75 m.

My vehicle is plagued with moderate ignition noise. The Corsair II's noise blanker reduces this quite a bit, but it is still audible. The noise blanker is a complex circuit with blanking threshold and pulse width adjustable via front-panel controls. These controls didn't seem to have much effect. For various types of noise, including power-line "hash," the noise blanker either worked or it didn't, regardless of the settings of its controls. The noise blanker had little effect on the "Woodpecker". As mentioned in the owner's manual, it was possible to set the noise blanker sensitivity too high and overload the

blanker. At times, the noise blanker accentuated received key clicks.

A mobile whip, especially on the lower HF bands, is inefficient. I found the receiver to have adequate sensitivity, even with an inefficient mobile whip antenna. The Corsair II receiver also measures up well in terms of dynamic range and phase-noise performance.

Digital Modes

The Corsair II's specified TR turnaround time of 30 ms is acceptable for AMTOR, so I decided to try this mode. Fig 5 shows the turnaround time measured in the ARRL Lab. Because of my AMTOR inexperience, I secured the help of an "expert" to aid me with equipment hookup and operating procedures. It took me a while to familiarize myself with the mode, but after some initial hesitation, I finally had my first AMTOR QSO! I worked only a few stations, but the rig performs well on both strong and weak signals. AMTOR will never become my main operating mode, but it sure is fun to play with something different.

The Manual

I am familiar with Ten-Tec equipment, so the operation of most of the Corsair II's features was pretty self-evident, and all features function as described in the 54-page owner's manual. A section at the front of the manual shows the important operating requirements at a glance. The Corsair II's operating features are adequately explained in the manual, and I had no trouble making things work. Hookup diagrams are conspicuously absent. Less experienced users might want more information about connecting the TR relay or break-in control signals to an external amplifier. RTTY and AMTOR operation are treated only briefly in the manual. I would have liked to see more information to help me in the use of these modes. The information on the noise blanker is sketchy, with no explanation on the use of the N.B.LEVEL and N.B.WIDTH controls.

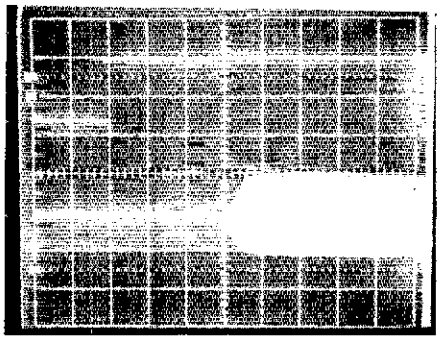


Fig 5—Receiver recovery time (turnaround) for the Corsair II. Horizontal divisions are each 10 ms. The top trace shows the voltage on the PTT line, which drops to zero as the PTT switch is closed. The bottom trace shows receiver audio output. The recovery time of approximately 35 ms is marginally acceptable for AMTOR operation.

The manual devotes 33 pages to alignment and service, including full schematics of each circuit board. Each schematic includes a parts list, although little information is given about the various toroid transformers throughout the Corsair II's circuitry. There is a brief description of circuit functions and step-by-step instructions for performing most of the adjustments for each circuit. The charts of nominal transmit and receive voltages are invaluable to those who choose to do their own troubleshooting. Block diagrams show most of the interconnections between modules. There is also a good technical discussion of the relationship between SWR, final-amplifier efficiency and measured power output.

Although the manual is well written in almost all areas, it is not without its flaws. The LED frequency display shows the CW receive frequency. The displayed frequency *does not change* during transmit. The transmit frequency is 750 Hz *higher* than the reading on the digital display below 14 MHz (160, 80, 40 and 30-m bands) and 750 Hz *lower* than the reading on the digital display on frequencies above 14 MHz (20, 17, 15, 12 and 10-m bands). This section of the manual is rather confusing, and I had to read it several times before I understood exactly what was meant. If you fail to properly account for the 750-Hz offset, it could result in out-of-band transmissions!

Conclusions

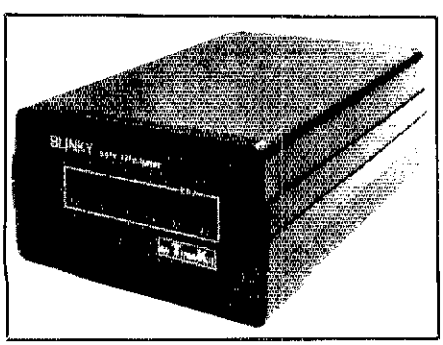
I used the Corsair II for several months. Did I have fun with it? You bet! As I weigh the pros and cons of this transceiver, I find that, for me, the Corsair II comes out ahead of some of the more complex HF transceivers. I am happy with a transceiver that is easy to use and can perform well for my favorite activities—mobile/portable operation, QSK CW and "simple" sideband. Every ham's operating requirements are different, so manufacturers make equipment with a range of features; every operating feature cannot be incorporated into every transceiver. For some people, a given feature is a must, for others it just gets in the way. The Corsair II *does* incorporate many fine features, and performs well. Before spending money on any transceiver, you should carefully weigh operating requirements and choose a rig solely on your preferences.

The Corsair II is manufactured by Ten-Tec, Highway 411 East, Sevierville, TN 37862, tel 615-453-7172. Recommended list price: Model 561, $1345; Model 263 remote VFO, $219; Model 260 power supply/speaker, $229.—*Ed Hare, KA1CV*

New Products

TIMEKIT BLINKY SSTV/RTTY TUNER

☐ The Blinky SSTV/RTTY tuner is an operating aid that indicates received audio frequencies and their shifts on a calibrated and easy-to-read analog-type scale. Blinky comprises an amplifier/limiter that drives six sharply tuned and temperature-stabilized op-amp filters. The filter outputs feed LED drivers that energize the appropriate frequency LEDs to illuminate the front-panel display. Blinking indicators are provided at 1.2, 1.5, 1.7, 1.9, 2.1 and 2.3 kHz. As the receiver is tuned across a RTTY signal, the unit indicates employed frequencies and shifts.

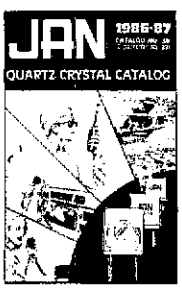


In spite of the manufacturer's name (TimeKit), Blinky is supplied fully assembled, tested and tuned. Blinky is housed in a small black plastic case measuring 2 × 3 × 5½ inches, and operates from an external (not furnished) power source, or an optional 12 V dc wall adapter. An internal dc-to-dc voltage converter allows operation from 9 to 12 V dc.

For more information, contact Fred Sharp, W8ASF, TimeKit, PO Box 22277, Cleveland, OH 44122. Price class: Blinky, $100; Model 60 wall adapter, $10.—*Bruce O. Williams, WA6IVC*

JAN CRYSTAL CATALOG

☐ A free booklet with general information on frequency-control quartz crystals and listings of various types is available from JAN Crystals. JAN has been a manufacturer of high-quality crystals since 1935.



The booklet includes data and current prices for crystals for CB, amateur (Novice to General), scanners, microprocessors and business radio. For a free copy, write to JAN Crystals, 2400 Crystal Dr, PO Box 06017, Fort Myers, FL 33906.—*Bruce O. Williams, WA6IVC*

Hints and Kinks

Conducted By Bob Schetgen, KU7G
Assistant Technical Editor

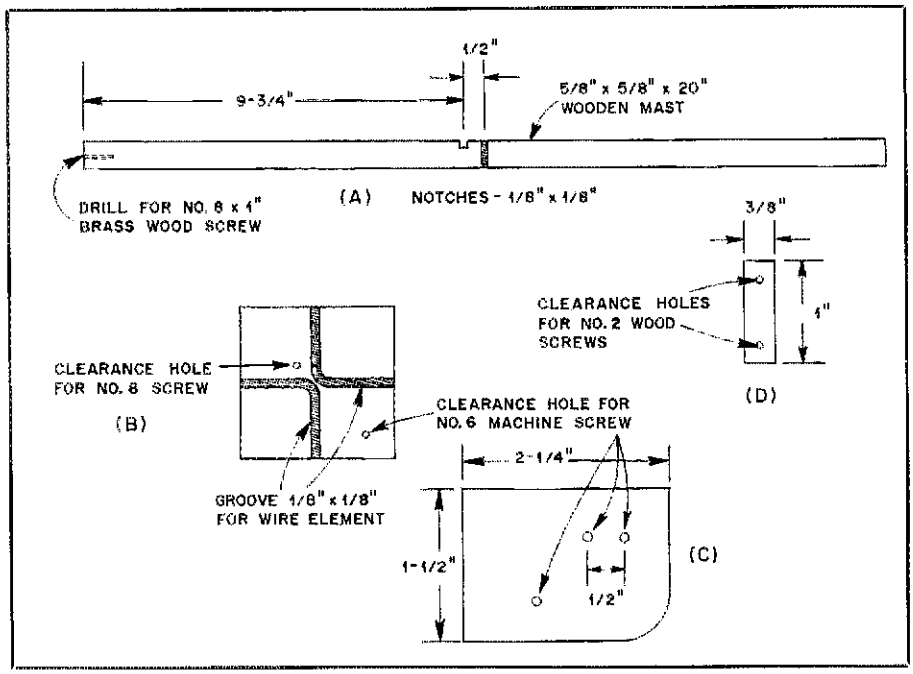


Fig 1—Construction details of the mast (A), top mount (B), feed-point insulator (C) and lower element clips (D) of WA8ZVT's compact 1λ 2-meter antenna.

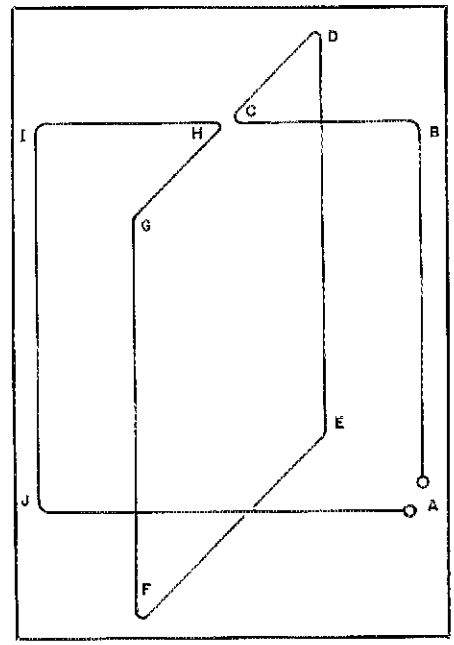


Fig 2—The wire element of the Egg-Beater antenna. Position the bends thusly: A to B, 10 in; B to C, 5 in; C to D, 5 in; D to E, 10.5 in; E to F, 10 in; F to G, 10.5 in; G to H, 5 in; H to I, 5 in; I to J, 10 in; J to A, 10 in. The bends at points H and C should fit the grooves in the top mount.

A FULL-WAVE 2-METER ANTENNA

☐ In 1972, as the 2-meter band was becoming popular, I was looking for an omnidirectional antenna that was small in size. I considered a λ/4 monopole, but did not use it because I prefer full-wave antennas. My experiments began with a full-wave length of no. 8 (AWG) aluminum wire. After bending it into several different shapes, the "Egg Beater" emerged. It is a full-wave antenna that fits inside an 11-inch cube. But it was *not* omnidirectional; my search turned to other options.

Two years later, I found the Egg Beater in my workshop and started to experiment with it again. After a few changes, I came up with the antenna shown in Figs 1 and 2. It is small and provides both horizontally and vertically polarized radiation components. It is easy to build and small enough to use in an apartment window. Try building one—it's great!

A 5/8-inch-square, 20-inch-long wooden mast supports the wire element. Notch the mast and fabricate the top mount, clips and feed-point insulator as shown in Fig 1.

The top mount clamps curves C and H of Fig 2. Cut 1/8-inch-deep grooves into a 2-inch square of ¼-inch-thick Bakelite™ for the lower plate of the mount and a similar (ungrooved) square of 1/8-inch-thick scrap plastic for the top plate. [Mine was three layers of 1/8-inch plastic (glued together) with the center layer composed of four small squares arranged to hold the element.—Ed.] Use 1/8-inch scrap plastic for the feed-point insulator and element clips as well. Hole locations are not critical in any of the antenna parts.

Cut an 82-inch-long piece of aluminum wire, and clamp one end in a vise. Tighten the other end in the chuck of an electric hand drill. Pull on the wire, and twist it straight by running the drill in short bursts.

Bend the wire into shape as shown in Fig 2. Assemble the top mount around the element and mount the feed-point insulator at the element ends. Mount the element on the mast so that its lower parts rest in the mast notches and fasten the top mount to the mast end with a brass machine screw. Install the plastic clips (using no. 2 × 3/8-inch brass wood screws) so that they hold the element into the mast notches.

Fabricate and assemble the parts of the matching system as shown in Fig 3. (The tubing and rod needed for the matching system can be salvaged from a "rabbit ear"

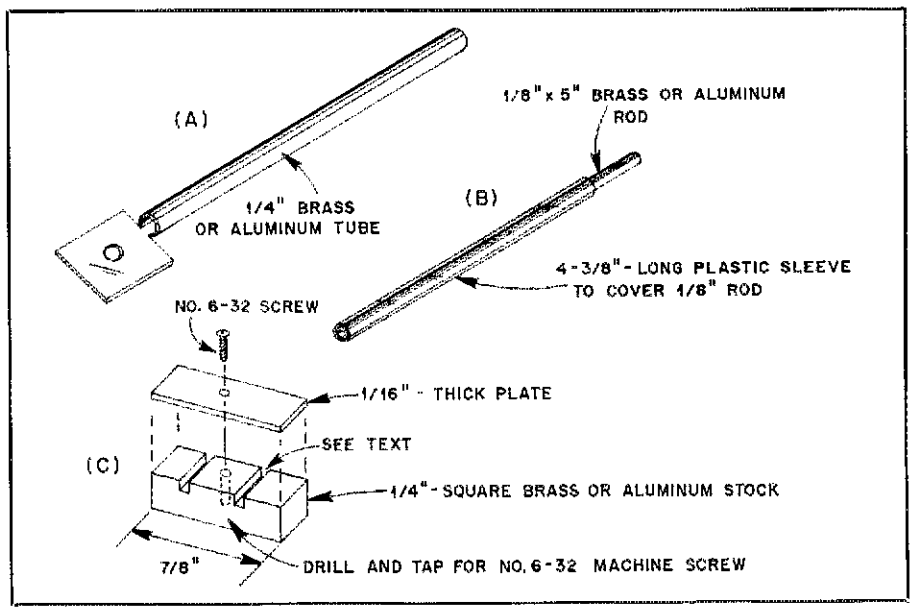


Fig 3—The matching system consists of an outer tube (A), inner rod with insulating sleeve (B) and rod-to-element clamp (C).

TV antenna if you have one laying around.) To make the outer tube, measure about 5/8 inch from one end and make a partial cross cut so that the small end section is not removed, but can be flattened without distorting the rest of the tube. Flatten the tube end and drill it to clear a no. 6 machine screw. Insert the small rod into the insulating sleeve and the sleeve into the large tube. Fasten the large tube to the third hole in the feed-point insulator with a no. 6 machine screw and nut. Size the grooves in the rod-to-element clamp to provide a snug fit for the rod and element. Install the clamp on the rod and element. Connect the feed-line center conductor to the no. 6 screw at the large tube and the shield to the other end of the element. Adjust the clamp location for minimum SWR. Finally, paint the antenna well to weatherproof it. —*Joseph Masek, WA8ZVT, Garfield Heights, Ohio*

Editor's Note: WA8ZVT's antenna is very intriguing. Imagine, for example, a 20-meter antenna that fits in a 9-ft cube! I built a 2-meter version in the ARRL Lab. It is fairly sensitive to nearby objects, but the SWR stayed below 2:1. Outside, at a height of 2λ, the SWR was 1.8:1 at the band edges and about 1.7:1 at the center of the 2-meter band.

WA8ZVT's matching system is not a conventional gamma match. Since the moving rod is one "plate" of the capacitor, there is a distinct value of capacitance associated with each setting of the rod. I have tried a standard gamma matching arrangement and others (series C, series L) based on the MININEC analysis (339 – *j*539 Ω). The other systems provided no better performance than WA8ZVT's original.

MININEC analysis of loop antennas sometimes yields questionable results. With this in mind, plotted data shows a nearly omnidirectional pattern ranging from –3 dBd to –7 dBd for the vector sum of the horizontal and vertical components. A plot of the vertical component is similar to the vector-sum plot with –5 dBd maximum. The horizontally polarized component is a figure-eight pattern with a peak of –7 dBd oriented between the antenna loops. (If a top view of the antenna were drawn on a rectangular coordinate system with the feed point on the +X axis, the major lobe would be in the lower-left quadrant.)

Personally, I would expect current loops at points A and F (Fig 2); hence, the radiation to be elliptically polarized and the pattern omnidirectional.

THE BABY-BOTTLE BALUN

☐ The merits of feeding a balanced antenna such as a Yagi, quad or dipole through some balancing device and coaxial cable have been convincingly demonstrated to me by Eggers in "Analysis of the Balun" (*QST*, Apr 1980, p 19). Ferrite-balun information in the *Radio Amateur's Handbook* (Newington: ARRL, 1982, p 19-7) and DeMaw's article on air-core baluns, "Simple Coreless Baluns" (*QST*, Oct 1980, p 47) led me to construct an air-core balun for my new triband quad antenna. [See also, "How to Build and Use Balun Transformers" (*QST*, Mar 1987, p 34).—Ed.]

The problem of protecting my homebuilt balun from adverse weather was troublesome (plastic food-storage boxes notwithstanding) until I discovered the answer at hand during a 3 AM feeding of my newborn son—his plastic baby bottle!

A 6-inch-long bottle holds a 10-trifilar-turn 1:1 balun on a 1-inch (outside diameter) form. A 4:1 balun of 10 bifilar turns neatly slips into a 4-inch bottle.

Construct the balun housing (see Fig 4) by drilling the bottle bottom for the SO-239 connector and its mounting bolts. Drill

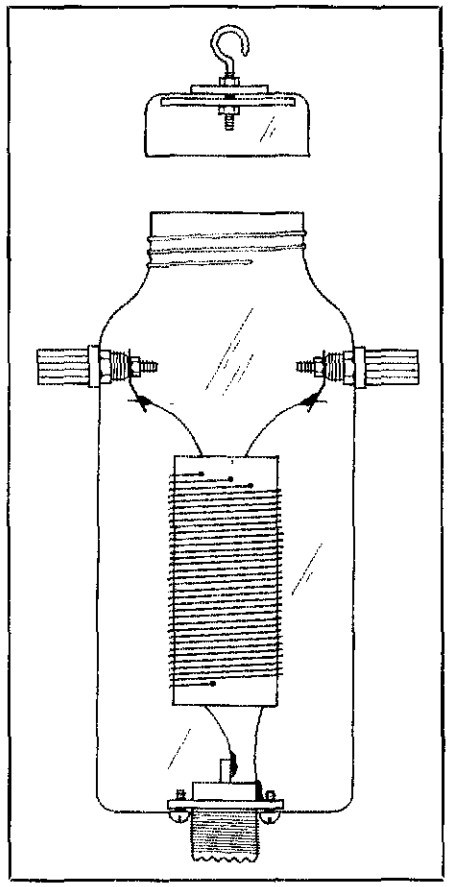


Fig 4—KA2F's baby-bottle balun housing.

1/8-inch holes on opposite sides of the bottle 1½ inches from the top, and mount binding posts in them with solder lugs on the inside of the bottle. Fit the screw-on collar with a 1½-inch-diameter plastic disk to which a small eyebolt is attached. Seal the bottle threads and seams at the binding posts and SO-239 with a liberal coating of silicone rubber to complete the project. Don't discard the nipple—it may prove useful as a pacifier sometime when you fail to bust a DX pileup!—*John P. King, KA2F, Little Silver, New Jersey*

CONNECTIONS FOR ½-INCH HARDLINE

☐ Many hams would use rigid coaxial cable (Hardline) in their stations if not for the hard-to-get and often expensive connectors that it requires.[1] Here is a way to fit ½-inch Hardline with a PL-259 for about $3. Refer to Fig 5 while reading these instructions.

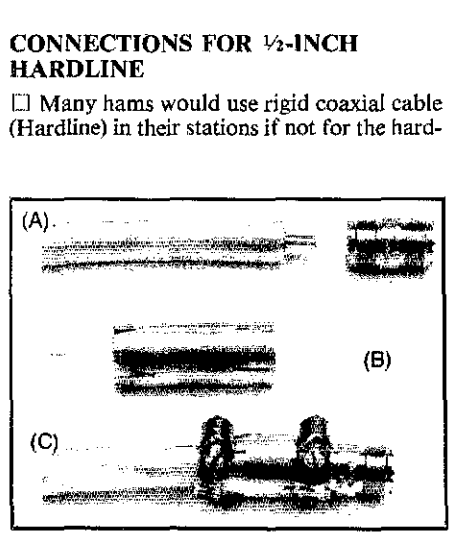


Fig 5—WB5GDB's Hardline connector (see text for explanation).

A) Remove the shield and dielectric to expose approximately 3/8 inch of the center conductor. Slip a 3/8- × 5/32-inch brass tube over the center conductor and solder it in place. (This ensures a tight fit for the PL-258 barrel connector.)[2] Place a barrel connector on the prepared end of the Hardline.

B) Cut a 1½-inch-long piece of 5/8-inch (inside diameter) aluminum tube and slit the ends with a hacksaw to allow easy compression when the clamps are tightened. [The end that clamps to the Hardline needs at least four large, V-shaped slots for the 5/8- to ½-inch transition.—Ed.] Clean the outside of the Hardline and the inside of the fitting. Coat the mating surfaces with conductive grease, such as Dow Corning Molykote™ 41, and center the fitting over the Hardline/barrel-connector joint.[3]

C) Place hose clamps at each end of the aluminum fitting and tighten the clamps snugly. Weatherproof the connector assembly with epoxy or another sealant.

This arrangement should last many years if done correctly. Good DXing!—*Dennis Stice, WB5GDB, Oklahoma City, Oklahoma*

[1]For more homebuilt Hardline connectors see "Hardline Coaxial Connectors You Can Make," in Apr 1987 *QST*, p 32.

[2]I tried WB5GDB's suggestion with some Hardline in the ARRL Lab. The line has a 0.162-inch center conductor that fits a PL-258 snugly. The Times Microwave Systems (an LPL company) catalog lists ½-inch Hardline with center conductors ranging from 0.098 (75 Ω) to 0.162 (50 Ω) inches, while the pin of a PL-259 measures 0.155 inches. Some lines require the brass tube, while others do not.—Ed.]

[3]Molykote 41 is available from Eastern Bearings, 7096 W Willow, Manchester, NH 03103, tel 603-668-3300.

A MAG-MOUNT PLATE FOR NONFERROUS VAN AND RV BODIES

☐ Mag-mount antennas are very handy as they can be quickly removed from a vehicle. Such antenna mounts, however, do not work with aluminum or fiberglass RVs, trucks, trailers or truck "caps." I added a steel panel to the roof of my aluminum RV so that I can now use a mag-mount antenna.

First, find a suitable steel sheet to become the mag-mount plate. (Mine was salvaged from an old VFO cabinet.) Choose an easily accessible spot for the steel plate on the vehicle body. Thoroughly clean both the plate and its new home on the RV top. Use a heavy weight to hold the plate in place and seal the edges with a thick epoxy (I used one called "PC-7"). When the epoxy has cured, the steel plate and the aluminum roof will be firmly bonded together. Protect the steel panel from rust by painting it after the epoxy has cured.

A friend who works in a body shop assures me that a steel panel may be fastened to a fiberglass body in the same fashion. The plate and the spot where it is to be affixed should be roughened prior to bonding, and the epoxy should be applied over the entire metal surface, rather than just around the edges. Also, the plate should be of adequate size to form a reasonable ground plane.—*Leslie Sterling, K7GL, Bigfork, Montana*

Technical Correspondence

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

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

IMPROVED BROADBAND ANTENNA EFFICIENCY

☐ When Brian Wermager's article, "A Truly Broadband Antenna for 80/75 Meters," arrived at HQ, I wanted to see if the antenna worked as well as claimed before publishing the information in *QST*.[1] I stopped tuning the antenna when the SWR was less than 1.6 across the entire band.

For working DX, the antenna seemed to work as well as, or better than, a dipole at 50 feet. Casual contacts were not difficult to make, but in contests, it was a different matter. The results were satisfactory, but could "satisfactory" be changed to "outstanding"?

The key to improving the efficiency of this antenna is found in the sidebar accompanying the article. The Mini-Numerical Electronics Code (MININEC) computer analysis done by Gerald Hall, K1TD, shows that: "A relatively high current flows at the base of the tower to ground—more than in any other part of the system. This indicates that a good earth connection, and even a radial system, would offer highest efficiency."

A system of radial wires improves antenna efficiency by cutting ground resistance losses. The decreased resistance in ground losses will also narrow the antenna bandwidth. The question now becomes: Is the narrowing of the bandwidth too much? I decided to investigate that question next.

With help from my brother-in-law, I installed 42 radials around, and bonded to, the tower base. As expected, SWR increased across the entire band. After I retuned the antenna, the SWR was below 2:1 across the entire band (see Fig 1). As for results, DX stations are typically 2 to 6 S units stronger on the KØEOU antenna than on the dipole at 50 feet. Contest QSOs are now a reality. I am not the loudest East Coast station on the band, but I am very pleased with the performance of the broadband antenna. (The dipole has been removed and stored!) —*Chuck Hutchinson, K8CH, Technical Editor, QST*

[1]B. Wermager, "A Truly Broadband Antenna for 80/75 Meters," QST, Apr 1988, pp 23-25.

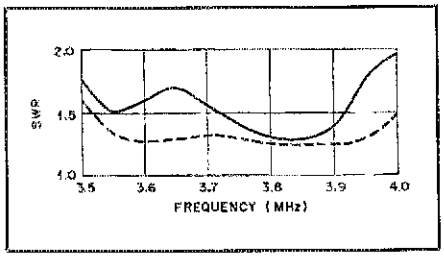


Fig 1—Graph showing SWR vs frequency for the KØEOU 80/75-meter antenna. The lower curve depicts results before adding ground radials; the upper curve was plotted after adding radials and retuning the antenna.

STRIPPING SOFTLY

☐ Now that I have your attention: How many of you have heard of the Cauzin Softstrip™ system? If you're an Apple® II, //e, Macintosh or IBM® PC computer owner and subscribe to any one of several computer magazines, I'm sure you must have seen one of Cauzin's ads at some time. Or, maybe the memory of those funny-looking, black-and-white Softstrips on a magazine or book page remained with you. (See Fig 2—yeah, those things!)

For those of you not familiar with the Cauzin system, here are some basics. The Cauzin Softstrip system provides the software and hardware means to place computer programs, text, graphics, digitized sound and other types of 8-bit data on paper in the form of data strips, and read the information in those strips into a computer. Once the information is in the computer, it can be manipulated as any other ASCII-encoded data can.

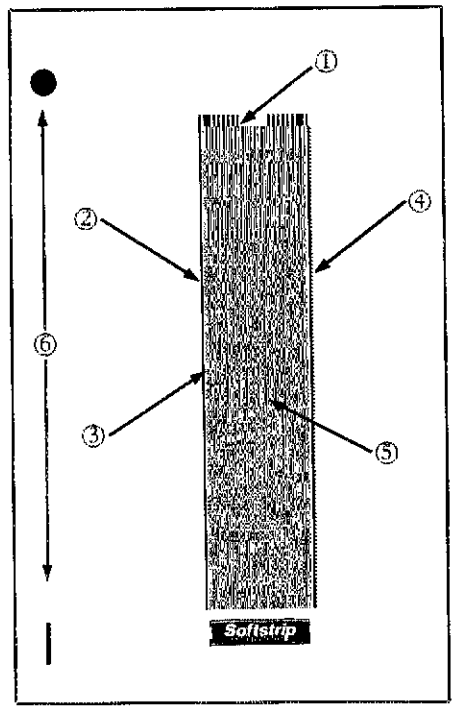


Fig 2—Softstrip anatomy. The header (1) at the top tells the reader the number of bytes in a line, the height of each line, and the paper-to-ink contrast level. Running vertically down the sides of the strip are the startline (2), the checkerboard (3) and the rack (4). These identify the boundaries of every horizontal line to be read. They also work in tandem to feed the reader alignment information.

Contained within the body of the strip, between the checkerboard and rack, is the file's data area (5). Another important component part of the data strip is the alignment dot and black line (6) at the side, which are used as guides for lining up the reader correctly. (Reproduced courtesy of Cauzin Systems, Inc)

The data strips are a structured pattern of black and white rectangles that look like a condensed bar code. Strips that appear in magazines and books are produced by a special process that allows up to 5500 bytes of data to be contained in a 5/8-inch-wide strip that can be as much as 9½ inches long. (Strips you produce on your printer contain about 1500 bytes.) An infrared optical reader is used to scan the strips and send the decoded information to the computer. Information from the reader is sent serially to the computer.

The Cauzin system offers alternatives to existing methods of information transferral: Computer programs need not be keyed in by hand or downloaded from a BBS. There's no longer reason to be concerned about exposing floppy disks to magnetic fields while they're in the mail. You simply connect the reader, run the Cauzin software and suck the information right off the printed page into the computer, or output data to your printer and onto a piece of paper for filing or transmittal to your buddy. With a Softstrip in front of you, you're only minutes away from using the data it contains. For instance, I've leisurely transferred 170 kbytes of program code from Softstrips (published in a paperback book on Pascal) to disk in less than an hour. Because the program Softstrips were in the book, I didn't have to make a toll call, purchase a disk or spend hours at a keyboard keying in line after line of program data; no debugging time was required either! The programs were ready to run!

I'd like to know if any, and how many, *QST* readers are already using the Cauzin Softstrip system. Drop me a line and let me know what sort of applications you've found for the Softstrips. What future, if any, do you think Softstrips have in Amateur Radio, now so closely linked with computers?

If you'd like to know more about the Cauzin system, contact Cauzin Systems, Inc, 835 S Main St, Waterbury, CT 06706, tel 203-573-0150. Also, the April 1987 issue of *Radio-Electronics* contains an interesting and descriptive article, "The Cauzin Softstrip System," on pp 93-95 and 100. —*Paul K. Pagel, N1FB, ARRL HQ*

COMPUTER RFI

☐ When operating on 20 meters one day, I came across a loud (S7), buzzing noise. The interference covered the entire band, making it impossible for me to operate. I also discovered the buzzing sound on 10, 18 and 21 MHz. After further checking, I learned the noise was emanating from my neighbor's computer, about 75 feet away.

My neighbor is using a program called EX-Press. Information processed by this program includes stock reports, news and other items of interest. The information is accessed through the CATV system. As shown in Fig 3, the CATV cable is attached

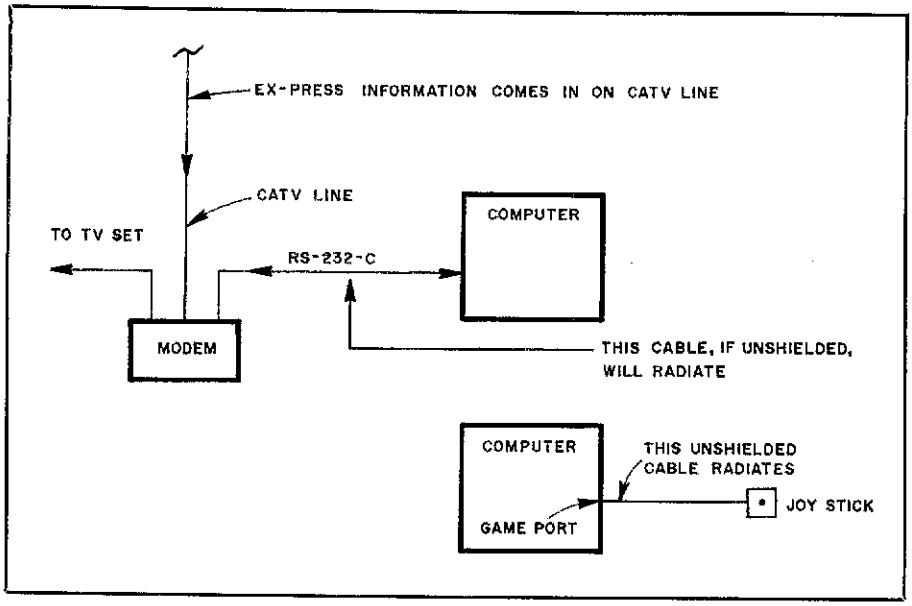


Fig 3—Block diagram of the two computer installations creating interference.

to a modem, which is in turn connected to a TV set and to the computer by an RS-232-C cable. We traced the 20-m interference problem to the RS-232-C cable, which was unshielded. Replacing that cable with a shielded one solved that problem.

Later, I discovered a second source of interference from another computer in the same house. These interfering signals appear on two frequencies: 2 and 20 meters. At 147.28 MHz, the interfering signal opens the squelch on my transceiver and will not allow the receiver to scan no matter how tight the squelch control setting. On 20 meters, the signal level is S4. The radiator of these signals is an unshielded 6-foot cable between the computer and the joysticks. Normally, game ports do not use shielded cables. I am hoping that the neighbor's little boy will get tired of playing games and disconnect the cable. At least he isn't home during the day because he has to go to school.—*H. M. Cremer, KH6DEH, 7072 Kalanianaole Hwy, Honolulu, HI 96825*

[Mr Cremer's letter brought to mind the interference situation I once created for myself. The cable supplied with the RTTY modem I used was only 3 feet long; too short to reach comfortably between the modem and the computer in my equipment setup. To make the hookup of my RTTY gear more flexible, I installed a commercially available game port extension cable (unshielded) for the Apple //e computer I then owned. That's when some annoying and unwanted signals made their appearance. None of these spurious signals, however, were greater than S3, and those that reached S3 were few.

Attempts to remove the interference using ferrite cores and blocks on the cable were unsuccessful. It wasn't until the unshielded cable was removed and replaced with a homemade shielded cable of the desired length that all but the strongest interfering signals disappeared, and these were reduced to almost inaudible levels. This new cable ran directly from the 14-pin DIP internal game-port socket (not the 9-pin DB-9 connector on the Apple //e rear panel) to the modem.—Ed.]

MORE ON MOVS

☐ Doug DeMaw has received many favorable comments on his article, "A Ham-Shack AC-Outlet Strip with Filtering."[2] If you'd like more information about MOVs, see "Protect Your Equipment from Damaging Power-Line Transients," Feb 1982 *QST*, pp 35-38, by Ken Stuart, W3VVN, and Gene Collick, W8LEQ. Also, Steve Ciarcia's article, "Keep Power-Line Pollution Out of Your Computer," Dec 1983 *BYTE*, pp 36-44, contains a wealth of information.—*Paul K. Pagel, N1FB, ARRL HQ*

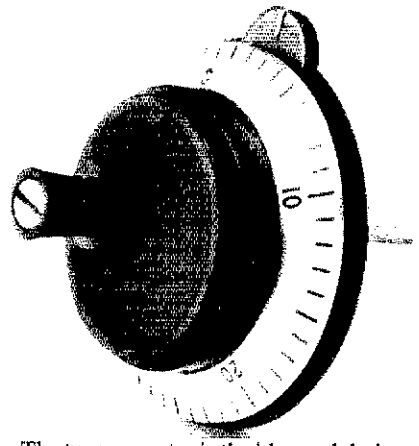
[2]Dec 1986 *QST*, pp 25-27.

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.

New Products

NEVADA COMMUNICATIONS TURNS COUNTER

☐ Nevada Communications has released the last piece of the jigsaw puzzle in their range of antenna matching network components: the Nevada TC48 Turns Counter. The TC48 is designed to drive the Nevada RC26 Roller Coaster inductor, but can be used with any equipment that requires a multiturn drive.



The turns counter is the idea and design of Ernie Quinnell, G4JEV, who also designed the matching inductor and capacitors. The TC48 produces one revolution of the outer dial and main drive shaft in response to 48 turns of the control knob. The TC48 is made in Britain and reflects the same high quality that other items in the line exhibit.

The TC48 is manufactured by Nevada Communications, UK. Exclusive distributor: Telecomms, 189 London Rd, North End, Portsmouth, Hants PO2 9AE, UK. Price class: £12.95 (approximately $22).—*Bruce O. Williams, WA6IVC*

Feedback

☐ Because of a camera problem, the PC-board pattern presented in Fig 11 for "The W2CXM 2-Meter Cube Receiver and Scanner," *QST*, Jun 1987, p 20, is not correct. The pattern is correctly reprinted here in Fig 4. We apologize for any inconvenience this error may have caused.

☐ Please refer to "Some Reflections on Vertical Antennas," Jul 1987 *QST*. Eq 3, at the bottom of the third column of the appendix on p 18, is missing an A before the angle sign. It should read:

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

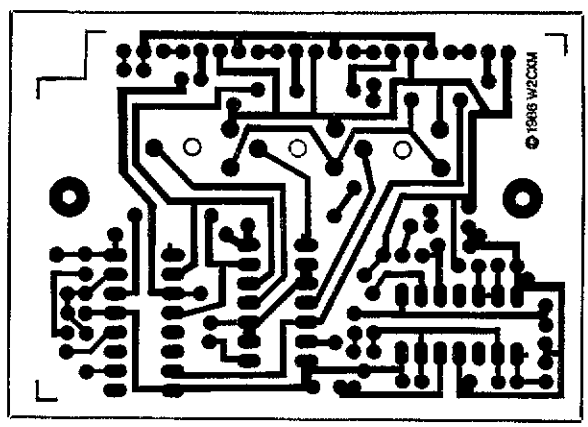


Fig 4—Corrected PC pattern for the 2-Meter Cube Receiver scan circuit board. Black areas represent unetched copper.

The Robert N. Dyruff Van

Santa Barbara hams prove that dreams can turn into reality; here's how they did it.

By John D. Hobson, MD, N6EGY
4604 Via Gennita
Santa Barbara, CA 93111

There it sat, wrapped up in a wide, red ribbon, while 200 local hams and well-wishers listened to our congressman extol the virtues of volunteerism in general and of our radio club in particular. Video cameras were looking on, flash units were popping, interviews were being granted and a warm, congratulatory letter from President Reagan was read to the crowd.

The Santa Barbara Amateur Radio Club (SBARC) mobile communications van, named after our friend and colleague, the late Robert N. Dyruff, W6POU, was finally being commissioned in a ceremony worthy of a naval man-of-war. Our two-year, $30,000 project was completed and ready for service.

We in Santa Barbara aren't the only ones interested in an emergency-communications van. Topeka, Coronado, Dallas, Dayton and other communities already have such vehicles, each unique, serving the unique needs of its community. There are many other clubs and Amateur Radio Emergency Service (ARES) groups throughout the country who would like to engineer their own vehicles, but aren't sure how to get the project underway. Here's how we did it in Santa Barbara.

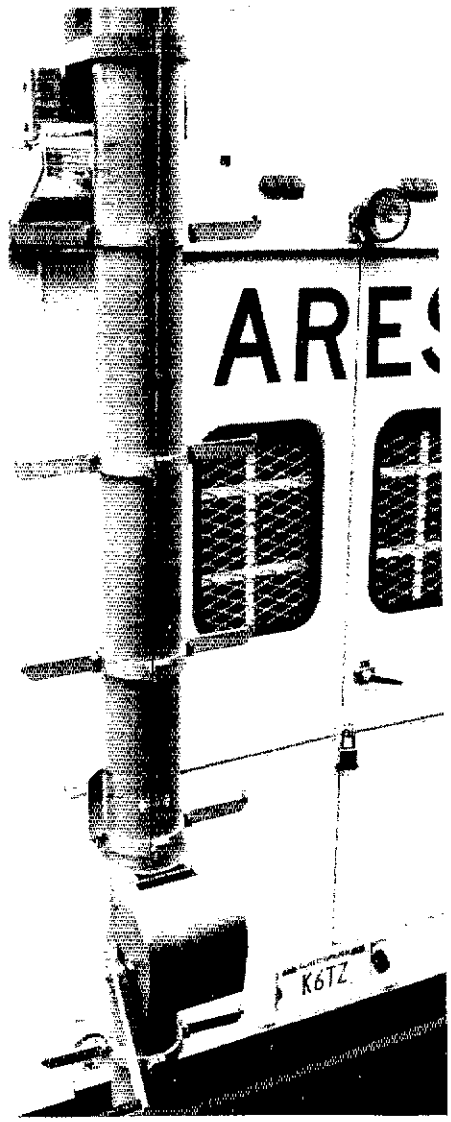
Fundraising

There is a saying among professional fundraisers: "First make friends, then make money." Most Amateur Radio clubs and ARES groups have, through years of public service to their communities, made many friends, especially among public-safety officers and government officials. Here in Santa Barbara, we are fortunate to have such friends, and one of our first tasks was to obtain letters of support—from police and fire chiefs, and directors of emergency services—to use in our fundraising effort.

We then drafted the case statement for our project.[1] In applying to charitable organizations, foundations and corporate donors, a well-written and attractively packaged case statement is an essential ingredient for success. In the statement, you should outline with great care the reasons why your club is pursuing the project. Mention the specific needs of disaster communications in your community, taking into account geographical and man-made features, weather patterns and whatever resources are available from local police and fire departments. Be careful, however, to avoid direct criticism of these agencies and their equipment. Add to the list the communications supplied free of charge to local civic and community events, and your case statement becomes a most persuasive document.

The case statement should also contain copies of the testimonial letters you have solicited from your friends in government, a list of club officers and ARES members, your organizational charts, a general description of the completed project, a brief history of your club or ARES group, and how contributions can be made. Despite new tax laws, charitable contributions can still be deducted by many individuals and businesses. Your organization must qualify as a charity, however, and in most states this means it must be incorporated as a nonprofit, charitable, tax-exempt corporation. In our case, this was not a problem since our club was already recognized by the Internal Revenue Service as a 501(c)(3) charitable corporation. [Club Services Department at ARRL HQ has information on how your club or ARES group can qualify under 501(c)(3).] We therefore directed that the club receive donations for the van and be the registered owner of the vehicle and all of its equipment. ARES would supply the manpower and leadership.

The tower in the raised position on the van. Note the steps on the tower allowing quick access to the roof if necessary.



There are certain realities of fund raising that should be accepted from the start of your effort.

(1) You don't raise $30,000 with bake sales! Funding a van will require some large donations in the $5000-$10,000 range. Large gifts can be solicited from charitable foundations and large businesses. Your library probably has several volumes listing the charitable foundations in your state or city. They will tell you which foundations to solicit and how much you might reasonably expect from each. Precisely follow the instructions for making the initial contact. Then get busy with letter writing.

(2) Networking among your friends and business acquaintances is essential. Nearly all of our major gifts resulted from the cultivation of friends and acquaintances who have control over corporate or charitable giving.

(3) Resource matching in fundraising is as important as impedance matching in electronics. Fundraising is most successful when the fundraiser solicits a gift that closely matches the size of his own gift. SBARC reached deeply into its own bank account for a corporate donation to the van fund before asking the same from others. Many individual members gave generously as well and were then in a position to ask others for similar contributions.

(4) Fundraising requires a significant investment in time spent writing case statements and letters, and completing grant applications.

(5) You must sell your van project. Identify a club or ARES member who excels in public speaking. Send him/her into your community with a tightly organized slide presentation describing the van project. Local civic and service clubs are ideal "targets" for your presentation because their

[1] A copy of the 35-page case statement, *A Vision of Service*, is available for $5 copying and mailing expense from SBARC, PO Box 3232, Santa Barbara, CA 93130-3232.

SBARC members on-the-air from the van's flexible operating positions. *(N6HKY photos)*

members frequently control potential charitable and corporate donations to your project.

(6) Finally, the essential ingredient: enthusiasm! You must truly and thoroughly believe in the project. Great things are not accomplished by reasonable people. You must be unreasonably enthusiastic!

Publicity played an important role in our effort to raise funds. We often hear hams and others complain about how hard it is to get their message into print or on the television evening news. Don't believe it! You must learn to play the game! Sit down and list the newsworthy events your club or ARES group participated in last year, then try to find any mention of these good deeds in the local paper. Chances are, Amateur Radio public service is one of the best kept secrets in your community. Take a vow right now that this must stop!

How can you do it? Write the articles yourself for starters. If you want publicity, you must write press releases. Let's imagine that tonight your ARES group will be called out on a search-and-rescue operation. A young woman is lost in the local back country after a weekend hike and because of terrain, hams will be supplying the only communication between the several hundred searchers and the sheriff's ground and air units. Eventually the woman is found. She's injured and has to be evacuated by helicopter to the local hospital.

The headline in tomorrow's paper might read "Injured Woman Found In Woods," or it might read "Local Hams Volunteer in Dramatic Rescue." If *you* write the story immediately after the event and deliver it to the newspaper well before their deadline (including all the who, what, where and why information, accompanied by some high-contrast black and white photos), how do you think the headline will read?

Submit press releases all year long. Field Day, ARES public-service activities, disaster drills and participation in real-life emergencies and disasters are all newsworthy events, provided they are reported in an accurate and timely fashion. Above all, remember that you should report news—not history.

Television news organizations also review press releases before deciding to cover various events. Talk to someone in their newsroom a day or two in advance of your event. Deadlines are especially important to the television people, and if you don't respect those deadlines, your activities will not appear on the tube!

News of Santa Barbara ARES participation in the disastrous Wheeler Fire near Ojai, California appeared under the headline "Ham Operators Fighting Fire—With Technology" on the front page of the Sunday, July 7, 1985 *Santa Barbara News-Press*. (Two days earlier, one of us had visited the city desk of the newspaper with press release in hand.) That coverage and our appearance on local television were key elements in our overall fundraising campaign.

Acquiring a Vehicle

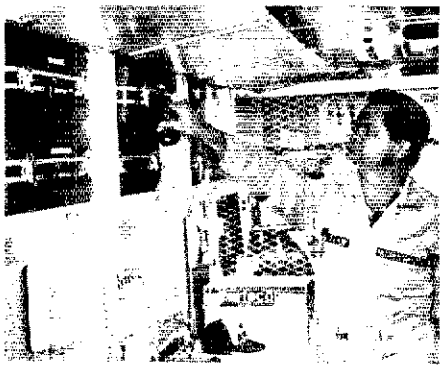
We obtained the vehicle itself just as we acquired many things for the project. We asked the right person in the right way at the right time. After deciding on a general set of guidelines for the kind of vehicle we needed, the van committee began its search. Two weeks later, the phone call came. "There's a 20-foot step van at work that no one's using anymore!" We immediately sent our case statement to the president of the company with a cover letter signed by one of us who knows the gentleman. We followed up with a phone call to the president a week later, after he'd had the chance to read the case statement. Three months later, the van was ours! Also, his corporate logo is displayed on the exterior of the vehicle, his firm is mentioned in all publicity regarding the van and he hosted the commissioning ceremony on the front steps of his office building attended by a bevy of local VIPs, our local congressman and the news media. It was, and still is, great public relations for his company!

Design and Contruction

Although design concepts had been discussed thoroughly and repeatedly for months, formal design and constuction of the van had to wait until we knew the identity of the vehicle. The van committee (consisting of KA6KGF, W1UUQ, WB6UNH and N6EGY) met for two months hashing out specific details of design and construction. A major decision had to do with flexibility. Should we build all the radios into a console or build several universal operating positions that could accommodate any radio depending upon a given situation? We settled on the latter plan, and since the communications needs are different each time we are called out, we're delighted with the result!

The van has four separate universal operating positions, three inside and one outside. Located at each position are terminals for power and antennas, removable shelves and a telephone. A central patch panel allows us to connect any of the nine permanent roof antennas, two ball-mount antennas, the HF beam or up to five additional antennas (dipoles, wires or remote VHF/UHF beams) to a radio at any operating position.

Our power system allows us to use our dual battery banks or self-generated ac power, or to plug into the utility mains, depending on our needs.



For safety and less exposure to the elements, electronic gear is stored above the operating positions. When needed, radios are unpacked and attached to removable operating position shelves with Velcro™ strips, which allow secure, yet quickly changeable, equipment configurations.

Significant effort went into the design of our power system. Again, flexibility was the key. After deciding that all lighting and radio equipment should operate from dc rather than 110-volt ac, we designed a dc system with sufficient power and minimal distribution losses. The main dc bus is designed to transfer up to 200 amps with less than a 0.2 volt drop. We used aircraft-type circuit breakers at both ends of the bus. Since much of the van's equipment contains programmable memories, we needed uninterrupted power on the main dc bus. Relays were ruled out because of switching transients and noise. The solution was a parallel feed system—batteries and dc power supplies simultaneously feeding the dc bus. Sixty-amp Shottky diodes are placed in series with the battery outputs to prevent a failing battery from depleting the remaining two good ones. The diodes have a maximum voltage drop of 0.6 volt when passing 60 amps and an even smaller drop when less power is being transferred. The 50-amp dc power supplies are factory designed for parallel use to avoid problems with permanent connection to a battery bus.

When we arrive at an operations site, we begin by drawing power from only one of the two 210 amp-hour battery banks, leaving the second bank in reserve. If it appears that the operation will last more than a few hours, 110 volts ac is fed to the system, either from nearby utility mains or from the 4.5-kW generator carried onboard. Once ac power is available, we switch on one or two of the dc power supplies, depending on our power needs. There is no power dropout as the supplies are switched on, just a slight increase in bus voltage due to the voltage drop across the battery diodes. We then switch to the second bank of batteries and begin charging the first bank. If the current load exceeds the capacity of the dc power supplies, the system, passively, begins to draw from the batteries as battery voltage exceeds bus voltage across the diodes. Those diodes are significant!

The tower, the most expensive single

item in the van, lies cranked down, reclining on rails on the roof of the van. When needed, one man can unlock and pull the tower backwards along the rails, swing it down into a vertical position and secure the bottom of the tower to a clevis pin on the rear bumper. The tower is cranked up manually to 45 feet.

The van has fluorescent interior lighting and 700,000 candlepower of incandescent exterior lighting, an environmental control system (13,000 BTU cooling/1500 watts heating), a sink and 30-gallon water tank and, of course, a coffee pot! Consistent with the concept of flexibility, individual radios are protected from vibration, dust and humidity while stored in foam-lined cases kept in cabinets above the operating positions and are unpacked only when needed.

Whenever possible, labor for the van was donated and, here again, networking was the key. Club members contributed welding, carpentry, cabinetmaking, wiring and painting skills. We had friends in the community who donated their time and talents to complete exterior painting, heliarc welding of the tower rack and lettering the signs on the sides of the van. While many hams are not in a posititon to make major financial donations to a project such as this, our need for donated labor encouraged widespread participation by over 50 club members, friends and families. Virtually thousands of volunteer hours went into the construction effort, and all of the participants are proud of their contributions, large or small.

As construction got underway, we sent our equipment list out for bid. We wanted to have not only broad amateur coverage, but provide VHF and UHF public-service band frequencies as well. We hope to have 6-meter and ATV capability within the next year. The use of commercial FM equipment on the public-safety bands allows us to program these radios with the frequencies of the public-service agencies from whom we have formal written authorization. Communications professionals in public-safety agencies are understandably protective about the use of their frequencies, and we do not intrude without an official event-specific request and prior written authorization.

Marketing

As construction for the van continued, the committee began to turn its attention to an appropriate commissioning ceremony. This ceremony would signal the end of construction and the beginning of another phase in the life of the project—public relations and marketing. While these two terms may be an anathema to some hams, their importance in a project such as this cannot be overemphasized. The commissioning ceremony was held on the grounds of the organization that donated the vehicle (and whose employees voted a $1000 cash gift to the project from their companywide charitable gift club). Formal invitations were sent to the mayor, city councilmen, county supervisors, the local police and fire chiefs, and administrators. We invited our state legislators, our congressman and US senators. Finally, because he's our neighbor, we embarked on a vigorous campaign to enlist President Reagan's participation in our ceremony. We had to settle for a beautiful letter from the President and some very special memories—"Dad, the White House is on the phone for you!" "That wasn't really the White House, was it?"

The ceremony was well attended. We heard remarks from Santa Barbara Chief of Police Gerald Lowry and from our US congressman, Robert Lagomarsino. Plaques listing the donors to the project were unveiled, and there was a formal ribbon-cutting. A special plaque was presented to Don Fuller, KA6KGF, recognizing the extraordinary contribution he made to the project from start to finish.

The ceremony was duly noted in the local papers (the press release was sent out a week before the ceremony), and we got another spot on the TV evening news, complete with interviews and shots of us breaking a champagne bottle on the front bumper (a phone call to a friend at the TV newsroom did the trick here). Our new constituents in the public-safety organizations attended and were impressed.

Since the ceremony, we have been marketing the van in other ways. Meetings have been held with local public-safety officials, and we now have written authorization to operate on many of the local fire and police channels during declared emergencies. We have tried to recruit as many new hams from the ranks of the police and fire departments as possible, and are proud to claim the president of the local search-and-rescue unit as one of our own. Regular training sessions are held, dealing with the operation of the van systems as well as radio discipline and message handling. This training pays off in many ways, best summarized by a recent public comment from our county fire chief: "You guys may be amateurs, but you communicate like professionals!"

How did we do it? We had committed, talented leadership and an enthusiastic club membership, and we worked together. There were no ego problems, and there was a lot of compromise along the way as decisions were made. The payoff for some of us came in the form of public recognition and praise, coin-of-the-realm in the volunteer world. For others, it was the immense internal satisfaction of knowing that we did it...without spending one dime of the taxpayers' money, but rather by involving ourselves, our club and our community in a tremendously beneficial volunteer project. *Your club can do it, too!*

Acknowledgments

The author would like to thank Don Fuller, KA6KGF, for his work on the design and construction of the van and for reviewing this manuscript. Mike Fuller contributed the drawings (space does not permit reproducing them here). Thanks also to Ron Fehr, N6HKY, who provided the photography. Thanks are also due to Karen Fuller for her tolerance and encouragement during the construction of the van—it was parked in her driveway for nearly one year! Finally, I am most grateful to my wife, Ann, for her encouragement and help during the writing of this article and for the many hours she spent sanding and painting the interior of the van.

John Hobson, N6EGY, first licensed in 1980, holds an Advanced class license. An alumnus of the University of California, Santa Barbara, he received his medical degree from the University of California, San Francisco in 1970 and practices gastroenterology at the Santa Barbara Medical Foundation Clinic. He is treasurer of the Santa Barbara ARC and has interests in ARES, casual DXing and not-so-casual T-hunting.

Robert N. Dyruff, W6POU May 23, 1921—January 30, 1985

There was no debate when it came to naming the Santa Barbara Amateur Radio Club's van after our friend and colleague, the late Bob Dyruff. Born in New York, Bob served in the United States Army Signal Corps during WW II and attended Syracuse University. He had a long career with General Electric, first in the East and then with GE Tempo in Santa Barbara.

In 1972, Bob became a founding member of the revitalized Santa Barbara ARC and remained an activist in Amateur Radio until his death. He served the ARRL as Section Manager, Section Emergency Coordinator and Assistant Director, and held numerous leadership positions in ARES and the Santa Barbara ARC. His expertise was recognized by others in the public-safety and emergency-preparedness fields, and, as a result, he served as a disaster reservist for the Federal Emergency Management Agency and both the State of California and City of Santa Barbara Offices of Emergency Service. Bob was a past Director of the Southern California Emergency Services Association and received their Outstanding Service Award. The California Earthquake Task Force commissioned him to write the report on emergency communications following the Coalinga Earthquake in 1983.

Just a few days before Bob died, a group of Santa Barbara amateurs gathered at the Dyruff home to show him the van and to formally dedicate the vehicle to him. Bob aptly termed the gathering his living memorial service and delivered an impassioned plea to all of us to continue to work in emergency communications and preparedness. With his passing, the amateur fraternity lost a champion and a dedicated servant.

Lieutenant Bigswitch Stayed for Dinner

A bit of unofficial post-World-War II radio fun seemed harmless enough to two ham chums... until the order came to "pull the big switch"—or else!

By Rod Newkirk, W9BRD
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Euphoria ran rampant among tens of thousands of Pacific Theatre GIs when WW II hostilities ceased in late 1945. It was all over but the shouting and the triumphant journey home. But then the old army game of "hurry up and wait" set in. Tedious standing by. Every seaworthy hull was pressed into service to get us all back to Uncle Sugar, but it would take months before the Luzon staging areas finally emptied. Meanwhile, it was rum, Coca-Cola®, hangovers, chess, volleyball, paperbacks, movies, ad infinitum. Wild anticipation became a real drag. I mean d-r—a—g.

We radio/radar types with a little clout managed to retain some sort of receiver to help while away the long hours on our rumps dreaming of home. Our eight-man tent boasted a beat-up jungle-green Australian HRO receiver. Tokyo Rose was QRT, but the Armed Forces Radio Service boiled in with solid jazz, sports and good news. SWLing was fun, too: All sorts of weird stuff piling through, rare DX we only read about in the States. Hey! There were *hams* on the air again! Tentmate Willie Kuure, W9YNY (now W8YNY), found a whole nest of local chatter on 20 meters one October evening—even a few OMs on phone. They were obviously self-styled and personally authorized; radio regs were in temporary limbo. Some fearlessly used their back-home call signs. Others grabbed the chance to be juicy HSs, XUs, FI8s, etc. Skip was fantastically short and solid—great conditions.

Willie and I beelined for the nearest supply compound in search of a rig, any rig—anything that would hit 14 Mc. Sorry, said the Officer In Charge, no more radios for fun and frolic, everything locked up for echelon transfer. Gnats! But true hams will find a way! We located a pile of condemned odds and ends destined for demolition and burial. Some 6V6s. An 807! An abandoned chassis with usable parts and wiring! In a few hours, we had a 20-meter master-oscillator power-amplifier transmitter feeding a Windom antenna strung between tent tops. The HRO's power pack provided about 250 volts at 40 milliamperes. QSOs!

The next week or two passed fast. We were reborn on the amateur bands after four-plus miserable years of abstinence! KA1 was the prewar Luzon prefix, so we became "KA1KN." We even got out on phone with a 6V6 Heising modulator, working stations claiming to be in dozens of countries on all continents—all on less than 6 watts. This sure beat volleyball and checkers.

Thus did we radio nuts settle down to ham away the time until embarkation call. Willie liked the day shift, particularly morning hours, while I banged brass in the evenings when skip went long. RF never tasted so good, especially because we had been convinced that our homecoming, or homegoing, was still months away.

Well, one sizzling Philippines afternoon, Willie was chewing the rag with mutual friend Hal, W5EGA (now W4VCI), on 20. Hal was signing KA1ZZ aboard a Manila-docked merchantman, and had been appearing regularly in our log. This waiting for a ride back wasn't half bad, we agreed, so long as our favorite hobby was at hand. Then suddenly into our humble hamshack popped a grim-looking first lieutenant. Willie signed off while the looie watched menacingly with folded arms. He cleared his throat, at-eased us and announced, "Sorry, men—you'll have to shut it down. The Old Man knows it's harmless, but Battalion is giving us flak. And we all *do* want to go home ASAP, don't we?"

Lieutenant Bigswitch had said the magic words. We began dismantling our pitiful little heap. He was, however, quite fascinated by our improvised transmitter. "Colpitts or Hartley?" He spoke our language! Soon, we had a real gabfest going. He was a QSO-hungry Oklahoma W5! "Who were you just working?" We told him about Hal, the roving merchant mariner. "W5EGA? He's my old school chum! I haven't heard from Hal in five or six years! Is he still on?" Willie found KA1ZZ a few kc. higher, working a VS4. Lt Bigswitch smiled ecstatically. "That's Hal's smooth fist, all right." Willie got up, the lieutenant sat down, and two old Okie buddies were magically reunited by Amateur Radio.

They went at it for an hour or more. Our other nonham tentmates watched Lt Bigswitch giggle, snort and laugh to himself, convinced that we had pushed him over the edge. Our visitor even missed chow call, so we brought him a full messkit. Finally he arose, stretched and sighed, announcing that he and Hal had a sked same time tomorrow. "But I've still got orders to close you down, guys. This may take longer than I expected." He supervised the lowering of our profile. We collected our prominently displayed junkpile and stowed it, still operational, under the W9BRD cot. There, the station would perform delightfully for weeks to come, including several more contacts between those long-lost W5 pals. At length, KA1ZZ/W5EGA hauled anchor for the Golden Gate. And so, eventually, did the rest of us, bug fists itching like crazy.

Rod Newkirk, W9BRD, conducted QST's "How's DX?" from 1947 to 1978. "Lieutenant Bigswitch Stayed for Dinner" first appeared in the October 1986 issue of Enjoying Radio. QST

A Fresh Look at CW

Lose your "Novice accent" by gaining code proficiency.

By Don Daso, WA8MAZ
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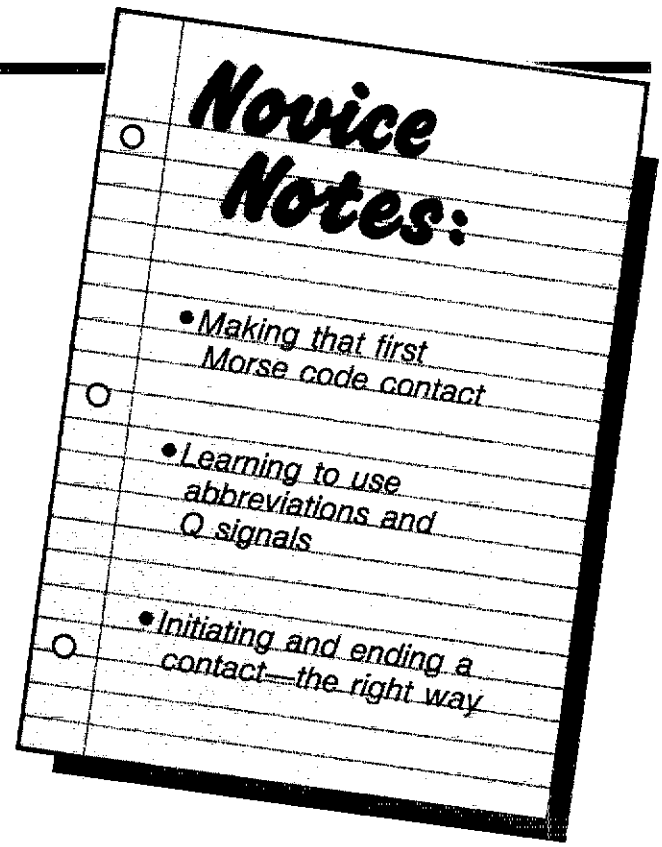


You sit down at the rig. Reaching out, you snap the power switch, bringing your transceiver to life. You put on the headphones. As you tune to WWV for a time check, you close the master antenna switch. You reach for the log and enter today's date, anticipating your contact. You begin tuning.

A CQ, with good signal strength, is coming in at about the limit of your copying ability. You answer. Things don't go quite the way you expected. You copy:

599 599 . . . FROM ORANGE, NEW JERSEY . . . FROM ANDREA

She moves right along, turning it back to you quickly.

Not to be outdone, you match her speed, although you know that may be asking for trouble. You send a 589, your location and your name. You mention your rig and antenna, the weather, then say you're turning it over and get the call signs in there, twice, for good measure.

Fingers flying, you're trying to keep up. No call signs, just a series of questions, although it seems to be only one or two words. There's something about an andrew ranger. There's a question, again. Then a BK and silence.

Your hands are sweating. You wonder what rangers do up there in the wilds of New Jersey. You repeat half of your own last transmission. You send the calls again, ending with a BK yourself. Silence.

You call a couple of times, using full call signs and lots of question marks. Hearing no reply, you turn off the rig and head upstairs. Probably bad conditions, you tell yourself. You've read about the sunspot cycle. . .

Sound familiar? Well, don't worry if it does—it's all part of the learning experiences we share as hams.

These mistakes aren't out of the ordinary. But they're easy to fix. First, calling at your own speed would have signaled the CQing station to slow down. The name of the CQing operator was Andrew, not Andrea. And Andrew was using one of his collection of old Johnson transmitters—the Ranger. His mistake was one of impatience—he should have known you were having difficulties because your procedures indicated inexperience.

The sunspot cycle didn't even enter into things. The signal path was there; the 589 and 599 reports were valid.

Hams who work the Novice CW bands, whether they're Novices or Extras, will nearly always do their best to carry on a contact at your level. Experienced hams like nothing more than to provide a first contact, or a "first Minnesota" toward the Worked All States award.

So don't be afraid of making mistakes; they are part of something we can call "the Novice accent." Most everyone, when learning a new language, has an accent. This characteristic usually marks them as a newcomer to those who know the language well. Over time, and with practice, the accent diminishes, and facility for the language increases.

The same thing happens on the ham bands. The accent of a newcomer is unmistakable. Sometimes it disappears quickly; sometimes it remains after considerable time has passed.

In November 1956, W6DTY (now a Silent Key) addressed this problem in a *QST* article, "Your Novice Accent," which was reprinted, and became a classic. Distributed to new Novices, it was a cornerstone in establishing good operating practices.

But times change, and circumstances dictate that new procedures replace some old ones. New techniques require new methods. Old-timers, newly licensed hams, or even prospective amateurs can benefit from these guidelines on operating CW in the '80s.

First, this reminder: Good operators get

THE RST SYSTEM

Readability

1—Unreadable.
2—Barely readable, occasional words distinguishable.
3—Readable with considerable difficulty.
4—Readable with practically no difficulty.
5—Perfectly readable.

Signal Strength

1—Faint signals barely perceptible.
2—Very weak signals.
3—Weak signals.
4—Fair signals.
5—Fairly good signals.
6—Good signals.
7—Moderately strong signals.
8—Strong signals.
9—Extremely strong signals.

Tone

1—Sixty-cycle ac or less, very rough and broad.
2—Very rough ac, very harsh and broad.
3—Rough ac tone, rectified but not filtered.
4—Rough note, some trace of filtering.
5—Filtered rectified ac but strongly ripple-modulated.
6—Filtered tone, definite trace of ripple modulation.
7—Near pure tone, trace of ripple modulation.
8—Near perfect tone, slight trace of modulation.
9—Perfect tone, no trace of ripple or modulation of any kind.

The "tone" report refers only to the purity of the signal, and has no connection with its stability or freedom from clicks or chirps. Most of the signals you hear will be a T9.

that way by operating. No amount of reading or reflection or advice will take the place of actual on-the-air time. Truly, practice makes perfect when it comes to good operating skills. And that's what this article is about—skills. The ability to use the equipment you have (whether it's the latest offering from a manufacturer or something home-brewed, borrowed, or old and dented from a flea market) to put forth the best signal you can.

These are skills that can be learned. You weren't born with a key in your hand, so you have to learn Morse. The first step in that procedure is learning to listen. You know that by now; you learned it while studying for your license. Now, you have to learn to listen another way—on the bands.

INITIATING A CONTACT

Let's say you've decided to operate. You've got some time, and want to get on the air. Regardless of your motives, you listen first. Is the band open? To where? Does that matter? Is there a clear spot where you can call CQ? Is someone else calling CQ? Listen first, always! And usually for several minutes. Know the band before you transmit. Then, if you decide to call CQ, find out *first* if the frequency really is clear. You do this by asking. QRL? is enough. Wait a few seconds, then send QRL? again if nothing was heard the first time. If nothing is heard again, try your CQ.

Why do all that? You think it's confusing? Well, nothing is more frustrating than having someone ruin your QSO by calling CQ (or anything else) on top of someone you're trying to copy.

Perhaps you think this whole QRL? thing is strange, but it's just one of a number of Q signals in use. Q signals make CW easy. Followed by a question mark, they are queries. Without one, they are declarative statements. (When you send QRL? don't be surprised to hear QRL —telling you the frequency is indeed in use. Or, don't be surprised to hear a couple of dits, a "C," which means "yes," or some other indication that the spot is occupied.) See the accompanying sidebar for a listing of some common Q signals. Learn them, and use them.

Let's say you've chosen a band, listened, found someone calling CQ, and want to answer. What do you do? Listen again (briefly, to determine how many others may be calling). In random, stateside QSOs, you'll often be the only station replying, especially in the Novice bands. But check first; you may hear several other stations calling, and then you must decide if you should join in.

Your call should match the speed of the other station. And if that signal was very strong, you can send a two-by-two reply:

N4ZC N4ZC DE WA8MAZ WA8MAZ K

Then listen again. Is someone else still calling? If not, and there's no reply, try your 2 × 2 again, or perhaps just:

DE WA8MAZ WA8MAZ K

The important point to remember is: Keep it brief! There's simply no need for long, drawn-out calls. Short calls, repeated, work much better than long, slow, drawn-out methods.

The same rule holds if you call CQ. A single 3 × 3 will suffice. That is:

CQ CQ CQ DE WA8MAZ WA8MAZ WA8MAZ K

If you don't get a response, call again. Just recently, I counted 21 CQs without a break from a KA3—entirely unnecessary, and sure to turn anyone off. Remember: Always call CQ at the speed at which you want someone to reply.

And try to be as accurate as possible when calling on the other station's frequency. Learn what the transmit offset is for your transceiver. Learn where to set your RIT (receiver incremental tuning)

Q Signals

Given below are a number of Q signals whose meanings most often need to be expressed with brevity and clearness in amateur work. (Q abbreviations take the form of questions only when each is sent followed by a question mark.)

QRG	Will you tell me my exact frequency (or that of ____)? Your exact frequency (or that of ____) is ____ kHz.
QRH	Does my frequency vary? Your frequency varies.
QRI	How is the tone of my transmission? The tone of your transmission is ____ (1. Good; 2. Variable; 3. Bad).
QRK	What is the intelligibility of my signals (or those of ____)? The intelligibility of your signals (or those of ____) is ____ (1. Bad; 2. Poor; 3. Fair; 4. Good; 5. Excellent).
QRL	Are you busy? I am busy (or I am busy with ____). Please do not interfere.
QRM	Is my transmission being interfered with? Your transmission is being interfered with ____ (1. Nil; 2. Slightly; 3. Moderately; 4. Severely; 5. Extremely.)
QRN	Are you troubled by static? I am troubled by static ____ (1-5 as under QRM).
QRO	Shall I increase power? Increase power.
QRP	Shall I decrease power? Decrease power.
QRQ	Shall I send faster? Send faster (____ WPM).
QRS	Shall I send more slowly? Send more slowly (____ WPM).
QRT	Shall I stop sending? Stop sending.
QRU	Have you anything for me? I have nothing for you.
QRV	Are you ready? I am ready.
QRW	Shall I inform ____ that you are calling him on ____ kHz? Please inform ____ that I am calling him on ____ kHz.
QRX	When will you call me again? I will call you again at ____ hours (on ____ kHz).
QRY	What is my turn? Your turn is numbered ____
QRZ	Who is calling me? You are being called by ____ (on ____ kHz).
QSA	What is the strength of my signals (or those of ____)? The strength of your signals (or those of ____) is ____ (1. Scarcely perceptible; 2. Weak; 3. Fairly good; 4. Good; 5. Very good).
QSB	Are my signals fading? Your signals are fading.
QSD	Is my keying defective? Your keying is defective.
QSK	Can you hear me between your signals and if so can I break in on your transmission? I can hear you between signals; break in on my transmission.
QSL	Can you acknowledge receipt? I am acknowledging receipt.
QSN	Did you hear me (or ____) on ____ kHz? I did hear you (or ____) on ____ kHz.
QSO	Can you communicate with ____ direct or by relay? I can communicate with ____ direct (or by relay through ____).
QSP	Will you relay to ____? I will relay to ____
QST	General call preceding a message addressed to all amateurs and ARRL members. This is in effect "CQ ARRL."
QSU	Shall I send or reply on this frequency (or on ____ kHz)? Send or reply on this frequency (or on ____ kHz).
QSW	Will you send on this frequency (or on ____ kHz)? I am going to send on this frequency (or on ____ kHz).
QSX	Will you listen to ____ on ____ kHz? I am listening to ____ on ____ kHz.
QSY	Shall I change to transmission on another frequency? Change to transmission on another frequency (or on ____ kHz).
QTH	What is your location? My location is ____

control to accurately be zero-beat, if necessary. Most of today's radios are very stable, but tuning accuracy is sometimes (seemingly) left entirely to chance.

Simple, so far, isn't it?

"NOW, WHAT DO I SAY?"

What happens after the CQ? Well, that's simple as well—simple in the sense that a standard procedure exists for ham communications. It has been around a long time; it's universally acknowledged. It goes like this: The first thing to send is a signal report—so the other station will know how his or her signals are being received (see the accompanying sidebar). Next is your QTH—where you live. Next is your name. This is the first exchange of information in a QSO. It's just standard operating procedure—with us since the early days of radio. Here's an example:

K2SD DE WA8MAZ UR RST 589 589
HR IN CHARLOTTE NC NC NAME IS
DON DON HW? K2SD DE WA8MAZ K

Notice the brevity. Notice the extra spacing between certain words (shown graphically here). That's all the punctuation you ever need. Notice the two-letter abbreviation of the state. Learn those, and use them. Be simple and to-the-point. Once something similar is exchanged with the other station, you can start communicating. Conversation may begin.

Don't think because every QSO begins this way that you're stuck in a rut. You're saving time and avoiding confusion. Once these simple preliminaries are finished, the gates are open to a whole range of topics. Sure, most hams talk about their gear or stations, but don't feel limited to that. Be imaginative; be inquisitive.

Sometimes, signal strengths may prevent a detailed information exchange. Or, you may be working someone in a rare country and have dozens of other stations waiting on frequency. That QSO wouldn't go past this exchange. Indeed, it might be limited to signal reports only. Another QSO might last for hours. Each is a valid ham radio contact.

You might have noticed some strange-looking words in the example: UR and HW. What are those? Abbreviations—CW's shorthand. UR and HW are short for "your" and "how." Again, there are several that are commonly used, and you should learn them (see the accompanying sidebar). You can save large chunks of time by *not* spelling everything out. The time it would take can be used in making more QSOs and meeting more potential friends. And, if you don't learn and adopt these abbreviations, you will have difficulty understanding people you work who are using them.

Along with Q signals and abbreviations are *prosigns*. These are letters with special meanings. "Combined" prosigns are written with a line above their letters. There are single letters, and letters that are combined (sent as a single unit). There are nine prosigns you need to know.

R means you have received a transmission completely, in full. If you missed something, don't send an R. And, don't send an R for each piece of information you received.

$\overline{AR}$ is used when calling a specific station before contact is established, and at the end of a message.

$\overline{KN}$ is used at the end of any transmission in which you wish *only* the station you're in contact with to reply.

$\overline{AS}$ means wait temporarily. It implies you are not at your rig, but will be right back.

$\overline{BT}$ also means wait, but implies that you're still at the rig, thinking of something to say.

$\overline{SK}$ means a contact is ending, and is sent before your final identification.

CL means you are closing down your station and will not reply to any further calls. It's sent after your final identification.

K is the most-used ending signal. It is

Some Abbreviations for CW Work

Although abbreviations help to cut down unnecessary transmission, make it a rule not to abbreviate unnecessarily when working an operator of unknown experience.

AA	All after
AB	All before
ABT	About
ADR	Address
AGN	Again
ANT	Antenna
BCI	Broadcast interference
BCL	Broadcast listener
BK	Break; break me; break in
BN	All between; been
BUG	Semi-automatic key
B4	Before
C	Yes
CFM	Confirm; I confirm
CK	Check
CL	I am closing my station; call
CLD-CLG	Called; calling
CQ	Calling any station
CUD	Could
CUL	See you later
CW	Continuous wave (ie, radiotelegraph)
DE	From, this is
DLD-DLVD	Delivered
DR	Dear
DX	Distance, foreign countries
ES	And, &
FB	Fine business, excellent
FM	From
GA	Go ahead (or resume sending)
GB	Good-by
GBA	Give better address
GE	Good evening
GG	Going
GM	Good morning
GND	Ground
GUD	Good
HI	The telegraphic laugh; high
HR	Here, hear
HV	Have
HW	How
LID	A poor operator
MA, MILS	Milliamperes
MSG	Message; prefix to radiogram
N	No
NCS	Net control station
ND	Nothing doing
NIL	Nothing; I have nothing for you
NM	No more
NR	Number
NW	Now; I resume transmission
OB	Old boy
OM	Old man
OP-OPR	Operator
OT	Old-timer; old top
PBL	Preamble
PSE	Please
PWR	Power
R	Received as transmitted; are
RCD	Received
RCVR (RX)	Receiver
REF	Refer to; referring to; reference
RFI	Radio frequency interference
RIG	Station equipment
RPT	Repeat; I repeat
RTTY	Radioteletype
RX	Receiver
SASE	Self-addressed, stamped envelope
SED	Said
SIG	Signature; signal
SINE	Operator's personal initials or nickname
SKED	Schedule
SRI	Sorry
SSB	Single sideband
SVC	Service; prefix to service message
T	Zero
TFC	Traffic
TMW	Tomorrow
TNX-TKS	Thanks
TT	That
TU	Thank you
TVI	Television interference
TX	Transmitter
UR-URS	Your; You're; yours
VFO	Variable-frequency oscillator
VY	Very
WA	Word after
WB	Word before
WD-WDS	Word; words
WKD-WKG	Worked; working
WL	Well; will
WUD	Would
WX	Weather
XCVR	Transceiver
XMTR (TX)	Transmitter
XTAL	Crystal
XYL (YF)	Wife
YL	Young lady
73	Best regards
88	Love and kisses

used after a CQ, or whenever you wish to invite anyone to reply.

BK is another ending signal, used during a QSO to indicate a "break" in talking, briefly. You can ask a question, interject a comment, whatever. You do not need to send call signs, except once every 10 minutes.

In short, QSOs can approach what we think of as normal conversation. Try it; it works.

ENDING A CONTACT

At the end of your QSO, just say goodbye. Again, be brief, concise, and sincere. 73 ("best regards"—*not* 73s, which is "best regardses") sent six times is pretty silly. Once is sufficient. So is the old "shave-and-a-haircut....two-bits" ditty, which still survives today, even outside the Novice bands. Just end the conversation, cleanly.

Clean is also a good adjective to use in talking about the code, or CW, itself. Good code is clean, with well-formed characters, correctly spaced. Understanding that—with proper word spacing and enough practice—you can become a CW artist. You can create flowing, rhythmical CW, a thing of joy and beauty.

You should understand and appreciate these rhythms before you get on the air. (Ideally, you've been taught this way, and are ready to operate when your license arrives.) One of the best ways to develop this feeling is to stay with a hand key until you have mastered it. Then, and only then, should you move to an electronic keyer. If you've gotten the feeling right, the electronic keyer's digital accuracy will be easy to accept and appreciate.

If you are interested in developing this feeling and appreciation for CW, you'll have to practice. Try sending in step with W1AW's code practice using a code oscillator (the schedule appears elsewhere in this issue). You should try to practice your CW a small amount each day. A traffic net will give you a concentrated dose of CW (usually well sent!) daily. Many Novice and slow-speed nets are looking for new participants (a *Net Directory* is available for $1 from ARRL). Also, you might want to try your hand at contesting. Every February, for example, the ARRL-sponsored Novice Roundup offers beginners a chance to increase their CW speed, pick up some new states and have a great time (rules appear in January *QST*).

Then practice some more. Listen and listen, and practice. You'll be surprised how easy it can be. Don't be discouraged. Remember to take your time; don't try (or expect) to learn this skill overnight. Keep trying, practicing in small time periods as often as you can.

Seek out good models. Listen to good CW—the W1AW computer-generated code practice is excellent. Try copying above your limit. When doing this, listen for the rhythms and spacing. Pretty soon, your own skills will improve, both sending and receiving.

When you get tired, do something different, like studying to upgrade. Do some tinkering; putter around the house. Put up a new antenna. Talk to others; ask about their experiences. Don't try learning it all by yourself—in self-imposed exile. Everyone was a beginner—a Novice—at one time.

Some ways to become a proficient CW operator have been outlined here; ways in which we use CW to communicate have been mentioned. When you're first starting out, you copy the code. Copying and communicating are not, necessarily, the same thing. Copying implies writing something down. That's pretty clumsy for communicating.

Writing what you copy means you have to translate it—from sounds to written word to comprehension by reading. Obviously, this slows you down—especially at slow speeds. Eventually, you will hear the sounds as actual words and phrases—just as you hear and comprehend a language you have learned. That way, understanding comes first, followed by any copying. This is the secret to higher speeds in CW, and the key to real CW enjoyment. This process comes with the practice, so be patient.

The code isn't a fine levied against people who wish to be hams. It's a well-established and viable means of communication, a method that is a long way from being a lost art.† By learning it correctly, and gradually losing of your beginning "accent," your enjoyment of CW will be that much greater. You'll be on your way to becoming a CW artist, and a top-notch operator.

†For a thorough discussion on the evolution of code, from straight key to computers, as well as practical advice on learning the code and its modern-day uses, see *Morse Code: The Essential Language*, available from ARRL. Ordering information is on page 152 of this issue.

Don Daso, WA8MAZ, was first licensed as a teenager in 1963, and Morse code has held a special place in his heart ever since. He recommends CW traffic nets as a means of gaining confidence (and code speed).

Land's End to John O'Groats with 2 Metres

What's it like traveling on foot through the moors of Britain with only a hand-held to keep you company?

By David Adams, VE3HBF
RR 1, Sutton West
ON L0E 1R0

"How To Stop Yourself Dying on the Moors" is the rather scary title of a leaflet for hikers on the Pennine Way in England. This famous Long Distance Path goes north from Derbyshire across the peaty, high moors near Manchester and other industrial cities. In wet weather, the peat bogs can be dangerous, and the leaflet urges: "Have at least one companion. The minimum party for safety is really three—one to stay with an injured person and one to get help."

Despite this sound advice, I felt safe in hiking alone, as I had my 2-metre rig in my shirt pocket. If I twisted an ankle, got lost or stuck in a bog, I had only to "whistle up" a repeater to summon help. Volunteer Mountain Rescue Teams all along the Pennines are ready to search the moors in all weather. My UK call was G4NWA, which soon became known as "Never Walk Alone." In 89 days walking from the southwest tip of England to the extreme northeast of Scotland, I never once had to make an emergency call; but I made a host of friends along the way.

My journey began at the end of April 1982. Bob, G2JL drove me the dozen miles from Penzance to Land's End, and watched me set off along the Cornwall Coast Path atop those spectacular granite cliffs. Bob had arranged for me to visit the Cable & Wireless Training College, a few miles along the coast at Porthcurno. There, 100 students from all parts of the British Commonwealth are instructed in everything from magnetic theory and touch-typing to complex satellite technology. Porthcurno was where the first cable link with India came ashore in 1870; it became the hub of Britain's worldwide cable network. On the cliffs nearby I saw the concrete bases and anchor rings of antenna towers put up at the turn of the century to monitor Marconi's experiments at Poldhu, 18 miles away, across Mount's Bay.

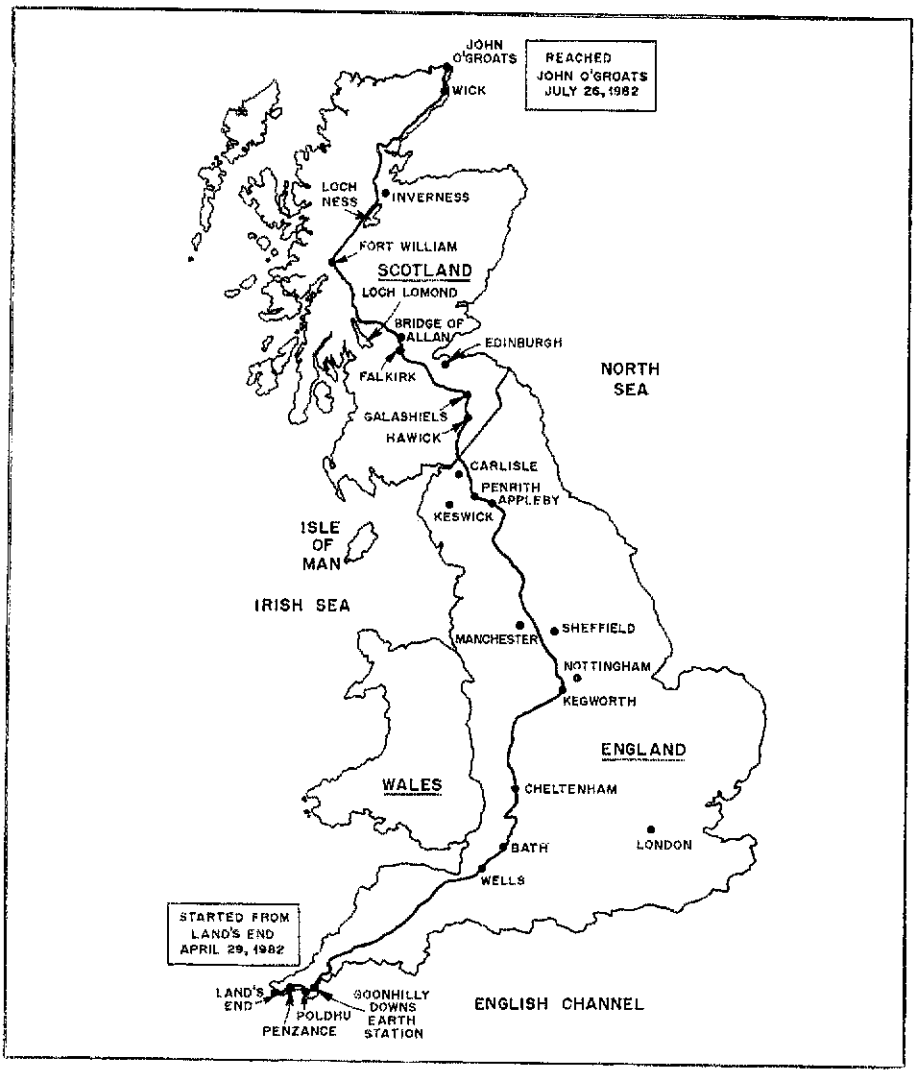
Because of a malfunctioning camera, David wasn't able to capture much of his 2-metre adventures in Great Britain on film. However, here's a glimpse of VE3HBF while hiking the 435-mile Bruce Trail in Ontario in 1984 to help raise money on behalf of Radio Reading for the Blind and print-handicapped people in the Toronto-Niagara area. *(photo by Betty Adams)*

On a stormy afternoon, I reached the Marconi Memorial, on the windswept clifftop at Poldhu, commemorating the first transatlantic radio message in 1901 and the first shortwave beam transmission in 1924. A few miles inland, I visited the Goonhilly Downs Earth Station, whose five great dishes handle most of Britain's international telephone traffic, as well as telex, facsimile and data transmission, telegrams and television. In 1962, Goonhilly, with the US and France, helped pioneer the first satellite tests. It was the first European station to transmit colour TV signals, and the first to transmit a live TV program to America.

The best of the UK 2-metre repeaters for me was GB2WR, on a 1000-foot TV antenna at the top of a 900-foot hill just outside the cathedral city of Wells in Somerset. I stopped for a rest right under the tower, and I was within range of 'WR for almost two weeks, making contacts as far away as the Channel Islands (over 100 miles). It was a busy repeater, but its many users were unfailingly polite, pausing to let others in.

More than once, people who heard me came out to find me, like G8OGN, who spotted me about to disappear down a footpath and whisked me to a nearby pub for a pint. Another time, I was admiring the view from a high point on the Cotswold Way footpath when someone called, "Is your name David?" It was G6GNG, up on the heights for a spot of 2-metre DXing. G3ZQQ and his family cooled me off one hot afternoon with lemonade and ice cream near Kidderminster. G4JY gave me supper in Kinver, and managed to contact my friends in Canada despite very poor propagation. I looked up G4JZ in his cluttered "Old Forge," tucked away in the Cotswold Hills near Cheltenham.

I just cannot list all the amateurs who showered me with kindness and hospitality, but one of the high spots was a stay with G4IRH and his family (and a full day's rest from walking!). G4IRH's home is Kegworth, a village in the Midlands, where I had spent Christmas holidays as a boy 55 years earlier. We drove into Nottingham, looking in vain for my old schoolfriend,



Along this 1145-mile route, which can be as lonely as it is lovely, David met a fair share of friendly amateurs who opened their homes—and the ham bands—to him.

and saw the Theatre Royal, where we came to the Christmas pantomine long ago. And we walked over to The Manor House, which had been my home for those Christmas holidays, and called in to see another amateur whose house is in the grounds there.

I followed the challenging Pennine Way for 100 miles to the edge of the Lake District and the Yorkshire Dales. My bed-and-breakfast home in Appleby in the Eden Valley happened to be next door to an antenna farm and a house called Condensergapp. After supper, I walked over and met G3JYP and his family. In the shack, we made contact with VE3SW, just across Lake Simcoe from my home in Canada. A delightful walk beside the River Eden took me to Penrith, where my old friend G3GRX had promised to put me up for a couple of nights—and another day's rest from walking. My home in Canada is 5 miles from the lakeside village of Keswick, so G3GRX took me into Keswick, on Derwentwater, aswarm with hundreds of hikers exploring the beautiful lakeland countryside.

I crossed the border into Scotland, and it took a little while to get used to saying "GM4NWA." I talked with GM3COX/Mobile, who offered to find me a bed-and-breakfast place in Hawick, while I walked beside clear, swift-flowing waters of the Teviot. In Galashiels, I followed the valley of the Tweed, past Abbotsford House, and westward along quiet forestry footpaths to Peebles. This is Walter Scott country; reminders of him and his stories are everywhere.

After crossing the industrial belt that stretches between Edinburgh and Glasgow, I stopped in Falkirk for bed and breakfast at Ivanhoe Lodge, just along the road from the chemist shop of GM4EJX. Chatting, we stood on the sidewalk outside his store and called on my hand-held for GM2TW, an old-timer with whom I had had many a QSO. I had never met him, but his son, GM4MCB, was one of the group from Stirling who arranged a special get-together for me in Bridge of Allan, after driving out to meet me on the road near Bannockburn, where Robert the Bruce defeated the English in 1314.

A few days later, as I picked my way carefully over slippery rocks in a driving rain on the wooded slopes above the bonnie banks of Loch Lomond, a figure in raincoat and sou'wester came toward me carrying a fishing rod. As he approached, I saw that the "fishing rod" was in fact a 2-metre whip. This was GM6JYT hiking back home to Glasgow. He wasn't surprised to see me, as he had heard from his club in Glasgow that I was going to walk the West Highland Way.

This West Highland Way is Scotland's first official Long Distance Path. It crosses some of the loneliest and loveliest moor and mountain country of the Highlands between Glasgow and Fort William. The wild scenery is magnificent, and the Countryside Commission keeps the path in good condition. Near Crianlarich, I fell in with two Canadians, a father and son, who were going my way. For five days we walked together, all the way to Fort William. As I came down from the mountains toward Fort William, I talked with GM6DPT, in the town.

Next morning, I started up the Great Glen, which cuts Scotland diagonally in two, when a car passed me and pulled up. Out jumped the driver, who pulled out his camera and snapped a picture of me. Here was GM6DPT, come to see how I was making out. He produced a thermos of hot coffee, and doughnuts. I told him the sad story of how my camera had let me down; I had taken six rolls of 36 pictures in three weeks before I found out they were all duds—my beloved camera had succumbed to some terrible but unknown malady! Devastated (as I had been) to realize that I had no photographic record of my first 900 miles, John dived into the trunk of his car, and handed me his spare camera! "Just mail it back when you get to John O'Groats" were his parting words.

At the north end of the Great Glen, I talked on 2 metres with GM4LNU, from Inverness, who made repeated but unsuccessful attempts to contact my friends in Canada. Finally, he just picked up the phone and placed a call to pass my news along.

On the morning of my 89th, and last, day on the road, I reached the QTH of GM3JDR, at Auckengill, just 5 miles from John O'Groats. GM3JDR works at the lighthouse in Wick; he and his family welcomed me into their wee home by the sea. I thought of G2JL in Penzance and all the other amateurs who had helped me along the way. Now it was GM3JDR who brightened my last few miles as "Never Walk Alone."

I got to John O'Groats some 25 pounds lighter, fit as a fiddle, and with never a blister. My son, Gordon, and his fiancee were there to greet me with a bottle of champagne, having come over from Canada to be there at the finish.

VUCC: The Right Way

Now that you have worked enough grid squares for VUCC, here's how to get your award application processed quickly!

By Larry Reiser, WB9MSV
119 N Castle Dr
Dunlap, IL 61525

It's a lazy early-August 1986 afternoon. I've just finished putting a 2-meter squalo on the car, using an old modified trunk lip mount from another antenna. The SWR bridge is in line. Key down CW, with 25 watts out, 1.2:1. Perfect! Can I really make a QSO on 2-meter mobile SSB? Let's try 144.200 MHz. "CQ CQ CQ WB9MSV WB9MSV in grid square EN50 calling and by." To my amazement, KB3QM (grid square FM28) in Delaware answers with a 5-9 report. As I pick myself up from the driveway, I confirm the report and set a new land-speed record as I run to the shack and turn on the base station.

So starts an evening of fun and frolic on 2 meters as a great sporadic-E cloud envelops the country from Massachusetts to Texas. It's not long before several new grid squares enter the log. A few days later the cards start rolling in.

This is a tale of excitement that took place above 50 MHz. Many frustrated low-band enthusiasts are moving up in frequency between sunspot cycle peaks. The DX, which they are quite used to chasing, has taken on a new shape—not in the form of countries, but in grid squares. A grid square measures 2° longitude by 1° latitude.

As a result of the ARRL's implementing the VHF/UHF Century Club (VUCC) program in January 1983, the activity on the VHF and UHF bands has increased logarithmically. Many portable mountaintop grid-peditions are taking place, resulting in amazingly large grid count numbers for many operators. Even low-power stations, running very modest antennas, are qualifying for VUCC.

Where do all the QSL cards that are generated by these fantastic band openings go for verification? Not to ARRL HQ, but to volunteer VHF Awards Managers. The volunteer position of VHF Awards Manager was created under a new plan that utilizes active amateurs, recognized by the ARRL, to handle the verification chores. Initially, only a select few of the prominent VHFers were Awards Managers, but as popularity increased a new program was created involving appointees from ARRL Special Service Clubs (SSCs). This program allows each SSC to appoint both a VHF and HF Awards Manager to handle QSL card checking and to initiate the awards process.

ARRL VUCC AWARD APPLICATION

1. Please PRINT. 2. Use separate application for EACH band.

Call: WA5VJB Name: Kent Britain (Print exactly as you want it to appear on certificate) APR -2 AM 9:19

List any ex-calls used on any cards submitted.

Address: 1626 Vineyard (number and street)
Grand Prairie, Tx 75052 (City, state/country, ZIP/PC)

FOR RETURN POSTAGE
Money/Stamps enclosed
$ Ret 1.00 MSH
PLUS $1 for certificate or s.a.s.e. (2 units first class postage) for endorsement.
Return my cards via:
☐ Registered
☐ Certified • U.S. only
☐ United Parcel Service
☒ First-class mail

Membership control number (from your QST wrapper): 606594 07 0188
☐ Initial application (check one) ☐ Endorsement
BAND (check one only): ☐ 50 ☐ 144 ☐ 220 ☐ 432 ☐ 902 ☒ 1296 ☐ 2.3 ☐ 3.4 ☐ 5.7 ☐ 10 ☐ 24 ☐ 47
INITIAL applicants. 26
Nr. of grid squares claimed.
ENDORSEMENTS:

Nr. previously credited	+ Nr. additional in this application	= NEW TOTAL

The undersigned affirms he/she has read, understood, and abided by the rules of the VUCC (MCS-261).

Signature: Kent Britain Date: 3/28/87 19__

VHF AWARDS MANAGER VERIFICATION

Grid square credits claimed on this application have been verified as correct and true. TOTAL number of grid squares credited: 26

(signature) (call) (Mgr. 4-digit code #)
V-NE-03
Mar. 28, 1987 (date)

DIRECTIONS TO APPLICANT

1. Fill out this application and MCS-259. Read the VUCC Rules (MCS-261) carefully.
2. Enclose postage sufficient for return of cards (if mailed), and return address label.
3. For initial applicants, enclose $1.00 U.S. for mailing certificate (W/VEs only).
4. For endorsement, enclose s.a.s.e. with 2 units of first class postage (W/VEs only).
5. Sort QSLs alphabetically by field, and numerically within the field, from 00 to 99.
6. Forward cards to nearest VHF Awards Manager (see attached information). DO NOT SEND CARDS TO ARRL HQ.

MCS-260(287)

Example of the properly completed VUCC application submitted by Kent Britain, WA5VJB.

The responsibility of each VUCC applicant is to provide the VHF Awards Manager with accurate, easy-to-read and complete data. This is of paramount importance as the number of award applications increases.

While verifying many original applications and numerous requests for additional grid-square credit endorsements over the past year and a half, I have found several mistakes that occur regularly on both initial and endorsement applications.

The most frequent and agonizing error is that the QSL cards, when submitted, are not sorted correctly by grid field. The cards also do not follow the grid-square order on the MCS-259 summary sheet, which must also be submitted. The MCS-259 summary

sheet is a continuing record of grid squares confirmed versus grid squares needed. For example, a card that confirms a contact with grid square EM12 turns up where a grid EN12 card should be. It takes the VHF Awards Manager extra time to make sure that all cards match the order on the summary sheets.

The second most frustrating problem arises when an applicant requests credit for 100 grids but submits fewer than 100 cards. I recently rejected an HF Worked All States (I am an HF Awards Manager also) request when only 48 QSL cards confirming 48 states arrived with the application. Either a simple mistake was made or this individual doesn't know that Alaska and Hawaii are in the Union.

Other difficulties that periodically appear include:

1) There is no *frequency* or *band* information on the QSL card.

2) There is no *date* of QSO.

3) An applicant doesn't include an SASE for the ARRL to return an endorsement sticker, or the $1 application fee for processing of the certificate.

4) An applicant doesn't provide a self-addressed return envelope or box, with proper postage affixed, to return the QSL cards to the applicant after they have been processed.

The accompanying sidebar contains guidelines to follow when submitting your VUCC application. Upon request, the ARRL will send you the name and address of the Awards Manager for your geographical area and all application materials.

May the Tropo be with you. Good VHF/UHF DXing! QST

VUCC Application Guidelines

On the average, it requires 30 minutes for an Awards Manager to verify an initial VUCC application. To help ensure that the application process goes smoothly, here are a few guidelines for you to follow:

- Read the VUCC rules (MCS-261) very carefully.
- Legibly print the calls of each claimed QSL on the grid field summary sheets (MCS-259).
- Count your QSL cards. Make sure the number of QSL cards in each grid field you submit for verification matches the actual number of QSL cards submitted.
- Separate, with rubber bands or paper, each set of QSL cards by grid field, and make sure the QSL cards are in grid-square order from 00 to 99.
- Enclose sufficient return postage and a self-addressed envelope or mailing box for the safe return of those rare QSL cards. Many times, the original boxes or envelopes the cards arrived in are not reusable.

VHF/UHF Century Club Awards

The ARRL VUCC numbered certificate is given to amateurs who submit written confirmations for contacts with the minimum number of Maidenhead grid-square locators indicated in *italics* for each band listing. Initial qualifiers are shown first, followed by those with endorsements, for April 14, 1987 through June 13, 1987. An SASE will bring you the rules and application forms.

6 m (50 MHz)
100

210	WB0CGH
211	WA7TUX
212	W0RTZ
213	W5HUQ
214	KA9SOW
215	WA1TRE
216	N5HHS/5 (EM 10)
217	N5HHS (EL 29)
K1RSA	125
K4RWP	200
N4AVV	125
W5HUQ	125
KA9LDS	150
KA9MGR	300
N0HQL	125

2 m (144 MHz)
100

172	K6PVS
173	K3NXH
174	N4EJW
175	Y22SA
176	NY4T
177	WB4OOJ
178	KA0GGI
DL6LAU	200
G6XVV	150
W2GU	125
WA6MGZ	200

70 cm (432 MHz)
50

91	K9DZS
92	WB9CAS
K1FO	190
N2AHN	60

23 cm (1296 MHz)
25

G4PRJ	30
WB5AFY	45
WB5LUA	80

2.3 GHz
5

16	W4HHK
17	N3CX
WB5AFY	15
WB5LUA	25

3.4 GHz
5

WB5AFY	10

5.7 GHz
5

9	WB5LUA
K5PJR	20
WA5ICW	20

10 GHz
5

17	K6UQH

QST

W1AW Schedule

April 5-October 25, 1987 **MTWThFSSn = Days of Week** **Dy = Daily**

W1AW code practice and bulletin transmissions are sent on the following schedule:

UTC	Slow Code Practice	MWF: 0200, 1300, 2300; TThSSn: 2000; Sn: 0200
	Fast Code Practice	MWF: 2000; TTh: 0200, 1300; TThSSn: 2300; S: 0200
	CW Bulletins	Dy: 0000, 0300, 2100; MTWThF: 1400
	Teleprinter Bulletins	Dy: 0100, 0400, 2200; MTWThF: 1500
	Voice Bulletins	Dy: 0130, 0430
EDT	Slow Code Practice	MWF: 9 AM, 7 PM; TThSSn: 4 PM, 10 PM
	Fast Code Practice	MWF: 4 PM, 10 PM; TTh: 9 AM; TThSSn: 7 PM
	CW Bulletins	Dy: 5 PM, 8 PM, 11 PM; MTWThF: 10 AM
	Teleprinter Bulletins	Dy: 6 PM, 9 PM, 12 PM; MTWThF: 11 AM
	Voice Bulletins	Dy: 9:30 PM, 12:30 AM
CDT	Slow Code Practice	MWF: 8 AM, 6 PM; TThSSn: 3 PM, 9 PM
	Fast Code Practice	MWF: 3 PM, 9 PM; TTh: 8 AM; TThSSn: 6 PM
	CW Bulletins	Dy: 4 PM, 7 PM, 10 PM; MTWThF: 9 AM
	Teleprinter Bulletins	Dy: 5 PM, 8 PM, 11 PM; MTWThF: 10 AM
	Voice Bulletins	Dy: 8:30 PM, 11:30 PM
MDT	Slow Code Practice	MWF: 7 AM, 5 PM; TThSSn: 2 PM, 8 PM
	Fast Code Practice	MWF: 2 PM, 8 PM; TTh: 7 AM; TThSSn: 5 PM
	CW Bulletins	Dy: 3 PM, 6 PM, 9 PM; MTWThF: 8 AM
	Teleprinter Bulletins	Dy: 4 PM, 7 PM, 10 PM; MTWThF: 9 AM
	Voice Bulletins	Dy: 7:30 PM, 10:30 PM
PDT	Slow Code Practice	MWF: 6 AM, 4 PM; TThSSn: 1 PM, 7 PM
	Fast Code Practice	MWF: 1 PM 7 PM; TTh: 6 AM; TThSSn: 4 PM
	CW Bulletins	Dy: 2 PM, 5 PM, 8 PM; MTWThF: 7 AM
	Teleprinter Bulletins	Dy: 3 PM, 6 PM, 9 PM; MTWThF: 8 AM
	Voice Bulletins	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.

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.

On Monday, Wednesday and Friday, 1300 through 2100 UTC, transmissions are beamed to Europe on 14, 21 and 28 MHz; on Wednesday at 2200 UTC they are beamed south.

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 June 1987 *QST*, pages 9 and 70" 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 70.

On Fridays, UTC, a DX bulletin replaces the regular bulletin transmissions.

On Tuesdays and Saturdays at 2230 UTC, Keplerian Elements for active amateur satellites will be sent on 45.45-baud Baudot on the regular teleprinter frequencies.

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 1500 UTC transmissions, and 2200 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 EDT and on Saturday and Sunday from 3:30 PM to 1 AM EDT. 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 September 7.

Happenings

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

ARRL Requests Packet STA

The ARRL has filed a request to the FCC for special temporary authority (STA) to permit approximately 50 amateur packet stations around the country to conduct unattended automatic operation while transmitting third-party traffic on frequencies below 50 MHz.

This STA request would waive for 6 months the provision of section 97.80 of the FCC rules, which allows unattended operation only while transmitting third-party traffic on frequencies above 50 MHz.

The amateur stations included in the STA will be able to participate as relay stations in a long-haul HF net called "Skipnet." This net will operate on a single frequency in the 80, 40, 30 and 20-meter bands, and stations will relay traffic via packet throughout the country.

If the FCC approves the STA, the ARRL and the packet community hope to show that unattended packet operation on HF can be conducted without harmful interference to other stations and that the content of third-party messages relayed via "Skipnet" will not be improper or business related.

A little history: This STA request is a result of the Report and Order in FCC Docket 85-105, issued in January 1986. In the original Order, FCC amended its rules to allow automatic control for digital operation, but continued to require that if third-party traffic was being passed, a control operator must be present to monitor the communications. Thus, while the Commission granted automatic control on the one hand, it added third-party language that practically prohibited it on the other. Many active packet operators noted that since much amateur digital communications is conducted at speeds faster than a person can read, by the time the control operator read the improper traffic, it would have already been relayed!

The ARRL filed a petition for "Extraordinary Relief," requesting the Commission temporarily waive the rules requiring a control operator for packet operations above 50 MHz, provided certain conditions were met; the Commission rapidly complied. A few months later, the Commission, acting on Petitions for Reconsideration, including one filed by ARRL, adopted Section 97.80(b) to allow unattended automatic operation while passing third-party traffic on frequencies 50 MHz and above.

The packet community feels that a useful purpose would be served by permitting at least limited automatic operation on HF, bearing in mind the crowded nature of the HF bands and the need to minimize the impact on the other users of the spectrum. If the STA operations are successful, ARRL may decide to request a permanent rules change.

SECOND NOTICE—ARRL BOARD ELECTIONS—CALL FOR NOMINATIONS

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

The ARRL Board of Directors is the governing body of the nonprofit, educational and scientific corporation chartered under laws of Connecticut as the American Radio Relay League. The Board of Directors is ultimately responsible for all League matters, including deciding ARRL priorities and services that will be made available to the membership. There are 16 Directors, who are elected by the membership on a geographical basis. (The CRRL President and Vice President serve as Canadian Director and Vice Director, respectively.) Half of the Directors stand for election in even-numbered years, half in the odd. At the same time Directors are elected, Vice Directors are also chosen who can fill in when Directors are unable to serve. For this reason, candidates for Vice Director must meet the same requirements as the candidates for Director.

ARRL voters/members have the privilege and responsibility either to decide they like the actions of their incumbent representatives and support them actively for reelection or to decide that someone else could do a better job and work for their election.

For a candidate to be eligible for the office of Director or Vice Director, he or she must submit a nominating petition bearing the signatures of 10 (or more) Full members of a Division naming him or her as a candidate for Director or Vice Director. The petition must be received by League Headquarters *no later than noon on August 20, 1987.* Each candidate must also provide information (on a form provided by HQ) that will allow the Executive Committee (EC) of the Board of Directors to determine the eligibility of the candidate in accordance with the provision of the ARRL Articles of Association and By-Laws.

The candidate must also include a statement of not more than 300 words, setting forth the candidate's qualifications, which will be included with the ballot mailed to members without content editing. If the statement as submitted exceeds 300 words, the first 300 words will be used. The statement must not contain any derogatory reference to any person or entity. Along with the 300-word statement, the candidate must also submit an accompanying signed statement certifying that the information is true to the best of the candidate's knowledge and belief. Any willful violation of the statement will be grounds for disqualification by the Executive Committee. A candidate may also submit a recent photo of himself/herself.

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

The EC will meet shortly after August 20, so candidates should make sure their information form arrives at Headquarters as early as possible but *no later than August 20.* (It is in the candidate's best interest, obviously, to get the nomination in early. If there is to be a mid-August nomination for some unavoidable reason, the candidate information, 300-word statement, signed certification and photo should also accompany the nominating petition.)

Whenever there is more than one candidate for either office, ballots will be sent to all Full members of the League in that Division who were in good standing as of September 10. (You must be a licensed radio amateur to be

a Full member.) The ballots will be mailed not later than October 1, and, to be valid, must be received at HQ by noon on Tuesday, November 20. A group of nominators can name a candidate for Director or Vice Director, or both, but there are no "slates" as such—each candidate appears on the ballot in alphabetical order. If a person is nominated for both Director and Vice Director, the nomination for Director will stand and that for Vice Director will be void. A person nominated for both offices does have the option, however, of declining the higher nomination and running for Vice Director if he or she wishes.

Nominating Form

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

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

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

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

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

Absentee Ballots

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

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

The Incumbents

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

Atlantic—Hugh A. Turnbull, W3ABC, and James M. Mozley, W2BCH.

Dakota—Howard Mark, WØOZC, and Richard Whiting, WØTN.

Delta—Clyde O. Hurlbert, W5CH, and Lionel A. Oubre, K5DPG.

Great Lakes—George S. Wilson III, W4OYI, and Allan L. Severson, AB8P.

Midwest—Paul Grauer, WØFIR, and Claire Richard Dyas, WØJCP.

Pacific—Rodney J. Stafford, KB6ZV, and James Knochenhauer, K6ITL.

Southeastern—Frank M. Butler Jr, W4RH, and Evelyn Gauzens, W4WYR.

Petitions need 10 or more signatures of Full members and are due at Headquarters by noon August 20. If there is only one candidate for an office, he or she will be declared elected by the Executive Committee; otherwise, ballots will be mailed not later than October 1 to Full members of record September 10. To be valid, ballots must reach Headquarters before noon November 20. The new term will begin at noon January 1, 1988.

For the Board of Directors:
May 15, 1987
Perry Williams, W1UED
Secretary

LEE AURICK, *QST* ADVERTISING MANAGER, RETIRES

Advertising is the lifeblood of any publication. The responsibility for coordinating advertising in *QST* and other League publications rests with the Advertising Manager. Here at HQ, Lee Aurick, W1SE, has managed the Advertising Department since January 1977. Lee will retire August 31, and he and his wife Mary will be moving to Winter Springs, Florida.

Lee first joined the ARRL HQ staff in 1954, serving as Assistant Secretary until 1957. He then returned to industry, where he was a part of the RCA Advertising and Sales Promotion group in New Jersey and Pennsylvania. After 20 years of service with RCA, Lee rejoined HQ as Advertising Manager.

Lee was first licensed in 1946, and has held many call signs including K3AZ, K2LS and W2LE. His son is K3QAF, and his grandson, KA9SNP, was licensed at age 10.

A second hobby is the study of the history of the events leading to WW II and the conflict itself. Lee hopes he may now have the time to complete reading the large library of books on this subject that he has accumulated over the years.

ARRL FILES COMMENTS IN SELECTOR SWITCH NPRM

The ARRL has filed comments in FCC General Docket 87-107, an FCC proposal concerning input selector switches for televisions. This switch would permit the viewer to alternate between receiving television channels on his cable system or receiving local "over the air" channels directly.

Why does this affect amateurs? This switch has the potential for causing cable signal leakage over a wide spectrum, including amateur frequencies, or conversely, to allow amateur signals to enter the cable system, causing interference to cable users. In this docket, the FCC has proposed that this switch meet a number of technical standards, including an isolation factor of approximately 60 dB in order to meet the Part 15 technical standards required by the FCC.

In its comments, the ARRL argues that a stricter 90 dB standard should be required for these switches. Discussions between the staff of the National Cable Television Association, ARRL and others have revealed that cable input switches now designed are capable of 90 dB of isolation. Even after years of service, effective isolation of 80 dB in the switch may be expected.

The League's comments state: "If an error is made now in establishing interference parameters for cable terminal and switching equipment, the results of that error will plague the public, radio users and Commission enforcement staff for years to come. Is it not better to begin with a conservative standard at the outset, under such circumstances? On this basis, the League recommends that the Section 15.606(a) standards not be applied to cable input selector switches... the degree of isolation between the cable input connection and the antenna input should be no less than 90 dB."

ARRL also urged the Commission to require that when the input selector switch is switched to the cable input terminal, the antenna input be properly grounded or otherwise shielded from the other positions. This would also prevent cable signal interference to other users, and conversely, prevent amateur signals from entering the cable system.

The problem of cable interference extends not only to the switch, but to the entire system of cable components that terminate at the television, such as matching transformers, connectors and cables. ARRL urged FCC to establish isolation requirements that would extend to this terminal equipment.

In conclusion, ARRL urged FCC not to adopt the proposed 60 dB standard for these switches, but to adopt the 90 dB standard which present technology already permits.

CW DEAD? NEVER!

Who says CW is dead? Not the FCC! The June 5 *Federal Register* presents a proposed amendment by the FCC to allow the use of CW (and voice) by Emergency Position Indicating Radiobeacons (EPIRBs) and Emergency Locator Transmitters (ELTs). These are devices which automatically "turn on" if a plane makes an emergency landing or crashes. Presently, these devices use a nonvoice swept audio signal modulation.

The FCC summary in the proposal (PR Docket 87-133) said that the use of CW and voice would improve the detection of distress situations and aid search-and-rescue operations.

JAMES MCKINNEY NAMED TO WHITE HOUSE POSITION

James McKinney has been named Deputy Assistant to the President and Director of the White House Military Office. McKinney, a career FCC employee, is known to the Amateur Radio community for being the Chief of the FCC's Private Radio Bureau from 1981-83, the Bureau which oversees the Amateur Radio Service. Since leaving the Private Radio Bureau, McKinney had been Chief of the FCC's Mass Media Bureau.

During his 24 years of service with FCC, McKinney has received a number of management awards, including The 1985 Presidential

Rank Award for Distinguished Executive Service.

EV HENRY, W6AP, SILENT KEY

Everett "Ev" Henry, W6AP, who headed the Amateur and Citizens Division during the late 1960s, recently became a Silent Key. [Readers may have noticed his name and call in the Silent Keys column last month—Ed.] Ev was employed for many years with the FCC in various capacities with increasing positions of responsibility. In 1966, he was selected to be the Chief of the Marine Division and later moved to the former Amateur and Citizens Division, which he headed until his retirement in 1971.

AROUND HQ

ARRL Public Service Manager Mike Riley, KX1B, and ARRL Assistant Technical Editor Bob Schetgen, KU7G, have transferred into the Office of the Executive Vice-President to become Assistants to the Exec VP. Riley will also provide support for ARRL Secretary and Washington Area Coordinator Perry Williams, W1UED. Schetgen is working on various long-term projects including the proposed Visitor's Center.

With the advent of Novice Enhancement, Amateur Radio is growing—not only in terms of the number of licensees, but even more in terms of how many are active. The ARRL continues to grow, with membership increasing by more than 1000 during the past two months.

The 10-meter band has been virtually open round the clock to most of the US from New England during the past several weeks. Several HQ staffers have worked over 700 stations from W1AW in the Novice/Tech phone subband, providing many new amateurs with their first W1AW or CT QSO.

AMATEUR ANTENNA VICTORY IN MISSOURI

On May 15, the City Council of Kansas City, Missouri, unanimously passed a liberalized zoning ordinance allowing amateurs antenna-tower heights of up to 60 feet and a safety setback of one-third the height from the adjoining property. The previous standard was five feet above the rooftop in residential areas.

After an amateur in Kansas City was cited for violating the previous ordinance, Kansas City amateurs banded together to attempt to obtain a more liberal ordinance. A meeting was held between amateurs and city officials which convinced the officials that antennas five feet above rooftop was not adequate for most amateur communications. After further discussions with city officials, the city drafted the new ordinance. No opposition developed during the zoning commission hearings on the new ordinance, and it became effective May 15.

During the meetings with city officials and the subsequent ordinance hearings, amateurs were represented by Rod Richardson, WAØHHX, a local attorney specializing in property use issues. Richardson credits PRB-1, the FCC statement of Federal preemption of state and local regulations pertaining to amateur antennas, with convincing city officials to change their highly restrictive ordinance.

TRANSAMERICA BICYCLE RACE

On June 1, over 200 bicyclists started on the adventure of a lifetime—bicycling from Seattle, Washington to Atlantic City, New Jersey, to benefit the American Lung Association (ALA). The trip encompasses over 3000 miles.

The goal of the trip is to raise over $1 million for the ALA. A major concern with a race this size is rider safety. To coordinate emergency traffic, as well as routine messages, requires the development of a communications network from coast to coast.

More than 60 amateurs have been recruited along the course to pass information and calls for assistance to and from riders and the trek emergency-vehicle staff. ICOM America, Inc, is providing the equipment to be used on each of the checkpoints and emergency vehicles.

CONVICTION FOR SELLING ILLEGAL VIDEO TRANSMITTERS

A Federal jury in Las Vegas has convicted Joseph Andre Ali and his corporation, Orion Industries International of Las Vegas, on nine counts of importing and selling illegal video transmitters.

According to an FCC news release, Ali had imported and sold the illegal devices under the name "TV Genie" and had failed to file the necessary forms notifying the FCC of the operation. The TV Genie was designed to connect to a video source, such as a video cassette recorder or camera, and transmit the signal over the air to a nearby TV receiver. FCC regulations do not permit this type of operation.

Ali was found to have sold over 27,000 of the items after his corporation received its second warning that the devices were prohibited. Before searches and seizures halted the operation, net profits to his company exceeded $900,000. Ali could receive nine one-year sentences and fines of over $1 million, according to the FCC news release.

KC4 CALL SIGNS BEING ISSUED

Hearing lots of Antarctic stations on recently? If you live in New England your beam may be pointed south, but don't be disappointed if KC4AJO turns out to be in Virginia! For the past several weeks, Group D 2 × 3 call signs beginning with the prefix KC4 are now being issued to new Novices in the fourth call area.

US stations in the Antarctic are assigned only the following 32 call signs: KC4AAA-AAF and KC4USA-USZ.

SECTION MANAGER ELECTION NOTICE

To all ARRL members in the New Mexico, Alabama, Western Massachusetts, Alaska, Santa Barbara, Kansas, Tennessee, Michigan, East Bay and Delaware 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. 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 St, Newington, CT 06111

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

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

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

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

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

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

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

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

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

Richard K. Palm, K1CE
Field Services Manager

REPEAT NOMINATING SOLICITATION

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

SECTION MANAGER APPOINTMENT

In the Santa Barbara Section, Thomas I Geiger, W2KVA, has been appointed to complete the term (until December 31, 1987) of Byron W. Looney, K6FI (resigned).

In the West Indies Section, Jose A. "Tony" Purcell, KP4IG, has been appointed to complete the term (until September 30, 1988) of Alberto L. Valldejuli, WP4CSG (resigned).

SECTION MANAGER ELECTION RESULTS

The following Section Managers will begin a two-year term of office October 1, 1987:

Uncontested

Georgia	Edmund Kosobucki, K4JNL
Los Angeles	Phineas J. Icenbice, Jr. W6BF
Sacramento Valley	Robert Watson, W6IEW
Southern Texas	Arthur Ross, W5KR
Washington	Brad Wells, KR7L
West Virginia	Karl Thompson, K8KT

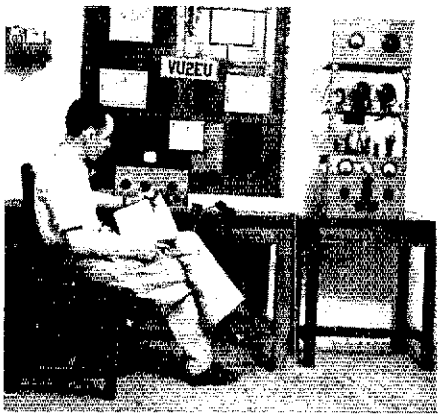
How's DX?

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

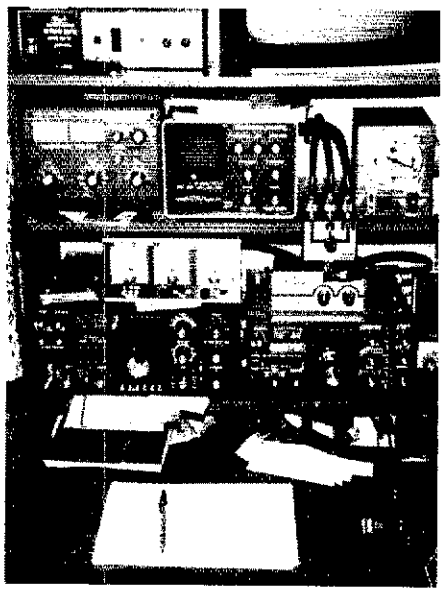
VU2EU/AC4EU

One of the fascinating things about DXing is that the casual cruising you do on the bands allows your ready ear to copy the bits and pieces of contacts in progress. Sophisticated "snooping" for sure, but fun! Some months back, this writer had the pleasure of overhearing the call VU2EU mentioned by a VK during a QSO in progress on the 30-meter band. Naturally, I stood by and then had a most interesting contact with VK2EZA/G6VS, who held the calls VU2EU/AC4EU pre-WW II. Further correspondence with George yielded the following information, making history come alive (once again!), thanks to the commonality of our interest in Amateur Radio.

"Born a few months before the start of WW I, I built my first crystal set at the age of 10 years, having gotten the "bug" from my father, who took a great interest in radio in those early days. Four years later, I had progressed through valve amplifiers to my first transmitter, which consisted of a PX4 in a TPTG circuit, tuned to "around" 200 meters, and a PM1LF audio amplifier connected in anode modulation. In 1928, I made my first (then illegal!) transmission energizing the carbon microphone from an acoustic windup gramophone. The signal was heard at a friend's house about 400 yards away. But, I was at least 'on the air'!



VU2EU (now VK2EZA) in 1938-39.



The VK2EZA/G6VS station today.

"Eventually, at the start of 1935, I became fully licensed as G6VS, but had little opportunity of using the call, as I left the UK for India and the Indian Signal Corps. In the same year, after passing the Indian Post and Telegraph's Non-commercial Operator's examination, I received the call VU2EU, remaining very active under this call until the outbreak of WW II. While in Cherat, on the Northwest Frontier of India (at an altitude of nearly 10,000 ft asl), the UK was worked with an input power of only 250 mW, using a Windom antenna. The average signal-strength report was 549. (Thank goodness, the California kilowatts didn't bother us much in those days!). The VU2EU photo was taken in Meerut, the place where the Indian Mutiny started with the revolt of the Sepoys, outside the Garrison Church.

"The TX shown consisted of a type-43 valve crystal oscillator, 25L6 doubler and a pair of 25L6s in the PA, with operation from 200 volt dc mains. The RX was a 0-v-1, operated from inert cells. Generally, a Windom antenna was used. I earned WAC and WBE, and also won the VK/ZL (VU2 region) from that station.

"AC4EU was only in operation a brief period towards the end of 1939, and only a handful of USA stations were worked. The majority of the contacts were with stations in the USSR. (All log books from both AC4EU and VU2EU were stolen during the war.)

"Returning home in 1945 at the end of hostilities, G6VS was reactivated, but became inactive in 1951 due to domestic problems. It wasn't until 1980 that I became active again on the air, and also took up ballroom Latin and sequence dancing. It was at a dance in 1984 that I met my present, supportive XYL, Audrey, who had returned to England after her husband, VK2BCM, became a Silent Key. After a few talks, I discovered that I had known him when he was G3OBH and a member of the Liverpool Radio Club. Small world! We married in November 1985 and came to New South Wales a year later."

VK2EZA/G6VS will be back in England in 1988 and, meanwhile, we look forward to many more interesting contacts!

George, VK2EZA/G6VS, with his supportive XYL, Audrey.

I WANT IT NOW

[An interesting DX consideration. The following is courtesy W6BDN.—Ed.]

The key component in most amateur high-power amplifiers is the electron tube. This device uses a smaller amount of power to control the flow of electrons and produce a substantially higher output power. In the tubes of interest to the ham, the stream of electrons is provided by a directly heated filament, or an indirectly heated cathode. Filaments are usually carburized thoriated tungsten, and cathodes are generally nickel coated, with combinations of the oxides of strontium, barium and calcium heated by a tungsten or tungsten-rhenium heater.

An important characteristic of an electron emitter is its work function. This is a measure of the energy (temperature) required to liberate the electrons from the surface. Tungsten-type filaments have an appreciably higher work function than oxide cathodes. The tube data sheet will usually tell you which kind of emitter is used. You can, however, make a very good guess from the heater/filament power required. If a maximum legal amplifier tube requires less than 80 watts of total heater power, it is almost surely an oxide cathode. If more than 120 W is needed, bet on a tungsten filament.

Okay, that's all very interesting, but so what? The cathode types require less heater power, but that is usually no big deal. But for the DXer there is a possibly significant difference, which should be considered along with other amplifier selection factors. If you hunt for DX as I do, you spend lots and lots of time listening, and very little time transmitting (with certain notable exception, major DXpeditions, etc). I always leave the amplifier off, unless (or until) I've heard, or sensed, potentially desirable prey. At that point, I want the amplifier and I want it now!

The directly heated filaments warm up and are ready to go in seconds. Oxide cathodes normally require minutes to stabilize at their operating temperature. This means that, with the latter types, you have to leave the amp on for long dormant periods, be gifted with precognizance, or risk missing a few.

From all of this you have no doubt guessed that my amp uses filament-type tubes. Well, not so. For reasons dating back to the dim past, I use a cathode type. You, however, may still have the option to consider the various factors and decide how important warmup time is to you.

HONOR ROLL TOO HARD?

W1HSB's "serious" DXing started about nine years ago in New Hampshire, and since that time he has worked all but nine DXCC listings (essentially with Advanced class privileges). Although Red has been continuously licensed since 1938 (originally W9GLP), it wasn't until 1978 that he got back on the air, not getting a beam up until 1979 when the DX bug bit. W1HSB currently uses a TS-430S, an L4B linear, ATB-34 tribander and a center-fed Zepp on 80 and 40. Not an elegant approach, he comments, but enough to make 5BDXCC as well as to bring him to Honor Roll ranking during the downslide of the sunspot cycle.

W1HSB was a WW II fighter pilot aboard aircraft carriers, later spending a lot of time overseas in the Diplomatic Service. Red says he holds the world's record for procrastination, as he upgraded to Extra in early March of this year!

(Thanks to New England Division Director K1KI for the tip which led to the above.)

W1HSB

Troster's Tips for Easy Listening

Malicious Interference I

You are the DX op. Last time, we discussed "policeman." There are also malicious types who intentionally zero beat your frequency and hold the key down, or send dots, or call test, or otherwise try to disrupt your operation by making it very difficult for a listener to copy your calls and reports. These people are "jammers," and jamming is illegal. Jamming also is against every good thing Amateur Radio stands for. (Fortunately, there are not many jammers in the world, but even a few are too many.)

Jammers display some personality quirk best known to psychologists. It is their moment of glory, their ego trip. They purposely disrupt a DX station that the entire amateur world is trying to work. They do not personally dislike you, the DX chaser, and probably do not even know who you are. Once in a while, however, jamming may be related to jealousy of some DXpedition.

The greatest chaos occurs with provocation. "Good guy" operators begin to yell at the jammer to stop jamming. That is now the ultimate success for the jammers because the incensed callers in effect are also jammers. The DXpedition operation is pretty well disrupted, and this is just what the jammer wants.

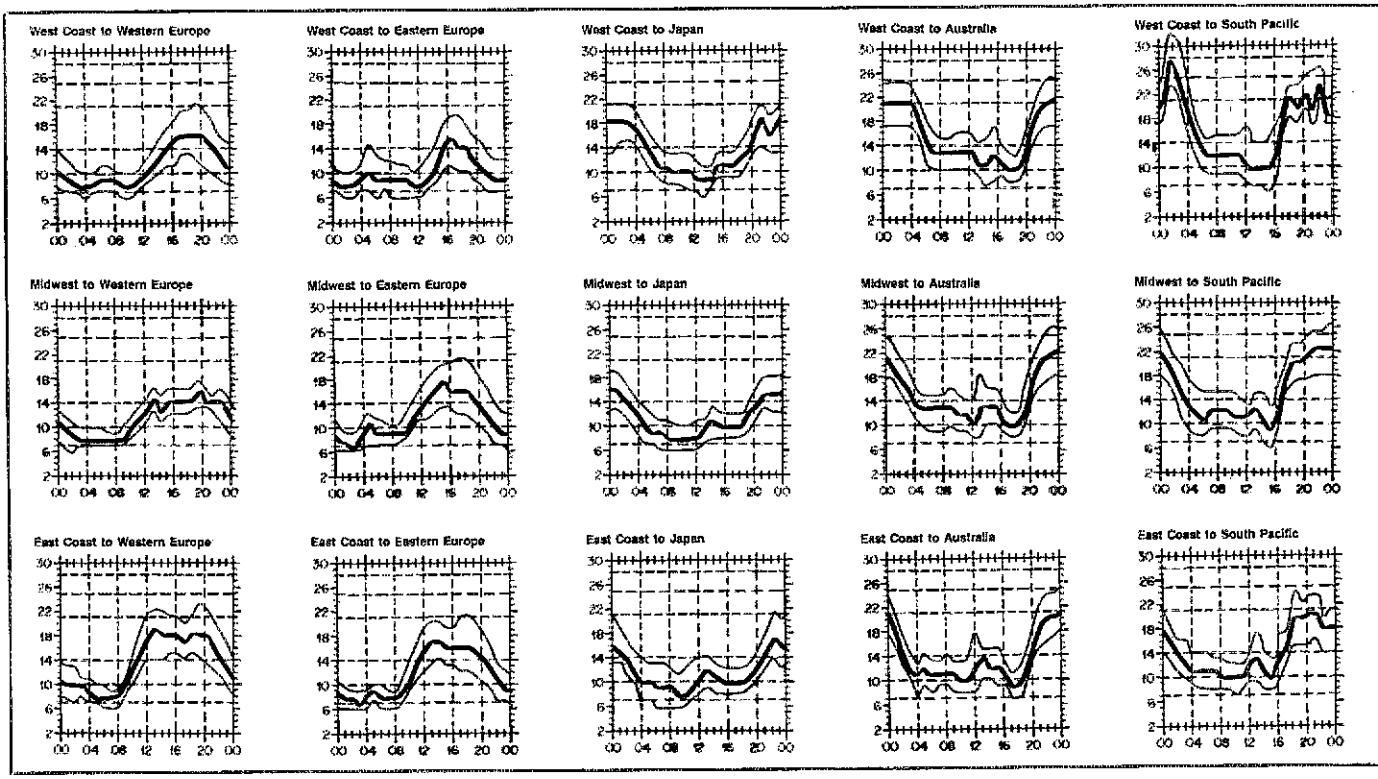
Be it resolved: If you are a caller, and a jammer comes on, don't join in. Be quiet. Jammers do quit sometime. As the sage once said, "And this, too, shall pass."

(More next month from W6ISQ.)

THE CIRCUIT

☐ **Grenada:** J73D writes that the J7 bureau is only now getting started and dozens of cards still awaiting a reply were found buried in a file cabinet! (Al notes that he uses a 40-watt solar panel charging a 12-volt battery, which operates either of his Kenwood transceivers. QRV!)

☐ **KH6BZF Reports:** Lee's latest prognostication seems to pinpoint the bottom of the cycle as early April, while other indicators point to an earlier time. Regardless, reported mean solar flux for May was 85, as compared with last September's 68.7!



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

☐ **New England DXCC:** August is just about the right time to plan a New England foliage trip, coupled with the 35th anniversary of the New England DXCC. October 10 is the date, and the downtown Masonic Lodge in historic Concord, Massachusetts will be the place. Further information from Joe Poges, W1EED, Program Chairman, 144 Broadway, Wakefield, MA 01880.

☐ **EA:** EA5BQ reports that the legalities have now been straightened out, and Spanish CW is now a part of their Class A and C examinations.

☐ **7P8DX:** Ed began operating late February last year on 40-10 and is hoping to find some traps to make his dipole cover 80. From late Nov '82 to the end of June '86, he was EL2ED (and 5L2ED). Cards for his Liberia or Lesotho operation go to him directly: Ed Douglass, PO Box 333, Maseru 100, Lesotho, Southern Africa.

☐ **TR8:** AK1E reminds that TR8JLD, TR8WCY and TR1G cards are now being handled by him, as well as any future calls that might be assigned to Jean-Louis. However, cards for the past 3CØA operations still go to TR8JLD—Dan Morehouse, AK1E, 618 Leander St, Shelby, NC 28150-6440.

☐ **YCCC:** The Yankee Clipper Contest Club has a giveaway DXCC List (similar to the old Operating Aid no. 7) available for an SASE to Secy/Treas Charlotte Richardson, KQ1F, 11 Michigan Dr, Hudson, MA 01749.

☐ **ZF:** New officers for the Cayman Amateur Radio Society include Pres ZF1EJ, VP ZF1DJ, Secy/Treas ZF1RC and QSL Mgr ZF1JC. Watch for ZF1ØPW to be used by CARS members during Pirates Week, Oct 24-31. An attractive QSL will be available for any contact made (SAE, $1 US). ZF1MM (VE5RA) and ZF9SV (VE7SV) have advised the club they don't want the cards being held for them. Note 160-meter ZF allocations: 1.8-1.825, 1.875-1.925 and 1.975-2.000 MHz.

☐ **EUDXF:** The European DX Foundation, with a goal to support DXers and expeditions (including the recent Peter I/5A events), is a reality. Contributions and correspondence go to EUDXF, PO Box 620260, 5000 Cologne 60, Fed Rep of Germany.

☐ **Peter I:** The NCDX Foundation has a limited number of personalized, signed copies of an enlargement of the handsome color photograph of the Peter I QSL card. This striking 13- × 19-in enlargement, on an 18- × 24¾-in background, is individually numbered and signed by LA1EE. A $150 tax-deductible contribution to NCDXF brings one to you. Write the Foundation Secretary, Eric Edberg, W6DU, 461 Heather Ct, Los Altos, CA 94022.

☐ **Travel:** WB5SSD, President of the Delta DX Association, has supplied a partial list of DX repeaters in the US. If your DX club maintains a repeater, send Tony a note with the details (DDXA, Box 73, Metairie, LA 70004). This would make a dandy accessory to ARRL's *Repeater Directory*!

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.

A71BK (KI4GV)
CS2BOH (CT1BOH)
C3ØBBE (OH6XY)
FMØA (FM5CD)
FOØQK (W6TM)
KG4AA (K6GXO)
KH2D (KA3T)
KS6DV PO Box 1618, Pago Pago, American Samoa 96799
OHØAM (OH2BH)
P29FG (WAØGUD)
P29RT (W6FAH)
TI1T (K8LJG)
VD1DH (VE1DH)
VS6BL PO Box 541, Hong Kong
V85PO (FE9ON)
XE2FU (KB5FU)
YJØARW (ZL1AMO)
5Z4SS (JA1ODC)
8R1PK (KC2CS)
9K2KW PO Box 13296, Kuwait City 71953, Kuwait
9VITJ (KØGYK)

Special Notes

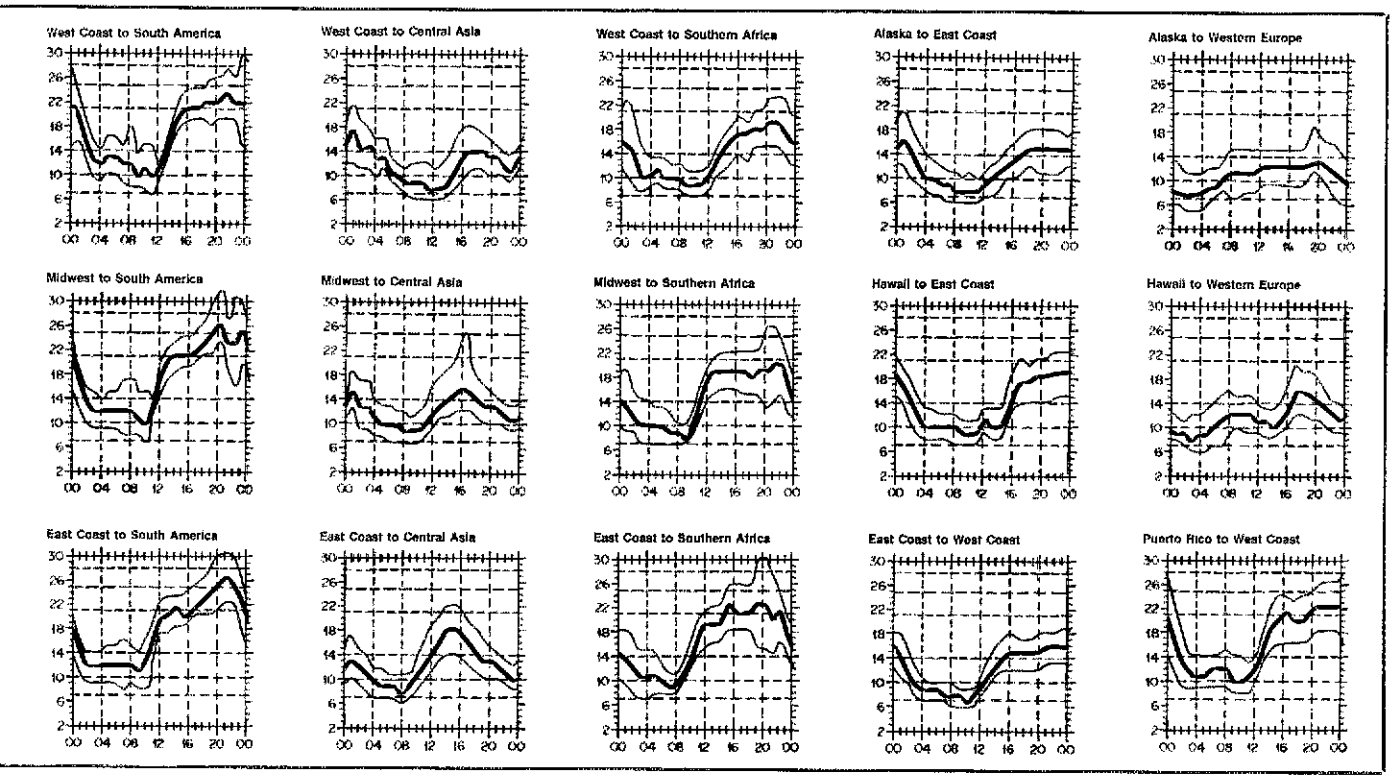
VU2CVP states that Indian amateurs are receiving US currency, both for regular Indian stations and especially for the current Andaman and Nicobar Island operations. This is causing serious consequences for Indian amateurs, who may be subject to possible arrest and or fines for accepting US currency.

If QSLing direct, please send either IRCs or Indian postage stamps.

QSL Manager Volunteers

NTØW NB2D N3CHR

☐ QSL Corner, June 1987 *QST*, page 55, contains information and addresses for the ARRL Incoming Bureaus. QSL Corner, March 1987 *QST* (page 67) 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.



QST, page 58, September 1977 *QST*, page 35, and January 1979 *QST*, page 11, for a complete explanation. The horizontal axis shows Coordinated Universal Time (UTC); the vertical axis, frequency in MHz. Data are provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for August 16 to September 15, 1987, assume a sunspot number of 26, which corresponds to a 2800-MHz solar flux of 83.

DX Century Club Awards

Administered By Don Search, W3AZD

The ARRL DXCC is awarded to the amateurs who submit written confirmations for contacts with 100 or more countries on the offical 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 May 1 through May 31, 1987. An SASE will bring you the rules and application forms for participation in the DXCC program.

New Members

Mixed

DF2YJ/100	HG19HB/203	JA3RWJ/309	PA3EIC/107	ZC4AK/103	K2YA/106	KI6AN/100	W6QL/ZS3/109	KD8DU/103
DL4FN/110	HK1LAQ/111	JH3HMW/104	T77J/110	3D6QL/106	KA2SKO/123	N6HR/KX6/104	WE6G/100	WB8TLE/100
F1HWB/166	HK6HFY/119	JA7IIL/110	UR2QD/309	7P8KG/106	AA4NJ/182	W6HDP/103	WI6S/100	NI9Z/109
G4YEK/103	HL1IE/171	JA7NBL/109	YC6LD/137	9J2LC/102	KJ4KS/144	W6KG/A2/104	WT6V/103	W9SU/315
HA5FW/223	JN1UEP/124	JA0KN/188	YC0DAJ/106	KB1XN/107	N4LJM/100	W6KG/ZS/116	KC7EM/286	WB9RRU/189
HA6KNV/149	JO1MOS/104	LA4FBA/107	YU2LLL/199	KW1K/102	WA4OEJ/307	W6QL/Z2/107	KW7J/101	KA0VNN/101
HA6ZV/126	JA2DSF/155	PA3DLM/113	XE1ND/103	W1GWN/108	W5IZ/334			

Radiotelephone

DF2XE/109	HK6HFY/116	JJ3AFV/255	VU4TTC/122	YV3BAP/109	N2BSG/114	KY3F/111	WN5W/104	KD7IK/105
G4POF/110	HL1IE/166	PA3DLM/113	YC4BEE/103	4X6DK/199	N2CTP/129	AA4NJ/141	KB6ISL/100	KE7BR/105
GU4GNS/100	JE1SCF/129	PY2FR/332	YC5BEH/105	9J2DX/106	WA2LIY/106	N4IIA/100	KI6BU/102	NI9C/108
HA5FW/184	JO1MOS/104	VK4ZM/110	YU2LLL/112	KA2SKO/103	WA2ZLK/130	K5MR/193	KC7EM/270	W9SU/266
HA8UB/103	JA2DSF/155							

CW

DJ5EY/245	JN1UEP/110	PA3DPB/100	YU2QU/175	AA4NJ/114	WG5G/100	WJ6O/126	AB9O/101	KB0U/215
DL4FN/105	JA7IIL/108	VE3ORF/103	W1ETH/103	K5MR/162	KI6T/103	KC7EM/134	W9SU/110	NX0I/103
HB9CXR/112	OZ7L/103	YU2LLL/104	AA4MM/103	NC5O/110				

160 Meters

DJ6RX/104	FM5WD/102	W1NG/109	K7SP/102	AB0X/102				

5BDXCC

OK1ALW	HG19HB	SV1LV	AG6Q	4X6DK	WA4QMQ	I2QMU	K4UTE	W4JYS
VE3NSZ	K5OTI	W6NA						

Endorsements

Mixed

CE6EAT/304	IT9FWD/203	YO4WU/319	W1WEF/304	KR3E/154	K5BDS/300	N6ADK/175	KA8OUT/150	N9RD/251
DJ5EY/275	JH1OCC/144	YV1TO/248	W2GC/256	W3TVB/315	K5LIL/336	NJ6V/251	KC8MK/200	NB9C/226
DL1BS/329	JH1QOJ/324	ZS6ASW/229	K2QEY/265	WB3FMA/200	K5MR/316	WB6DXU/326	KD8EE/175	NF9Q/300
FD6HSI/270	JE3NWN/265	ZS6P/169	K2YGM/313	KA4LRM/206	K5PC/251	WB6VGY/237	KX8V/140	NI9C/144
FM5WD/250	JR3IIR/316	4Z4AB/293	KB2EN/307	KB4JRS/159	KA5V/311	WK6E/292	N8FZI/240	NJ9Q/201
G4CP/363	OE1UZ/334	5H3RB/157	NA2Q/173	KD4OM/200	KF5EA/174	KB7VD/279	NE8Q/252	WA9RCQ/282
G4EDG/270	OH5UQ/342	AB1A/298	W2ZO/249	KI4M/305	KR5D/286	KY7M/270	W8QID/259	K0AFN/130
GM4KLO/204	PY2BW/330	AG1J/286	WA2AOG/280	N4DRC/293	N5PC/208	N7RP/291	W8URM/175	KC0D/243
HB9BIN/178	PY7OD/290	K1PV/186	WA2DSC/271	NE4A/316	WC5E/214	NW7O/288	WB8RJX/307	KC0FJ/224
HK3HFQ/147	VE3JDO/153	KA1EJ/200	WA2PPV/282	WA4BEC/307	K6GAK/315	W7KJJ/200	AB9O/299	NS0B/125
IN3RZY/299	VE3TB/301	KB1ER/202	WA2YMX/206	WA4TBH/131	K6SIK/226	W7ZI/300	K9RHY/302	W0JCB/311
I8KDB/355	VU2TTC/167	W1FOV/160	K3IE/301	WB4KMH/126	K6TS/245	KA8GBB/125	N9ALC/296	W0PUD/182
IK8EPC/255	XE1F/159	W1NH/269	K3RV/299	WB4MRH/123	K6UD/322			

Radiotelephone

CE6EAT/291	I8KDB/355	SM5VS/316	KC1BJ/202	KM3N/234	WA4OEJ/306	K6BAG/163	KB7VD/279	NE8Q/252
CT1CNI/160	I8LEL/321	VS6CT/288	KE1K/261	KB4JRS/159	WA4BEC/306	K6DQ/293	NW7O/232	W8GIO/311
CT1TM/229	IK8EPC/254	YC6LD/133	N1CPC/128	KD4WB/162	WB4MRH/124	K6SIK/225	W7KSK/150	AB9O/283
DF8GQ/158	IS0PJP/212	YC0EMJ/203	W1ETH/229	KE4SN/200	KA5V/308	K6UD/311	K8REG/258	NB9C/198
DL1BS/275	JH1OCC/134	YU2QU/160	W1QJI/181	N4DRC/293	KR5D/225	W6AML/126	K8WWA/252	N0BZE/175
F1HWB/166	JR3IIR/312	YV6BTF/152	W1WAI/150	NE4A/274	N5PC/205	WB6VGY/233	KC8MK/200	W0JCB/286
F6FGJ/207	LA4CM/251	ZL1SZ/271	KG2U/306	W4CYJ/278	NJ5L/126	K7DS/306	KD8EE/175	W0JS/158
HC2RG/251	PA3AWQ/223	4Z4AB/265	W2LV/352	W4KHL/224	WC5E/212	KA7AUH/310	N8FZI/231	W0PUD/182
HK3HFQ/147	PY2BW/322	AG1J/284	K3RV/254					

CW

DL1BS/273	IK2DJV/207	OZ4RS/155	K1PV/177	K3IE/289	AC5K/176	K6UD/255	NQ7M/152	NB9C/137
DL1HBT/201	I4YCE/140	PT2CW/228	KE1K/204	W3TVB/287	K5PC/203	N6LHN/129	N8MC/294	KC0D/226
FD6HSI/220	JR3IIR/267	PY2BW/234	KB2OR/125	KG4O/175	KR5D/272	WK6E/200	W8URM/169	W0HBH/202
G4EDG/254	LA1CCA/140	VU2TTC/127	W2HN/249	NE4A/205	W5CJZ/187	WW6F/124	WB8RJX/278	W0JS/159
I2HJD/159	LA3IBA/207	4Z4DX/287						

RTTY

W2FG/129

160 Meters

N4JF/199	W4DR/200							

DXCC Notes

Honor Roll Corrections: Mixed—N4SU 316/363, K9GX 307/313, 4Z4DX 314/323; Phone—W1JR 313/344, 4Z4DX 308/316; CW—N4JF 310/311.

Conducted By Bob Atkins, KA1GT
103 Division Ave, Millington, NJ 07946

Using a TVRO LNA at 3456 MHz

Dave Mascaro, WA3JUF, has passed along some information on how he modified a surplus TVRO low-noise amplifier (LNA) for use in his 3456-MHz transverter. Dave points out that these devices are plentiful in the $15-30 range and can be used as low-level transmit amplifiers as well. Dave has experimented with the Amplica model ACD 305329 (100 K) and ACD 305331 (90 K) units purchased from the used equipment shelf at Amateur Electronic Supply. (These are usually referred to as 100° and 90° LNAs.) The ideas presented here may be used as guidelines for modification of other similar units.

TVRO LNAs are a gold mine for the amateur experimenter. They usually offer about 50-dB gain and a low noise figure. Miniature piston tuning capacitors allow for tweaking at 3456 MHz in a noise-figure setup. As a transmit amplifier, the 1-dB compression point is about +10 dBm. LNAs can also be a source of inexpensive components—the 100 K unit has four GaAsFETs, about 25 chip capacitors and many chip resistors.

The modifications are very simple: (1) The waveguide antenna input is removed and an SMA connector is attached; (2) The input isolator is connected directly to the gate of the first GaAsFET amplifier; (3) a dc blocking capacitor must be added between the isolator output and the gate of the FET to prevent shorting the bias supply to ground (which would result in a blown FET); and (4) provision is made for a separate dc power-supply input. The results are more "normal" RF and dc connections to the LNA and smaller overall size.

The two models Dave has modified are different in the way the gate bias is applied. See Fig 1. The 100 K unit has the bias decoupling etched on the board, so a blocking capacitor is all that is needed. In the 90 K unit, the gate bias is fed in through the termination port of the isolator. This unit needs a blocking cap and an external bias circuit. No doubt there are other ways to provide dc blocking (for example, adding an external dc blocking unit to the input SMA connector).

The other power-supply modification is the addition of an external dc power input. The stock units require dc to be fed in on the feed line connected to the RF output port. Dave points out that adding a dc feedthrough capacitor is easier than making a bias "T" to insert the dc through the output connector.

Follow these step-by-step instructions to modify your LNA. Use a *grounded soldering iron* and take care when performing this work.

1) Remove the side cover having the +15-V dc tag.

2) Use Locktite™ on all setscrews on the isolator so they don't loosen up from the vibration during flange removal.

3) Remove the three screws holding the isolator halves together.

4) Unsolder the waveguide probe from the isolator input.

5) Pull the probe all the way out and cut the pin where it changes size. Save the smaller-diameter pin for use later.

6) Remove the plastic bushing and save for later use.

7) Push a piece of tissue into the hole to minimize the amount of aluminum filings and dust entering the LNA.

8) Reassemble the isolator by just snugging the screws to hold the unit together during flange removal.

9) Locate and mark a hole for the dc input feedthrough on the end wall near the output connector.

10) Attach the cover with four screws to keep out metal filings.

11) Remove the waveguide flange flush with the housing with a band saw.

12) Smooth the area where the flange was with a milling machine or a belt sander.

13) Drill and tap the dc feedthrough hole. Install the feedthrough.

14) Drill and tap holes for the no. 2-56 × 3/16 inch screws that secure the antenna input connector flange. Be careful to drill just deep enough for the screws.

15) Open the unit and blow out the metal filings.

16) Remove the isolator half. Using the small pin (from step 5), extend the center pin of the SMA connector to the proper length.

17) Cut the plastic bushing (from step 6) and slide it over the extended center pin to keep it centered in the hole.

18) Attach the SMA connector and solder the center pin to the isolator input, making sure that everything fits properly when the isolator is assembled.

19) Reassemble the isolator and tighten the screws.

20) Carefully unsolder and bend up the output tab of the isolator. Solder a 10- or 20-pF, 50-mil-square chip capacitor between the isolator output tab and the base of the miniature trimmer capacitor that the tab was previously soldered to. This is a dc blocking capacitor.

21) This step is for the model ACD 305331 (90 K) LNA only. Remove the cover on the other side. Locate the 51-kΩ resistor and remove it from the circuit by cutting the leads right at the point where they are soldered to the board. This resistor will be put back in the circuit on the opposite side of the board. Cut one lead of this resistor to a length of ¼ inch. Form an RF choke in the center of the ¼-inch lead by bending it 1 turn around a no. 50 drill bit. Solder this lead to the base of the input trimmer capacitor. Install a bypass capacitor (10-pF, 50-mil chip capacitor) at a point between the RF choke and the body of the resistor. Ground the other end of the bypass capacitor by soldering it to a plated-through hole nearby that another bypass is soldered to. Trim the other lead of the resistor and solder it to the PC-board trace that connects to the feedthrough where the resistor was disconnected from on the other side of the board.

22) The remaining steps concern the dc input connection. Cut the microstrip RF choke that brings dc in from the output connector. Create a gap in the choke by cutting it in two places right at the output line.

23) Connect a wire to the feedthrough capacitor you installed in step 13. Solder the other end of this wire to the point where the bypass chip capacitor connects to the microstrip RF choke. This point is near the gap cut in step 22.

24) Check for proper LNA operation. Be careful when using the LNAs on a 12-V supply—the internal 12-V regulator will lose regulation at 12-V input. Use the recommended 15 V. Enjoy your new preamp!

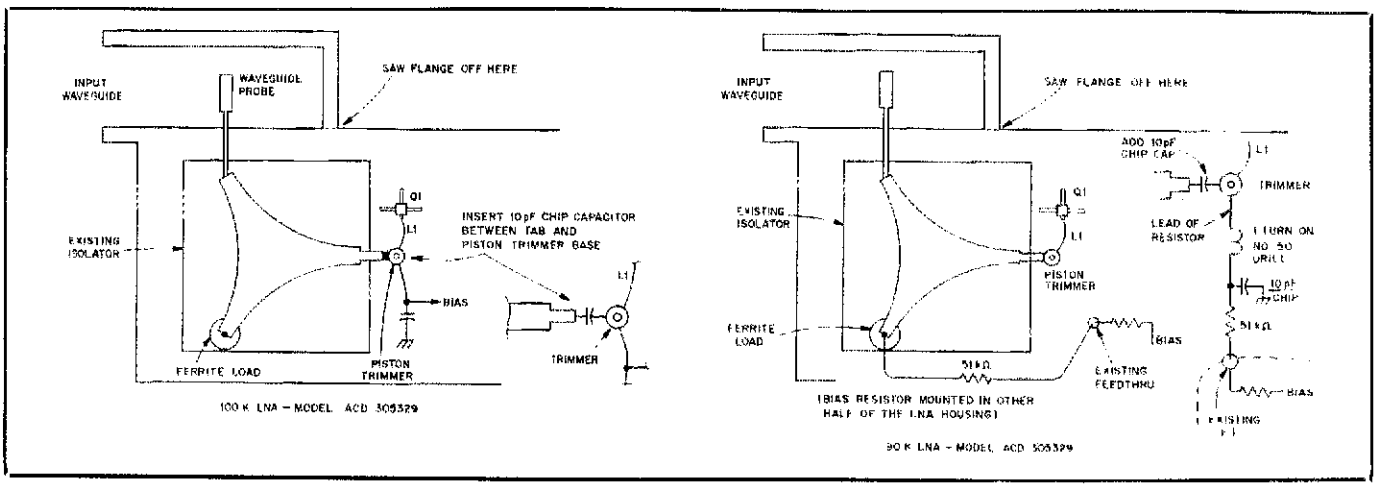


Fig 1—Details for converting a TVRO LNA for service on the 3456-MHz amateur band. Full details are given in the text.

The World Above 50 MHz

Conducted By Bill Tynan, W3XO
Send reports to PO Box 117, Burtonsville, MD 20866,
or call 301-384-6736 to record late-breaking information.

Ten-Meter Liaison Frequency—Is It Time for a Change?

Those of us who were around for the peak of Solar Cycle 21 (1978 through 1982), remember, I'm sure, how valuable 28.885 MHz was to spread the word about what was happening on 6 meters. With the decline of the solar cycle, the 10-meter band has not been useful for disseminating information like it was during those wonderful years. Nevertheless, particularly in Europe, 28.885 has continued to be used, and much of the crossband work between the UK and countries not yet able to transmit on 6 meters is accomplished on that frequency.

Because of its long-standing use, particularly in the rest of the world, we probably should not abandon 28.885. However, the recent opening of SSB voice privileges to Novice and Technician licensees impels a re-examination of the existing 10-meter liaison arrangement. It seems imperative that a frequency be available in the 28.3 to 28.5 range so that everyone who has an interest in 6 meters and other VHF bands can participate. What frequency should be chosen? If 28.885 is to continue to be used, at least some, the most logical choice is 28.385. The reason it is the logical choice is that many transceivers can readily QSY in increments of 500 kHz. Although use of the second VFO, found in most transceivers, would permit rapid switch between any two frequencies, it doesn't seem reasonable to tie up both VFOs when you don't have to. Thus, whether the new frequency becomes the primary liaison spot, or remains a secondary meeting place, choosing 28.385 makes it simple to shift between the two rapidly.

One thing is clear. If we are to have these frequencies available for passing 6-meter information, we must become active on them right away. Then, when 6-meter conditions begin to heat up, we'll be able to get on 28.885 and 28.385 and let everyone in on what's going on.

A forthcoming column will speculate on how soon we might expect the improvement in 6-meter propagation to take place.

ON THE BANDS

6 Meters—If there were any doubts that this year would again produce transatlantic 6-meter E_s openings, they were dispelled early in the season. WA1OUB lists two European openings as of June 7. On the 6th at 0009Z Bob worked CT4KQ, whose SSB signal was up to S8. Other New Englanders working the Portuguese station that evening were K1TOL, K1GPJ and K1JRW. Possibly the first North American station to work CT4KQ was KQ3D in central Pennsylvania. Ken reports completing two contacts at 2309 and 2322Z June 5. WA1OUB's other European opening came Sunday morning June 7. Beginning at 1337Z, Bob began hearing the GB6SIX beacon at 579. This was followed a few minutes later by Scottish station GM4TXX being heard but, unfortunately, no QSO. Then, at 1416Z, he completed a CW contact with EI6AS in Ireland with 539 signals. About the same time, Bob heard, but did not work, G6NB. At 1424, he worked G4IJE and at 1436 GI8YDZ in Northern Ireland for country Number 60. Two new countries in as many days isn't bad anytime! A few days later on June 8 about 2300, W4CKD in the Virginia suburbs of Washington, also worked CT4KQ, joined soon afterward by W2IDZ and his XYL, WA2QCE.

The Far East participated in some rare 6-meter DX of its own. JA1VOK writes that he upped his country total to 67 by virtue of a contact with DX-pedition station BVØAE Taipei, Taiwan. The Taiwan operation was undertaken by JA1UT and resulted in 110 JA QSOs on the first day of operation, June 5. BVØAE was authorized two spot frequencies on 6 meters—51.110 and 51.200. Most of the contacts appeared to have been by split-frequency operation.

The June issue of the RSGB magazine *Radio Communication* carried the great news that Class B licensees are being given privileges on both the 50- and 70-MHz bands, and the upper limit of UK 6-meter assignment is being expanded from the former 50.5 MHz to 52 MHz. These moves are certain to bring a great deal more activity to the 6-meter band in the UK.

In addition to all of the international DX news, the season is turning in a good performance for domestic single and doublehop E. For the number of stations and signal strengths, one particularly notable evening was June 2 local time. It began here with an excellent opening to the VE1s and then swung around to the west with many strong 8s, 9s and Øs. What this session lacked in the way of doublehop, it more than made up for by the strength of the signals and the many areas covered. The only evidence this conductor observed for extended propagation that night was a CW contact with VE5LY. The VE5s are quite rare in the mid-Atlantic states. But the real news for this evening was on 2 meters. See that section for details. One of the numerous double-hop openings of 1987 occurred two nights later early in the evening of June 4. It didn't appear to last long, only about an hour, but it produced many strong signals from the western states. Upon arriving home from work at 6 PM (2200Z), the first thing this conductor heard was an S9 signal from W7HAH in Montana. After working Shep, I went on to QSO NS7P CN84 Oregon, WA5ZAY/7 DN06 Washington, W7CVJ DN16 Idaho, K7CRE CN87 Washington and W7PQE CN96 Washington. Everything was gone for me by 2315Z, when I had to leave for a previous engagement, so I don't know what might have taken place after that time.

2 Meters—There is one really big story to be told about 2-meter happenings this report period. For years, it has been pretty much assumed that 37 states was about par from the East Coast unless one took the EME plunge. Many have achieved that "limit" by using a combination of tropo, meteor scatter, aurora and E-skip to work states as far west as the Dakotas, Nebraska, Kansas, Oklahoma and Texas. The next three, Wyoming, Colorado and New Mexico, were considered all but unattainable. Over the years, there have been a few isolated E_s contacts with New Mexico and Wyoming just to tantalize us with the prospect. But on Tuesday evening June 2, the picture changed significantly. What began as a very nice E_s opening turned into one that will long live in the history of the world above 50 MHz. The first inkling this conductor received that something unusual had transpired were rumors a few days later (No, I wasn't on) to the effect that a Baltimore-area station, K3NXH, had worked Wyoming. I managed to confirm this a few days later. Actually, Charlie worked *two* Wyoming stations that evening. The opening, for him, began at 0005Z (June 3) with a contact with WØEMP

1¼-Meter Standings

For WAS holders, listing is WAS number, call, state, call areas worked and grids worked. For others, call, state, US states worked, call areas worked and grids worked. Call areas are the 10 US call areas, plus KH6 and KL7, plus each VE and XE call area plus DXCC countries not located within the continental limits of the US, Canada or Mexico. In order to make the standings a true reflection of stations currently active on 1¼ meters, those not reporting activity within the past two years are subject to being dropped. They will be reinstated upon written presentation of continuing activity. It is not necessary to have worked additional states or grids in order to remain in the standings or be reinstated, merely an indication that you are still on the band. WAS holders are listed in any case. Compiled June 11, 1987. Deadline for next update is December 5, 1987.

WAS Holders

1	WØVB*	MN	13	—	
2	WØSD*	SD	—	—	
2	WBØTEM*	IA	—	—	
4	K5FF*	NM	14	—	
5	W5FF*	NM	13	—	
6	WB5LUA*	TX	—	—	
7	VE3EMS*		14	—	
8	W3GPY*	PA	—	—	
9	K9KFR*	IN	—	—	

W1JR*	MA	44	14	75
W2SZ/1	MA	23	9	55
K1FO	CT	23	7	—
K1PXE	CT	16	6	—
W1GXT	MA	17	9	—
W1QXX	MA	15	5	21

*Some contacts made via EME.
—Information not supplied.

K1LPS	VT	12	6	—
WA1JOF	MA	11	5	15
KA1DHO	MA	11	4	14
W1RIL	MA	9	4	15
W2PGC	NY	22	10	23
K2GK	NY	20	8	47
N2WK	NY	18	10	50
N2BJ	NY	16	6	29
WB2IEY	NY	14	7	41
K2YCO	NY	14	7	—
WA2FUZ	NY	14	5	—
W2WW	NY	13	5	19
K3HZO	MD	24	9	37
WA3FYJ	PA	23	10	44
W3RUE	PA	18	10	19
N3CX	PA	18	—	—
W3XO	MD	17	6	19
KB3QM	DE	16	—	68
W3UJG	MD	15	8	—
AC3T	DE	15	6	13
W3IP	MD	13	6	—

KA3B	PA	7	4	9
KC4EG	KY	34	9	55
WA4PCS	KY	32	7	—
WD4DGF	TN	31	9	63
WS4F	GA	29	9	51
WA4CQG	AL	26	6	—
WA4NMA	GA	25	8	—
W3IY/4	VA	23	10	—
K4LHB	VA	21	9	—
WA4SBC	VA	21	7	25
N3AHI/4	GA	20	8	—
WA4MVI*	SC	12	7	—
K4CKS	GA	11	2	—
WA4LYS*	FL	6	6	6
W5RCI	MS	32	8	52
K5UR	AR	27	7	75
K5SW	OK	25	8	60
W5HN	TX	23	7	28
K5CM	OK	22	—	—
WA5VJB	TX	17	6	—
W5NZS	OK	12	—	25

N5KW	OK	12	—	—
WB5AFY	TX	9	4	31
KE5EP	TX	7	—	9
WA5DBY	TX	3	1	3
WB8NMT*		10	6	—
W6WSQ		6	4	—
N6AMG*		3	3	—
W4WD/7*	UT	37	10	25
W7JF*	MT	17	9	—
K7ICW	NV	4	2	—
WB8BKC	MI	31	9	55
WA8TXT	OH	28	10	—
W8IDU	MI	26	8	—
WB8PAT	OH	16	8	—
W8VO	MI	11	7	—
K9MRI*	IN	34	9	—
K9XY*	WI	28	13	—
WØUC/9	WI	6	2	7
KB9NM	WI	5	4	—

KAØY*	IA	32	11	—
KØDAS	IA	29	10	—
KØALL	ND	25	10	—
KØTLM	MO	23	7	48
WØPW*	CO	20	8	—
KCØQR	NE	19	6	38
KFØM	KS	16	5	28
WØRT	KS	12	5	—
KBØQR	NE	8	3	8
WAØNOK	MO	6	2	—
WBØZKG	IA	5	2	—
VE1UT	NS	7	4	—
VE3LNX		15	9	43
VE3DSS		13	7	—
VE3AIB		10	12	—
XE2BC*		2	3	—

2-Meter Standings

For WAS holders, listing is WAS number, call, state, call areas worked and grids worked. For others, call, state, US states worked, call areas worked and grids worked. Call areas are the 10 US continental call areas plus KH6 and KL7 plus each VE and XE call area plus DXCC countries not located within the continental limits of the US, Canada or Mexico. Grids are 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 May 9, 1987. Updates for next listing must be at PO Box 117, Burtonsville, MD 20866, by November 5, 1987.

WAS Holders

1	KØMQS*	IA	—	—
2	K5CM*	OK	—	—
3	NØJA*	MO	—	—
4	K9HMB*	IL	—	—
5	K1WHS*	ME	—	—
6	WA4MVI*†	NC(1)	—	—
7	K5JL*	OK	—	—
8	WA9DOT*†	WI	—	—
9	WBØZXU*	IA	—	—
10	K9CA*	IN	—	—
11	WØSD*	SD	—	—
12	K5BMG*	LA	—	—
13	K5GW*	TX	—	—
14	WB5LUA*	TX	23	—
15	K4GL*	SC	23	—
16	WØVB*	MN	14	—
17	WB5LBT*†	LA	50	—
18	K4PKV*	NC	—	—
19	WØRWH*	MO	23	—
20	W8IDU*†	MI	23	—
21	K1MNS*†	NH	48	—
22	WB9VEN*	IL	—	—
23	K5FF*†	NM	18	—
24	W5FF*†	NM	22	149
25	W7FN*	WA	—	—
26	W1JR*†	MA	34	146
27	WBØQMN*	CO	—	—
28	WB4EXW*	NC	18	—
29	K9KFR*	IN	—	—
30	K3VGX*	PA	—	—
31	SM7BAE*		21	—
32	WA7BJU*	OR	—	—
33	VE7BQH*†		57	—
34	W6PO*	CA	—	—
35	WA3VSJ*	PA	27	—
36	AL7FS*	AK	20	—
37	WBØYSG*	NE	—	—
38	N7NW*	WA	—	—
39	W5LUU*	TX	—	—
40	W4HJQ*	KY	—	—
41	K5UGM*	TX	—	—
42	W5UN*	TX	—	—
43	WA4LYS*†	FL	49	—
44	WA1JXN/7*†	MT	58	—
45	W5JTL*	MS	14	—
46	WØANH*	MN	—	—
47	WA4NJP*	GA	—	—
48	W5HM*	NM	—	—
49	W7CI*	AZ	26	—
50	N5KW*	OK	13	—
51	WBØTEM*	IA	23	—
52	WDØFOY*	IA	23	—
53	WØRWG*	MO	16	—
54	WB5ERD*	TX	—	—
55	W4WD/7*	UT	—	—
56	KE5C*†	TX	—	—
57	WA4CQG*	AL	—	—
58	WB9CAS*	IL	—	—
59	W2CNS*	NY	28	—
60	Deleted			
61	KØALL*	ND	26	—
62	K9XY*	WI	29	—
63	K1FO*	CT	18	98
64	W4DFK*	VA	—	—
65	WD5CRK*	OK	—	—
66	WB8PAT*	OH	49	39
67	KXØO*	CO	30	103
68	W7HAH*†	MT	44	149
69	K7KOT*	WA	—	—
70	KB8RQ*	OH	—	—
71	WA7BBM*	AZ	—	—
72	SM2GGF*		—	—
73	KD8SI	OH	—	—
74	K2OS*†	NY	17	—
75	K1GVM*	MA	34	—
76	WA9OZN*	IL	—	—
77	WA6MGZ*†	CA	49	176
78	WD5AGO*	OK	38	—
79	WD4DGF*	TN	36	174
80	VE1UT*	NS	42	—
81	WØRRY/5*	OK	30	—
82	WBØVYV*	IA	—	—
83	W5RCI*	MS	12	—
84	WA2GSX*†	NY	27	—
85	WAØTKJ*	KS	25	171
86	KB7Q*	MT	—	—
87	AB3D*	DE	25	32
88	KFØM*	KS	18	151
89	WB2NPE*	NJ	—	—
90	N5BLZ*	TX	—	—
91	KØAOD*	MO	—	—

WA1OUB*	NH	40	22	145
K1PXE	CT	35	13	—
N1AIS	MA	34	12	—
W1AIM*	VT	32	11	72
K1VMI	CT	31	12	—
W1RIL	MA	30	12	—
W1GXT	MA	30	11	—
KA1DHO	MA	29	11	46
W2SZ/1	MA	28	19	154
K5MA/1	MA	27	11	106
WA1AYS	MA	27	10	—
W1QXX*	MA	26	9	81
WA1LOU	CT	25	11	—
KA1BRD	CT	24	11	—
W2PGC*	NY	49	22	87
K2QR*	NY	45	28	66
WA2PVV*	NY	40	13	—
K2TXB*	NJ	39	—	117
W2RS	NJ	38	13	—
W2BLV	NJ	37	10	—
W2ORI	NY	37	8	—
KE2N	NY	36	13	122
WB2CUT	NJ	36	13	—
NB2T	NY	36	12	40
K2OVS	NY	36	12	35
WA2FGK	NJ	35	11	—
K2GK	NY	34	11	121
N2BJ	NY	34	11	79
W2MPK	NY	31	11	—
W2HRW	NJ	29	—	—
W2DWJ	NJ	27	11	—
KA2BTD	NJ	26	10	—
K2YCO	NY	26	10	—
W2WW	NY	24	10	44
WA2DKB	NJ	23	11	—
KC2KK	NY	17	7	34
K3MD*	PA	42	26	112
WA3HMK*	PA	38	14	162
W3CWG	PA	37	12	142
W3ZZ	MD	37	12	124
W3XO	MD	37	12	38
W3RUE	PA	37	11	60
K3RX	PA	37	10	130
W3IWI	MD	37	—	—
WA3FYJ	PA	36	10	96
WB3LJK	MD	35	11	45
AE3T	PA	35	11	—
W3CLQ	PA	35	10	—
KB3PD*	DE	34	8	—
W3IP	MD	33	10	65
W3IWU	PA	32	11	76
K3KEL	PA	32	11	63
WA3DMF	MD	32	11	57
W3OTC	MD	32	11	54
KB3QM	DE	32	—	68
W3LNA	PA	29	8	43
W4ZD*	FL	47	42	157
KC4EG*	KY	45	14	—
WA4PCS	KY	41	11	—
WB4NXY	KY	41	9	125
WS4F	GA	40	14	135
WB4NMA	GA	40	10	—
W4CPZ	SC	39	12	22
WA4DKH	KY	39	11	—
W4HHK	TN	38	9	—
K4KAE	SC	37	13	80
WA4OWC	FL	37	10	—
W4ISS	GA	37	8	—
K4QIF	VA	37	8	—
W5HUQ/4*	FL	36	13	—
W4LNG	GA	36	8	30
N4VC	TN	35	9	126
WA4SBC	VA	34	13	—
W4FJ	VA	34	8	—
W8QXO/4	GA	33	10	100
W3IY/4	VA	32	8	—
K4CKS	GA	31	11	100
WB4KNF*	TN	31	11	33
W3ZR/4	FL	30	9	77
K1FJM/4	FL	29	9	61
N4EJW	FL	28	12	76
NI4Z	FL	27	9	22
WA4OFS	FL	27	7	15
WD4AHZ	FL	26	10	95
NA4I	GA	24	10	—
WB4RUA	GA	22	7	69
WD4FAB	FL	22	—	71
K4LFF	GA	19	9	56
W5UWB*	TX	48	15	—
K5UR	AR	48	13	258
K5WE*	OK	47	13	—
K5SW	OK	47	12	198
K5YY	AR	46	15	253
W5HN	TX	42	12	—
KB5MR	OK	40	14	140
W5SXD	TX	40	11	55
WA5DBY*	TX	40	11	—
W5HFV	OK	38	10	—
NR5O	OK	38	9	109
WB5JAR	AR	37	10	—
WA5HNK	TX	37	10	—
AA5V	OK	36	9	—
W5NZS	OK	36	7	97
K5VVV	TX	31	10	—
N5BBO	TX	31	10	—
K5DHU	TX	30	10	50
WA5IYX	TX	27	9	—
W5DFU	OK	26	7	—
N6AMG*		32	37	—
W6XJ*		29	12	—
K6PVS*		24	—	—
K6JYO*		23	7	—
K6QXY*		20	14	—
WA6LHD		18	7	54
WA8LLY/6		13	5	19
K6HXW*		13	—	—
N6TX*		9	8	—
K6GAO		9	6	—
N6CA		8	3	—
WA6HXM		6	3	16
W7IUV*	AZ	45	47	129
WA7JUO*	NV	45	16	—
W7JF*	MT	45	—	—
KB7WW*	OR	32	10	—
WA7ADK	UT	25	7	—
K7ICW*	NV	23	9	—
AA7A	AZ	23	6	59
WA7JTM	AZ	21	6	—
WA7EPU	AZ	12	6	—
W7IDZ	WA	9	4	30
K8EUR*	OH	41	11	—
NI8O	OH	40	12	145
K8WKZ	MI	39	14	—
K8RZB	OH	39	10	142
WB2DIN/8	WV	36	13	—
W8NJR	OH	33	11	124
W8GAP	MI	30	11	75
KB8SG	MI	29	6	—
W9BOZ	IL	47	21	—
W9UD	IL	45	12	—
NN9K	IL	44	11	155
KB9NM	WI	43	14	—
N9AQ	IL	42	12	171
WB9MSV*	IL	42	12	158
N9KC	IL	41	11	130
K9SM	IL	36	8	—
KD9JQ	IL	34	—	139
W9HAD	IL	33	9	112
W9YCV	WI	30	—	107
N9CUE	IN	27	10	28
N9CEX	IL	26	9	—
K9BQL	IL	23	8	40
WØRT*	KS	48	20	109
WØEMS	NE	48	11	—
KØDAS*	IA	47	13	—
NØLL	KS	46	11	180
WØOHU	MN	45	12	—
KCØQR	NE	43	11	143
WØPN	MN	43	11	52
KØTLM	MO	43	10	157
WØFY	MO	43	10	124
WBØDGF	NE	43	10	85
KMØA	MO	42	11	164
WØRAP	IA	40	10	114
WBØDRL*	KS	39	34	116
KØUS	NE	39	11	125
WØPW	CO	38	9	—
WØIZ	IA	36	11	133
WBØZKG	IA	36	10	—
NOØY	KS	34	11	59
WØRWC	IA	34	8	—
NØAJU	NE	32	9	102
WBØYZN	NE	31	11	107
KBØHH*	KS	30	9	116
WBØZAH	MN	29	9	79
WØKEA	CO	29	6	87
WØJRP	MO	27	8	105
KCØOG	NE	25	8	60
KØBTN	NE	20	9	85
KAØKUY	KS	20	6	75
VE1ALQ*	NB	45	46	122
VE1AHM	NB	21	10	—
VE3DSS*		38	12	—
VE3EMS		38	11	—
VE3FKX		35	10	—
VE3DTQ		31	12	—
VE3EQQ*		20	16	—
VE4MA		14	9	—
VE4AQ		11	5	7
VE5LY*		19	9	44
PA2VST*		28	—	—
WA1JXN/C6A		23	28	—
KG6DX*		22	—	67

(1) WAS completed in NC; now in SC.
*Some contacts made via EME.
†WAC.
—Information not supplied

EN21. Five minutes later, he was shocked to work WA7KYM DN71 Cheyenne, Wyoming followed shortly by WØSII/7 DN70 also in Wyoming. Also worked were WØSD EN13 and K1LL/Ø DN84 both South Dakota plus several stations in Lincoln, Nebraska EN10—10 QSOs in all. Meanwhile, to the north in New Jersey and Pennsylvania, K2SMN and W3CWG were partaking of other rare 2-meter DX. Their unusual contact was with WØETT DM79 near Denver. The opening began, for them, at about the same time as it did for K3NXH but the extended range DX came near its end, 0028Z for K2SMN and 0038Z for W3CWG. Neither they, nor any others in the area, heard the Wyoming stations but both made a number of contacts at what would be considered conventional E_s distances. Only time will tell if this success indicates that the rest of us will be sporting a few more states before too long, or if this was one of those rare events that happen only every 5 to 10 years.

The Higher Bands—As reported in the May/June issue of the *432 and Above EME News*, the recently reconstituted East Coast VHF Society staged its first major operation when it put K2UYH's 28-foot dish on 13-cm EME. Although the group had some problems getting going, they went on to work OK1KIR, F2TU, OE9XXI, W4HHK, SM6FHZ and LX1DB. They heard several other stations they were not able to work and were copied by a few that they were unable to hear. The story is reminiscent of 23-cm EME attempts 10 years ago. The group may try again on this band next year, but, in the meantime, they plan a few portable operations on 23 cm and possibly some EME work on the higher microwave bands.

A letter from WØSD expresses gratitude to the NC11 group for putting Rhode Island on 70 cm. Not only did they have to mount the operation, with all that entails, but, due to proximity to the Cape Cod PAVE-PAWS radar installation, they had to obtain a high-power permit as well. As of the first day of operation, K2UYH says they had worked 16 stations. He notes that they have been doing so well that they might consider going to FP8 next time.

AT DEADLINE

The June 1987 VHF QSO Party is just over, and it was one of the most outstanding, in terms of E propagation, in history. Six meters was open all across the US for hours on end. CT4KQ was worked on the East Coast and even into the Midwest. Two meters was open widely, including a several-hour affair across the southern tier of states. And to top it off, the first ever two-way 1¼-meter E_s contact was completed. The honors for accomplishing this historic feat go to W5HUQ/4 near *Jacksonville, FL* and K5UGM Irving, TX. More on this, and other events of this wild weekend, next month.

On Line

Conducted By Stan Horzepa, WA1LOU
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CompuServe ID no. 70645,247

The Latest Computer Wares for You

What's new on your ham radio store's computer shelves this summer? In this installment of On Line, we'll look at what you may find when you go shopping.

Commodore 64™ Packet-Radio Software

Zeltwanger Electronics has introduced two packet-radio programs for the Commodore 64 computer (and the Commodore 128™ computer in the C-64 mode). "TNC-Link 64" provides a user-friendly interface between you and the TNC connected to your computer. The program allows you to select TNC commands from a menu and features a variable split-screen display that allows you to select how many lines of the computer's display should be used for transmitted text and how many lines for received text. Other features include different color combinations for differentiating transmitted and received text, word wrap, the ability to save received data in an 8192-character buffer for disk storage and/or hard copy, ten 256-character message buffers for frequently repeated text and disk storage for the TNC/program operating parameters.

"Pathfinder 64" monitors packet-radio activity detected by the TNC connected to your Commodore 64 or 128 computer. The program then compiles tables of as many as 100 call signs and lists every possible path between the stations in three formats: all call signs heard, highlighting those stations that can be connected to directly and those used as digital repeaters, all stations that can be directly accessed by any of the listed call signs, and possible paths between any two stations using a maximum of two digital repeaters.

Zeltwanger Electronics also has introduced "RTTY Link 64," a Baudot and ASCII RTTY program for the Commodore 64 and 128 computers, and "Micro TU RTTY Terminal Unit" for Commodore 64 RTTY applications. Contact Zeltwanger Electronics, PO Box 4995, Natick, MA 01760.

IBM® PC and CP/M® Propagation Prediction

MINIPROP™ version 2.0 is now available for the IBM PC, clones and compatibles with 128 kbyte of RAM and for any computer running CP/M 2.2, CP/M 3.0 or CP/M Plus. The user enters the date, sunspot number, solar flux, and latitudes and longitudes of the path terminating points (a built-in atlas may be used instead of entering latitudes and longitudes and the user's latitude and longitude may be stored on disk so that it need not be entered each time). The computer churns out predicted short path and long path signal levels on five selected frequencies, F-layer MUF and E-layer cutoff frequency in two-hour increments. Beam headings, path lengths, and sunrise and sunset times for the path terminating points are also computed. A DX compass indicates which bands are open in 12 directions from the user's QTH at any time of day.

MINIPROP is user-supported software (sometimes called "share-ware"); it may be copied from others who already have it or it may be downloaded from a bulletin board. In either case, if you find the program useful, you are asked to send a $25 contribution to the program's author, Shel Shallon, W6EL, 11058 Queensland St, Los Angeles, CA 90034-3029. As a last resort, copies of the program may be obtained from the author by sending him a blank 5¼-inch diskette and a self-addressed, stamped, disk mailer. Be sure to mention the desired format (MS-DOS® or CP/M), the computer you are using, and whether it requires single- or double-sided diskettes.

THE ARRL OPERATING MANUAL

A brand new, completely revised edition of the *The ARRL Operating Manual* is now available at your ham-radio dealer or directly from the ARRL. Edited by Bob Halprin, K1XA, the *Operating Manual* contains new chapters of interest to hams using computers, including chapters on RTTY communications, image communications and packet radio. The 700-plus page book also includes chapters on many other Amateur Radio operating modes written by experts in their respective fields. This new "Op Manual" looks like a real winner!

PACKET RADIO IN LIBERIA

On April 26, the first amateur packet-radio QSO in Liberia took place. Lee, EL2FE, and Jim, EL2GA, established a 2-meter 1200 bit/s AX.25 simplex link over a 40-mile path using a Heath HD-4040 TNC at Lee's end and an MFJ-1270 TNC at Jim's end. Lee uses several TNCs in an integrated commercial voice and data network at the rubber plantation where he works, so he is an old hand at packet. This was Jim's first packet QSO.

Several other Liberian hams have expressed interest in packet radio including EL5G, EL3BN, EL2BB and others. Jim and Lee hope that in the future Liberia will have an active, thriving packet-radio group!

Jim is now writing a simple BBS and robot station program for his Commodore 64 and building an outboard modem for HF operation. If you know of any good Commodore 64 BBS programs, he would appreciate hearing about them. (Editor's Note: Bob Bruninga, WB4APR, has written a packet radio BBS program for the Commodore 64 that is used by C-64 owners stateside. It is available by sending $5, a formatted diskette, and a self-addressed, stamped diskette mailer to Bob at 59 Southgate Ave, Annapolis, MD 21401.) Also, Jim and Lee are interested in setting up an HF gateway station there, but they are not sure how to go about it. They've read that the "Brand X" TNC has two radio ports, but are not sure that the TNC can digipeat from one port to the other. (Editor's Note: The "Brand X" TNC and other TNCs with two radio ports do not digipeat from one port to another. The function of the two ports is to allow you to use one TNC with two different radios, typically a VHF/UHF radio and an HF radio. What you need is a dual-port digipeater which does provide the link between the radios connected to each port.)

That's the word on packet from Liberia. (Thanks to Jim DeLoach, EL2GA, KB6EH, Secretary of the Liberia Radio Amateur Association.)

PX: Software Basics

Program 156 provides nodal analysis of RF circuits for the TI99/4A® computer with Extended BASIC. The program computes the frequency response and input impedance of linear networks composed of resistors, capacitors, inductors, op-amps, and bipolar and FET transistors. The program was originally written by Bert K. Erickson (for *RF Design*) and converted for the TI99/4A by Kurt Bittman, WB2YVY.

Program 157 calculates coaxial cable loss and effective radiated power using a Radio Shack® TRS-80® Model III computer. This BASIC program was originally written by Irvin McNally, K6WX, and converted for the Model III by Henry R. Leggette, WD4Q.

Program 158 provides Amateur Radio logging on a Radio Shack TRS-80 Model 4 or 4P computer; it was written in BASIC by Joe Morgan, W5PRV.

Program 159 displays a graphic representation of Amateur Radio band allocations on a Radio Shack TRS-80 Model 4 or 4p computer. It was written in BASIC by Joe Wavra, WQ5M.

Program 160 is a multifeature Morse code sending and receiving program for the VIC 20™ computer with 8 kbyte expansion and cassette tape facilities. This BASIC program includes machine language routines for speed; it was written by Bob Putnam, K7ACP. It is a long program and requires 73 cents postage on your SASE.

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

A list of all 160 programs in the PX library is also available by sending a business-size SASE with 22 cents postage to ARRL, Dept PX, 225 Main St, Newington, CT 06111.

FM/RPT

Conducted By Stan Horzepa, WA1LOU
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CompuServe ID no. 70645,247

Chasing FM DX

Recently, I received a letter asking where does one operate to work DX in the FM mode?

The one place not to chase DX is on an FM repeater. When propagation is normal, that is, when there are no openings that propagate signals farther than normal, it is all right to use a repeater to converse with a "DX" station that is located on the other side of the state or across state lines. However, when there is a band opening, such as during tropospheric or sporadic-E conditions, and signals can be propagated far beyond their normal limits, it is advisable not to use the repeater channels to chase DX.

Under such conditions, some stations attempt to chase DX by working other stations through distant repeaters. They may use high power and high gain, directive antennas to chase their prey. The problem is that it may be possible to access more than one repeater on the same frequency. While a station is repeated through a distant repeater, that station may also be repeated by other repeaters that are operating on the same frequency as the distant repeater. The station chasing DX may be able to make contacts with other stations using the distant repeater, while at the same time, that station is interfering with stations trying to use the other repeaters that can also receive our repeater DXer. So, when the band opens up, do not use the repeater channels to chase DX.

Now that you know where not to DX in the FM mode, we are back to our opening question: Where does one operate to work DX in the FM mode? Let us start with the "National Simplex Frequency." On each VHF and UHF FM band, one frequency is set aside as the "National Simplex Frequency." The National Simplex Frequency (NSF) for each band follows:

Band	*NSF*
29.3-29.7 MHz:	29.6 MHz
50-54 MHz:	52.525 MHz
144-148 MHz:	146.52 MHz
220-225 MHz:	223.5 MHz
420-450 MHz:	446.0 MHz
902-928 MHz:	906.5 MHz
1240-1300 MHz:	1294.5 MHz
10.0-10.5 GHz:	10.368 GHz

If everyone tried to chase DX on the National Simplex Frequency each time that a band opened, few contacts would be completed because there would be too much interference between all of the stations trying to use the same frequency. The solution: When the bands are open, the National Simplex Frequencies should be used as "calling frequencies." On a calling frequency, stations make their initial contacts with other stations and move to another frequency to conduct the actual conversation. For example, if I hear K9XI calling "QRZ DX" on 223.50 MHz during a tropo session, I can give him a call and, if he acknowledges me, we can arrange to continue our contact on another frequency.

But, what is that other frequency? Many VHF and UHF bands have frequencies set aside for simplex operation besides the National Simplex Frequency (refer to the ARRL *Repeater Directory* for lists of these simplex frequencies). These frequencies should be used to continue contacts that are established on a calling frequency.

During good band openings, the National Simplex Frequency may become too crowded to use as a calling frequency, especially if the opening occurs during the prime-time operating hours. If this is the case, the other simplex frequencies may be used.

If you have any thoughts on FM DXing, please pass them along and they will be published in a future installment of FM/RPT. Until then, good FM DXing!

FIRST USSR AMATEUR REPEATER IS ON THE AIR

Since February, a VHF FM repeater has been operating from a high building at Moskovskiy Gosudarstvennyy Universitet (MGU, the Moscow State University). A collective of the newspaper *Komsomol'skaya Pravda* station installed it under a special license from the State Telecommunication Inspectorate for experiments using new types of radio communication including computer communication. The repeater permits communications using low power over relatively long distances because the height of the antennas [about 150 meters (492 feet) above ground level] provides a radio horizon of over 50 km (31 miles). The repeater system offers the following advantages: easier communications in local radio nets, a means of announcing radio club events, and a means of transmitting alerts for rare HF DX and tropospheric or aurora VHF and UHF propagation.

The repeater receives on 145.00 MHz and transmits on 145.60 MHz with 10 watts of power and a deviation of 3 to 5 kHz. The repeater transmits the call sign UK3KP and the QTH-locator KO85PQ during every three minutes of continuous operation.

The antennas are vertically polarized half-wave dipoles. The receiving antenna is located on the northwest side of the central MGU tower and the transmitting antenna on the southeast side. Initial tests have shown that the screening effects of the building are substantial with energy received in various directions from MGU varying by as much as 10 to 15 dB. At a distance of less than 10 km (6.2 miles) from MGU, transmitters running 100 to 500 mW can be used, as can receivers with a sensitivity of not less than 10 μV.—*Leonid Mikhaylovich Labutin, UA3CR, from Dex Anderson's* Monthly Translation of USSR Amateur Publications

PESKY INTERFERENCE SOURCE (OR HOW TO TEAR YOUR HAIR OUT)

One of the changes you will note in the ARRL *1987-88 Repeater Directory* is the Humboldt (Iowa) 147.855-147.255 repeater's frequency change to 147.990-147.390. This was necessitated by one of the most aggravating and hard-to-find interference problems we have seen recently.

Ever since they received their coordinated frequency pair, the Humboldt group worked diligently to find the source of the problem. It seemed to be everywhere at once, yet it seemed to be moving from one location to another. The interference was finally pinned down to the frequency 147.858 MHz, but just when they thought they located the source, it would seem to move and emanate from a different location. Finally, they gave up and requested a frequency change. The new frequency was coordinated and with their letter acknowledging the change, a note was included informing me that they had discovered the source.

It seems that there is a business-band community repeater in the Humboldt area operating on 464.975 MHz with a first IF on 21.4 MHz. The local oscillator frequency is tripled to provide the offset, as follows:

464.975 MHz − 21.400 MHz =
443.575 MHz (output of local oscillator-tripler)
443.575 MHz / 3 = 147.858333 MHz
(local oscillator)

Since there are lots of pickups, cars, tractors etc, driving around Humboldt with the culprit business-band radios in them, it was very hard to pinpoint the multiple, moving targets.

The problem is now solved, but take note that the frequency pair of 147.855-147.255 MHz is not usable in the Humboldt area. If you have some interference that seems very hard to find, you might consider looking in the other bands for some very strange answers!—*Dennis Crabb, WBØGGI, from* Iowa Repeater Council Newsletter

REPEATER LOG

According to April 1987 reports received, repeaters were involved in the following public-service events: 353 vehicular emergencies, 26 medical emergencies, 23 fire emergencies, 16 public-safety events, 12 drills/alerts, 5 criminal activities, 4 weather emergencies, 3 search and rescues and 1 power failure.

The following repeaters were involved (followed by the number of events): W2VL 31, NK2W 10, WA2ZWP 6, W3UER 8, W4BFB 7, WA4BVW 11, WD4JDW 6, WD5KBZ 5, WA6BJY 5, WD6DIH 24, KA6EEK 65, W6FNO 232, K6ZT 13, W7HSG 8, K8DDG 7, N9DOK 5.

Washington Mailbox

Conducted By John C. Hennessee, KJ4KB
Regulatory Information Assistant, ARRL

Perry Williams, W1UED: Amateur Radio's Voice in Washington

Washington, DC—The name conjures up images of the White House, the Washington Monument, the Lincoln Memorial and, of course, the Capitol building with its Senators and Congressmen pursued by hordes of lobbyists. This month's Washington Mailbox is about one particular lobbyist—the one who represents ARRL and Amateur Radio in Washington.

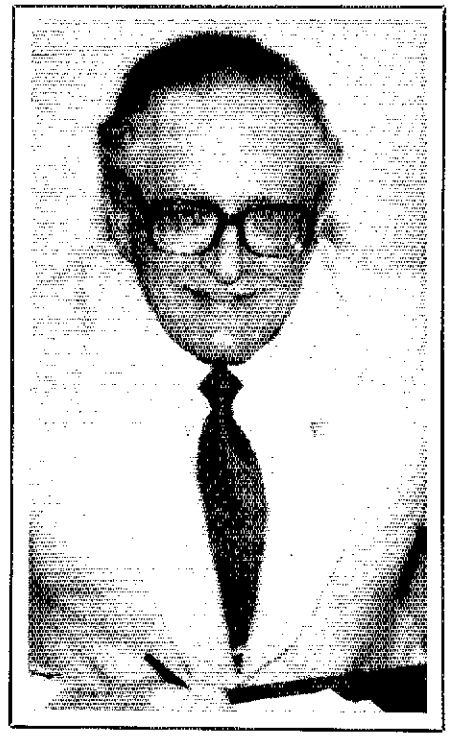
Here at Headquarters, we don't call him that. Instead, we give him the title Washington Area Coordinator. Of course, we're talking about Perry Williams, W1UED.

Q. What is your role as Washington Area Coordinator?

A. As the ARRL's Washington Area Coordinator, I spend a couple of days per week in Washington, DC, working on behalf of Amateur Radio and the ARRL. Otherwise, I am in my office at ARRL HQ in Newington. My mission, under the direction of ARRL President Larry E. Price, W4RA, is to keep Amateur Radio in the foreground of influential Washington circles so that there will always be an Amateur Radio Service. I keep current on pertinent legislation and other matters of concern to ham radio operators. As the lobbyist for Amateur Radio in Washington, I deal with one set of issues—Amateur Radio. My functions are to inform Congressional staff on issues important to the amateur community and to exchange ideas with staff members of federal agencies, notably the FCC. The responsibilities of the Washington Area Coordinator lie in the following areas: keeping close and continued contact with the FCC, Congress and government officials who can further our interests; providing an interface between HQ and the League's Counsel, Chris Imlay, N3AKD; coordinating ARRL staff efforts involving Washington; and maintaining contact with our Washington-area volunteers who can help promote our interests.

Q. Can you define Amateur Radio's main interests?

A. Of course, the most important of our interests is the preservation of amateur frequency allocations, and, when possible, making additions to them. Since the World Administrative Radio Conference (WARC) in 1979, US amateurs have seen the addition of three new bands to the amateur allocations: 10, 24 and 902 MHz. 18 MHz, a fourth new band, is not currently open to US amateurs, but it should be by July 1989. Another of our interests is maintaining the proper balance between rules and regulations and the freedom to experiment. There must be enough regulation and enforcement to control irresponsible operators, yet enough flexibility to develop new techniques such as packet. We, as amateurs, must keep growing and experimenting with new forms of communication, just as amateurs have been doing for nearly a century.



Q. Has the ARRL always had a Washington Area Coordinator?

A. This position has existed in some fashion since the second decade of this century. Until his death in 1936, ARRL Vice President Charles Stewart, W3ZS, a volunteer, was the League's principal agent in Washington; later ARRL staff became more involved. At various times there has been sentiment in favor of a full-time, resident League representative in Washington. The 1978 Board of Directors decided that a commuting Headquarters staff member could accomplish as much on a cost-effective basis. Harold Steinman, K1FHN, served as the first Washington Area Coordinator until 1980, when I took over the job.

Q. What do you see as Amateur Radio's greatest victory in Washington over the past few years?

A. The most favorable long-term victory for Amateur Radio recently is the Commission's adoption of PRB-1. Anyone who has had trouble with local zoning ordinances is familiar with this document. PRB-1 is the FCC's limited preemption of local zoning authority over amateur antennas and towers. This gives municipalities some guidance in drafting ordinances favorable to amateurs.

Q. How can an amateur "get involved" in complicated FCC proceedings?

A. If an amateur has an opinion on an issue before the Commission involving Amateur Radio, the amateur should contact his ARRL Director. This is how League policy is influenced. An example of this process is the way Novice Enhancement came into being. A number of people, ARRL Board Members and individual amateurs, independently arrived at the conclusion that the solution to low growth and the high drop-out was to make Amateur Radio more satisfying and more fun. This could be done by increasing operator privileges. Some amateurs went right to the FCC; others worked through the League to propose Novice Enhancement. The ARRL then filed as a group representing over 144,000 amateurs.

In conclusion, amateurs should get involved in the decision-making process. Make your opinions known! You can help determine the direction of Amateur Radio and help ensure that the Amateur Radio Service remains a vital, growing force.

Agencies Contacted

To indicate the scope of ARRL representation in Washington, consider that, in addition to daily contact with the FCC, contacts were made with the following agencies during the past year:

- US Senate
- US House of Representatives
- Department of Defense
- Department of State
- Department of Transportation
- Department of Justice
- Federal Emergency Management Agency
- National Telecommunications and Information Administration
- Office of Management and Budget
- National Weather Service
- National Communications System
- Office of Foreign Disaster Assistance
- Military Affiliate Radio System
- Armed Forces Press Service
- National Medical Disaster Service
- Voice of America
- Commission on Bicentennial of the Constitution
- International Telecommunication Union (ITU)
- US Telecommunications Training Institute

QST Profiles

Conducted By Paula McKnight, N1DNB
Editorial Assistant, ARRL

Formerly a freight ship's radio operator, J. B. Fuqua used the principles of ham radio ingenuity to achieve great success in the business world.

J. B. Fuqua (ex-W3EOO/W4FGN)

An article in the Money section of USA Today *(April 26, 1986), featuring an interview with Atlanta businessman J. B. Fuqua, caught my attention with the statement that he "started his march toward fortune by reading a 25-cent book on ham radio." Curious about the book Mr Fuqua meant, I wrote to him for details. The information from the phone calls and letters we exchanged soon led to the QST Profile of this remarkable gentleman.*

Why is J. B. Fuqua remarkable? To the business world, he is best known for his acumen in buying and selling companies, turning loss into profit. This earned Fortune 500 status (Fortune *magazine's list of the top 500 businesses in gross revenues) in just four years for Fuqua Industries, Inc.*

To Duke University, he is the man with a long memory. In the 1930s, the Duke library loaned books by mail. J. B., then a high-school student in Virginia, read their finance and management (and electronics) books. Fifty years later, he donated $10 million to Duke's graduate school of business, pumping life blood into a school that once had only 12 students. Now, the school has an enrollment of 350 and rates, according to a 1985 survey by The Wall Street Journal, *among the top 10 graduate business schools in the country.*

Well, I could list other accomplishments—such as serving in the Georgia State House of Representatives and State Senate, and as Georgia Federal Bank Director—and awards—such as the 1984 Horatio Alger Award, given by the Horatio Alger Association of Distinguished Americans to the 10 individuals whose lives best exemplify the merits of America's free enterprise system. But, what is even more interesting is the story (as told to QST*) of J. B. Fuqua, the ham, and what Amateur Radio meant and still means to him.*

Ham radio set the course of my life. In 1932, I was 14 and living on a tobacco farm in Virginia. On a Saturday afternoon, just after we had gotten our first radio, I tuned in WRVA in Richmond and became fascinated by a program being put on by the chief engineer, who was teaching code. At the end of the program, listeners were offered the ARRL booklet *How to Become an Amateur Radio Operator* if 25 cents was sent to the station. This was the greatest investment I ever made.

Home-Brewed Magic

From instructions in the booklet, I built a two-tube receiver, including my own hand-wound plug-in coils. I had no tools. I used an iron rod heated in the coals of a wood cook stove for a soldering iron and also to make holes in the wood breadboard for the transmitter. I used the end of a file to make holes in the aluminum panels.

I built a transmitter, winding my own copper tubing. It used a type-171 triode tube. The filament was run by a 6-volt car battery. The plate power was supplied by three 45-volt B batteries. The antenna was a wire strung between two poles, as instructed by the ARRL material. My call was W3EOO.

Although this rig probably put out less than 1 watt, I was able to contact other hams on several continents. I operated on the 20, 40 and 80-meter bands.

First Job

I became deeply interested in learning more about radio. I borrowed lots of books by mail from the Duke University library. By the time I had graduated from the little country high school, and when I was 17, I had passed the examination for a first-class radiotelegraph operator's license. I got my first job as the only radio operator on a freight ship that ran between North America and south and east African ports.

"Ham radio set the course of my life."

The ship was a relic from World War I. It had a small, single-tube oscillator transmitter, but its principal transmitter was a 2000-watt quenched spark transmitter, which was powered by a motor generator. While modern-day hams will think that a spark transmitter must have been very inefficient, as a matter of fact, across salt water it was capable of communications over several thousand miles at very low frequencies (below 500 kilocycles).

Land Ho!

I left the ship after several voyages and got a job as an engineer in a radio station. At 19, I was reputed to be the youngest chief engineer of a radio station, WCSC in Charleston, South Carolina. In Charleston, I was W4FGN. When I was 21, I got some investors interested in building a new radio station in Augusta, Georgia—WGAC, which I managed and owned part interest. Subsequently, I owned my own radio station and built, bought and sold a number of radio and TV stations between 1940 and 1980, when I disposed of all my broadcasting properties.

Kilowatt Kismet

If it had not been for ham radio—and, indeed, if it had not been for that fateful Saturday-afternoon radio program—I might have been a farmer or certainly in some totally different career. I am very grateful for the contributions ham radio has made to my life.

The technology of ham radio [today] is much more complex than in the 1930s. I enjoy listening to a modern, sophisticated ham receiver. At some point, I may become interested in being a ham operator again. I am most impressed by the miniaturization of equipment than any other changes over the years. The thing I haven't forgotten is the code. I believe I can copy almost as fast at age 68 as I could at 18.

Correspondence

Conducted By John Hennessee, KJ4KB
Regulatory Information Assistant, ARRL

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.

YOUR NOVICE ACCENT

☐ While operating on 10 meters, I heard one "know it all" severely criticizing a young newcomer for his use of some pretty tame CB jargon. That is not a very good welcome.

While working DX on 20 meters, we amateurs are tolerant of other's languages, accents and dialects. Why can't we tolerate a newcomer's goof? A lot of hams were CB users before they "got their ticket." If our "know it all" used CB and said "Hi hi" or "fine business old man," he would only get a few chuckles, and not a lecture!—*James G. Coote, WB6AAM, Los Angeles, California*

☐ A musing or two after reading June *QST*. . .How good it is to see the Newkirk tradition at *QST* being carried on by Dave, AK7M. Now if he could just get the minutes of this year's get-together at the Long Hall of the DX Hoggery and Poetry Depreciation Society, life would be sweet again!

There was something he left out of this excellent piece for Novices and Technicians and their new privileges on phone. On several occasions recently, I have had the pleasure of a QSO with some of these newcomers on voice in the 10-meter band. By and large, they are really catching on and becoming good SSB ops. But what, pray tell, is the meaning of this phrase I've been hearing in the Novice subband? It goes like this: "The *personal* here is. . .?" The "personal" what? Personal deodorant? Personal privilege? Personal protection?

It then dawned on me that they were trying to give me their *name!* Lighten up, fellas, the word to which you answer is *n-a-m-e.* Pure and simple, and easily understood. Just "name." That'll do it, and the guy on the other end knows exactly what you mean. Perhaps it's time "Your Novice Accent Is Showing" was rewritten and updated. —*Drayton Cooper, N4LBJ, Bishopville, South Carolina*

["Your Novice Accent" *has* been updated; see "A Fresh Look at CW," elsewhere in this issue.—Ed.]

ART COLLINS, WØCXX, SK

☐ Recently, during a visit with a client, I picked up a copy of the company newsletter, *Rockwell News.* Right on the front page was the sad news of the passing of Art Collins, WØCXX, the founder of Collins Radio.

Just as it did with Art Collins, Amateur Radio often plays an important part in starting a technical career. Amateur Radio can be a lifelong hobby that can build into a rewarding career. Many amateurs take the freedoms of our hobby all too lightly, but I am sure those who are truly involved have only a thankful attitude towards this privilege of hamming. To newcomers, I tell my story of early attempts to become licensed, but if it wasn't for the ARRL, I may have never learned the basics of the Amateur Radio spirit. That spirit has carried me through some very dark moments. When others say "all is lost," the hams, with their keen sense of dedication, continue to produce worthwhile results. It is that level-headedness on which the firm framework of ham radio is based.

So it is to the early radio pioneers like Art Collins whom I feel we respect and hope to follow in a similar pattern of success. With that, I close in a somber note of loss, but I feel an even greater sense of promise in the future.—*Ronald G. Haley, WA9YLD, Hampshire, Illinois*

CW QRP—SPREAD THE WORD!

☐ I am an amateur who went from Novice to Advanced. After passing the code test, I didn't really put the CW to use. Never did I give up on the CW though. I've kept in practice, but it seems when I get on the air, it's always on SSB.

Tonight, I discovered Amateur Radio like I've never known it before. Winter had taken its toll on my beam and I thought this meant no more Amateur Radio for me until the antenna had been worked on. Tonight, I got the idea to string up a 20-meter dipole and work QRP on my Heath HW-9. Finland, Spain and the USSR were worked one right after the other on CW—and I loved it!

QRP—spread the word!—*Mike Paine, DA2RV/KD2QX, APO New York*

A CALL FOR HELP—ANSWERED

☐ In the May issue of *QST*, my request for information (regarding the addition of 10 meters to a Clipperton L amplifier) was printed in the Stray section. The response to my request has been overwhelming! Two days after receiving my May *QST*, the first responses began to come in. It is very gratifying to know our fellow hams are so willing to help when a need is there.

To date, I have received 18 offers of information or assistance. Additionally, I have received two requests for copies of the information that I got from others. So, the initial assistance offered by these hams has aided others also. Instances such as this typify the general attitude and willingness of the amateur community.—*Michael L. Thomas, NA5U, North Richland Hills, Texas*

INSTANT NOVICE TICKETS?

☐ As a very new Novice and a member of ARRL, I have been quite impressed by the friendly helpfulness of hams. Since I have not yet received my Novice call, I obviously can't get on the air for a period of at least 6-8 weeks because of the lag time from the date I passed my Novice to the time my call sign is issued by the FCC. As one who has completed over 20 years of military service with the Naval Reserves and who has passed every FAA exam through CFI, I am fully aware that competence of a Federal agency is neither directly nor indirectly proportional to time.

The suggestion that I am proposing to the ARRL may be neither new nor practical. As one who has worked very hard to become a Novice, I am most anxious for my first QSO. That long time period waiting for my license will limit me to listening. Although this is a learning process, it is most frustrating. My suggestion is as follows: A method of giving a Novice some type of temporary call sign should be established.

The immediate issuance of a call sign to a Novice labeling him as such opens many doors that do not exist at this time. The Novice will be immediately identified by his call sign rather than his "fist" and should induce other hams to be more helpful and tolerant. This may only be a start of many rewarding results that can occur through such a program.

It is with some certainty that I believe other Novices share my sentiments concerning the present situation, and they will appreciate the ARRL's help, thoughts and assistance. —*Dennis M. Agin, Columbus, Ohio*

[As of June 1, 1987, the average waiting time for new Novice licenses was only 4-5 weeks.—Ed.]

DERIVATION OF "HAM"

☐ For some 50 years now, I've endeavored to find out just where, when and why we Amateur Radio operators came to be known as "hams." My search ended several weeks ago when the Sunday *New York Times* printed a splendid article on our hobby. The story contained the derivation of the word *ham.*

The article stated that some 75 years ago, the magazine *Home Amateur Mechanic* devoted an issue to assembling home radios. The devices were eventually named *ham* after the magazine's initials. The users of these devices became known as *hams,* an adaptation of the first letters in the magazine's name.

And so ended my long search for the reason why we are known as "hams". . .or so I thought. I quoted the above story to an old friend of mine, W4IIZ of Sunrise, Florida, and I was amazed to hear what he had to say with regards to this article. He thought the article was dead wrong, and he gave the following explanation. The word *ham* began to be used by English radio amateurs. Use of this word came about quite inadvertently. It was due to a particular accent of the Cockney dialect. In referring to themselves as *amateurs,* the word often came out as *h'amateurs.* In order to prove this point, W4IIZ stated that dropping or adding an "h" is often a part of the Cockney dialect.

It's back to square one for me. My search continues for the true story behind the term "ham."—*Bill Blumenfeld, W1TFT, New Haven, Connecticut*

YL News and Views

Conducted By Joan Gibson, KG1F
RR 1, Box 1465, Waterbury, VT 05676

KC7ET Can Inspire the Young, As Well as the Not As Young

One spring day, while Harry Johnson, WB7TBO was listening to a local 80-meter net, he heard a female voice say "I passed." The enthusiastic YL was Harry's friend, Evelyn Cavallo, KC7ET/mobile on her way home to Douglas, Arizona after taking the license examination in Tucson. Her first attempt to pass the Extra Class exam was successful. Evelyn is 74 years old.

In 1978 Harry and an amateur friend were having dinner one evening at the local pizza eatery discussing, what else, their mutual hobby. Overhearing the conversation, a white-haired YL stopped by their table to ask about Amateur Radio. Smiles Harry, "I had been an amateur for about two years and was more than glad to tell someone about the greatest hobby in the world. I told Evelyn about a Novice class being offered at the local high school. Evelyn signed up, took the course and received her Novice license on May 5, 1978. She filled three log books with contacts during the next year!"

Evelyn enjoyed CW, but decided it was time to upgrade and enjoy the phone portion of the band. With help from Bob Selman, K7YGW and Gene Glasscock, W7DZG, she upgraded in 1980 to General class and to Advanced one year later.

Like many amateurs, Evelyn was bitten by the DX bug, and she now claims 276 countries confirmed for DXCC. She has received certificates for YLCC, WAC, WAZ, WAC/YL, WAS/CW/15 meters and WAS/YL. She is a member of the 10-10, INDEXA and sponsors 5X5GK in NCDXF. KC7ET is active in the New Mexico Breakfast Club, YL Coffee Cup Net, YL Open House and the Cactus Keys 2-meter repeater group as well as the Cochise Amateur Radio Association and Tucson Repeater Association, and she is secretary-treasurer of the Douglas Radio Club. A couple years ago, Evelyn heard about two YLs who were interested in Amateur Radio. To keep their interest alive, Evelyn taught a Novice class, and, as a result of her efforts, Douglas, Arizona has two more licensed YLs.

KC7ET enjoys the privilege of the Extra Class license and shares her knowledge with young and old alike. *(WB7TBO photo)*

Her enthusiasm for the hobby is boundless. She shares her excitement of Amateur Radio by giving presentations to grade-school science classes. "Who better to tell some young people about a hobby than Evelyn," says WB7TBO. "She sets an excellent example of accepting a challenge and following through. Evelyn never said she couldn't get her code speed high enough to upgrade nor did she say she didn't have the time to study." KC7ET's philosophy is if it is worth having, it is worth working for. *(Thanks WB7TBO—Ed.)*

CANADIAN LADIES' AMATEUR RADIO ASSOCIATION TO CELEBRATE 20TH ANNIVERSARY

CLARA will celebrate its 20th anniversary September 11-13, 1987. In honor of this occasion, Canadian YLs will have an "87 Celebration" Convention in Toronto. The three-day weekend promises to be full of activities for all YLs and their families. The festivities begin Friday night with a dinner and entertainment. Saturday morning, CLARA will have its official business meeting followed by a luncheon and recognition presentations. Various forums will take place Saturday afternoon, and the evening will feature a dinner dance and more entertainment. Sunday, the registrants will meet for a bon voyage breakfast. The members of CLARA cordially invite all YLs to join them in Toronto during September for this important milestone. For more information, contact Cathy Hrischenko, VE3GJH, 56 Stockdale Crescent, Richmond Hill, ON L4C 3S9, Canada.

Results, 1986 Howdy Days

YLRL Member Winner: DJ1TE
YLRL Nonmember Winner: KAØVPO

DJ1TE	119	KB8RT/7	49
KM8E	107	G4VBT	48
WD8MEV	99	GM4YMM	48
KA1JC	90	DF2SL	43
KA6SOC	89	KD8SC	43
WA1UVJ	85	OZ1GLN	41
NC2Q	82	G4EZI	40
N2EVZ	74	N1DJU	37
W2GLB/7	73	SMØHNV	35
J87CD	72	VK3KS	27
K6KCI	67	VK3BJB	26
YT3YL	67	WA8EBS	22
KE5UO	64	VK4ASK	22
KU7F	62	N4ODI	18
W4DEV	59	CP5LE	17
WA2NFY	58	**Checklog:**	
DF8XU	56	NM7N	
KØEPE	53		
KAØVPO	52		

Christa Elksnat, DJ1TE, has been QRV since 1953 and enjoys the YLRL sponsored contests. She has been a member of YLRL for 30 years and plans to attend its 50th anniversary convention in Hawaii. A member of the Australian, Japanese and African YL organizations, as well as QCWA, QCWW and YLISSB, Christa is an active amateur who, when not working her usual 12-hour day as a secretary in a family-owned business, finds time to garden and travel.

Kat Meyers, KAØVPO (now KEØHY), was first licensed in 1985 and, a year and a half later, she earned Advanced class privileges. Her interests in radio include DX and contests, and she plans to expand her activities by participating in emergency nets. Kat comes from an amateur family. Her OM is WBØIEL. Her brother, sister-in-law, father-in-law and brother-in-law are licensed Amateur Radio operators. Taking care of her two children keeps Kat busy, yet she finds time to pursue her interests in astronomy, reading and handicrafts.

Strays

***QST* congratulates ...**

☐ Dr Peter Lyman, N6LGV, of Pasadena, California, on being appointed Deputy Director of the Jet Propulsion Laboratory.

IARU News

Conducted By Richard L. Baldwin, W1RU
HC 60, Box 60, Waldoboro, ME 04572

President: Richard L. Baldwin, W1RU
Vice President: Carl L. Smith, WØBWJ
Secretary: David Sumner, K1ZZ
Assistant to the Secretary: Naoki Akiyama, N1CIX/JH1VRQ

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Masayoshi Fujioka, JM1UXU
Secretary, IARU Region 3 Association
PO Box 73, Toshima
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Japan

The International Amateur Radio Union—since 1925 the federation of national Amateur Radio societies representing the interests of two-way Amateur Radio communications.

How You Can Participate in IARU

Hardly a week goes by that we don't get a letter from someone asking how he can help IARU. "What can I do?" "Do you have any travel assignments for me?" "Are there some meetings I can attend?" "I'm going to be vacationing in Cannes—who do you want me to visit?"

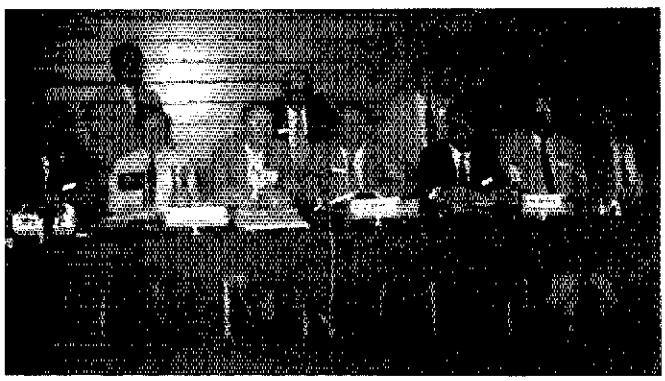
In order to put our reply into perspective, it is necessary to point out that IARU is a union of national societies. Societies participate, not individuals. It is true that when IARU was first organized, way back in April 1925, it was set up as an association of individuals, and member number one was Hiram Percy Maxim, 1AW. But that concept soon changed, and, for most of its life, IARU has been a union of national societies. Oh, of course, individuals are involved, but only insofar as they play a role in one of the organized bodies of IARU. There is an Administrative Council of IARU, and its nine members function as a group. There are Executive Committees of the regional organizations, and they are chosen by the member societies of the region and function as a group. There are triennial regional conferences, to which member societies of the region send representatives, with those individuals representing not themselves, but the society.

When IARU participates in an ITU conference, the individuals attending on behalf of IARU are following a closely defined modus operandi. The policies of IARU, the goals and objectives for a particular ITU meeting, have been carefully spelled out. Those attending on behalf of IARU do so within a set of parameters that have been developed over some period of time within the structure of IARU. The process of development would have followed this course: First, the national member society would have participated in a regional IARU conference, where some particular issue would have been discussed and a decision taken. That decision would then be coordinated with the other two regions, and there might have to be some give-and-take between the three regions so that we have a common and consistent worldwide policy. Thus, at the ITU conference, the individuals designated to attend either by their regional Executive Committee or the Administrative Council will know precisely what position to take on a variety of matters that might affect the amateur service. These individuals have, in effect, been indoctrinated about IARU goals and objectives over a period of time.

So how can you help? Well, what we are trying to point out here is that the national member society is the basic key to all authority and action in IARU. If you want to help IARU be successful, help your national society be strong. Join. Get others to join. Play some role in the affairs of the society. If you are internationally minded (and you must be, or you wouldn't have written to ask how you can help IARU), get yourself involved on the international side of your society.

"There are triennial regional conferences, to which member societies of the region send representatives . . ."

(N1CIX photos)



"IARU is a union of national societies."

Without exception, every member of a regional IARU Executive Committee is an individual who has participated actively in the organizational affairs of his national member society. There is not one single instance of a person leaping out of nowhere to become active in the IARU regional organizations. The same comment applies to the IARU Administrative Council. There is not one single instance of a person leaping out of nowhere to become active in the work of the IARU Administrative Council.

If you are a member of one of the smaller societies, it may be easier for you to become involved in the international liaison activities of your society, for often with the smaller societies it seems that there are never quite enough volunteers to tackle all the tasks that need doing. If you are a member of a larger organization, one that is understandably somewhat more highly structured, it may be a bit more difficult to become involved. But, difficult or not, that is the path to follow. If you have some linguistic skills, if you have some experience in working with international organizations, if you have a broad base of Amateur Radio experience, then you may be just the person your society has been looking for.

That so many people write and inquire how they may participate in IARU is indeed encouraging, as it shows an appreciation of what we are trying to accomplish. We hope that these few paragraphs will serve to show you that the most potent role you can play, even though you may not consider it the most glamorous role, is through your member society, be it ARRL, CRRL, DARC, RSGB or any one of the other 120-odd members of IARU. The strength of IARU comes from the strength of the individual societies—that's where your challenge is.

Canadian NewsFronts

Conducted By Harry MacLean, VE3GRO
500 Riverside Dr, London, ON N6H 2R7
Tel 519-473-1668

CRRL Officers and Directors

President: Thomas B. J. Atkins, VE3CDM
Vice President and Secretary: Harry MacLean, VE3GRO
Treasurer: William Loucks, VE3AR
Honorary Vice President: Noel B. Eaton, VE3CJ

Directors: Ron Hesler, VE1SH
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Raymond W. Perrin, VE3FN
William A. Gillespie, VE6ABC
David Fancy, VE7EWI

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Bureau Manager: Donald Welling, VE1WF

Spectrum 20/20

CRRL President Tom Atkins, VE3CDM, and Counsel Bob Benson, VE2VW, attended Spectrum 20/20, the RABC-DOC-sponsored spectrum-management conference held in Montreal on May 12-13. What was learned? Basically, that spectrum management isn't going to become any easier in the future, and that the Minister of Communications is knowledgeable and concerned about EMI. A draft of a new *Radio Act* that will give the Minister power to act in EMI cases, even cases involving non-radio equipment, is in the works.

We realize that none of this will be the stuff of late-night conversations on 75 metres. For that, we offer a few random gleanings from the transcripts of the proceedings:

Since 1981, DOC has been studying the feasibility of using an unmanned, lightweight aircraft, flying in a 1-km-diameter circle 21 km above the ground, as a low-altitude satellite capable of relaying radio transmissions within an area with a 600-km diameter. The aircraft would be much like a sailplane, but powered by an electric motor. Solar cells on the upper surface of the aircraft would gather power during hours of light. Antennas underneath the aircraft would gather power, beamed to the aircraft from 200-1000 megawatt microwave transmitters, during hours of darkness. The aircraft, known as a SHARP (*S*tationary *H*igh-*A*ltitude *R*elay *P*latform) would remain aloft for several months at a time.

AM broadcast listening is on the decline. According to CBC, both broadcasters and receiver manufacturers are to blame. Broadcasters add preemphasis to their signals to give them more "punch." This results in adjacent-channel interference, better known to us amateurs as "splatter." To compensate, receiver manufacturers have been adding selectivity to their products. This results in poor audio quality. The frequency response of the average AM receiver manufactured today is about the same as a telephone: 3 kHz. Then there are the problems of noise and skywave interference at night. Solutions? New antennas that will attenuate the skywave; synchronous detection to improve signal-to-noise ratios; and a standard preemphasis curve to minimize splatter and encourage manufacturers to open up the bandwidth and improve the audio quality of their receivers.

DND, the Department of National Defence, has 24,000 individual frequency assignments and exclusive jurisdiction over 225-400 MHz and parts of the 3-23 MHz band. DND tries to anticipate its communications needs 20 years in advance and will soon be buying 10,000 VHF-FM radios and 1000 SSB-HF radios for its forces in Canada and Europe. DND is experimenting with, or about to experiment with, (1) devices that can disturb the earth's magnetosphere in a controlled way, to create ducts for propagating radio signals; (2) buried antennas that will be as effective as above-ground antennas in laying out a ground wave; (3) lasers that can create ion clouds useful for reflecting radio signals or ion paths that can serve as long-wire antennas; and (4) radars with sufficient resolution to produce optical-quality pictures.

There's lots more, but we've run out of space. For the rest, you'll have to get your own copy of the Spectrum 20/20 transcripts from RABC at $75 a copy. Let us know if you need an address.

CRRL ELECTIONS: SECOND NOTICE

☐ Nominations are open for the offices of CRRL President and CRRL Vice President. Nominations, bearing the signatures of 10 or more CRRL Full members, will be accepted at the CRRL Headquarters office in London, Ontario, until 1200 EDT 1987 August 20. Because of space limitations, the entire election notice will not be reproduced here. For full details, please refer to last month's *QST* or contact CRRL Headquarters.

SECTION MANAGER ELECTION RESULTS

☐ Congratulations to Ernie Savage, VE7FB, recently reelected British Columbia Section Manager for a two-year term beginning 1988 January 01. Ernie ran unopposed, eliminating the need for a ballotted election. As a side note, Ernie is the "longest surviving" Section Manager in either CRRL or ARRL. (He's been a Section Manager for over 25 years.) Ernie held the post shortly after World War II, came back to it in 1962, and has held it ever since.

NOTES FROM ALL OVER

☐ Leonid Labutin, UA3CR, a well-known polar explorer, will be with a group of Canadian and Soviet scientists crossing the North Pole on skis next February. The expedition will begin at Severnaya Zemlya in the Soviet Union and end at Cape Columbia near Alert on Ellesmere Island. Leo advises that he will be taking a 10-watt transceiver for the 80, 40 and 20-metre bands, and possibly some equipment for communicating through the OSCAR satellites. A number of Canadian amateurs, including several VE8s, have been lined up to keep in contact with Leo and the expedition.

CRRL ended 1986 in a strong financial position. Helping to keep it that way in 1987, here is CRRL's Management and Finance Committee at a recent meeting at CRRL Headquarters: From left, CRRL Treasurer Bill Loucks, VE3AR; General Manager Ray Staines, VE3ZJ; and President Tom Atkins, VE3CDM. *(VE3AND photo)*

☐ You probably missed it. DOC allowed Canadian amateurs to use special prefixes, CG1 in the Yukon, CZ1 and CZ2 in Newfoundland and Labrador, and CK1-CK8 in the rest of Canada, for one day only, Canada Day, July 01. There's a good chance it will happen again next year. Watch for it.

☐ To commemorate the 60th Anniversary of Terrace Bay, British Columbia, Terrace Bay amateurs may use the special prefix XO7 during December 01-31. To mark the 15th Winter Olympics being held in Calgary, Alberta, Canadian amateurs may use the following special prefixes during 1988 January 01-February 29: CH1 in the Yukon, CJ1 and CJ2 in Newfoundland and Labrador, and VX1-VX8 in the rest of Canada.

☐ Reginald Aubrey Fessenden, the Quebec-born inventor credited with making the first-ever radio voice transmission in 1900, is one of four innovators in communications featured on a series of stamps currently offered by Canada Post.

☐ Congratulations to John Iliffe, VE3CES, who was recently elected President of CARF, the Canadian Amateur Radio Federation. Congratulations also to CARF, which is celebrating its 20th anniversary. CLARA, the Canadian Ladies' Amateur Radio Association, is also celebrating its 20th anniversary. CLARA members will be meeting at the Sheraton Parkway Hotel, Richmond Hill, Ontario, on September 11-13.

☐ Nominations are now open for CRRL Amateur of the Year. This award recognizes longtime contributions to Amateur Radio or specific achievements. Past winners include VE3BBM, VE7APT, VE3AYL and VE6ABC. Send your nomination and supporting documentation to CRRL, Box 7009, Station E, London, ON N5Y 4J9.

Coming Conventions

ALABAMA STATE CONVENTION

August 15-16, Huntsville

The Huntsville ARC is sponsoring the Huntsville Hamfest and ARRL Alabama State Convention to be held at the Von Braun Civic Center, 700 Monroe St. Admission is free. Doors open 9 AM-5 PM Saturday and 9 AM-3 PM Sunday. Talk-in on 34/94. Features include CAVEC Exams, various forums, food and much more. For more information, call Gwin Grievs, 205-883-2760, or Don Tunstill, 205-536-3904.

WEST GULF DIVISION CONVENTION

August 7-9, Austin, Texas

The Austin ARC and the Austin Repeater Organization present the ARRL West Gulf Division Convention, Austin SummerFest '87, in conjunction with the summer meeting of the Texas VHF-FM Society. The Convention features an indoor flea market, dealer exhibits, ARRL Forum, technical programs, hosted hospitality suite and VE exams for all license classes. Women's events available. Saturday evening features a barbeque at a historic Austin site and a midnight Wouff Hong ceremony. On-site registration begins at 7 PM Friday. Admission is $5 in advance, $7 at the door, under 15 free. Flea-market tables are $5 each, with a limit of 3; first come, first serve. Saturday barbeque is $9; advance reservation required. Location is the Villa Capri Motor Hotel, 2400 N 135, near the center of Austin. Talk-in on 146.34/94. Send registration to Austin SummerFest, PO Box 13473, Austin, TX 78711. For more information, contact Don Weiss, KB5PM at the above address, or at 512-836-1485.

August 1-2
Northern Florida Section, Jacksonville

August 7-9
West Gulf Division, Austin, TX

August 15-16
Alabama State, Huntsville

August 22-23
Northwestern Division, Tacoma, WA

August 29-30
Great Lakes Division, Saginaw, MI

September 18-20
Dakota Division, Watertown, SD

September 26-27
Midwest Division, Des Moines, IA

ARRL NATIONAL CONVENTION
Sept 9-11, 1988—Portland, Oregon

NORTHWESTERN DIVISION CONVENTION

August 22-23, Tacoma, Washington

The Radio Club of Tacoma presents Hamfair '87 and the ARRL Convention at Pacific Lutheran University. Friday evening entertainment will be provided for early arrivals. Doors open at 9 AM on Friday. Talk-in on 147.98/38 and 222.92/224.52. The Banquet MC will be Rush Drake, W7RM, ARRL Northwestern Division Director. The Banquet speaker is Norm Ray, W7LFA, who will present a slide program, "China Odyssey." Bob Schetgen, KU7G, Assistant to the Exective Vice President at ARRL will present seminars on 160- and 80-meter antennas, and also trouble-shooting ham gear. Mac McGrath, KZ1A, from the ARRL's VEC office will chair a VEC Forum and an ARRL Forum. Other technical seminars and forums include: HF propagation, achieving high-speed CW skills, antennas, QRP, repeaters and packet radio. Activities include commercial exhibits, flea market, women's displays, snack bar, VE testing (all classes) and much more. Registration is $5 until Aug 12, $6 at the door. Banquet is $10, reserve by Aug 12. RV spaces are $2, no hookups. Logger's breakfast is $2 on Sunday morning. Flea-market tables $18 per 6ft, includes one registration. Dorm rooms are $13 single, $19 double, no reservation needed. For more info and/or flea-market tables, write to Al Wittich, KA7SBJ, 3832 Gay Rd, E Tacoma, WA 98443, or call Bill Morgan, W7GRP, 206-531-3821, or Marion O'Neal, WB7SQU, 206-838-3126.

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.

California (Pomona)—Aug 15: The Tri-County ARA is sponsoring their hamfest at the Palomares Park on Arrow Highway. Doors open 7 AM-3 PM. Tables are $2 to members, $5 for nonmembers. Plenty of food and drinks, parking available. VE exams, displays, ARRL forum, technical topics and much more. For more info and reservations, contact Eugene Heelzle, K6PMC, 1071 Vanderbilt Rd, Claremont, CA 91711, tel 714-624-6382.

Colorado (Denver)—Aug 9: The Rocky Mountain Radio League Hamfest will be held at the Jefferson County Fairgrounds, (Sixth Ave Freeway and Indiana Street Exit) 9 AM-5 PM. Tables $7 in advance, $9 at gate. For reservations or more info, contact Bill, KAØCZW, 3570 Jackson Way, Thornton, CO 80233, or call 303-457-9809.

Colorado (Glenwood Springs)—Aug 8: Ski Country ARC will host its 6th annual hamfest in conjunction with the Colorado Council of ARC summer meeting at the CMC building, 1402 Blake Ave, 9 AM-3 PM. Talk-in 146.07/67. Admission free, tables $5. Refreshments and lunch will be available. VE exams 9 AM. Videotapes, packet and AMSAT demos; HF station on the air. Campout at Reudi Reservoir after hamfest. For further information, contact Bob Ludtke, K9MWM, 406 Yale Cir, Glenwood Springs, CO 81601, 303-945-8722.

†**Delaware (Georgetown)—Aug 16:** The third annual Delmarva Hamfest will be at the Delaware Tech Community College on Del Rte 18, just one quarter-mile west of the intersection of US 113 and Del Rte 18 at Georgetown. Doors open 8 AM-4 PM. Exams will be given. Inside tables are $5, tailgate space $3. Swimming available. Talk-in on 147.075. For info and reservations, write to Delmarva Hamfest, Rte 2, Box 244G, Georgetown, DE 19947.

†**Florida (Melbourne)—Aug 29-30:** The Platinum Coast ARS is sponsoring their 20th annual hamfest at the Melbourne Auditorium, off US 1 downtown. Talk-in on 146.25/85. Hours Sat 9 AM-5 PM, and Sun 9 AM-4 PM. Features include exams, exhibits, swap tables, ARRL Forum, QCWA, MARS and much more. Tickets $3 in advance, $4 at the door. For info and reservations, contact PCARS, PO Box 1004, Melbourne, FL 32901. For tickets, send SASE marked "Ticket." For swap tables, send SASE marked "Swap Tables." Limited to two adjacent tables per request.

†**Georgia (Madison)—Aug 22-23:** The Confederate Signal Corps, Inc, is sponsoring their Hamfest at the Holiday Inn on I-20 and US 441. Free admission. Doors open 9 AM-4 PM Sat and 9 AM-2 PM Sun. Talk-in on 146.265/865. For more info, contact Roy L. Jordan, WB4ILR, 1146 Shoreham Dr, College Park, GA 30349, tel 404-996-4587.

†ARRL Hamfest

†**Illinois (Danville)—Aug 30:** The Vermilion County ARA is sponsoring their 18th Annual Danville, Illinois Area Hamfest. Location is at the UAW Civic Center-Tilton. Doors open at 8 AM. Admission $2 each, or 3 for $5. Activities include forums on computer usage, RTTY demonstration, Novice privileges and much more. Talk-in on 146.22/82. For more info, contact Chris Stonecipher, KA9VMN, RR 3, Box 117, Danville, IL 61832, tel 217-431-0110.

†**Illinois (Willow Springs)—Aug 9:** The Hamfesters Radio Club is sponsoring their 53rd annual hamfest at Santa Fe Park, 91st and Wolf Rd. Plenty of free parking. Gates open 6 AM. Refreshments available along with many activities. Tickets $3 in advance, $4 at the gate. For tickets, send check and SASE to John Schipitsch, W9BNR, 13058 Finch Ct, Lockport, IL 60441, tel 312-403-1043.

†**Indiana (Angola)—Aug 2:** The Steuben County Radio Amateurs present the 28th Annual FM Picnic and Hamfest at Crooked Lake. Features include BBQ chicken, inside tables for exhibitors and vendors, overnight camping (fee charged by County Park). Talk-in on 146.52 and 147.81/21. Admission $2.50. For more info, contact Don Laird, 219-665-6311.

†**Indiana (Lafayette)—Aug 16:** The Lafayette Hamfest will be held at the Tippecanoe County Fairgrounds located on IN 25. Indoor setup 5 PM-8:30 PM on Saturday. Outdoor setup from 5 AM Sunday. Gates open at 5 AM on Sunday. For more info, contact Lafayette Hamfest, 111 S 7th St, Lafayette, IN 47901-1628.

†**Indiana (Marion)—Aug 9:** The 8th Annual Grant

County ARC Hamfest will be held at the 4-H Fairgrounds. Doors open at 8 AM with refreshments, free parking, VE exams and much more. Admission $3 in advance, $4 at the gate. Table reservations inside, $4; flea-market space $2. For tickets or more info, send SASE to Brooks Clark, WB9EAP, 2202 S Boots St, Marion, IN 46953.

Indiana (Valparaiso)—Aug 2: The Porter County ARC presents the Northwest Indiana Hamfest and Computer Fair at the 49er Drive-In Theater, Rte 49, north of Valparaiso. Gates open at 7 AM (6 AM for vendors). Plenty of activities available. VE testing for all class licenses, free parking and food. Admission $3, under 12 free. Talk-in on 146.775/175 and 145.45/144.95. For further info, contact Rich Stahl, K9LBO, PO Box 1782, Valparaiso, IN 46383.

†**Iowa (Cedar Rapids)—Aug 1-2:** The Cedar Valley ARC is sponsoring their Summerfest 87 at the downtown Five Seasons Center. Admission in advance $5 for adults, $3 for student; at door $6 for adults, $4 for student; under 12 free. Banquet buffet tickets in advance $10, $13 at door. Gates open 8 AM-5 PM Sat and 8 AM-3 PM Sun. Talk-in on 16/76 and 52. Features include seminars, VE exams, vendors and much more. Tables 8 ft for $10. Commercial $20 for the first booth, $15 each thereafter; phone 319-377-3829. For advance registration, write to Summerfest '87, 2825 23rd Ave, Marion, IA 52302, tel 319-377-2761 or 319-362-3602.

†**Kentucky (Georgetown)—Aug 9:** The Central Kentucky ARRL Hamfest sponsored by the Bluegrass ARS will be held 8 AM-4 PM at Scott County High School, Longlick Rd and US Rte 25. Talk-in on 146.16/76. Technical forums, license examinations, exhibits and much more. Outside flea-market space free with paid admission. Tickets $5 in advance, $6 at the gate. For more info or tickets, send SASE to Bill DeVore, N4DIT, 112 Brigadoon Pkwy, Lexington, KY 40503.

Massachusetts (Dalton)—Aug 30: The Northern Berkshire ARC is sponsoring their Radio and Computer Flea Market at the American Legion Field, Rte 9. Admission $1, women and children free. Starts at dawn. Refreshments available. No charge for selling.

Missouri (Monett)—Sep 13: The Ozarks ARS will hold its 6th Annual Ozarks Club Congress and Swapfest at the city park, located at the corner of Highways 60 and 37. Tailgating begins at 9 AM. Potluck dinner at 12:30. Special activities are provided throughout the day. Talk-in on 146.37/97. Admission, coffee and soft drinks are free.

Missouri (St Charles)—Aug 23: The St Charles ARC will sponsor Hamfest '87 at Blanchette Park 6:30 AM-3:30 PM. Free admission and parking (including handicapped). Tailgating $2. Food available. Forums and VE exams at 10 AM. Dealers welcome. Talk-in on 146.07/67 and 146.52 simplex. For more info, contact Eric Koch, NFØQ, 2805 Westminister, St Charles, MO 63301, tel 314-946-0948.

†**North Carolina (Shelby)—Sep 5-6:** The Shelby ARC is sponsoring their Hamfest at the Cleveland County Fairgrounds on NC 180 at 74 Business-East. Gates open at 6 AM (both days). Admission $4 in advance, $5 at the door. VE exams included. Talk-in on 146.28/88. For more info, contact John Ledford, N4GOQ, 3410 Oakcrest Dr, Shelby, NC 28150, tel 704-482-4951.

†**New Jersey (Mullica Hill)—Aug 30:** The Gloucester County ARC is sponsoring the Gloucester County Hamfest '87 8 AM-4 PM. Talk-in on 147.78/18 and 146.52. Admission is $3.50, $4 at the door. Features include VE testing, food, drinks and more. For more info, contact John Fisher, K2JF, 609-589-2318, Harry Spiece, NJ2B, 609-728-7454, or Mike, N2FIZ, 609-435-7922 evenings.

†**New Jersey (Oakland)—Aug 22:** The Ramapo Mountain ARC is sponsoring their 11th Annual Flea Market. Location is 20 miles from the George Washington Bridge at the Oakland American Legion Hall, 65 Oak St. Admission $2. Doors open 8 AM-1 PM for buyers, 6 AM for vendors. Talk-in on 147.49, 146.49 and 52. Food and drinks available. For more info, contact Sol Silverman, 800 Godwin Rd, Paramus, NJ 07652, tel 201-337-2290 days or 201-652-1882 evenings.

New Mexico (Alamogordo)—Sep 5-6: The Alamogordo ARC will hold its Third Annual Hamfest at the Civic Center on First St. Doors open 8 AM both days. VE exams Saturday only. Activities include ARRL, MARS, traffic nets, technical meeting and much more. Banquet Saturday night. Admission both days $5, $6 at the door. Talk-in on 145.35 and 52. For more info, contact Larry Moore, WA5UNO, 1830 Corte Del Ranchero, Alamogordo, NM 88310, or Road Runner Traffic Net each evening on 3939 kHz at 0100 UTC, tel 505-437-0145.

New York (Ithaca)—Aug 22: The Tompkins County ARC will sponsor the 6th annual Finger Lakes Hamfest-Computerfest held at 8 AM at the Trumansburg Fairgrounds, 12 miles NW of Ithaca, on Rte 96. Admission $3, under 12 free. Outdoor flea-market space is $1. Indoor tables available by reservation. Free parking. For reservation or info, contact David Flinn, W2CFP, 866 Ridge Rd, Lansing, NY 14882, tel 607-533-4297.

†**Ohio (Marysville)—Aug 23:** The Union Co ARC is sponsoring their Marysville Hamfest and Computer Show at the fairgrounds. Admission $3 in advance, $4 at the door. Doors open 6 AM-4 PM. Talk-in on 147.99/39 or 146.52. Activities include stage show and flea market. Food available. For more info, contact Gene Kirby, W8BJN, 13613, US 36, Marysville, OH 43040, tel 614-261-8871 days or 513-644-0468 evenings.

†**Ohio (Warren)—Aug 16:** The Warren ARA is sponsoring their Warren Hamfest. Flea market at 6 AM, vendors at 8 AM. Admission $2.50 till August 1; $3 thereafter. Talk-in on 146.37/97. Location on Rte 45 (Rte 5 bypass, Mahoning Ave exit.) Breakfast and lunch will be served. For more info, contact WARA, PO Box 809, Warren, OH 44482, tel 216-652-0452.

Ontario (Barrie)—Sep 19: The Hex-9 Group of the Barrie ARC is holding its Third Packet Radio Symposium, cosponsored by and held at Georgian College. Talks for beginners from 9:30 AM. Main discussions start at 1 PM. Emphasis this year is on networking. Guest speaker Lyle Johnson, WA7GXD well-known in TAPR circles. Talk-in on 146.25/85. Registration $5. Inquire Hex-9 Group, Box 254, Barrie, ON, L4M 4T2. Preregister via packet VE3FJB-1.

Ontario (Brantford)—Aug 15: The Brantford ARC is sponsoring their Flea Market 8 AM-2 PM. Vendors 7 PM-3 PM, $3 per table. Location is the Woodman Park Community Centre, 491 Grey St. Admission $2, under 12 free. Vendors, auction, refreshments and much more available. Talk-in on 146.52, 147.75/15. For more info, contact Jack, VE3DLR, PO Box 1661, Brantford, Ont, tel 519-753-2087.

Rhode Island (West Greenwich)—Aug 22: The Hope Valley ARA will hold its Second Annual Flea Market 8 AM-2 PM at the West View Inn. Free admission. Plenty of free parking. Seller's fee $5 per space, tables not supplied. Limited indoor space in case of rain. VE exams available. Reservation required. Talk-in on 147.765/165 and 223.90. For more information, contact Ray Ortgiesen, 35 Hornet Rd, N Kingstown, RI 02852, tel 401-885-1364.

Tennessee (Lebanon)—Aug 30: The Short Mountain Repeater Club is sponsoring the Lebanon Hamfest at the Cedars of Lebanon State Park, US Hwy 231, seven miles south of Lebanon. Outdoor facilities only. Free admission. Exhibitors bring your own tables. Space available on a first-come basis. Talk-in on 146.31/91. Food and drinks available. For further information, contact Mary Alice Fanning, KA4GSB, 4936 Danby Dr, Nashville, TN 37211.

Texas (Amarillo)—Aug 8-9: The Panhandle ARC will hold their 13th annual PARC Golden Spread Hamfest at 9 AM both days at the Inn of Amarillo, 601 Amarillo Blvd, West Amarillo. Preregistration $5, $6 at the door. Distributors, dealers, flea market. VE testing both days, walk-ins only. Flea-market tables at $5 each. For more info, contact PARC Hamfest, Box 10221, Amarillo, TX 79116.

Texas (Bonham)—Sep 19: The Fannin County ARC is sponsoring a Flea Market at the National Guard Armory at the intersections of US Hwy 82 and TX Hwy 121. Free admission. Bring own tables. For more info, contact Garland Stevenson, WM5T, Rte 1, Box 112A, Telephone, TX 75488, tel 214-664-2265.

†**Texas (Victoria)—Aug 22:** The Victoria ARC is sponsoring the Victoria Hamfest held at the Knights of Columbus Hall on 3610 N Ben Wilson Rd. Doors open 7 AM-7 PM. Admission $3, $4 at the door. VE exams available. Talk-in on 145.19 and 147.16. For more info, call 512-576-1742 days, 512-576-1742 evenings, or 512-573-1423.

†**West Virginia (Ripley)—Aug 8:** The Jackson County ARC is sponsoring their 10th annual Hamfest held at the Jackson County Junior Fairgrounds, six miles west of Ripley. Doors open 9 AM-4 PM. Admission $3. Activities include VE exams, flea market, packet-radio demos, videos and much more. Food and drinks available. Talk-in on 146.07/67. For more info, contact Les Shockey, WB8SNO, RFD #2, Box 36, Sandyville, WV 25275, tel 304-273-3525.

Wisconsin (Green Bay)—Aug 15: The Green Bay Mike and Key Club is sponsoring their Summer Swapfest at the Community Service Center on 1673 Dousman St. Take Dousman St/Shawano Ave exit off Hwy 41. Admission/parking $1. Doors open at 7 AM for sellers, 6 AM for exhibits. Electronic equipment, components, computer hobbyists, experimenters, VE exams and much more. Talk-in on 147.72/12 or 147.96/36. Tables $5 for 8 ft, by reservation only; limit to four each. Food and drinks included. For table info and reservation, send SASE and check payable to Green Bay Mike and Key Club, C/O Cathy Strommen, KD9WO, 1500 Main St, Green Bay, WI 54302. For VE exam info and reservation, contact Larry Siebers, KD9IA, 7077 Weyers Rd, Freedom, WI 54130, tel 414-788-3823. All must have original license and ID photo.

Note: Sponsors of large gatherings should check with League HQ for an advisory on possible date conflicts before contraction for meeting space. Dates may be recorded at ARRL HQ for up to two years in advance.

Strays

***QST* congratulates . . .**

☐ the following hams for awards received at the annual Old Hickory Council (Winston-Salem, NC) Exploring Awards banquet: Robert Stitcher, KB4MZV, Council Explorer of the Year; William Batts, III, KB4EAK, Exploring Advisor's Key; and Jaime Burcham, KB4MZU, special recognition for service as the council Explorer Officer Association chairman.

☐ Rob Brownstein, NS6V, of Santa Cruz, California, on being elected to the board of directors of the California Engineering Foundation.

☐ Ivan Menendez, KB4RMB, of Miami, Florida, on becoming an Eagle Scout.

☐ Carter Craigie, KD3AO, of Devon, Pennsylvania, on receiving the 1986 Lindback Foundation Award for distinguished teaching at Cabrini College.

☐ Richard Olsen, N6NR, of La Jolla, California, on being named Vice President of Product Operations for Lunar Industries.

☐ the Amateur Radio operators of New Hampshire on being honored "for their contribution to country and state through the years" by the state House of Representatives.

☐ the following radio amateur on 70 years as an ARRL member:

• Charles Campbell, W2IP, of Mount Vernon, New York

☐ the following radio amateur on 60 years as an ARRL member:

• Vernon Holmes, WØLR, of Sioux City, Iowa

Club Spectrum

Conducted By Lee Hayford, AH2W
Club Services Manager, ARRL

Wanted: Hams who can Provide Friendly Assistance

I really didn't know too much about physically disabled people and their enthusiasm for Amateur Radio until a number of articles about Amateur Radio appeared in several magazines targeted for this readership. The May 1987 issues of *Paraplegia News, Sports 'N Spokes* and *DAV* magazines touted the ARRL's program for the disabled and the Courage Handi-Ham System in Minneapolis, Minnesota.

Enthusiastic Response

As this was being written, more than 250 physically disabled people had written to League HQ for information! Since the physically disabled have a wide range of special needs, we decided not to refer them to instructors and clubs until a pool of willing and able volunteers is formed.

You Can Help

Maureen Pranghofer, KFØI, Student Coordinator, Courage Handi-Ham System, emphasized that a person doesn't have to be physically disabled to become a member of the Courage Handi-Ham System. All hams are invited to join this organization and learn more about how their interests and abilities in Amateur Radio can make the difference for a physically disabled person attempting to get an Amateur Radio license.

The ARRL Club Services Department is compiling a list of clubs and instructors willing to learn more about the Courage Handi-Ham System. Once we have a good-sized list of volunteers that adequately covers all areas of the country, we'll send it. She'll contact each of these potential volunteers with more information.

Maureen said the most effective teaching method for helping the physically disabled is tutoring. Students in the Courage Handi-Ham System are supplied with appropriate study materials, and instructors can contact the System by phone and letter for personal advice. Instructors and ham radio clubs can also be supplied with special devices that adapt equipment to the special needs of disabled students.

Day-to-Day Courage

Danger is often associated with courage. The mass media sometimes depict courage as a soldier on a battlefield coming to the rescue of a comrade in arms, or perhaps turning the whole tide of the battle in a reflex action, or by taking a chance against the odds. After the battle, some type of recognition, or honor, is awarded to the soldier for his brave or courageous action. Battlefield courage is easy to see and reward, but what about the daily struggles people battle through? What awards are given to blind, deaf or physically disabled people as they adapt to their newly shaped world?

Friendly Assistance Can Make the Difference

Most soldiers would readily confess that the fear of failure or disgrace in the eyes of their fellow soldiers is what motivates them to a higher level of performance. Often this performance is viewed as courage. Yet how courageous would the soldier be if isolated? If cast out from his company or ridiculed for his lack of ability, would this soldier be capable of performing a courageous deed? Without the support and acceptance of his peers, would he not become completely ineffective? In fact, would not his will to succeed greatly diminish or disappear altogether?

You can be that special person in a physically disabled person's life who provides the key to open up a whole new world of globe-spanning friendships and turn disabilities into possibilities via the airwaves. All it takes is a little time and persistence in learning how to effectively reach people with special needs to help make their world a better place to be.

Write League HQ Today!

Why not sit down at that typewriter or take up a pen and jot down a few words? We're waiting to hear from you. Fall will soon be here. It offers many opportunities to share the excitement of our great hobby. We want to put you in touch with Maureen at the Handi-Ham System. She's the right person to help channel all that enthusiasm in the right direction. She can help you reach those people who especially exhibit courage daily.

The next time you think Amateur Radio is losing some of its luster, just sit in your chair, close your eyes, and imagine what it's like being enclosed in a world of darkness; or block your ears and try communicating with people around you; and after that run in the park, contemplate the obstacles you'd face if you used a wheelchair. Be thankful for your capabilities, but don't stop there—start spreading some of that joy that Amateur Radio brings to your life with others who could use a helping hand. QST

Welcome SSCs!

The following clubs have demonstrated their zeal for enhancing enjoyment of Amateur Radio and going the extra mile in serving their local communities. These clubs were granted Special Service Club status after demonstrating effective programs in six areas: (1) Public Relations, (2) Emergency Communications, (3) Training, (4) Technical Advancement, (5) Operating Activities and (6) ARRL Membership Recruitment. The number in parentheses is the number of club members. Welcome Aboard!

Atlanta Radio Club, Inc, Atlanta, GA (469)
DuPage ARC, Clarendon Hills, IL (81)
Kanawha ARC, Charleston, WV (74)
Mississippi Coast ARA, Gulfport, MS (100)
Reading RC, Inc, Reading, PA (115)
San Benito ARC, San Benito, TX (6)
Tampa Bay Repeater Assn, Inc, Plant City, FL (202)
Zephyrhills Area ARC, Zephyrhills, FL (40)

The following renewing Special Service Clubs have reaffirmed their commitment:

American Red Cross Emergency Comm Service, East Meadow, NY (28)
Anderson RC, Anderson, SC (77)
Beaver Valley ARA, Inc, New Brighton, PA (89)
Blue Ridge ARS, Inc, Greenville, SC (146)
Butler County ARA, Butler, PA (98)
Denver RC, Inc, Denver, CO (175)
Flathead Valley ARC, Kalispell, MT (29)
Frontier ARS, Las Vegas, NV (17)
Great Falls Area ARC, Great Falls, MT (41)
Humboldt ARC, Eureka, CA (62)
Huntsville Area Young Ladies ARC, Huntsville, AL (28)
Kerbela ARS, Knoxville, TN (24)
Lake County ARC, Inc, Griffith, IN (180)
Lincoln ARC, Inc, Lincoln, NE (225)
Mankato Area RC, Inc, N Mankato, MN (57)
McMinnville ARC, McMinnville, OR (21)
Mesabi Wireless Assn, Iron, MN (22)
New Ulm ARC, New Ulm, MN (24)
Newport County RC, Newport, RI (43)
Olympia ARS, Lacey, WA (132)
Portage ARC, Inc, Mantua, OH (102)
Porter County ARC, Valparaiso, IN (149)
Poughkeepsie ARC, Poughkeepsie, NY (90)
Putnam Emergency & Amateur Repeater League, Carmel, NY (129)
Rocky Mountain Radio League, Inc, Aurora, CO (371)
Roanoke Valley ARC, Roanoke, VA (154)
Tri City ARC, Scottsbluff, NE (21)
Tuscaloosa ARC, Tuscaloosa, AL (45)

Silent Keys

Administered by Nancy A. Slipski

It is with deep regret that we record the passing of these amateurs:

N1BHD, Louis Proulx, Jr, Rowley, MA
K1GJK, Warren E. Churchill, Chapel Hill, NC
KA1INM, John J. Guiney, South Royalston, MA
W1JDE, Fairbanks W. Greene, Center Harbor, NH
WA1JYQ, Howard E. Rummel, Sr, Auburndale, MA
KA1KTS, Stanley A. Brunstrom, Quincy, MA
W1LH, James V. Pettipas, St Petersburg, FL
W1RF, Clifford A. Harvey, Sturbridge, MA
K1RMC, Frank H. Fountain, Woodland, ME
WA1RTC, Alonzo L. St Germain, Spencer, MA
KB2BFX, Charles M. Stanton, Elmira, NY
K2BMK, Theodore L. Mokoid, Sr, Newark, NJ
N2CBZ, John L. Debes, III, Fairport, NY
W2DQA, Joseph T. Wintermute, Mountainside, NJ
W2DSK, Frank E. Scrafford, Albany, NY
W2GWP, John J. Krupiarz, Utica, NY
KA2GYA, Martin D. Feit, Metuchen, NJ
W2ICY, Edward Wiskup, Maywood, NJ
KC2JP, Carmelo Torres, Glen Cove, NY
*WB2NPT, Jules Manford, Maplewood, NJ
K2RM, Carroll B. Smith, Piscataway, NJ
KA2WDC, Leo Wasiewicz, Cranford, NJ
W3AVV, Roy Crocker, Carbondale, PA
W3BOP, Fred I. Keiper, Allentown, PA
WA3IEN, Edward H. Rigg, King of Prussia, PA
W3IMU, John E. Wolf, Jensen Beach, FL
*K3NSY, Reber M. Van Matre, Washington, DC
W3QXV, John J. Strickroth, Philadelphia, PA
W3SYP, Michael L. Chirozzi, New Castle, PA
W3TBG, Robert J. Tull, Seaford, DE
W3ZTJ, Charles E. Williams, Jr, Southampton, PA
N4CLU, Eddie L. Dyke, Sevierville, TN
KB4DOL, Paul J. Dupre, West Melbourne, FL
W4DVO, Lewis A. Connolly, Tampa, FL
NE4E, Walter J. Allard, New Port Richey, FL
W4HRF, John McKee, III, Hilton Head Island, SC
WD4HUE, Berkeley H. Martin, Jr, Richmond, VA
KI4IZ, Joseph E. Warren, Tampa, FL
N4JYD, Evelyn E. Wikoff, Fort Mill, SC
*WB4LXH, C. K. Marston, St Petersburg, FL
W4NAV, Raymond C. Ingraham, Port Charlotte, FL
W4NZC, Fred H. Hasty, Charlotte, NC
W4OGH, Leo Caruthers, Raleigh, NC
W4OQ, William L. Lawson, Roswell, GA
W4PUG, Paul H. Jacobs, Melbourne Beach, FL
*KN4S, John S. Hill, II, Rougemont, NC
K4SDW, William Paul Marlowe, Altamonte Springs, FL
*KF4ST, Ronnie Colcord, Florence, KY
W4TWP, Edmund J. Purser, St Petersburg, FL
K4URK, Daniel C. Britt, Smyrna, GA
KI4XJ, Howard S. Maguire, Jr, Roanoke, VA
KA5AHB, John V. Bieberbach, San Angelo, TX
N5BHW, L. J. Dolan, San Antonio, TX
WD5CLI, David F. La Chance, Lufkin, TX
WD5EOT, Henry E. Le Claire, Lincoln, AR
W5FSE, John R. Cumbie, Jr, Tupelo, MS
W5HBL, Paul M. Smallwood, Olmito, TX
KC5HW, Marshall B. Collins, Arlington, TX
W5MMK, Harry E. Wirth, Bay City, TX
WA5NIU, Wendle E. Campbell, Jr, Austin, TX
W5RKC, Mel E. Buechel, Dallas, TX
NI5Y, William M. Malicoat, Henryetta, OK
*WB6AHZ, John M. Nicholson, Valley Center, CA
N6BEO, Brian J. Slaten, Tarzana, CA
W6BFW, Gene W. Adams, Los Alamitos, CA
WB6BWS, Will M. Connor, Cardiff, CA
W6CY, Francis H. Melcher, Anaheim, CA
WA6INT, Donald M. Holdsworth, Camarillo, CA
N6JTP, Elmer L. Moyer, Concord, CA
WA6KFT, Wayne A. Martin, Cudahy, CA
*K6LHA, Duncan F. McDonell, Thousand Oaks, CA
W6PSV, Mario D. Belmessieri, Avery, CA
WB6TRP, S. Donald Tarditi, Oxnard, CA
W6UA, Charles E. Weir, Sr, San Luis Obispo, CA
KA6USP, Ron M. Light, Visalia, CA
WA6VQF, Kenneth M. Jeffers, Oakland, CA
*W6WL, Walter R. Larson, Hampstead, NH
WA6WYP, Harry L. Wolter, Victorville, CA
KA7CGL, Edward M. Albright, Medford, OR
K7CRL, Lewis H. Dorman, Powell, WY
K7CTP, La Verne W. Van Dyke, Seattle, WA
W7DHZ, Sanford J. Richardson, Toledo, WA
W7MGF, Alfred B. Summers, Cottonwood, AZ
K7NWE, Kaye Purkerson, Lebanon, OR
W7WK, George H. Eberting, Seattle, WA
W7YP, Charles "Port" Evans, Sun City, AZ
W8AJW, John E. Siringer, North Olmsted, OH
W8CTO, Harold Nash, Arcanum, OH
NF8I, James B. Bettis, Jr, Parma Heights, OH
WA8KLE, Harry E. Danford, Jr, Huntington, WV
W8MRV, Clyde M. Fuller, Boynton Beach, FL
K8MUG, Richard L. Givler, Wadsworth, OH
W8QPH, George Toma, Medina, OH
KC8SY, Leo Wilson, Jr, Burlington, MI
N9AI, Lee N. Hamm, Vero Beach, FL
W9AMS, Maynard H. Ruud, Mount Prospect, IL
WB9DGA, William E. Diercks, Chippewa Falls, WI
WA9HHL, Donald T. Cieszynski, Milwaukee, WI
K9IDW Wendell M. Bushnell, Blandinsville IL
K9KER, Glenn E. Greenwood, Danville, IL
W9PBY, Steve Zsizsik, Ottawa, IL
WB9SWL, Clyde L. Mock, Phoenix, AZ
WØNAM, Marguerite L. Cardwell, Waverly, NE
WBØPYQ, Maldon B. Crabill, Omaha, NE
WØUFZ, Charles D. Coleman, Alliance, NE
WØWIE, Phyllis French, Sedalia, MO
ABØZ, Larry L. Abbott, Taylor, NE

*Life Member, ARRL

In order to avoid unfortunate errors in the Silent Keys column, reports of Silent Keys are confirmed through acknowledgment only to the family of the deceased. Thus, those who report a Silent Key will not necessarily receive an acknowledgment from HQ.

Note: All Silent Key reports sent to HQ must include the name, address and call sign of the *reporter* as well as the name, address and call of the Silent Key in order to be listed in the column. Please allow several months for the listing to appear in *QST*.

50 Years Ago

August 1937

☐ Highlight of W8IGQ's radio operating stint on the *Yankee* cruising the south Pacific was a visit to isolated Pitcairn Island. There he met Andrew Young, op at the makeshift spark station furnishing the island's only contact with the outside world, and who would later put the site on the DXCC most-wanted list when he acquired equipment for the ham bands.

☐ Progress in transmitter and receiver stability demands parallel improvement in power supply regulation. George Grammer describes several voltage-regulated power packs that give "battery performance" for receivers, speech amplifiers and small oscillators.

☐ Vic Clark, W6KFC, was chosen to receive the first Hiram Percy Maxim Award as the most outstanding young amateur of 1936. His activities include traffic handling (BPL ten times), high scores in Sweepstakes and ORS parties, winner of 5-meter transmitter hunts, and low-power DXer.

☐ The popular RK-18 and RK-20 types have been expanded into the beam power field, with the RK-47 and RK-48 providing 150 watts output with only 2 watts drive.

☐ A good Field Day setup and one ready for any sudden emergency is the unit-style phone-c.w. assembly with superhet receiver and 35-watt 6L6 transmitter, the joint effort of W1CBD and W1JPE. A 6-volt battery powers dual genemotors for the plate supplies.

☐ Two new columns take their bows this month—one for the Army Amateur Radio System and the second for the Naval Communications Reserve.

☐ The Radio Manufacturers Association has agreed to set up a special engineering study to see if cheap, midget superhet broadcast receivers can be made more immune to interference from legitimate amateur operation. This comes as a result of League overtures to the industry.

☐ W8UD's extensive dissertation on Class B modulation points out that certain principles must be followed for a quality signal, not always attained by those of us who rely too much on the junk box for some parts. Transformer design is the most important factor.

☐ No one made perfect copy of the strange words and gibberish constituting text for the Copying Bee, but three hams—W2HHG, W5FCQ and W6GVT—made a score of 98%, putting down correctly 49 of the 50 groups of mangled letters.

☐ W1JPE solves the image problem in his 56-Mc. high-stability converter by using a high (20.5 Mc.) intermediate frequency.

☐ The U.S. has third-party traffic agreements with Canada, Chile and Peru, and at League request the Department of State will propose automatic reciprocal privileges throughout our western hemisphere.

☐ Communications Manager Handy announces a weekend low-power contest (25 watts) in August, effectively a second Field Day activity.

25 Years Ago

August 1962

☐ W3CT revamped the Heathkit SB-10 sideband adapter, adding a 5-band driver, replacing the output tube with a 6146, and installing a new pi-network output for low-impedance loads.

☐ A really handy gadget is a transistorized inverter from W9YVZ's workbench, providing about 50 watts of 60-cycle a.c. from any 12-volt car battery.

☐ The Editor says one solution to band overcrowding is to switch to 10 meters (from any lower-frequency band) when a local contact is in progress.

☐ W1ICP uses the overtone oscillator modes of a single crystal to achieve three-band reception (80-40-15) in his simple converter for the Novice/beginner.

☐ Many of us build gear "just like *QST*, except..." and the "except," usually a junk-box adaptation, often causes difficulty. W1HDQ finds that neutralization is a major area of difficulty, especially for newer hams, and so provides some tips on neutralizing r.f. stages to solve the stability problem in transmitters and receivers.

☐ For the apartment dweller with limited space, W3DEA offers some antenna designs that are inconspicuous, easily set up or removed, and still function reasonably well.

☐ K3CUI describes 1962-style Russian amateur radio, with improved signals, license figures growing, and considerable interest in sideband. The U stations are already known for their excellent operating skills.

☐ The Leonid meteor shower due in November comes near the peak of its 33-year cycle, and W1HDQ alerts meteor-ping enthusiasts to get ready for the show.

☐ W1IKE outlines the techniques of basic soldering, with illustrations of good and bad joints, and how to "make it stick" with a good electrical bond.

☐ A new international ham station has been inaugurated in the International Telecommunication Union building in Geneva, Switzerland, with the appropriate call sign of 4U1ITU. Over 500 contacts in 55 countries and all continents were made in the first weekend of operation.

☐ Forget those rumors about CBers being granted our 10-meter band. FCC points out the band is allocated to amateurs in the international table, and there is no intention of disregarding that agreement.

☐ See you at the 1962 national convention in Portland, Ore.—*W1RW*

Tornado Strikes Saragosa, Texas

What began as a very special occasion turned to tragedy in the small West Texas town of Saragosa on May 22, 1987. A preschool graduation ceremony for 30 four- and five-year-old children was interrupted by a vicious tornado with winds estimated at 260 miles per hour. The toll of dead and injured was the highest to hit Texas in recent years.

Twenty-nine people, including six children, were killed and over 120 were injured. Most of the dead and injured were participating in the graduation ceremony that was being conducted in the community center.

Threatening weather in the area had caused the SKYWARN system of the Midland weather service to be activated. Net control for the Midland SKYWARN is W5QGG, the call of the Midland Amateur Radio Club. W5QGG was manned by Bob Edgerton, W5MVC, the Midland Emergency Management Coordinator. At 7:55, a warning was issued to area residents as the result of cloud rotations reported through the SKYWARN system. Charlie Towry, W4LCC, was watching the weather from the east of Saragosa. Glenn Humphrie, WD5COG, was watching from the west. Both are residents of Balmorhea, located about eight miles from Saragosa. Also monitoring the weather was George Toone, WB5FBJ. Toone is a blind amateur, but with the help of his brother and father he was able to report from his parent's farm, about one mile east of Saragosa.

At 8:16 PM the twister touched down in the heart of Saragosa. WB5FBJ began describing the disaster using the West Texas Connection, a linked 2-meter repeater system that covers the vast West Texas area. Immediately hams from all over the region mobilized to provide assistance.

WD5COG, W4LCC and Bob McDaniel, WO5K, immediately began to assist in the search for victims. At the same time, Bob Ward, WA5ROE, net manager of the Big Bend Emergency Net, activated the net on 3922 kHz from his home QTH in Alpine, about 75 miles south of Saragosa. Rick Sohl, WB5MPX, who had been listening on 2 meters, began loading gasoline, water and other supplies and moved them to WA5ROE's residence. Sohl then began operating as net control on the West Texas Connection using WA5ROE. James Cook, K5FD, also arrived at Ward's to assist. Cook notified Bill Brooks, KE5OG, and Dave Cockrum, N5DO, to roll the Big Bend Amateur Radio Club's emergency-communications van. KE5OG, N5DO, K5FD and Jim Thomas, N5JOE, arrived in Saragosa at 10:53 PM with the van and some supplies.

The van was located near the command post of law-enforcement officials at the disaster on a site selected by the Reeves County Civil Defense Director. Within minutes, a generator was set and running, a wire dipole was strung and traffic was being passed from Saragosa.

Another station was established, also using an emergency generator, at the Balmorhea School, where shelter was being given to homeless Saragosa residents. W4LCC moved to Balmorhea to man that station using his call. He had assistance from AE5J, Doug Otapal, N5HYD, and Ken Clouse, who had passed his Novice exam just two weeks earlier.

Both stations were manned through the night except the KE5OG station was shut down from 3 to 6 AM Saturday morning when the search was temporarily discontinued. But sleep for the operators in Saragosa and Balmorhea was almost impossible.

The Big Bend Amateur Radio Club emergency-communications van was set up and operating less than three hours after the tornado struck Saragosa, Texas. *(KE5OG photo)*

More than 236 messages were passed over the HF net, including administrative traffic and health-and-welfare. Hundreds more messages were passed via 2 meters.

The KE5OG station was secured about 3 PM Saturday afternoon, and the van returned to Alpine. W4LCC remained on the air through Sunday to continue to handle health and welfare traffic.

It is impossible to list all the amateurs who assisted in this disaster, but special thanks should go to Noel Johnson, KE5NO, Don McCarty, K5CFA, Dick Ellis, W5YCK, and Kevin Hogan, KA5STE, who all helped with net control and relays, and area amateurs who man the SKYWARN system. Also Jim Jeffrey, WA5QMJ, who sponsors and maintains the West Texas Connection, a very valuable asset to the West Texas community.

Hundreds of emergency volunteers from a wide variety of agencies poured into Saragosa Friday night and Saturday. Radio amateurs stood out as being among the more "professional" groups in terms of preparedness and getting the job done. This was particularly true on Friday night. In the case of the Big Bend Amateur Radio Club based in Alpine, it was no accident we were able to activate an emergency net on 3922 kHz or that we had a van equipped to provide communications service from virtually anywhere. The net has been in existence for 10 years. It has provided training for net-control operators and experience in operating on a directed net, and has established a frequency that most West Texas amateurs know to monitor in an emergency.

In the case of the van, the BBARC, even though it is a relatively small club, committed itself three years ago to being able to provide emergency-communications services anywhere in West Texas. Through our fund-raising efforts, we have gradually been able to equip the van to do the job. Even now, plans are under way to add a mobile repeater system to the van, a capability that would have been useful at Saragosa. Additionally, we use the van whenever possible both to train our members in its use and to ensure that everything in the van is operating properly. This preparation paid off when a real emergency arrived.

Since we had never been to the scene of a major disaster before, we didn't know what to expect. We took lots of water, food and fuel. These items were necessary when we first arrived. We had no trouble getting into the disaster site because of our highly visible van and because officials were waiting for us. Other amateurs, however, were turned away. Later, amateurs with ham license plates on their vehicles were allowed into the site. In the future, we will try to have some official identification such as RACES stickers, magnetic signs for personal cars, membership cards, etc.

We also could have used more amateurs at places away from the actual disaster such as area hospitals. We had plenty of volunteers, but didn't realize all the needs until later. We also learned not to position the net-control station at the disaster site. There was too much local activity to handle net-control functions properly.

All in all, we did prove we were ready and capable. It was yet another case where Amateur Radio was a vital link in a public-service role.—*Dave Cockrum, N5DO, and Bill Brooks, KE5OG, Public Information Assistant*

IN SERVICE...

☐ Newark, NJ—Jan 10. On the way home from New York City on a rainy night, NJ2Q and his father, both members of the Springfield First Aid Squad, spotted an accident that had just occurred on Routes 1 and 9 South in Newark. A car had crashed into a cement wall on a bridge and had sustained heavy damage. NJ2Q called for help on 2 meters, while his father checked the injured man and set up flares. 4X4FN/W2 answered the emergency call and contacted the police and ambulance service by telephone. NJ2Q stood by the scene until an ambulance arrived.—*Jeff Gornstein, NJ2Q, EC, Springfield*

☐ Yakima and Benton Counties, WA—February 11. ARES members handled communications for the Hanford Nuclear Reservation core meltdown drill held near Richland, Washington. Radio stations were also set up at the Yakima County Courthouse Department of Emergency Services.—*Richard Umbarger, N7HHM, EC Yakima County*

☐ Bridgeport, CT—April 23. The L'Ambiance Plaza building collapsed while under construction and buried 28 men beneath its ruins. Early the following Monday morning, a plea for additional radio amateurs to help at the disaster site was issued by N4GAA of the Red Cross. Those on their way to work, who were listening on the local repeaters, responded to the request.

Two other hams got the word out to as many radio amateurs in the region as possible via area repeaters and packet bulletin-board messages in an effort to recruit a team of amateurs to fill the operating positions around the clock. A total of 46 radio amateurs operated 80 shifts around the clock for five days and nights.—*Jean Cassidy, KA1OAV*

☐ Bristol, TN and VA—April 25. Bristol Amateur Radio Club members provided radio communications for the 1987 March of Dimes Walk-a-thon. The 9.8-mile walk had six checkpoints along the route, and 13 club members monitored the progress of participants.—*James Jarvis, WD4EKA, DEC East Tennessee*

☐ Oak Harbor, WA—April 26. The North Whidbey Amateur Radio Association and the Whidbey Island Amateur Radio Club jointly participated in the annual National Diabetes Bike-a-thon. The radio amateurs were posted at various points on the bike-a-thon route for safety and traffic control, including a mobile route patrol. The Net Control Station worked closely with bike-a-thon officials to keep track of all riders.—*Raymond J. Greene, KA6ITF, EC Island County*

☐ Exeter, RI—May 4. KA1NDY of Rhode Island was in QSO with WA1ZDZ on 3980 kHz at about 1:15 PM when a distress call came through on frequency from WB1HIO, who was on a sailboat in the Atlantic Ocean. The boat had started from Cape May, New Jersey, and was headed toward Connecticut when she ran into trouble. Heavy winds had ripped two of the three sails, and the boat was drifting into shipping lanes.

KA1NDY called the Coast Guard in Rhode Island and New York, and maintained contact with WB1HIO until the Coast Guard cutter rescued the sailors at 9:16 PM.—*Victor Cznarty, WA1ZDZ*

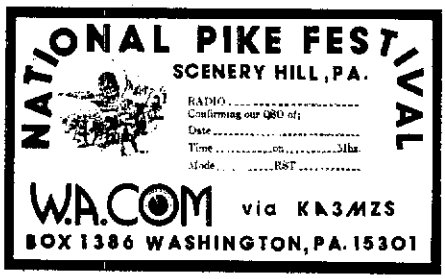
☐ Forsyth County, NC—May 9. The annual Tanglewood Steeplechase attracted nearly 20,000 spectators. Fourteen members of the Forsyth County ARES assisted with communications at the site again this year. Radio amateurs were stationed at the gates, shuttle buses and with the rescue squad.—*Rick Batte, N4BMI, EC Forsyth County*

☐ San Bernardino County, CA—May 9. Amateur Radio was called upon to provide coordination and safety communications for the second annual American Cancer Society Triathalon. Amateurs were set up along the bicycle and foot race routes to direct participants and to advise of any problems that occurred. The entire event took just an hour and twenty minutes. Amateurs had to do some quick maneuvering when the cyclists missed the first turn and continued straight. All stations at road intersections had to be notified so traffic could be halted before the cyclists arrived.—*Carmen Anthony Petrone, WB6QHB, EC, San Bernardino County, District 1*

☐ Northern Delaware—May 12. A severe weather front was observed entering the northern Delaware area bringing with it heavy winds, rains, hail and minor flooding. The National Weather Service activated the SKYWARN net with N3DFL acting as net control. Normal telephone and electricity were out in some areas.—*Michael Witkowski, N3DFL, DEC, Wilmington, DE*

☐ Kansas City, MO—May 18. A severe-weather storm watch was issued, and the local SKYWARN system went into operation. Liaison was maintained with the National Weather Service office in Kansaa City, and several spotters participated. The storm system generated funnel-cloud reports in nearby Wyandotte County.—*Michael Bellinger, KØUAA, PIA, Kansas City*

Washington County, Pennsylvania, ARES members and members of the Washington Communications Amateur Radio Club set up a special-event station on May 16-17 to commemorate our nation's first effort at road building. Known as the "National Road," or now as Pennsylvania Route 40, the route through Southwestern Pennsylvania from Maryland to West Virginia was determined by George Washington. Amateur Radio Station KA3MZS was set up at Scenery Hill in Washington County.—*Walt Piroth, N3BKW, EC Washington County, PA (N3FHG photo)*



Special QSL cards were prepared for the Washington County special-event station at the National Pike Festival in May.

YOUR CONDUCTOR'S CABOOSE
Again, the Baton Is Passed

I've had the honor of being responsible for this column since March 1985. Since then, many of you have reported your participation in public-service events and communications emergencies. The three of us in the Public Service Branch have done our utmost to report your actions in as effective and timely manner as possible. Only you can decide if we've done our job in the best interests of our readers. We hope we have.

I've recently accepted other challenges and responsibilities within Headquarters and will relinquish the reins of this column as of the September issue.

Thank you for your assistance and support as well as your steadfast commitment to serving the American public.—*Michael R. Riley, KX1B, Assistant to the Executive Vice President, ARRL*

Strays

QST congratulates ...

☐ Daniel Keele, N5CEW, of Youngsville, Louisiana, on being named Best Oral Advocate at the F. Lee Bailey National Moot Court competition.

☐ Joseph Cowen, WA5TUM, of Beeville, Texas, on being promoted to the rank of captain in the US Naval Reserve.

Field Organization Reports May 1987

ARRL Section Emergency Coordinator Reports

Twenty-eight SEC reports were received, denoting a total ARES membership of 14,486. Sections reporting were: AR, ENY, IA, ID, MDC, MI, MN, NE, NFL, NH, NLI, NNJ, OH, ONT, ORG, PAC, SCV, SD, SDG, SFL, SJV, UT, VA, VT, WA, WNY, WPA, WV.

Transcontinental Corps

Area	Successful Functions	% Successful	TCC Function Traffic	Total Traffic
Cycle Two				
TCC Eastern	105	85.00	521	1066
TCC Central	79	84.90	293	666
TCC Pacific	101	81.45	357	655
Summary	285	83.78	1171	2387
Cycle Three				
TCC Eastern	58	93.55	17	34
Cycle Four				
TCC Eastern	103	83.06	625	1247
TCC Central	81	79.40	420	472
TCC Pacific	106	85.48	582	1130
Summary	290	82.64	1627	2849

TCC Certificates issued this month: KB1AF KA8WNO

TCC Roster

KB1AF N1BHH W1CE N1DHT W1EFW K1EIC KY1F WA1FCD KN1K KA1MDM KA1MKJ W1NJM KT1Q W1QYY KA1T KW1U WB2EAG WA2FJJ W2FR W2GKZ NN2H NQ2H KB2HM N2IC W2LWB K2MT WB2QIX W2RQ WA2SPL N2XJ N3COY N3DPF KK3F K3NNI W3PQ KQ3T AA4AT K4DOR N4EXQ N4GHI WA4JDH W4JL K4JST K4MTX WB4PNY W4UQ NW4X K4ZK N5AMK N5BB N5BT W5CTZ ND5T N5DFO W5GHP K5GM AE5I W5JOV AJ5K W5KLV KD5KQ K5MXQ W5OVK KD5RC KA5SPT N5TC W5TFB K5TL W5TNT W5VMP KB5W KV5X WB5YDD WV5Z W6EOT W6INH K6LL WF6O K6UYK W6VZT KA7CPT NR7E W7EP KB7FE W7GHT NN7H W7IGC W7LG KA7MUL K7OVK KF7R W7TGU W7VSE W8PMJ AF8V KA8WNO N8XX WB8YDZ W8YP W9CBE W9EHS W9HBI W9JUJ KA9RII WB9UYU ADØA KCØD KØDJ KAØEPY KØEZ WØFRC KJØG WØGRW NØIA NXØJ AIØO WAØOYI KSØU ABØY VE3FAS VE3GSO

National Traffic System

Net	Sess	Tfc	Avg	Rate	% Rep	% Rep to Area
Cycle Two						
Area Nets						
EAN	31	824	28.20	.626	86.0	
CAN	31	618	19.93	.479	100.0	
PAN*	62	536	8.64	.462	98.9	
Region Nets						
1RN	62	490	7.90	.412	90.5	100.0
2RN	61	278	4.56	.356	90.5	90.3
3RN	31	175	5.64	.400	95.0	93.6
4RN	62	498	8.03	.361	82.2	96.8
RN5	62	687	11.08	.455	85.0	100.0
RN6	51	153	3.00	.315	100.0	100.0
RN7	62	371	5.98	.358	83.9	100.0
8RN	58	213	3.67	.240	86.4	96.8
9RN	58	214	3.69	.267	81.0	100.0
ECN						38.7
TEN	62	532	8.58	.343	81.0	100.0
TWN	53	289	5.45	.474	69.1	96.7
TCC						
TCC Eastern	105	1066				
TCC Central	79	666				
TCC Pacific	101	655				
Cycle Three						
Area Net						
EAN	31	204	6.58	.410	66.8	
Region Net						
1RN	30	64	2.13	.210	80.0	80.6
2RN	30	116	3.83	.342	94.0	48.4
3RN	21	11	0.52	.095	61.9	77.4
4RN						58.0
8RN						87.1
ECN						87.1
TCC						
TCC Eastern	58	34				
Cycle Four						
Area Nets						
EAN	31	1141	36.8	1.210	98.1	
CAN	31	1114	35.9	1.334	100.0	
PAN	31	778	25.1	.748	98.4	
Region Nets						
1RN						100.0
2RN	56	192	3.42	.372	81.0	93.5
3RN	62	247	3.98	.428	96.8	100.0
4RN	62	485	7.82	.340	100.0	100.0
RN5	62	567	9.15	.550	100.0	100.0
RN6	58	297	5.12	.440	93.0	98.4
RN7	62	362	5.83	.620	86.8	100.0
8RN	54	314	5.81	.355	78.0	93.5
9RN	62	432	6.97	.478	95.2	100.0
TEN	62	515	8.31	.652	73.0	100.0
ECN	60	137	2.28	.323	72.0	100.0
TWN	61	333	5.46	.435	95.2	96.7
ARN	31	84	2.71	.069	100.0	100.0
TCC						
TCC Eastern	103	1247				
TCC Central	81	472				
TCC Pacific	106	1130				

*PAN operates both cycles one and two.
TCC functions not counted as net sessions.

ARRL Section Traffic Managers reporting: AL, AR, AZ, DE, ENY, EPA, GA, IA, IL, IN, KS, MDC, ME, MN, NC, NE, NFL, NH, NLI, NTX, OH, OK, ONT, OR, ORG, RI, SB, SC, SDG, SFL, STX, TN, UT, VA, VT, WA, WIN, WMA, WNY, WTX, WV.

Public Service Honor Roll

This listing is available to amateurs whose public-service performance during the month indicated qualifies for 60 or more total points in the following nine categories (as reported to their SM). Please note maximum points for each category: (1) Checking into CW nets, 1 point each, max 30; (2) Checking into phone/RTTY nets, 1 point each, max 30; (3) NCS CW nets, 3 points each, max 12; (4) NCS phone/RTTY nets, 3 points each, max 12; (5) Performing assigned NTS liaison, 3 points each, max 12; (6) Delivering a formal message to a third party, 1 point each, no max; (7) Handling an emergency message, 5 points each, no max; (8) Serving as Emergency Coordinator or net manager for the entire month, 5 points max; (9) Participating in a public-service event, 5 points, no max. This listing is available to Novices and Technicians who achieve a total of 40 or more points. Stations that qualify for the Public Service Honor Roll 12 consecutive months, or 18 months out of a 24-month period, will be awarded a special PSHR certificate from HQ.

341
KC9CJ
158
N2EIA
156
NQ2H
145
K5MXQ
141
W8FPA
140
KA2F
139
KA9FFO
KA8TIK
135
KK1A
134
KB4WT
133
WB7WOW
129
N4GHI
128
WA4QXT
127
W2MTA
N8GPU
126
KAØEPY
124
WX4H
122
WB4DVZ
119
WB2OWO
118
N4EXQ
117
WA2EPI
N7FXJ

116
VE4AJE
W9YCV
KT1Q
115
KA1PHP
114
K4ZK
VE4LB
WB2EAG
113
KW1U
112
WA2SPL
W3FA
111
WA4PFK
K4NLK
K4JST
AA4JV
110
N9BDL
KØSI
109
W9JUJ
K8UQY
108
N3EMD
W0PRC
WF6O
AA4MP
K2YQK
WA4JDH
107
W7VSE
WB2VUK
KD7ME
W4PIM
106
KA2MYJ
105
WA4JDH
WB2ZJF
N7ØHL

104
KØGP
VE4RO
NØHMX
W9FZW
103
W2RRX
NØFOO
AG9G
NØDPF
KA2UBD
NC9T
102
WB5SRX
W2QNL
WA1FCD
KJ9L
WD6DOB
N1EDD
KZ8Q
101
W9DM
WD5GKH
N4KSO
W0IKT
KDØCL
100
AA4AT
W4ANK
WB1HIH
NG1A
N8EFB
99
WB2RBA
98
AJ5F
WA2VJL
N7APC
NE2W
97
K3JL
N2XJ
96
WB1CBP
W4CKS

KEØNI
WB8KWC
95
NDØN
K2VX
WB4KSG
K9CNP
94
N6MCY
W9DM
VE3WM
AA4TE
WB4ZTR
NOØA
KA1GWE
KBTVG
93
W4CKS
WA9VND
WA6ZUD
WA1JVV
KA1HFO
W9EHS
KA1MDM
92
WB4WII
KJ9J
91
VE3WV
WD4KBW
KC4VK
K5UPN
KB5ADE
N2EQM
90
KBØZ
NW7K
KA7AID
89
VE3DPO
KB9LT
N3AZW
KA9RII
WB4HRR
AA4ZV
KB1AF

88
WDØGUF
WB5YDD
WA2FJJ
WD8KQC
N1CPX
87
W9CBE
N3COY
WB2QMP
K2MT
W4QO
ND2S
WA2ERT
86
AA4HT
N3EGF
W1RWG
K2ZM
WB8JGW
N8FXH
85
W7GHT
AC5Z
WA4LLE
WØKK
84
KT9I
W5CTZ
W4JLS
WA4LTO
K4MTX
W5VMP
N2ABA/T
KA9RNY
N6EQZ
83
WA4RLV
KAØARP
VE7EJU
KA8WNO
82
WØOYH
WA8TFC
KØERM
N2EVG/T
WA9VLC
KA8TNT
81
KA2SPH
KA4FZI
80
KA4TLC
KA4TWI

NN2H
KN1K
W7LG
KBØZ
79
VE7EJW
W3YVQ
W9HBI
N8HRW
78
KF4FG
KJ3E
KA8CPS
N8IBS
WD8QXT
77
NØCLS
KAØSBY
KØZBJ
WA3UZI
KD8KU
76
KDØNH
K2ZVI
WD9DZU
N8EVC
75
K3NNI
KC3Y
WB8SYA
W1PEX
NF8B
KD8WI
74
K4IWW
K9ZBM
W7L9K
73
WB6QBZ
KA2INE
WB5J
N7BGW
KC3FK
72
N1AKS
KA1EXJ
71
NTØB
KA5UVY/T
WA6WJZ
70
WA4RNP
KB7FE

N4KRA
W5KLV
K2TWZ
N2GPA
W4HON
KA2TVX
VE7BNI
WA4RNP
N8FWA
69
KØPCK
WA6QCA
WB9PFZ
WA8HGH
68
AIØO
KB4BZA
NJ9S
N8AEH
KF8J
67
NØBKE
N6AWH
VE3GT
N4PL
W2FR
WA3GYW
WA1TBY
66
KA4GUS
WA1KLG
65
VE3POJ
VE4IX
N2DXP
KA7MUL
WB5EPA
WØYMB
N2AKZ
KA2ZYX
K2YAI
AE1T
64
WA3UNX
KP4DJ
KI4BR
KB2BKE
N8AHA
63
WD2AHD
VE3CYR
WA4MNR
WB5FQU

62
KA3DLY
KB4JPN
KA7EEE
WA8DHB
W1TN
N7GGJ
WD8KBW
61
KA6TND
NN4D
WBØWNJ
WB4TZR
WA4TVS
WBØGPM
NE3B
KA1MJK
NR8C
60
WØOUD
WA2PAC
KB4LB
KB2AKY
NF2N
VE7ANG
WD8RHU
KA1HPO/T
KA1LMR
K8ND
59
KA2ZNZ/T
58
KA1NOI/T
54
KA9CTW/T
52
WA8DYS/T
50
NØHMR/T
49
KA2JMA/T
48
KA1BBU/T
W1YOL/T
47
N8FBE/T
45
N6FWG/T
43
WB4HXS/T
N4MMM/T

Brass Pounders League

The BPL is open to all amateurs in the United States, Canada and US possessions who report to their SM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in the standard ARRL form.

Call	Orig	Rcvd	Sent	Dlvd	Total
W3CUL	535	879	1401	96	3211
NØBOP	32	1190	42	799	2063
WAØHJZ	0	1153	29	618	1800
WB9YPY	0	831	68	523	1420
W3VR	427	301	356	72	1156
K4DOR	36	442	460	8	936
WA4JDH	0	423	464	7	894
KC9CJ	6	450	125	240	821
KW1U	1	398	292	12	703
N4GHI	54	313	326	28	697
W9JUJ	2	349	333	8	692
WF6O	1	328	293	7	629
N3DPF	67	249	285	10	611
N4EXQ	11	281	231	49	572
W1PEX	0	121	420	21	563
NØDPF	195	67	242	49	553
KT1Q	61	249	213	17	540
WX4H	0	305	240	4	540
WBØWNJ	205	78	245	2	530
N2EIA	8	242	209	62	521
KA2UBD	1	254	253	2	510

BPL for 100 or more originations plus deliveries:
KA4TWI 205 W4QO 122

Independent Nets

Net Name	Sess	Tfc	Check-Ins
Central Gulf Coast Hurricane Net	31	156	3583
Clearing House Net	31	296	444
Early Bird Net	31	701	309
Empire Slow Speed Net	31	62	282
Golden Bear Amateur Radio Net	31	47	1643
Hit and Bounce Net	31	253	602
IMRA	26	755	1596
Mission Trail Net	31	68	866
NYSPTEN	31	57	497
Southwest Traffic Net	31	199	1379
West Coast Slow Speed Net	31	116	473
75 Meter ISSBN	31	248	1191
7290 Traffic Net	47	395	2381

Rules, 1987 CRRL Can-Am Contest

Phone: Sep 19, 1800Z-Sep 20, 1800Z.
CW: Sep 26, 1800Z-Sep 27, 1800Z.
Full 24-hour periods for all categories.

Object: Sponsored by the Canadian Radio Relay League to increase the friendship between Canadian and American amateurs and to provide a means of measuring the operating skills and equipment performance.

Categories of Competition

1) *Single Operator* (must be operated by the station licensee).

A) *All Band*

B) Single band: Any band can be selected for the single band category. All single-band entries will be judged in one category. It is up to the contestant to select the band that can bring him or her the highest score.

C) QRP: A maximum of 10 watts input is allowed for use during the duration of the contest.

2) *Multioperator, single transmitter:* stations operated by more than one operator or a single operator other than the licensee, or a club station.

Bands: 1.8, 3.5, 7, 14, 21 and 28 MHz. US General portion of the bands is recommended for use.

Exchange: Signal report (RS/RST), serial number starting with 001, and multiplier-area (MX) abbreviation (ie, 59001CT, 599021NY). Multiplier-area abbreviations are the usual two-letter postal abbreviations for the 50 US states, CN for Caribbean (KC4, KG4, KP1, KP2, KP4, KS4, KV4 and their A-, N- and W-prefix equivalents), PC for Pacific (rest of US possessions and Antarctica). Canadians will use: NL—VO1, VO2; NB—VE1 New Brunswick; NS—Nova Scotia; PE—Prince Edward Island; SI—Sable and St Paul Islands; PQ—VE2; ON—VE3; MB—VE4; SK—VE5; AB—VE6; BC—VE7; NW—VE8; YK—VY1 Yukon.

Multipliers: 50 US states, 2 US possessions (Caribbean, Pacific), 10 Canadian Provinces, 2 Territories (NWT, YK), 1 Island (Sable, St Paul). Maximum 65 multipliers per band. Maximum possible on all six bands is 390.

QSO Points: US to US, Canadian to Canadian contacts count for 1 point on phone and 2 points on CW; US to Canadian (and vice versa) contacts count for 2 points on phone and 3 points on CW. The same station may be contacted once on each band and mode.

Scoring: The final score is the sum of the total QSO points from all bands, multiplied by the sum of the multipliers from all bands. Phone and CW sections of the contest are considered separate contests. However, combined score for phone and CW will be used for overall competition. Combined score will be calculated by the contest committee as a result of the addition of phone and CW scores.

Awards: Certificates will be awarded in each multiplier area on both modes in single operator categories. Top five multioperator stations in each country will receive certificates for high combined phone and CW scores. Where appropriate, the Contest Committee will award additional awards. All scores will be published in *QST*.

Trophies (and Sponsors)

Single operator, Combined—Canadian Champion (ARRL)

Single operator, Combined—American Champion (CRRL)

Multioperator, Combined—Canadian Champion (Albuquerque DX Assn)

Multioperator, Combined—American Champion (International Radiosporting Assn)

The trophies will be awarded at the Dayton HamVention®.

Log Instructions: All times must be kept in UTC. Indicate multipliers the first time only on each band. Log must be checked for duplicate contacts, correct QSO points and multipliers. Do not use separate logs for each band. Rest periods must be clearly marked in the log. Each entry will consist of log sheets, summary sheets and signed declaration. Entries over 200 QSOs must include check sheets for each band. Official logs, check sheets and summary sheets with multiplier tables are available from the Contest Chairman. A large SASE with Canadian stamps (or US stamps not glued to the envelope) will bring samples. Contestants are encouraged to use them as they greatly help with processing of entries.

Disqualification: Violation of national Amateur Radio regulations or rules of the contest, unsportsmanlike conduct, poor signal quality, taking credit for excessive (more than 2%) duplicate contacts or unverifiable QSOs or multipliers will be deemed sufficient cause for disqualification. Each incorrectly logged call or exchange will cause the contact to be deleted from the log. Actions and decisions of the Can-Am Contest Committee are official and final.

Deadline: All entries must be postmarked not later than 30 days after the contest and mailed to: CRRL Can-Am Contest, VE3BMV/W2, PO Box 282, Pine Brook, NJ 07058.

Exam Info

ARRL/VEC
225 Main St, Newington, CT 06111

UPGRADING A LICENSE THAT HAS NOT YET BEEN ISSUED

How can a license be upgraded if it doesn't exist? Well, in the true sense, it can't be. However, there are hundreds (thousands?) of amateurs and almost-amateurs who are waiting for new or upgraded tickets and who want to go higher up the ladder. These folks can be easily accommodated in the ARRL/VEC program; here's how to handle these not-so-unusual multiple upgrades.

Pending Novice license: A person who has passed the Novice test (Elements 1A and 2) should be given a photocopy of both sides of the Form 610 for Novice license exactly as the examiners sent it to FCC for processing. The photocopied 610 serves as the person's evidence of having passed those elements.

When applying for upgrade, this candidate will be credited for those Novice elements if he/she presents the photocopied 610 to the VE Team that will administer the next test(s). If the candidate earns an upgrade at that session, the VE Team will issue him/her a Certificate of Successful Completion of Examination (CSCE) that indicates both upgrade and element credit. The CSCE clearly states that it cannot be used to validate temporary operation until the Novice license is issued; only then can the new privileges be used.

The VE Team will also instruct the candidate to send a photocopy of the Novice license to the ARRL/VEC when the ticket arrives. They will also send the Form 610 for upgrade to the VEC office where the application must be held until the license copy shows up and can be attached to the 610. (The FCC will not accept any Form 610 for upgrade unless the license [or photocopy thereof] being upgraded is attached).

Pending an Upgraded License: Another large group of upgrade aspirants are those who have already upgraded and want to upgrade further before the newly earned ticket arrives from the FCC. These hams will have been issued CSCEs for the appropriate upgrade credit by the VE Teams that administered the tests that resulted in the upgrade. When applying to take an upgrade exam, a ham in this category must present the administering VE Team with both his/her current original license *and* the original CSCE(s) that document the upgrade to the pending license class. The VE Team will return both documents to the candidate immediately after they have reviewed them for authenticity (FCC requirement).

Upon upgrading at the session, the candidate will be issued a CSCE for the appropriate element and upgrade class credit, and can then immediately go on the air using the newly earned license privileges. However, if the candidate cannot provide the VE Team with the original license or the original of any of the required CSCEs, only element credit can be issued, if earned. The VE Team will fill out a second CSCE that indicates both element and upgrade credit and will send all three copies of the CSCE to the ARRL/VEC office for holding until the candidate documents to us that the missing license or CSCE(s) can be accounted for.

We need only a photocopy of the missing document(s); we will then verify the claimed elements and upgrades by checking with the FCC (for undocumented licenses), researching our own records (for elements and upgrades earned at our sessions), or by contacting the VEC that coordinated the test session where the elements and upgrades were earned.

As with the pending Novice, the VEC cannot submit the candidate's newest upgrade application until the pending license is issued and a copy of it has been attached to the Form 610 for forwarding to FCC.

(Literally hundreds of upgrade candidates have been advised that the ARRL/VEC is waiting for copies of the pending licenses and that the FCC requires us to retain their Form 610s until the photocopies arrive. In several of these cases, the CSCEs that were issued have expired before the candidates sent in the photocopied licenses, ie, the certificates' one-year lifespans have expired, and the candidates to whom the certificates were issued cannot legally continue operating on the air using the upgraded privileges.)

Rules, September VHF QSO Party

The September VHF QSO Party is the last of the series of VHF/UHF contests for the '87 calendar year. This is your chance to finish out the year with some new grid squares for your VUCC or go on that mountaintopping expedition that you have been wanting to try. The usual Maidenhead grid squares will be the multipliers. Grid-square maps are available from ARRL HQ for $1. Official summary sheets and log sheets are also available from ARRL for an SASE. Send for yours today.

Rules

1) **Object:** To work as many amateur stations in as many different 2° × 1° grid squares as possible using authorized frequencies above 50 MHz.

2) **Contest Period:** Begins 1800 UTC Saturday, Sep 12, and ends at 0300 UTC Monday, Sep 14.

3) **Categories:**

(A) Single operator: One person performs all operating and logging functions.

(1) *Multiband.*

(2) *Single band:* Single-band entries on 50, 144, 220, 432, 902, 1296 and 2304-and-up categories will be recognized both in *QST* score listings and in awards offered. Contacts may be made on any bands without jeopardizing single-band entry status. Such additional contacts are encouraged and should be reported. Also see Rule 9, Awards.

(3) *QRP portable:* Run 10-W output or less using a portable power source from a portable location. The intent of this rule is to encourage operation from "remote" locations, not to have home or fixed stations run low power.

(B) Multioperator: Multioperator stations must locate all equipment (including antennas) within a circle whose diameter does not exceed 300 meters (1000 feet).

4) **Exchange:** Grid-square locator (see Jan 1983 *QST*, p 49). Example: W1AW in Newington, CT would send FN31. Exchange of signal report is optional.

5) **Scoring:**

(A) *QSO points:* Count one point for each complete 50- or 144-MHz QSO. Count two points for each 220- or 432-MHz QSO. Count three points for each 902- or 1296-MHz QSO. Count four points for each 2.3-GHz-or-higher QSO.

(B) *Multiplier:* The total number of different grid squares worked *per band*. Each 2° × 1° grid square counts as one multiplier on each band it is worked.

(C) *Final score:* Multiply the total number of QSO points from all bands operated by the total number of multipliers for final score (see scoring example).

6) **Use of FM:**

(A) Retransmitting either or both stations, or use of repeater frequencies, is not permitted. This prohibits use of all repeater frequencies. Contest entrants may not transmit on repeaters or repeater frequencies on 2 meters for the purpose of soliciting contacts.

(B) Use of the national simplex frequency, 146.52 MHz, or immediate adjacent guard frequencies is prohibited. Contest entrants may not transmit on 146.52 for the purpose of making or soliciting QSOs. The intent of this rule is to protect the national simplex frequency from contest monopolization. There are no restrictions on the use of 223.50 MHz.

(C) Only recognized simplex frequencies may be used, such as 144.90 to 145.00; 146.49, .55 and .58, and 147.42, .45, .48, .51, .54 and .57 MHz on the 2-meter band. Local-option simplex channels and frequencies adjacent to the above that do not violate the intent of (A) or (B) above or the spirit and intent of the band plans as recommended in the *ARRL Repeater Directory* may be used for contest purposes.

7) **Miscellaneous:**

(A) *Stations may be worked for credit only once per band from any given grid square, regardless of mode.* This does not prohibit working a station from more than one grid square with the same call sign. Such a roving station, however, must submit a separate entry for each grid square from which operation takes place. In this situation, the entrant may opt to waive rule 7 (C) and use a single, different call sign from each different grid square. Crossband QSOs do not count. Aeronautical mobile contacts do not count.

(B) Partial QSOs do not count. Both calls, the full exchange and acknowledgment must be sent and received.

(C) A transmitter used to contact one or more stations may not be used subsequently under any other call during the contest period (with the exception of family stations where more than one call is assigned to one location by the FCC/DOC); one operator may not give out contest QSOs using more than one call sign from any one location. The intent of this rule is to accommodate family members who must share a rig, not to manufacture artificial contacts.

(D) Only one signal per band (6, 2, 1¼, etc) at any given time is permitted, regardless of mode.

(E) While no minimum distance is specified for contacts, equipment should be capable of real communications (ie, able to communicate over at least 1 km).

(F) Multioperator stations may not include QSOs with their own operators except on frequencies higher than 2.3 GHz. Even then, a complete, different station must exist for each QSO made under these conditions.

(G) A station located *precisely* on a dividing line between grid squares must select only one as the location for exchange purposes. A different grid-square multiplier cannot be given out without moving the complete station (including antennas) at least 100 meters.

(H) Above 300 GHz, contacts are permitted for contest credit only between licensed amateurs using coherent radiation on transmission (eg, laser) and employing at least one stage of electronic detection on receive.

8) **Reporting:** Entries must be postmarked no later than 30 days after the end of the contest (Oct 14, 1987). No late entries can be accepted.

9) **Awards:**

(A) Single operator

(1) Top single operator in each ARRL Section.

(2) Top single operator on each band (50, 144, 220, 432, 902, 1296 and 2304-and-up categories) in each ARRL Section where significant effort or competition is evident. (Note: Since the highest score per band will be the award winner for that band, an entrant may win a certificate with additional single-band achievement stickers.) For example, if WBØTEM has the highest single-operator all-band score in the Iowa Section and his 50- and 220-MHz scores are higher than any other IA single ops, he will earn a certificate for being the single-operator Section leader *and* endorsement stickers for 50 and 220 MHz.

(3) Top single-operator *QRP portable* multiband and single-band score in each ARRL Section where significant effort or competition is evident.

(B) Top multioperator score in each ARRL Section where significant effort or competition is evident. Multioperator entries are *not* eligible for single-band awards.

10) **Condition of Entry:** Each entrant agrees to be bound by the provisions, as well as the intent, of this announcement, the regulations of his or her licensing authority and the decisions of the ARRL Awards Committee.

11) **Disqualifications:** See Jan 1987 *QST*, p 81.

VHF-UHF-EME LOG

log sheet 1 of 2

CALL USED WA1UJU/9

ARRL SECTION or COUNTRY WT EN53

50 QSOs per side
Number each new multiplier as worked

FREQ.	MODE	DATE/TIME UTC	STATION WORKED	COMPLETE EXCHANGE SENT	COMPLETE EXCHANGE RCVD	LIST NEW MULTIPLIERS	POINTS
144	A3	9/13/87 2049	K9HMB	EN53	EN52	EN52 1	1
		50	WB9OCO		EN51	EN51 2	
		52	WD9AVR		EN51		
		53	W9XA		EN51		
		54	WD9IFX		EN61	EN61 3	
		56	N9FBF		EN52		
		56	WA9OKB		EN63	EN63 4	
		2058	KI9Q		EN62	EN62 5	
		9/14/87 2105	KA9SPC		EN52		
		9/14/87 0125	KØVM		EN42	EN42 6	
		55	WAØTAQ/8		EN61		
		46	N3EML/9		EN62		
		48	N9EMC		EN52		
		49	W9YCV		EN52		
	A3	0150	WBØISK		EM79	EM79 7	

Properly completed sample log sheet.

Scoring Example

Band (MHz)	QSOs	QSO Points	Grid Squares
50	25 (×1)	25	10
144	40 (×1)	40	20
220	10 (×2)	20	5
432	15 (×2)	30	10
1296	6 (×3)	18	3
Totals	96	133	48

Final score = (QSO points) × (total no. grid squares): (6384 = 133 × 48).

Contest Corral

Conducted By Mary Schetgen, N7IAL
Assistant Contest Manager, ARRL

AUGUST

1-2

ARRL UHF Contest, Jul *QST*, p 79.
YL/OM Summer SSB Sprint, Jul *QST*, p 80.
New York State QSO Party, Jul *QST*, p 80.
YO-DX Contest, Jul *QST*, p 80.

1-3

Side Winders On Two Open QSO Party, Jul *QST*, p 80.

4

West Coast Qualifying Run, 10-35 WPM, at 0400Z Aug 5 (9 PM PDT Aug 4). W6OWP prime, W6ZRJ alternate. Frequency is approximately 3.590 MHz. Underline one minute of the highest speed you copied, certify your copy was made without aid and send to ARRL for grading. Please include your full name, call sign (if any) and complete mailing address. A large SASE will help expedite your award or endorsement.

8-9

European DX Contest, CW, Jul *QST*, p 81.

11

W1AW Qualifying Run, 10-35 WPM, at 0200Z Aug 12 (10 PM EDT Aug 11). Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 147.555 MHz. See Aug 4 listing for more details.

15-16

SEANET Contest, phone, Jul *QST*, p 80.

New Mexico QSO Party, sponsored by the Albuquerque Assn from 1600Z Aug 15 until 2100Z Aug 16. Phone and CW. Work stations once per band and mode. No repeater, crossband, crossmode or satellite QSOs. All QSOs must include one NM station. Mobile stations may be worked once per band and mode in each county. County-line QSO counts as one QSO and two counties. Stations outside NM do not call CQ on suggested frequencies. Station classes: A—inside NM, but outside home county; B—all other NM stations and stations outside NM. Exchange RS(T) and state/province/country (county for NM). Suggested frequencies: CW—1.810 3.555 7.055 14.055 21.055 28.055; phone—1.845 3.945 7.280 14.280 21.380 28.580. Score 3 points per CW QSO and 2 points per phone QSO. Multipliers are NM counties (max 33), VE provinces (max 12), DX countries (DXCC list, except US and Canada) and States (max 47). For scoring, multiply total QSO points by total multipliers. Class A stations multiply total score by 3. Class B stations multiply total score by 2. Awards. Include summary sheet, logs and dupe sheet if more than 200 QSOs. Send entries before Sep 30 to Bob Thanisch, KN5D, NM QSO Party, Box 997, Corrales, NM 87048.

15-17

SARTG World Wide RTTY Contest, sponsored by the Scandinavian Amateur Radio Teleprinter Group, 0000Z-0800Z Aug 15, 1600Z-2400Z Aug 15 and 0800Z-1600Z Aug 16. No crossmode QSOs. Bands are 3.5, 7, 14, 21 and 28. Classes: A—single operator; B—multioperator, single transmitter; C—SWL. Exchange RST and QSO number. Work stations once per band. Count 5 points per QSO with own country; 10 points per QSO with different country, same continent; 15 points per QSO with different continent. W/K, VE, VK call areas are considered separate counties. Multipliers are DXCC countries plus call areas in W/K, VE and VK. Final score is total QSO points times total multipliers. Awards. Send separate logs per band and summary sheet to be received by Oct 10 to Jorgen Dudahl-Lasjon, OZ1CRL, Egebjergvej 90, 4500 Nykobing Sj, Denmark.

New Jersey QSO Party, Jul *QST*, p 81.

22-23

ARRL 10-GHz Cumulative Contest, Jun *QST*, p 82.

All Asian DX Contest, CW, sponsored by the Japan Amateur Radio League, from 0000Z Aug 22 until 2400Z Aug 23. 160 through 10 meters. Entry classes: single op, single band; single op, multiband; multiop, multiband. No cross signal at any given time. Multiops may have a maximum of one signal per band. Exchange signal report and a two-digit number denoting the operator's age. YL stations may end 00. Count 1 point per QSO with Asian stations on 7 through 28 MHz, 2 points on 3.5 MHz and 3 points on 1.9 MHz. Multiply by the number of different Asian prefixes (WPX Rules) worked per band. Note: JD1 stations only on Ogasawara count for Asia. Use separate logs for each band. Mark multipliers the first time worked. Provide a complete summary. JARL Asian Countries list: A4 A5 A6 A7 A9 AP BV BY EP HL/HM HS HZ/7Z JA-JS/7J JD1 JT JY OD S2 TA UA/UN/UV/UW-UZ/RA/RN/RV-RW/RZ9-ø UD UF UG UH UI UJ UL UM V85 VS9M/8Q VU XU XV 3W XW XX9 XZ YA YI YK ZC4 5B4 1S 4S 4W 4X/4Z 7O 9K 9M2 9N 9V and Abu Ail. Enclose SAE and IRC for results. Mail logs to arrive by Sep 30 to JARL, POB 377, Tokyo Central, Japan.

24

W1AW Qualifying Run, 10-35 WPM, at 2000Z Aug 24 (4 PM EDT). See Aug 4 listing for more details.

29-30

GARTG World-Wide RTTY Contest, part 3, sponsored by the German AR Teleprinter Group. VHF portion is from 1200Z-1600Z Aug 29. HF portion is from 0700Z-1100Z Aug 30. Score HF and VHF portions separately. VHF frequencies are 144, 432 and 1296 MHz; HF bands are 80 and 40 meters. No repeater QSOs. Exchange RST, QSO number, name and QTH; VHF add grid locator. Work each station once per band. Count 1 point per QSO; points on VHF are per kilometers worked. Count 1 point on 144 MHz, 2 points on 432 MHz and 3 points on 1296 MHz per kilometer worked. Total of QSO points is the final score. Classes: A—more than 200-W input; B—less than 200-W input; C—SWL; D—VHF. Logs must include all information. Mail to be received within 20 days to Wolfgang Puenjer, DL8VX, PO Box 90 11 30, D-2100 Hamburg 90, Fed Rep of Germany.

Alabama QSO Party, sponsored by the Birmingham ARC from 1600Z Aug 29 until 2300Z Aug 30. Work stations once per band and mode. Work mobiles and portables again as they change counties. Exchange RS(T) and QTH (county for AL stations; state/province/country for others). Suggested frequencies: CW—1.810 3.550 7.050 14.050 21.050 28.050; phone—3.900 7.260 14.300 21.360 28.400 50.110 144.2 146.50; Novice—10 kHz from low end of Novice bands. Count 2 points per phone QSO; 3 points for CW QSO. AL stations multiply by total states/provinces/AL counties/countries. All others multiply by total AL counties (67 max). Multiply scores by 1.5 for 200 watts or less. Mobiles add 500 bonus points for each county from which 10 or more QSOs are made. Awards. Certificates (please send SASE). Mail entries by Sep 30 to Bill Levey, WA4FAT, 3164 Cahaba Heights Rd, Birmingham, AL 35243.

SEPTEMBER

2

West Coast Qualifying Run, 10-35 WPM, at 0400Z Sep 3 (9 PM PDT Sep 2). See Aug 4 listing for more details.

5

***73* 1st National CW Championship**

6

***73* 1st National SSB Championship**

LZ-DX Contest, sponsored by the Bulgarian Federation of Radio Amateurs, from 0000Z-2400Z Sep 6. CW only. Work stations once per band. Entry classes: single op, multiband; single op, single band; multiop, all band; SWL. Exchange signal report and ITU zone. Suggested frequencies: 3.510-3.560 7.000-7.040 14.000-14.060 21.000-21.080 28.000-28.100 MHz. Count six points per QSO with LZ stations, one point per QSO with stations on the same continent (including the same country) and three points per QSO with stations on other continents. Multiply by the sum of different ITU zones worked per band. Mail logs within 30 days to Central Radio Club, PO Box 830, Sofia 1000, Bulgaria.

9

W1AW Qualifying Run, 10-35 WPM, at 0200Z Sep 10 (10 PM EDT, Sep 9). See Aug 4 and 11 listings for more details.

12-13

European DX-Contest, phone, Jul *QST*, p 81.

12-14

ARRL VHF QSO Party, this issue, p 78.
Washington State QSO Party

13

North American Sprint, CW, sponsored by the *National Contest Journal*, from 0000Z to 0359Z Sep 13 (SSB Sprint Sep 20). Single operator only. No helpers or spotting nets. No crossmode. Suggested frequencies: CW— 3.540 7.040 14.040; phone—3.900 7.225 14.280. Work same station once per band. For exchange, send other stations call/your call/your serial number/name/location (state/province/country). Only valid 2-way contacts count, and logging must begin with serial number one (001). Scoring: Multiply total valid contacts by the sum of the states/provinces/NA countries/ to get final score (do not count USA or VE as countries). KH6 is neither state nor country. The eight VE multipliers are Maritime (VE1,VO1 and VO2), VE2-7 and Yukon-NWT (VY1 and VE8). Non-North American countries do not count. Send CW logs to Rusty Epps, W6OAT, 651 Handley Trail, Redwood City, CA 94062. Send phone logs to Rick Niswander, K7GM, 910 West Claremont, Phoenix, AZ 85013. Send summary, logs and dupe sheets no later than 30 days after Sprint.

19

Can-Am Contest, phone, this issue, p 77.

19-20

ARRL 10-GHz Cumulative Contest, Jun *QST*, p 82.
Scandinavian Activity Contest, CW

20

W1AW Qualifying Run
North American Sprint, SSB, see Sep 13 listing.
Can-Am Contest, CW, this issue, p 77.

26-27

Scandinavian Activity Contest, phone
***CQ* World-Wide RTTY DX Contest**
Steel City All Mode 10-Meter QSO Party

27-28

Fall Classic and Home-brew Radio Exchange

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 **Sep 1** to make the **November** 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 Mary Schetgen, N7IAL
Assistant Contest Manager, ARRL

Twinsburg, Ohio: The Cuyahoga ARS will operate K8ZFR and member stations from the site of the annual Twins Day Celebration on **Aug 1** 1700Z-0100Z and **Aug 2** 1700Z-2000Z. Suggested frequencies: CW—3.600 7.050 14.050 21.050; phone—3.870 7.245 14.245 21.320 28.440; **Novice** portions of 15/40/80-meter bands. For special QSL, send your QSL and SASE to CARS, Twins Day, Box 357, Twinsburg, OH 44087.

Oshkosh, Wisconsin: The Fox Cities ARC will operate W9ZL **Aug 1-2** 1300Z-2100Z in conjunction with the 35th Annual EAA International Fly-In Convention and Sport Aviation Exhibition. Suggested frequencies: 7.240 14.240. Send QSL and SASE via Ade Vanderburgt, K9DHR, 264 Evergreen Dr, Kaukauna, WI 54130.

South Bend, Indiana: The Michiana Radio Club will operate W9AB **Aug 1-8** 1400Z-2000Z to commemorate the 1987 International Special Olympic Games being held in the South Bend area. Operations in the General 75- to 15-meter bands and **Novice** 10-meter segment, daily. Send QSL and SASE for commemorative card to W9AB, c/o American Red Cross, 3220 E Jefferson Blvd, South Bend, IN 46619.

Indianapolis, Indiana: Indiana amateurs will operate W9PAX during the 10th Pan-American Games **Aug 7-23.** Continuous operations begin 0001Z **Aug 1** to 2359Z **Aug 23.** Suggested frequencies: CW—30 kHz up from bottom of 1.8-28 MHz bands; phone—1.850 3.850 7.250 14.250 21.350 28.550. Certificates available for log of contacts. For special QSL, send QSL to W9PAX, Box 18495, Indianapolis, IN 46218-0495.

Fishers Island Sound, New York: The Tri-City ARC will operate KA1BB on **Aug 2** 1300Z-2000Z from the usually uninhabited Flat Rock Island in Long Island Sound. Suggested frequencies: CW and phone—the lower 20 kHz of the 40/20/15-meter General bands and 7.125 for **Novices.** QSL with SASE via Tri-City ARC, Box 686, Groton, CT 06340.

Laona, Wisconsin: The Hodag Award Chapter will operate W9IAL and NN9Z **Aug 2** 1300Z to 0100Z **Aug 3** to commemorate the 50th Annual Laona Community Soup Festival. Suggested frequencies: phone—7.280 14.280; **Novice** phone—28.350. For certificate, send QSL and SASE to W9IAL, 322 N Stevens St, Rhinelander, WI 54501.

Shreveport, Louisiana: The Red River Valley Chapter of the TEN-TEN International Club will operate W6OI **Aug 3** 0001Z to 2359Z **Aug 9** from the site of the First TEN-TEN International Convention in Shreveport, Louisiana. Suggested frequency: 28.585. Send SASE for QSL to Karen Conley, KA5WXE, 9432 Castlebrook Dr, Shreveport, LA 71129-4808.

Stendal, Indiana: The Pike County ARC will operate W9CZH in conjunction with the Zoar Mosquito Fest from 2000Z **Aug 7** to 0400Z **Aug 8** and 1700Z-2200Z **Aug 8.** Suggested frequencies: phone—7.235 14.285 21.375 28.385. For certificate, send QSL and SASE to WB9NCE, Box 12, Stendal, IN 47585.

Bemidji, Minnesota: The Bemidji ARC will operate KAØDFV **Aug 8-9** 1400Z-2100Z in celebration of Paul Bunyan's birthday. Suggested frequencies: lower portions of the General 80/40/20/15-m bands; **Novice** phone—28.450. For commemorative certificate, send large SASE (39 cents postage) to Howard D. Menge, KAØDFV, 812 Donald Ave, Bemidji, MN 56601.

Canton, Ohio: The Canton ARC will operate W8AL in celebration of the Pro Football Hall of Fame Greatest Weekend(s) **Aug 3-7** 2200Z-0200Z and **Aug 8-9** 1700Z-2300Z. Suggested frequencies: CW—7.060 14.060; phone—7.270 14.270. Send your QSL and 9- × 12- inch SASE for unfolded certificate (business-size SASE for folded) to Randy Phelps, KD8JN, 1226 Delverna Ave SW, Canton, OH 44710.

Fleurimont, Quebec: VE2FMA will operate in celebration of the 50th anniversary of the town of Fleurimont, Quebec, from 1400Z-0200Z **Aug 9.** Suggested frequencies: 3.765 14.160. SWLs welcome to QSL. Send QSL for certificate to VE2FQX, 1866 Ch Galvin, Fleurimont, PQ, J1G 3G1 Canada.

Cuyahoga Falls, Ohio: The Cuyahoga ARC will operate W8VPV at the 50th running of the All American Soap Box Derby **Aug 10-15.** Mon-Fri 2200Z-0300Z; Sat 1100Z-2000Z. Suggested frequencies: 3.860 7.230 14.240. **Novice** phone—28.420. For certificate, send large SASE to W8VPV, Box 614, Cuyahoga Falls, OH 44222.

Mt Whitney, California: Stations WB6FNI, KB6IJL and KB6IJK will operate from the summit of Mt Whitney from noon (PDT) **Aug 12/13/14** on the 2-meter simplex frequencies; 145.555 146.555 147.555; repeaters—Table Mountain 145.280, Keller Peak 146.985, Mazourka Peak 146.760. For special QSL, send large SASE to James W. Young, WB6FNI, Box 576, Wrightwood, CA 92397.

Spanish Forks, Utah: The Utah National Parks Council BSA, in conjunction with the Utah County ARES, will be operating station K2BSA/7 from 1800Z **Aug 12** to 0600Z **Aug 15.** Suggested frequencies: CW—7.040 7.125 14.040 21.040 21.140; phone—7.245 14.270 21.310. For commemorative QSL, send SASE to NR7P, 376 North 520 West, American Fork, UT 84003.

Mt Vernon, Ohio: The Mt Vernon ARC will operate K8EEN 2300Z **Aug 14** to 0300Z **Aug 15** in conjuction with the Dixie Days celebration, which commemorates the song *Dixie*, and its author, Daniel Decatur Emmett. Suggested frequencies: 3.860 7.230 14.260 28.485. For large certificate, send QSL and large SASE to Michael W. White, KC8UZ, 5802 White Rd, Centerbury, OH 43011.

Pipersville, Pennsylvania: The South Jersey RA will operate K2AA from 1400Z **Aug 15** to 2100Z **Aug 16** to celebrate the 75th anniversary of the Sea Scouting (Exploring) Program of the Boy Scouts of America. The operation site will be Treasure Island Scout Reservation—the first Scout camp in the US. Suggested frequencies: Low end of 75/40/20/15-meter General phone bands and 10-meter **Novice** band. Send SASE for QSL to SJRA, Box 1026, Haddonfield, NJ 08033.

Littleton, Colorado: The Arapahoe RC will operate K9AY and several other stations on **Aug 14** 1600Z-1800Z from several 14,000-foot ("Fourteener") mountain peaks in the Colorado Rockies. Suggested frequencies will be given upon contacting the following net frequencies: CW—14.060; phone—14.285. Certificates (and special memento to those working all "Fourteener" stations). Send QSL and SASE to K9AY, 7277 S Clermont Dr, Littleton, CO 80122.

Richmond, California: The East Bay ARC will operate W6CUS **Aug 16** 1900Z-2300Z to celebrate the club's 40th anniversary and annual picnic. Suggested frequencies: CW—7.125 14.065; phone—7.290 14.340; Packet—via W6CUS-1 tripleport BBS will be accepted 1500Z-1800Z on 7.093 144.97 223.58 MHz. For commemorative certificate, send QSL and SASE to EBARC Inc, Box 1393, El Cerrito, CA 94530 by Oct 16.

Jakarta, Indonesia: Station YB42RI will be operating **Aug 16-18** in celebration of Indonesia's 42nd year of independence. General phone-band operation—no specific frequency mentioned. QSL via bureau or Suwanto Hendrayudo (Wanto), YBØSY, Box 4770, Jakarta 10001, Indonesia.

East Lansing, Michigan: The Michigan State University ARC will operate W8SH **Aug 22** 1600Z-0000Z to celebrate the 150th birthday of the state of Michigan. Suggested frequencies: 7.270 14.300 146.52; **Novice** phone—28.350. For commemorative certificate, send QSL and large SASE to W8SH, 260 EE, Michigan State University, East Lansing, MI 48824-1226.

Norway, New York: The Fort Herkimer ARC will operate WB2TKD during the Bicentennial Celebration of the founding of the Township of Norway, New York. Operations from 1300Z-2000Z **Aug 23** in the General class phone portions of 40/20 meters; **Novice** 10-meter phone operations. For certificate, send QSL and SASE to M. Harodecki, RD 1, Newport, NY 13416.

Newark, Ohio: The Newark AFB station support team will operate WB8HII during the base's 25th anniversary celebration **Aug 29** at 0800-1700 EDT. Operations in the lower General phone portions of 40/20 meters; **Novice** 10-meter phone portion. For certificate, send QSL and SASE to WB8HII, Box 149, Newark, OH 43055.

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 Sep 1 to make the Nov 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- × 12-in envelope if you want an unfolded certificate, or a no. 10 envelope if folds are okay. Include enough postage for return of your envelope. (3) Mail both your QSL and your SASE to the address listed, or to the address given on the air by the station you QSO. Be patient. Special-event stations will often print their cards and/or certificates after the operation is over so they will know how many to order. QST

Mini Directory

As a convenience to our readers, here is a list of items of particular interest and when they most recently appeared in QST.

Advisory Committee Members	Jun 1987, p 51	Novice Enhancement Report and Order	Apr 1987, p 64
Club Contest Rules	Jan 1987, p 81	QSL Bureaus	
DX Contest Awards Program	Feb 1987, p 82	Incoming	Jun 1987, p 54
Element 2 Question Pool, New and Revised Questions, Answers	Apr 1987, p 23	Outgoing	Mar 1987, p 67
		Reciprocal-Operating Agreements	Jul 1987, p 51
Frequency/Mode Allocations	Apr 1987, p 70	Tech and General Written Exams	Apr 1987, p 29
Golden Jubilee of DXCC Award	Sep 1986, p 60	Third-Party-Traffic Agreements	Jul 1987, p 51
Hamfest Calendar Rules	Sep 1986, p 84	10-GHz Cumulative Contest Rules	Jun 1987, p 82
License-Renewal Information	Apr 1987, p 70	1987 ARRL UHF Contest Rules	July 1987, p 79
Major ARRL Operating Events and Conventions—1987	Jan 1987, p 57	220-MHz Band NPRM	Apr 1987, p 16

Section News

Administered by Steven Ewald, *WA4CMS*

The ARRL Field Organization Forum

CANADA

ALBERTA: SM,Bill Gillespie, VE6ABC—A/SM: VE6AMM. SEC: VE6AFO. OO: VE6TY. STM/DEC/SM: VE6ABC. Clubs gearing up for summer hamfests. Namao Hamfest by NARC May 29, 30 & 31. Red Deer Picnic June 19, 20 & 21. CRRL/CARF Symposium at the Saskatchewan Hamfest in Saskatoon August 1 & 2. Antenna weather has finally arrived and this station almost ready to go after 6 months. Southern Alberta amateurs pitch in to provide communications for the Rocky Mountain Car Rally. Traffic: APSN QNI 1001, QTC 72, Informal 71. ARES Net QNI 307. ATN QNI 239, QTC 68. Personal totals: VE6XG 60, VE6GUS 24, VE6AKY 6, VE6EJ 2.

BRITISH COLUMBIA: Ernie Savage, VE7FB—BCEN, NM VE7FJU Ferdi reports that the BCEN has changed frequency to 3651 because of an interfering station commercial of nature and uses no call signs. Change from 3650 seems to be little but enough for all to be clear of the QRM. Mays checkins are down and I like to blame the hockey games—we hope. QTCs are also down. Thanks to Shirley for her work as NCS she request a break but back later. A special welcome to the two new NCSs George, VE7DJ and Ary VE7BRC for Tuesday and Wednesday. Please we need your QTCs for the net. British Columbia Public Service Net, 3729 kHz 0130 Z Net officially opens 0200Z. Net Manager, Ford, VE7DDF. Ford took over the net from Sil, VE7QC, when he became a Silent Key and for all of two years has worked hard and faithfully for all the net members and the net. He has now requested to be relieved of the Net Manager duties. We must now seek a volunteer to fill his place. Please some one volunteer to carry on with those duties. Net reports—BCEN QNI 838 QTC 239. BCPSN High 161 Low 104 Total 4204. It was so nice to see many VE7s at Seaside Convention. I sincerely hope they enjoyed themselves like we do meeting so many friends and the Seminars. Rick K1CE from HQ, etc... Traffic: VE7BNI 212, VE7EJU 175, VE7EJW 125, VE7ANG 98, VE7BNH 49, VE7XA 36, VE7FB 30, VE7CCJ 25, VE7AGM 20, VE7FME 20, VE7DJ 13, VE7BZI 2.

MANITOBA: SM, Jack Adams, VE4AJE—With summer quickly coming upon us everybody is doing their thing, so not too much to report for the month of May. Good time to introduce the CRRL Manitoba Section: Yours truly-VE4AJE Jack, SM; VE4IX-Max, ASM & NM; VE4ANR-Terry, SEC; VE4LB- Charlie, NM; VE4OO Walt, STM. VE4ALO- Kally, TC. PIO; VE4ADP-Ray ATC. VE4FK-Jim, OO. Net Reports: CRRL Evening Phone Net: QNI 944, QTC 35, Sessions 31. MXW: Net Manager and SEC. CRRL Phone Net the one & only VE4TE Mac. QNI 656, QTC 35, Sessions 31. MTN CW Net: QNI 121, QTC 26, Sessions 16. Traffic: VE4RO 72, VE4TE 46, VE4FK 43, VE4IX 23, VE4AJE 25.

MARITIME-NEWFOUNDLAND: SM, Leigh Hawkes, VE1GA—SEC: VE1JJ, BM: VE1BQO. Pleasure meeting MNI Amateurs at various Maritime Amateur events these past months. VE1 callsigns are now being issued from the VE1VAA series. Time to start thinking about your ant projects and fall Ham Radio Activity. CRRL could use your help. A number of field appointments are still open. Congrads to VE1CBK and XYL on arrival of a new Jr. YL op. VE1EX is now operating 5H3WG. VE1BQO appointed BM. Carl will be responsible for the OBS program and recruiting. Please support your local clubs & PROV organizations. Traffic: VE1BKM 61, VE1VX 23, VE1WA 4, VE1BXD 2, VE1ALU 1, VE1QX 1.

ONTARIO: SM, Larry Thivierge, VE3GT—A/BM: VE3GT. SEC: VE3GV. STM: VE3CYR. TC: VE3EGO. Congratulations again to the Thornhill Amateur Radio Club on the recent celebration of their 10th anniversary. The Club was founded back in 1977 through the efforts of Rick, VE3ILP. Over the years their training classes were responsible for a number of new comers to join the amateur fraternity including VE3ALF and VE3PVL. During a spring eyeball, Bulletin Editor, Al, VE3WV, personally delivered their latest editions and advises he is enjoying his retirement, hamming, travelling and with sometime in for fishing too. Repeater VE3PBO in Peterborough has their new, long sought after repeater equipment, thanks to the efforts of VE3IQZ, VE3MCC and others. The system is a GE Master II repeater, 110 watt continuous duty power amp, receive pre amp, power supply, Sinclair duplexer and back batteries with charger all mounted in a 6-foot cabinet. Their Club had their best attended meeting in some time when Terry, VE3CAB, presented a demonstration how the VE3ULR link system worked. The latest addition to the system was VE3RTR at Rice Lake. Congratulations to the new incoming President of CARF, VE3CES, and their new board of Directors. VE3OKG has moved to New Liskeard, Niagara Peninsula ARES has a very active weekly net to keep in operational readiness. London ARC had a very successful annual banquet where VE3MGR was named the Club's Amateur of the Year. New appointment: VE3OCF, ORS. For those struggling with cw, an encouraging note, at the recent Rochester Ham Fest's cw receiving contest, NTS operators KN1K and K2KIR successfully copied 60 wpm by hand using a pencil! Traffic: VE3FAS 360, VE3GSQ 255, VE3GNW 124, VE3OCF 120, VE3WV 97, VE3CYR 86, VE3GT 83, VE3DPO 80, VE3BCZ 59, VE3BUO 59, VE3WG 51, VE3KXB 49, VE3WM 37, VE3ORN 30, VE3KCZ 29, VE3EAM 26, VE3AJN 24, VE3BAJ 23, VE3NVJ 16, VE3GFN 14, VE3MCO 14, VE3POJ 9. (Apr.) VE3NVJ 8.

QUEBEC: SM, Harold Moreau, VE2BP—STM: VE2EDO. BM: VE2ALE. OO: VE2DNH. TC: VE2ED. I hope that everyone is enjoying the summer and all activities will resume in September. Thanks to all, who renewed their membership or joined the League at the CRRL booth, at the Sorel Hamfest. With regret, I have to report the following amateurs as Silent Key: VE2BLN, VE2HL, VE2FM and VE2EVW. La foudre a frappe a la station de VE2BNE. Bonne chance, Jacques, et nous esperons te revoir bientot. VE2FQM et VE2FOH (le pere et le fils) sont tres actifs en packet (VHF). Traffic: VE2BP 62, VE2WH 35, VE2EC 27, VE2JN 13.

ATLANTIC DIVISION

DELAWARE: SM, Harold K. Low, WA3WIY—SEC: KC3TI. DEC: K3PFW N3FDL. EC: KC3JM KA3LNK WA3EWK WA3PHT WA3VDJ. STM: KA3GRQ. PIO: WB3DPJ. SGL: AF3R. PSHR K3JL. The Nanticoke ARC has been very busy this last month with communications for a Bikeathon, a Tricathlon in Seaford and another Tricathlon in Milford, also a memorial day parade. SARA furnished communications for a Crop Walk that had been postponed due to bad weather. K3YBW of Wilmington has been a welcome checkin on the DTN and DEPN. Glad to have you aboard John. DTN stations 308 traffic 35 in 21 sessions. DEPN stations 59 traffic 13 in 5 sessions. SEN stations 60 in 4 sessions. Traffic: W3QQ 117, WB3DUG 37, WA3WIY 33, KA3GRQ, K3JL 23, K3YBW 16, W3PVQ 12, W3FEG 10.

EASTERN PENNSYLVANIA: SM, Kay Craigie, KC3LM—ASM: WA3PZO, KA3A, KO3B, K3ZFD. SEC: WA3PZO. ACC: KC3QB. SGL: WA3IAO. STM: KB3UD. PIO: W3AMQ. TC: W3FAF. Salutations of the month go to EPA's hamfest committees. Thanks to you, the rest of us get the pleasure of spending money and having fun. Enjoy Mid-Atlantic's fest on Aug. 9. We welcome 2 new Affiliated Clubs: Philadelphia Area Repeater Assn. and Ephrata Area Repeater Society. Reading RC has become a Special Service Club. Did you notice EPA clubs won all 3 categories in the 1987 ARRL VHF Sweeps? Pack Rats took the unlimited, Delaware Valley VHF won the medium, and Murgas topped the locals. Suburban, Warminster, Mobile Sixers, and Penn Wireless were our other entrants. 25% of all clubs entering were from EPA! Start training Novice ops now for the PA QSO Party. New multipliers for Novices on both CW and SSB make them valuable to your club's score. How does, say, 50,000 points for 100 QSOs grab you? To encourage Novice participation, KC3LM is sponsoring a top Novice plaque this year. Tune in Warminster's Novice social net on 28.450, Sundays at 9 PM. KA3QND makes everyone welcome. In ARES news, KC3B is now DEC1. He uses the K3PGB PBBS. Lots of news from Dist. 3. Former SCM/SM W3VA is now EC in Schuylkill Co. WB3FPL, EC Berks, notes that Daubervilie DX Assn members provided about 8 hours' communications for Red Cross after a gas company explosion in Reading. Carbon Co. ARES/RACES net on Wednes-days, 9 PM, 147.255/R, is linked at net time to Eastern PA VHF Soc.'s 224.26/R, and Novice check-ins are very welcome. If you're a Novice who wants to volunteer for ARES, contact your county ARES Emergency Coordinator, or (if you don't know who that is) write to Section Emergency Coordinator WA3PZO at his callbook address. We want YOU, too! N3EFW (EC Monroe), KB3TS (AEC Monroe), KB3UD (DEC4) and other Slate Belt ARK members WA3MDP, WA3RKZ, WB3IWC, and WB3EIU did comm for the Upper Mt. Bethel Bicentennial Parade. We have several new Assistant TC's: W3CPR, W3FM, KC3EC, and KA3OMG. TC W3FAF says things are picking up for the ATC program. WA3TSW is our first packet BBS sysop to be appointed an OBS. Individual ARRL members who run PBBS's that make W1AW bulletins and other League info available are invited to apply for the OBS appointment. NETS (April QNC/QTC/SES-SIONS): D2ARES 72/0/4, D6ARES 116/37/9, MARCTN 146/64/13, MARCARES 66/11/4, STAR 345/79/30, D5ESN 72/9/4, D3ARES 69/3/4, EPAEPTN 550/186/70. 3RN PBBS: KB3UD 52, K3RLI 27, AG3F 8, W3AVK 2, KB3ZW 2. Traffic (April): N3AZW 614, N3COY 232, N3DRM 140, W3IPX 113, N3CD 102, W4UQ 92, KD3AO 91, KA3DLY 87, W3KAG 86, W3JKX 80, KU3R 71, WA3CKA 69, KB3UD 62, K3WPI 48, N3EFW 46, WB8KPE 41, K3TX 33, W3AQN 25, W3DP 19, KO3M 19, KY3M 17, W3ADE 13, W3FAF 11, W3CL 9, K3EBZ 6; BPL N3AZW; PSHR N3COY N3AZW KA3DLY N3EFW.

MARYLAND-DC: SM, John A. Barolet, KJ3E— SECOND CHANCE! Nominations of candidates for election to Maryland-DC Section Manager are open; see HAPPENINGS in this (or July) QST for instructions. Select and nominate the person of your choice. KJ3E is not running for reelection but is 'minding the store' until the next SM is elected. For super performance as Assistant Section Manager, N3EGF has been awarded an ARRL Certificate of Merit. He is the ASM, Section Traffic Manager (STM) and Net Manager (NM) of the Maryland Emergency Phone Net (MEPN). His Macintosh computer system is always buzzing with the work of these positions. Also, month after month WA1QAA sends an outstanding written report of his Emergency Coordinator (EC) planning and managing in Howard County; for that he too has received the ARRL Certificate of Merit. Well deserved! In the past year there were three unexpected internal-communication failures in hospitals; Baltimore, Takoma Park and Cumberland hospitals were affected. Amateur radio responded and was effective in each case, led by WB3EFG, KN3U and W3DFW respectively. If you have been in a hospital recently (four times for me in the last two years) you can understand the need for internal, and external, communications. Amateur radio stations at various stations throughout the hospital and with radio connections to the external telephone system provided vital communications for administrators, doctors, nurses and patients. Also, 440 MHz generally performed more reliably than 144 MHz within the hospital. ECs! Run some tests in your local hospital, with the concurrence of the hospital administration, of course. N3RO sent a fine set of pictures of members of the Frederick ARC stationed along the Appalachian Trail on South Mountain; they were keeping track of Mountain Club of Maryland hikers on their 40-mile trek along the trail from the Pennsylvania line to Harper's Ferry, WV. Well done, and fun also. N4DLA, former MEPN regular, writes from Mountain View, CA, his new home QTH. Santa Clara Valley Section's gain and our loss. Appointments: W3VVN ATC, KA3T OES, N3ESR EC (Montgomery County). appointment cancellations, numerous; the next SM will inherit a lean, mean group of ARRL MDC Field Organization activists! WITH THE NETS: Net/Mgr QND/QTC/QNI: MDD/W3FA 61/209/464 (MDD Brass: W3QQ/123 W3FA/94 K3NNI/67 K3JL/65 KJ3E/62, MEPN/N3EGF 31/128/1023, MSN/KC3Y 39/57/375, WRPON/WB3BFK 20/22/249, MDCPON/W3OYY 5/4/74, HOCOARES/K3NNI 2/8/28, SMEN/KJ3E 1/3/7. PSHR:W3FA 112, N3EGF 86, W3YVQ 79, KJ3E 78, WA3UZI 77, K3NNI 75, KC3Y 75, KC3FK 73, WA3GYW 67. Traffic: W3FA 158, KJ3E 112, WA3UZI 89, W3LDD 80, N3DE 79, N3EGF 68, KC3Y 61, KK3F 54, W3YVQ 52, NC3Z 47, KT3T 42, K3ORW 34, K2EB 33, W3DQI 33, K3NNI 30, WB3BFK 27, WB3LQT 27, KX3U 25, NB3P 24, WA3YLO 23, KC3FK 16, KC3ZJ 9, W3FZV 9, WA3GYW 5, WA1QAA 5, KA3T 4, K3TEZ 2, KC3DW 2, NF3X 2, WA2WDT 1.

SOUTHERN NEW JERSEY: SM, Richard Baier, WA2HEB—ASM: N2CER. SEC: K2QIJ. STM: WB2UVB. ACC: K2IXE. TC: KA2RAF. PIO: VACANT. SGL: KA2KMU. BM: WB2UVB. OOC: WA2HEB. ATC'S N2BQT, K2JF, KA2RJA and WB2MNF. I am pleased to announce that Ted Wood, N2CER of Mays Landing as accepted an appointment as Assistant Section Manager. In this position, Ted will be available to speak about section happenings and League developments at club meetings and help represent the section staff at some of our section's hamfests (club officer, please take note). With my work schedule, I cannot get to as many club meetings and hamfests as I'd like. Ted is a former SM and is totally familiar with League and section affairs. To contact Ted, his address is: RD 20-Box 186, Mays Landing 08330. The 28th annual NJ QSO party will be held on August 15 and 16. Starting times: 2000 UTC Sat. to 0700 UTC Sunday and from 1300 UTC Sunday to 0200 Monday. Full details in July's QST, or on the section's various packet BBSs. Also, if interested, you can contact me. VEC testing every 3rd Thursday of the month at the Bellmawr Community Center at 7 PM. For further details contact Bill Hemetag, WA2VQG, 214 Russell Ave., Barrington 08007. Until next month, very 73. Traffic: WB2ZJF 226, N2CER 68, WA2HEB 3.

WESTERN NEW YORK: SM, William W. Thompson, W2MTA—ACC: N2EH. PIO: WA2PUU. SEC: NN2H. TC: K2QR. SGL: WB3CUF. ASM: NA2C. STM(A): W2MTA. Appointments: (OES) KB2DP, N2FMA, AC2I, KD2JJ, WA2TCZ, WA2VAM, W2ZOJ, (ASM)NA2C. Silent Keys: John Bonar, NA2C Instructed many of the new hams in the Syracuse area and was an inspiration to all; John Everson, KA2SCJ provided leadership as Emergency Coordinator in Wayne County. We shall miss them both very much. PSHR: N2ABA, NE3B, N2EIA, N2EVG, WA2FJJ, W2FR, NN2H, W2MTA, WB2OWO, WB2RBA, ND2S, KA2UBD, NE2W, K2YAI, KA2ZNZ. BPL May: N3DPF, N2EIA, KA2UBD. Club Officers: Rawny KA2NYS, WA2FKV, KD2V, KA2EXI. UNYREPCO Officers: WA2VAM, N2BQV, K2DLL, WA2UKX. Congratulations: Atlantic Division Ham-of-Year N2EH. Central NY H-O-Y KB2DP. Grand Old Man to W3OCR. ARNS award to Chenango Valley ARA "Bull Thistle Bugle" newsletter—one of 26 newsletters received in WNY by Section Manager—amongst 48 affiliated clubs now filed in WNY. Eleven other clubs have not filed their annual reports—how is your club doing?

NYSEMO ssb	104-010-05	BLUE LINE	212-026-25
NY8R cw	027-005-05	JCRAC Net	441-012-31
NYS/M* cw	319-209-31	NYS/E* cw	389-220-31
WDN/M* fm	311-156-30	WDN/E* fm	435-206-31
Mike Farad	---	BRVS Net	315-003-31
NYPON* ssb	580-322-31	LCARES fm	045-002-05
ESS slo cw	282-062-31	VHF THIN	034-000-04
NYSPTEN ssb	497-053-31	CNYTN* fm	—
OCTEN/E* fm	612-116-31	OCTEN/L* fm	243-088-31
Q NET fm	476-003-31	WDN/L* fm	406-134-31
STAR* fm	405-082-31	NYS/L* cw	354-279-31*

NTS nets. Note-ARES/RACES nets also in Chemung, Chenango, Clinton, Essex, Oneida, Onondaga, Oswego, Steuben, etc. but data not available for this column. Presently, Western New York has 33 Emergency Coordinators in the 40 counties. A total of 134 appointments; do you hold an appointment? Contact SM W2MTA if you wish more information. HAMFESTS:HAM-O-RAMA at Niagara Falls September 26; Syracuse October 17. Traffic Handlers' Picnic at Verona QTH of K2KIR on August 8: hear the latest in traffic handling on ALL MODES, including FM, SSB, CW, RTTY, PACKET on HF and VHF bands. Traffic: N3DPF 611, N2EIA 521, KA2UBD 510, WB2OWO 372, W2MTA 336, NE2W 277, N2ABA 266, WA2FJJ 210, W2FR 135, WB2QIX 135, KA2QOO 124, K2YAI 94, NN2H 92, WB2IJH 81, N2EVG 79, WB2RBA 73, KA2ZNA 73, KB3WL 66, WA2JPB 64, AF2K 61, KA2TVX 57, W2UYE 32, KA2DBD 30, NE3B 28, WB3CUF 22, W2PPS 21, K2QR 14, W2ZOJ 10, K2IUT 6, K2VR 5, KD2GB 2, WA2OEP 2. Have fun this summer.

WESTERN PENNSYLVANIA: SM, Otto L. Schuler, K3SMB—SEC: WA3UFN. STM: WN3VAW. BM: KC3ET. TC: N3EFN. OOC: KX3V. ACC: AK3J. SGL: W3DTW. Need PIO for section.

Net	QNI	QTC	Sess	KHz	T/D	Mgr
WPACW	230	113	31	3585	7:00P/D	WA3UNX
WPAPTN	395	109	31	3983	6:00P/D	WA3HLN
KFN	110	47	20	3983	1:00P/D	N3EMD
PFN	161	130	31	3958	5:00P/D	KA3THT
WPA2MTN	311	75	31	148.28/88	8:00P/D	KA3BGC
NWPA2MTN	533	39	27	144.53/.5.13	9:00P/D	KC3NY
WPARTTY	10	2	5	3840	9:00P/SU	WA3ZSC

Our sympathies are extended to the family of W3ZIJ. His friends will miss him. Packet radio has been booming and there are many operators across the country with BBS services who pass traffic over wide areas from one BBS to another. This service is great and one should follow the rules for each as set by the operator. Please do not try to use tactics to cause problems. I hope to get my TNC operating when I get it not to stick on Xmit. From the Parasitic Emission (QCARC) the PaPA has been organized to serve all amateurs in the state who are interested in packet. The goal is to establish a 220 MHz packet trunk across the state to speed up forwarding BBS mail and files. For more info contact WA3UFN Bryan Simanic, DuBois, PA 15801. (also from ARRL Letter in part). I wouldlike to have a list of repeaters used in the section for ARES and RACES when we have emergencies or disasters that require our services and to be able to pass weather reports to the weather service covering each area. SKYWARN needs reports to assist getting warnings of severe weather in your area. In many areas, Amateur reports were the first notice received. It would be nice to be able to tie us together. May traffic: N3EMD 186, W3OKN 130, N3CZW 112, N3AES 84, WA3UNX 65, K3SMB 56, W3NGO 50, KA3OEM 35, KD3AC 27, N3FM 24, N3EKJ 22, K3LTV 21, W3KUN 20, WA3QNT 17, WA3DBW 16, W3TTN 10, KC3JQ 7, W3AHH 6, KC3WJ 5, KA3EGE 5. (Apr.) W3OKN 74, KC3ET 40, WN3VAW 36, KC3GO 20, KF3V 15.

CENTRAL DIVISION

ILLINOIS: SM, David E. Lattan, WD9EBQ—SEC: W9QBH. STM: K9CNP. OOC: W9TT. BM. K9EUI. SGL: W9KPT. PIO: N9EWA. ACC: WB9SFT. TC: N9RF. ASM: AA9D. Illinois Section Nets

NET	FREQ	TIMES (LOCAL ILLINOIS)
ISN	3905	1800 DAILY
ILN	3690	1830 + 2200 DAILY
ITN	3705	1900 DAILY
CTN	147.69/09	2100 DAILY
ILARES	3905	1630 1ST + 3RD SUNDAYS

ILLINOIS INDEPENDENT NETS

IEN	3940	0900 SUNDAYS
ILPN	3915	1630 M-F,1430 SUNDAY
NCPN	3915	0700 MONDAY-SATURDAY
NCPN	7270	1215 MONDAY-SATURDAY

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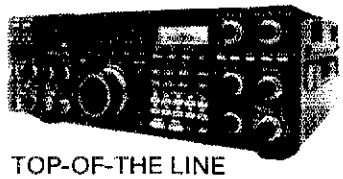

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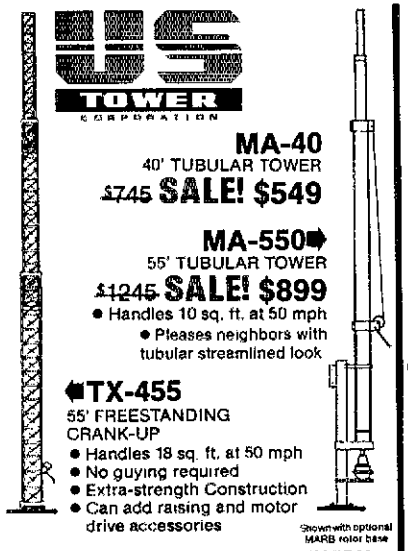

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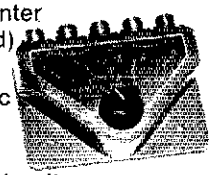

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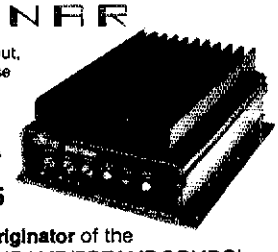

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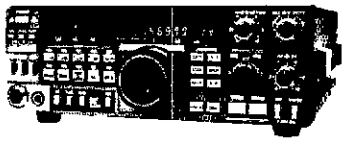

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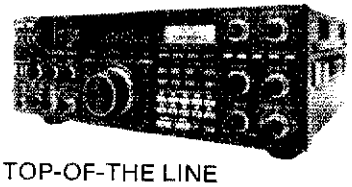

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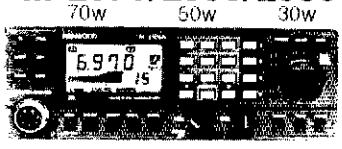

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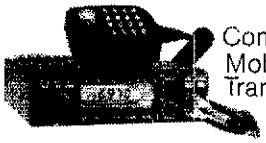

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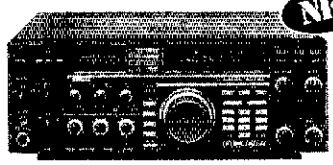

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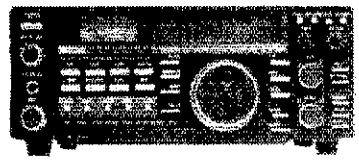

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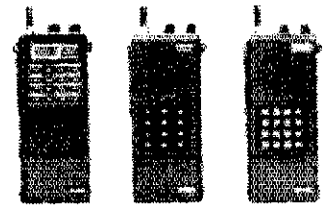

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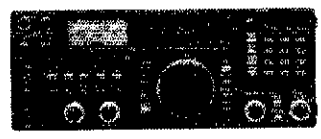

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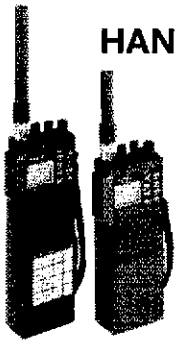

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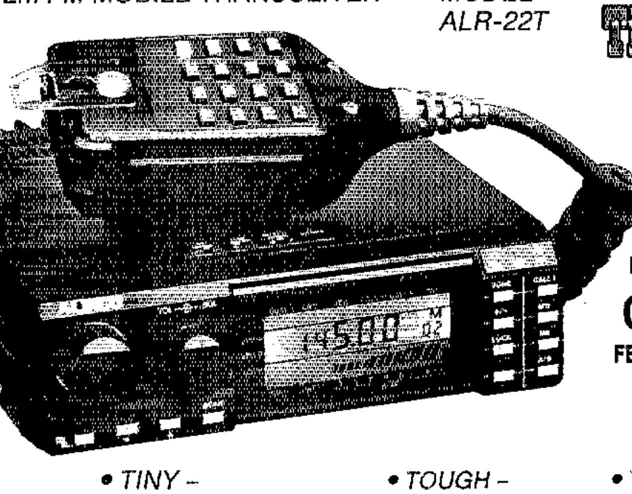

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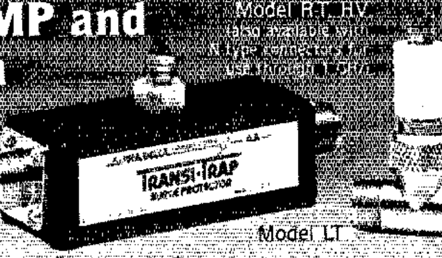

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Lake who has just received the VUCC Half Century Award for 432 MHz work! This information was provided by Keith, KY9P, who is the VHF/UHF Awards Manager for the Ozaukee Radio Club. (SSC- Wisconsin) With the help of his XYL, KA9WUI, Keith manages to prcess most award applications within 48 hours of receipt. KY9P is good in the 1987 callbook and would be happy to assist anyone interested by processing their VHF/UHF awards. On the new appointment front, longtime Illinois traffic handler W9DBO was appointed an ORS by STM K9CNP. I can't exactly say "welcome aboard" to Elmer as he has been more regular in his traffic reports for many years than are some appointees! In any case . . . Thanks and keep up the good work from Wenona! In April, Sandy KA9QXI, Net Manager for the Chicago Traffic Net, was guest speaker at the North Shore Radio Club monthly meeting, speaking on traffic handling. An explanation of "how to" in concise form from her talk was presented in the most recent issue of the North Shore RC newsletter the "TRANSMITTER." Thanks to Sandy for her program and to the "TRANSMITTER" for helping to get the word out. Many amateurs who THINK that they don't like traffic handling, think so only because they've never given it a try . . so . . . why not join us on one of the nets listed above? It's a pretty painless learning experience, it is the most basic skill required of radio operators in dealing with disasters, and who knows, you may find many of us have that it's a lot of fun with some real nice hams! The W9VEY memorial net has been in existance for 11 years and has been conducted weekly on the WA9FDP repeater in Gillespie. On May 19th, the repeater suffered a direct lightning strike and was totally destroyed. The damage started at the antenna and went all the way back to the commercial power meter. Jim, WA9FDP, worked many long hours and was able to piece together a makeshift repeater, having the system back on the air in under one week, and just three hours before net time. Hats off to Jim for a fine example of Amateur spirit , and thanks to Montgomery Co. EC WA9RUM for the report. Traffic: KA9FEZ 483, W9HLX 230, KJ9L 224, NC9T 168, W9EHS 157, W9NXG 127, W9HOT 121, K9CNP 120, W9HBI 103, WA9VLC 80, W9LWH 72, K9EUI 44, WA7MAD 42, KD9K 41, N7DOY 32, KA9EWN 29, NN9M 29, W9DBO 29, KA9BBV 20, WD9DZU 19, WB9TVD 18, KA9CTW/T 17, W9LNQ 13, W9KR 13, K9QEW 11, W9VEY/M 3, WA9RUM 3, N9GKD 2.

INDIANA: SM, Ron Koczor, K9TUS—ASM: W9UMH. SEC: WB9ZQE. STM: W9JUJ. ACC: K9TUS. PIO: KA9LQM. TC: K9PS. SGL: WA9VQO. BM: KC9TA. OOC: KJ9G. SRC: N9WB. Net Managers: ITN KD9DU, QIN KJ9J, ICN KD9ER, VHF W9PMT, IWN KA9ERC.

NET	FREQ	TIME DAILY UTC	QNI	QTC	QTR	Ses
ITN	3910	1330/2130/2300	2977	416	2179	90
QIN	3656	1430/0000/0300	556	290	1614	91
ICN	3705	2315	140	37	717	31
IWN	3910	1310	1793	392	31	
IWN	VHF	Bloom./Kokomo	2183	443	31	
Hoosier VHF Nets:			5440	217	4259	111

Appointments: KD9ER, NM ICN; WD9AVQ; DEC District 5; KA9DZM, DEC District 10; N9FMO, EC Vandenburgh County; W9ROA, EC Steuben County. Silent Keys: W9BQP, Kokomo; W9GFS, Evansville; K9JYM, Vevay; W9IAG, Columbus. W9EPC, Frankfort. BPL: W9JUJ Orig 2; Rcvd 349, Sent 333, Dlvd 8. OO report rcvd from N9CJT, KW9D steps down as NM for ICN and KD9ER picks it up. Thanks to Bill for three years of dedication and frustration making ICN grow! Good luck to Steve! We note with sorrow the passing of several oldtimers this month, including some with over 50 years as hams. I wonder if we are enriching the hobby as much as they did. The Special Olympics and Pan Am Games special event stations should be going strong when you read this. Make sure you contact and send for the commemorative QSLs and certificates available from each. ECs around the state were activating their teams during May, with severe weather, fires, floods and the like hitting Hoosierland. Amateurs in the Northeast corner of the state helped manage the evacuation of some 2000 residents of Hicksville, Ohio, into Auburn as the result of a chemical fire in Woodburn. Civil Defense and ARES teams provided communications from the fire site for some time until telephone lines were set up. Congratulations to all who took part. Make sure that you hold a debreifing session with all who participated so that you can find out what worked and what didn't. We must learn from our mistakes! Congratulations to the recipients of our Section awards given at the convention in Indy last month. Those awards represent just a small recognition of the hours of dedicated activity given by hams in the state. Where are all our OOs? Neither KJ9G nor I have been receiving many reports. Station reports for May: W9JUJ 692, KJ9J 239, KA9FFO WB9PFZ 69, NJ9S 68, KD9ER 63, NR9K 61, K9WWJ 52, WD9HII 49, K9SBW 46, WA9QCF 37, KW9D 36, KA9RNY 29, K9KTB 27, K9ZBM 26, W9UEM 25, KA9LQM 24, W9ZGC 21, WB9IHR 20, KB9HH 19, KA9QMI 18, W9PMT 13, W9BTZ 11.

WISCONSIN: SM, Richard R. Regent, K9GDF—SEC: W9OAK. STM: K9UTQ. ACC: KA9FOZ. BM: WB9JSW. OOC: NC9G. PIO: K9ZZ. SGL: AG9V. TC: K9GDF. Awards Manager KY9P presented 6-meter VHF/UHF Century Club Award to KA9SOW for confirming 100 grid squares. Kettle Moraine Radio Amateurs look good in their Club T-Shirts and Jackets. W9IZG now on Packet Radio. NØAW now on Packet, worked VU2 on RTTY, and helps local Novices with TVI cures. ATC NK9O continues helpful technical assistance. Watch for the new 700- page ARRL Operating Manual, especially Chapter 14 Emergency Communications, which I wrote. Every Club should have a copy of this Manual in their library. KAØCPA is now N9GJI. Congratulations again to Wisconsin Oldtimer W9DR of Milwaukee, who first began experimenting with Amateur Radio in 1909. August 15th Green Bay Mike and Key Club Swapfest, Community Center on Dousman Street open 7 AM. Also August 15th, Rhinelander Swapfest sponsored by the Northwoods ARC, South Park School, 511 South Pelham Street, open at 8 AM. Exams August 15th at Waukesha County Technical Institute, send card to WD9JKZ. August 22nd exams at Nicolet College, Science Center Fireside Room, contact K9RMN. Affiliated Club Coordinator, KA9FOZ, can send you information about Special Service Club programs or ARRL Affiliated Club benefits. Working with the news media? Ask Public Information Officer K9ZZ for promotional literature about Amateur Radio or requirements to become a Public Information Assistant. Interested in tracking RFI/TVI, being an Official Observer or an Auxiliary Monitoring station? Then check with Official Observer Coordinator NC9G. Traffic: WB9YPY 1420, KC9CJ 821, W9YCV 261, KA9RII 250, K9GDF 186, N9BGE 151, W9CXY 138, WA9WYS 112, AG9G 104, N9BDL 98, W9DND 98, K9EP 87, W9UCL 76, N9BCX 65, K9AKG 65, WB9ICH 58, W9IEM 49, KA9KLZ 36, K9UTQ 30, KA9BHL 29, K9JPS 26, NB9H 22, K9FHI 21, W9ODV 21, KA9MWT 19, WD9JID 19, N9BYS 16, WD9DNQ 15, KA9VIA 13, W9UW 12, W9PVD 6.(Apr.) WB9ICH 47, N9AGH 26, KA9RZL 13, N9BYS 6. (Mar.) W9CXY 200, WB9ESM 52, N9BYS 6.

DAKOTA DIVISION

MINNESOTA: SM, George Frederickson, Jr.,KCØT— Well another hot month is past and the hottest news is the nicked

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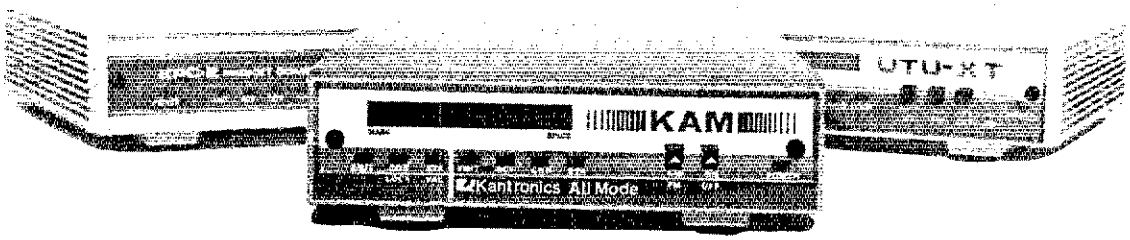

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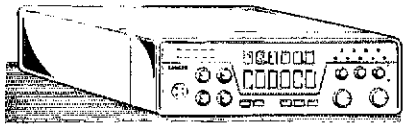

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named (Scanner law) is passed, and when this is read by you August first date will be in effect. It all boils down to this, Minnesota statues 1986 section 299c.37 subdivision one is amended to read (I'll just cite the highlights.) No person other than peace officers within the state, the members of the state patrol, and person who holds an Amateur License issued by the Federal Communications Commission. Shall equip any motor vehicle with any radio equipment or combination of equipment capable of receiving any radio signal, message, or information from any police emergency frequency. The Amateur License holder is not entitled if he has been convicted in this state or elsewhere of a crime of violence in the last 10 years. He must have a copy of his license in the motor vehicle at all times. The penalty is a petty misdemeaner and fastly must be under the direct control of license holder when ever it is used. (Net News) Amateur of the month is WBØBIN, Bob of Moorehead. Congratulations, call change: KAØSDI is now NØIAN. I am sad to report N7AST, Andy Schaefer, of Hackensack, and KCØWY, Dennis Peterson, of Hoyt Lakes, are Silent Keys our deepest sympathy to family and friends. On Sept 26/27, 1987 the P.O.W./M.I.A. walk around lake march at Mille Lacs lake Area. Sponsored by the Isle V.F.W.. Any ham with 2 meters equipment please help out with the communications. For more information contact KØOGI, Lou Guerre, at RT.1, Box 178B, Wahkon, MN 56386 or call 612-495-3467 Tnx. I hope everyone has enjoyed their summer vacations and the Kids will be back in school 73's Dave KAØBFP.

MSN/RTTY	3620	6:30P	Start in Sept.	WAØLUT
MSN/1	3685	6:30P	410/121/31	KAØEPY
MSN/2	3685	10:00P	300/40/31	KDØNH
MSSN	3710	6:00P	292/38/31	KAØSBY
MSPN/N	3860	12:05P	451/256/31	WBØWNJ
MSPN/E	3860	5:30P	771/150/31	KAØBFP
MNAMWXNT	3860	6:15P	286/169/31	KØOGI
PICO NET	3925	9:00A	3119/273/123	WDØBAC

MN EMERGENCYFREQ 3860 BULLETINS 3685 3860 MN/MSO 3620 Traffic: WBØWNJ 530, WAØTFC 356, NØFOO 265, KAØEPY 243, KAØARP 134, KDØCL 127, KT9I 124, KAØSBY 82, KØOGI 65, KDØCI 64, W9DM 57, NØCLS 52, KDØNH 47, WØGRW 44, KAØBFP 37, WDØGUF 30, KAØPDM 25, KAØVII 25, KAØAJF 22, WBØUKI 22, KCØT 14, KØCSE 13, NTØB 12, WØKYG 9, KAØCDC 6, Total 2405.

NORTH DAKOTA: SM, Bill Kurtti, NØAPF—The Fonx Hamfest will be Oct 17. We will miss the following Silent Keys: WØJPW, KAØMEM, and WAØMND. Fyetta (WAØMND) was one of the founders of the YL WX Net. Congrats to KAØZFX, KAØVWN, KAØZED, KAØSMQ, KAØVWL, KAØTOH to general and WAØMSJ, WBØQAJ and NØCYT to advanced. The Jamestown Amateur Radio Club, WØFX, provided communications for the March of Dimes Walk-a-thon. Jamestown is to move their repeater to 147.18 +600. WØFX also has a new 430 in OEC. Grand Forks has the university club station on the air again. Glad to hear that WØCDO is out of the hospital after a long stay there. Tnx to KBØCH for pinch hitting on Goose River Net. The new digi at Wolford gives link between Minot and Devils Lake. Traffic: KAØFSM 64.

NET	FREQ	TIME	QNI/QTC/SESS	MGR
W WX Nets	Not in operation in summer			WØGFF
Goose River	1.990	9:00 AM (Sun)	5/115/2	WØCDO
Data	3.883	6:30 PM	23/386/27	KAØFSM

SOUTH DAKOTA: SM, R. L. Cory, WØYMB—SEC: KAØKPY. STM: KDØYL. Asst SM: NØABE, WAØFPR. OBS: NØABE. The Dakota Division Convention at Watertown is coming up fast so be sure you have your plans and reservations made for Sept. 18-19-20. I hope everyone sent in their letter to the Forest Service in regard to the $1000 per yr rental for a repeater site. The outcome of this will determine whether or not the Rapid City Club can keep their repeater on Bear Mountain. My thanks to the clubs at Sioux Falls, Borrkings, Watertown, and Rapid City for sending me their club newsletters. We have a total of eight nets reporting each month. Please send any items that you would like to have in this column to me. Traffic: NØDPF 553, KØZBJ 129, KØERM 95, WØMZI 49, KDØYL 41, WØYMB 11, WBØOMF 30, WAØVRE 8, KEØIR 2.

DELTA DIVISION

ARKANSAS: SM, Joel M. Harrison, WB5IGF—ASM: K5UR. SEC: N5BPU. STM: W9OK. ACC: NI5D. SGL: W5LCI. TC: W5FD. Repeater Coordinator: WB5FDP. It is with sorrow that I report the passing of our dear friend Marion Pryor, K5KFY. WF5X reports that amateur radio was praised highly by the University of Arkansas Dept. of Public Safety and others for its roll as a primary communications link during a recent emergency exercise. Eldo, W5LL, has been appointed Bulletin Manager for Ark. He will be coordinating the dissemination of ARRL bulletins and information of interest around the state. Along the same lines, Harold Clark, KA5HBQ, has been appointed OBS for Northwest Ark. Reports are that the NW Ark. hamfest was a big success. Congratulations to the NW ARC and my apologies for my absence due to professional duties. I would like to thank Nelson and Serena BAlley, K5TML and WA5RJF for making available ARRL material in my absence. Several Ark. stations were active in the June VHF Sweepstakes, K5UR, WB5IGF, and WB5JAR as well as others. Traffic: WM5W 65, W5UAU 32, W9OK 30, WF5X 8, W5KL 6, WB5IGF 4.

LOUISIANA: SM, John "Wondy" Wondergem, K5KR—ASM: KB5CX. SEC: N5ADF. ACC: K5DPG. SGL: KD5SL. TC: N5JM. OOC: KE5QK. PACKET: NE5S. Congrats to Mike, W5ZPA, selected as DXer of the year by the Delta DX Association. Bob, KA5HLP, has placed an "Official Welcome" to traveling hams in Louisiana's eleven tourist information centers. It includes the La. repeaters as listed in the '86/87 Repeater Directory. The Radio Amateur Service Club (RASC) of Baton Rouge meets on the 3rd Friday of each month at the Red Cross Bldg. 1165 S. Foster Dr. at 7 PM. RASC is very active in providing communications for disaster drills and public-service events. The RASC net meets on the KD5SL repeater Sun & Wed at 9 PM on 145.49/144.89. The Jefferson ARC in Metairie has a W5GAD 10 meter net on Thursday at 7 PM on 28.450 to help the novices and techs get on the air and have someone to talk to with their new voice privileges. Sam, KB5VCO, and Jay, N5HZF, are the co-chairmen. We are now in the hurricane season and its time to take stock and make preparations to minimize the possibility of getting caught off guard. Participation in local emergency net and frequent drills is a very worthwhile and rewarding public service. Central Louisiana has a new Quarter Century Wireless Association Chapter designated QCWA Chapter 163 thanks to the efforts of organizers Bill, W5JBK and Bill, N5HOF. Traffic: CAND La. 100% 618 msg, 31 sessions by WA5V. DRN5. La. 97% 687 msg by K5WOD, WA5WBZ, WA5V & KF5VW. La. net: W5GHP, W5MI, K5TL & WA5TQA.

MISSISSIPPI: SM, Jim Davis, KK5Z—ASM: W5TRD. SEC: WD5IKD. SGL: NC5Y. ACC: K5VXV. PIO: WN5M. BM: AJØX. TC: WB5SXK. OOC: KK5K. STM: N5AMK. VHF Coord: N5DWU. Congrats to folg upgrades: to Tech, KA5CFK. Gen: KA5WRX, Adv: KB5BXN, Extra: WY5X. CAND: (W5KLV) Sess 62, QNI 618. DRN5: (WB5YDD) SESS 62, QTC 685. DRN5 rep 98% by N5AMK, KT5Z, W5HKW, KB5W, KE5EC, K5ZFM, MSBN (WJ5B) Sess 31, QNI 1537, QTC 51, MTN (KB5W) Sess 31 QNI 152, QTC 71. Miss/Slo/Net: (W5YRX) Sess 21, QNI 80, QTC 16. MAG/SEC/NET: (NS5M) Sess 7 QNI 85, QTC 4. Miss/Lou/Emerg/Net (WD5O) Sess 5, QNI 160, QTC 3. GCSBN (W5JHB) Sess 31, QNI 931, QTC 17. PSHR N5AMK, Total Points 102. ARRL Info Net (KK5Z) Sess 4, QNI 43. Rankin County ARES (KF5IZ) Sess 4, QNI 47. Packet BB (KF5IZ) Recd 1, Del 1, Total 1. Lauderdale County Amateur Radio Emerg Net: Sess 4, QNI 74. Ripley 2 M Net (NS5M) Sess 4. SEC rept: Total ARES members: 52, an increase fm last month. EC/DEC Rept 4. EC/DECs reporting: NS5M, N5JPX, N5HGN, K5DZE. Local emerg nets: 3, w/ NTS liaison 3, total sess: 12. Traffic: N5AMK: orig 1, recd 241, sent 176, Del 1, KT5Z Recd 44, Sent 47, De 7. Total 98, W5WZ Recd 27, Sent 35, Del 1, Total 63. WD5JXT Orig 9, Recd 13, Del 13, Total 35.

TENNESSEE: SM, John C. Brown, NO4O—ASM: WA4GLS. ACC: WA4GLS. OOC: W9FZW. SEC: WA4GZQ. SGL: WA4GZZ. STM: NG4J & TC: W4HHK. It has never been mentioned in this column about the "grid square" contest. Those that have made contact with all the countries, continents and possibly countries, or all counties in the US, the next quest is worked all grid squares in the United States or some other country. A map for this purpose can be obtained from ARRL. There is also a booklet for the whole world. The map of the US seems to be quite a popular item. The technical coordinator for the TN section has advised that he has received a VCC certificate 16 for working 10 grid squares on 2.3 GHz. You can also really do it the hard way by EME on 2.3 GHz. There are some beacons in the section that will need mentioning on 6 meters, W4RFR on 50.068 and W4HHK on 50.070 MHz. A reception report would be welcomed. 2M subband beacon can also be heard on 144.050- 144.060 MHz area. The novice and techs are working to get a net going in the 10M section of band that is run and managed by them. All higher class check-ins are welcomed. The net can be found in the new phone section of the Tech/Novice portion. One of these nets is in West Tennessee and the other is in the Knoxville area. Why not join in and show your support and guidance. I got a refreshing note the other day from a member out there concurring with some comments that were in a previous column was very refreshing. Congrats are in order to WC4W for assisting in the emergency situation of a stranded ham out in the wilds of Texas. Seems the other ham was only ten miles from home but that just happened to be eight miles from the nearest house and a very much untraveled road. Job well done, "LEE." The traffic activity for the section was as follows: LF-Sessions-78, QNI 4657, QTC 133; VHF Sessions-39, QNI 2117, QTC 460; CW Sessions-42, QNI-261, QTC- 69. CW Net Honor Roll for period: N4OZB, W4LVP, NN4D and NG4J. K4WWQ is still doing a very commendable and much appreciated job with the DRN5 and CAND nets. Individual station activity for the period was as follows: W9FZW 168, WA4FMR 122, K4WWQ 62, KA5KDB 41, NN4S 37, KE4LS 27, KE4OL 21, W4PFP 21, W4PSN 14, W4SYE 13, NN4D 11, W4TYV 10, N4OZB 10 and W4EWR 5. Hope to see all at the many hamfests.

GREAT LAKES DIVISION

KENTUCKY: SM, John Thernes, WM4T—To facilitate the sharing of ideas among Ky. appointees, I will act as NCS for the new KAN (Kentucky Appointee Net), which will be called immediately following KTN on the First Sunday (local time) of each month. I urge all to QNI and help share ideas. Please QNI the KNTN run by KB4OZ; let's all support our new Novices. Congrats to NKARC for a successful Ham-O-Rama. W4RHZ took part in his 29th consecutive Armed Forces Day test. Jessamine Am. Radio Society & BARS (Lexington) provided communications for the Cross Country Trials on May 30th. KA4LSQ has a RTTY net going and welcomes your QNI.

NET	QNI	QTC	SESS	MGR
MKPN	1270	139	31	WD4RWU
KTN	669	38	31	WB4LBG
KNTN	194	45	41	KB4OZ
KYN	294	95	61	K4AVX/KZ8Q

Traffic: KI4QH 144, WD4RWU 114, K4VHF 108, K4AVX 38, K4MTX 32, KC4WN 25, K4HQE 17, WA4AVV 8, W4PKX 5, WD4COF 5, KV4A 4, N4PEK 3. PSHR: KI4QH 63, KA4MTX 63.

MICHIGAN: SM, James R. Seely, WB8MTD—Silent Keys, WB8AKS, WD8DWJ. Your conductor again this month is WB8BGY, ASM/SEC. PRB-1 saves the day again. Reports from W8YZ, MI TC, indicate that Southgate is now allowing Amateur towers to be erected under recent consideration of PRB-1. Grand Rapids amateurs were able to get radio amateur antennas exempted from a satellite dish ordinance passed June 3. Hats off to all for a job well done. Congratulations to a new group of U.P. Novices, KB8BRS, KB8BTG, KB8BTH, KB8BTI, KB8BTJ, KB8BTK, and KB8BWV. Welcome to Ham Radio! A special thanks to N8GWM, N8GOH, and KA8IHU for a super job on the Walk America March of Dimes project. The U.P. Net continues its winning ways, now 42 consecutive months. The BAARC 145.31 repeater is the only Wide Area Repeater in MARC's records and is probably now one of the largest area coverage repeaters in MI thanks to efforts by WB8SIJ, and WB8ICU. New EC for Grand Traverse Co. is N8AYQ. Jim is also the Co. RACES Officer. CARS of Jackson report 3 major events in one weekend. A Girl Scout Volksmarch had over 1100 entries from the mid MI area. The Jackson Rose Run and Parade were a big success as well. Fall is just around the corner, and many clubs and individuals are about to start Novice license classes. Keep in mind the new and enlarged Novice class privileges. You will be starting the next generation of Hams! Past history has shown that most new Novices never get on the air or upgrade. Many claim that the limited (CW) privileges were the problem. That excuse is now gone. Be a good Elmer, emphasize the fun of Ham Radio as well as the need for them to take part in Public Service Events and the National Traffic System. Most important, get them on the air, encourage upgrading and get them involved in local activities. Let your League Officials know who they are. Let them see their call in print for the first time in QST. Invite them to become League members. Remember you too were once a Novice. Don't try to mold them to your particular operating habits, but guide them in a direction that will let them develop their individual talent's and interest. Traffic: KA8CPS 256, WD8KQC 177, WD8RHU 116, N7AHA 77, WA8DHP 52, K6HAP 48, KB8GT 40, W8YIQ 39, WB8SYA 38, N8CNY 37, W8SCW 37, WB8BGY 34, NJ8X 33, K8UPE 29, W8URM 23, K8OCP 21, W8CUP 12, N8EXS 12, W8IHX 11, WA8MVH 10, N8BWL 10, W8VZI 7, WD8MJB 7, WB8ITT 2.

OHIO: Jeffrey A. Maass, K8ND—ASM: N8UH. SEC: WD8MPV. STM: KF8J. BM: W8ZM. ACC: KJ3O. TC: KB8MU. OOC: AD8I. SGL: N8CVK.

NET	QNI	QTC	Sess.	Time(Local)	Freq.	MGR
BN(E)	260	100	31	1845	3.577	N8EVC
BN(L)	179	99	31	2200	3.577	K8TVG
BNR	197	73	31	1600	3.605	W8EK
BSSN	294	182	58	0945,1900	3.873	K8OZ
ONN	184	39	30	1825	3.705	WD8KBW
OSN	284	73	31	1810	3.577	N8AEH

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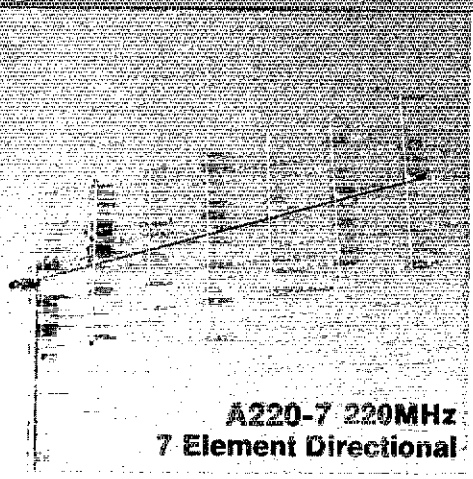
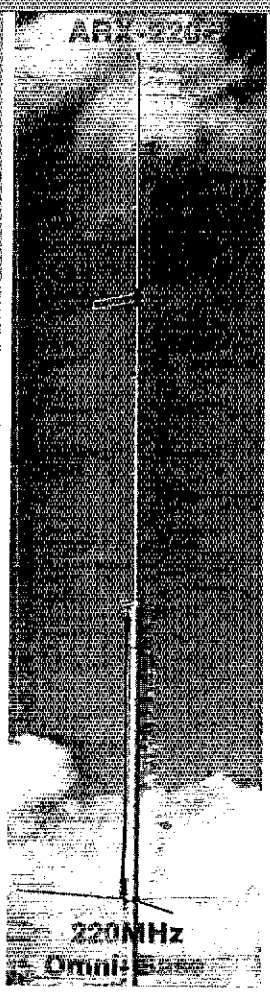
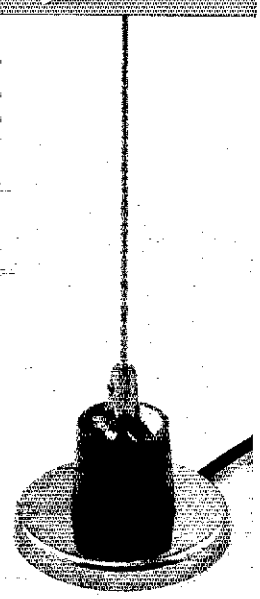


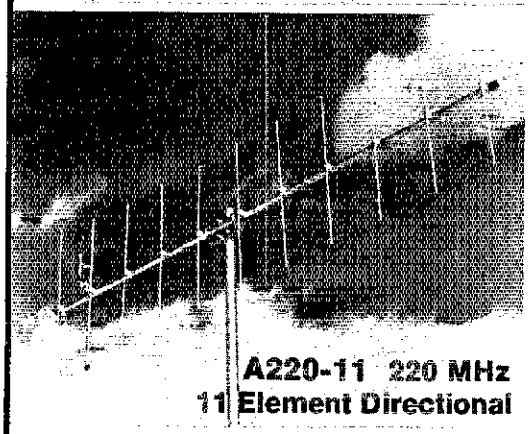
A220-7 220MHz
7 Element Directional



ARX-220
220MHz
Omni-Base



CS-220
220MHz Mobile



A220-11 220 MHz
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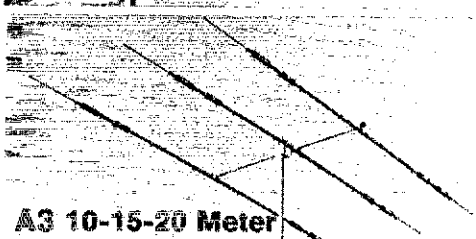
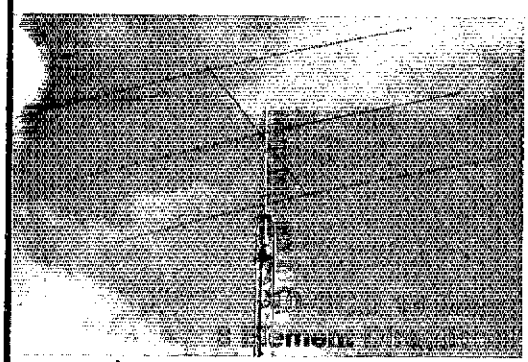
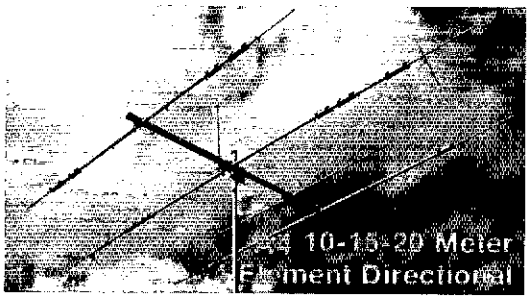
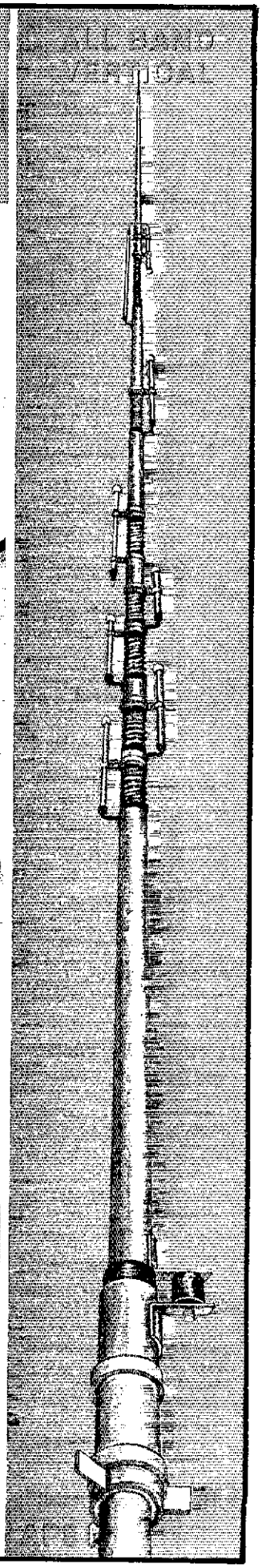


A3 10-15-20 Meter
3 Element Directional





A4 10-15-20 Meter
4 Element Directional



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The 1987 ARRL Great Lakes Division Convention will be held on August 29-30 in Saginaw Michigan. An ARRL Convention is more than just a hamfest: it is an opportunity to concentrate on enjoying an Amateur Radio weekend with an emphasis on YOUR ARRL. I hope to see you there: it's worth the trip! Ohio hamfests in August: Warren 8/16, and Marysville (Northwest of Columbus) 8/23. VE exam sessions: Columbus 8/8; Portsmouth 8/15; Canton 8/29. Contact me for details. A reminder: you should pre-register with VE Teams if at all possible! I can provide names and telephone numbers for contacting the VE Teams offering the exams listed in this column. On August 9, the Third Annual ARRL Ohio Section Conference and Picnic will be held in the Mansfield area: mark your calendar! This event has become a key way for your Section Manager and my appointed assistants to learn what ideas YOU have for the improvement of ARRL programs in the Ohio Section and at the National level. Several of the inputs that have come out of previous picnics have been implemented, and some others are in the process of implementation. Mansfield is easy to get to from all parts of the Section, and I hope to see many of your there! With the granting of new voice privileges to Novice licensees, new nets seem to be sprouting up all over! KA8ZNV would like to start a "Party Time Net" on 28.400 MHz on Fridays, Saturdays and Sundays. The net would begin at 8 PM on each of those nights, and all operators, DX or local, are welcome to participate: help to spread the word! What other nets are the various clubs sponsoring? Congratulations to the Portage ARC on their second very successful Hamfair in May, and on the renewal of their ARRL Special Service Club (SSC) status for yet another year! Is your Amateur Radio club affiliated with the ARRL? Contact KJ3O for details of the benefits of affiliation and information on how to join the other fine clubs (over 100 of them in Ohio) can proudly display the ARRL diamond on their newsletters and correspondence! With August, we start into a seemingly non-stop schedule of large hamfests through the Fall. Send an SASE or stop by the ARRL booth at any hamfest to get a current list of hamfests and VE session in Ohio through December. A note on Packet Radio: Although the protocol used to transmit messages by Amateur Radio packet my be error detecting and correcting, you still have to type it correctly in the first place! I have detected several errors in the traffic report messages that reach me in packet form, clearly because they were transcribed from voice to packet at some point in between the originator and the fellow printing the message for me. Use care: proof read your typing! The Amateur Radio stations listed below have helped to uphold our responsibility to the public and have reported handling radiogram traffic during the month of May 1987: W8PMJ 278, WA8EYQ 253, N8IBS 211, K8TVG 210, WB8JGW 195, W8SKP 102, K8JDI 180, W9ZOL 167, W8BO 166, KD8KU 159, WD8KFN 156, N8GEC 152, KF8J 148, W8QZK 138, K8AKS 115, K8ND 107, K8CMR 103, N8EFB 100, KD8HB 97, KA8GJV 91, WD8QXT 88, NF8B 87, N8GHS 84, KD9KR 83, W8CQK/D 78, W8FPA 73, W8EK 72, WA8SSI 70, N8AEH 69, WB8KWC 67, KD8FW 62, N9AUG 61, K3RC 61, N8FWA 58, WA8HGH 52, WD8KBW 50, WD8RIB 49, WD8IKC 47, N8EVC 46, K8DHD 44, N8HBI 40, KD8IC 36, WB8BWY 35, W8RG 34, K8EF 33, WA8HED 33, N8GPU 32, KD8XL 32, W8LDU 30, KD8WI 30, WB8DMF 28, K8IOW 27, WD8JAW 27, KA8RIX 26, W9SWM 22, KA8DRR 21, K8ES 21, W8JLW 20, K1LT 20, N8FPH 19, K8CKY 18, KE8CV 17, WA8GMT 16, KA8OQF 16, KC8WH 16, NU8H 14, KA8TNT 14, K8DXZ 13, N8IIP 13, KC8YV 13, W8BHL 12, WA8DYS 12, N8HRW 12, WD8JYE 11, WB8KWD 11, N8CJS 10, N8GOB 10, NU8I 10, KA8YIT 9, KA8ZOW 9, N8AJU 8, WD8ATN 8, NR8C 8, KA8CBO 8, N8FBE 8, WB8MRL 7, WD8QZM 7, N8CDN 6, WB8HHZ 6, NK8B 5, WD8CSP 5, WD8DKQ 5, N8GIO 5, WD8SDH 5, K8VOY 5, N8CW 4, N8IAE 4, KA8SOM 4, KA8YKE 4, KC8D 3, K8EEN 3, N8GIY 3, WB3LHI 3, W8LT 3, WB8YFD 3, WB8AWM 2, N8HBF 2, KA8SZH 2, KA8VYT 1. (Apr.) WB8YYS 28, N8HIL 2.

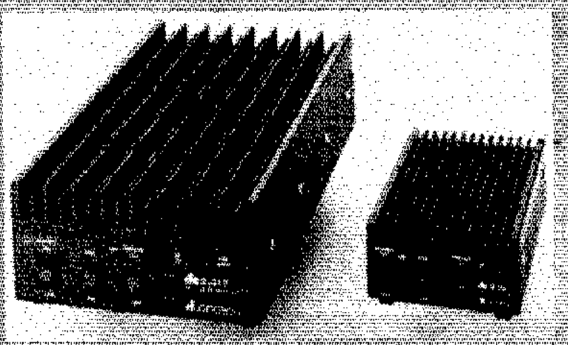
HUDSON DIVISION

EASTERN NEW YORK: SM, Paul S. Vydareny, WB2VUK—ASM & STM: K2ZM. SEC: WA2ZYM. BM: WB2IXR. PIO: KB2TM. TC & OO/RFI: KC2ZO. ATC: WA2VGM. SGL: KB2HQ. Newsletter Editor: WB2NHC. NET LISTINGS(QNI/QSP): CDN 510/74 ESS 282/62 HVN 307/58 NYPON 580/322 NYS/E 389/220 NYS/L 354/279 NYS/M 319/209 SDN 276/90. CLUB NEWS: Albany ARA provided communications for Crop Walk with WA2YBM, KA2CPN, KC2QP, KA2OWW, N2FBD. CCNR worked on plans for Field Day. OMARC has been involved with many public service activities with Ulster RACES and also Poughkeepsie and Mt. Beacon clubs with KA1BZE KA2QYL KA2TIP KA2TQW KU2Q KY2J K2KBL N2EGR WA2RUW WB2POM W2ILW W2IQU KB2GA N2FS W2ZW WB2OXY N2LL KD2NE WA2GWE WA2ZNU W2XL W2RI KB2L WB2DID KA2AHW W2IHY ND2O WA2JPR KD2NN N2AVN WA3AFS W2GJF WA2UBI all participating. Rip Van Winkle ARS is also working hard on plans for Field Day. Saratoga RACES is working on plans for the Hamfest on Saturday, September 12th. Schenectady ARA welcomes new members K3WGA WA2CJI W2XM KB1VH KB2AFR WB2LZM WB2OQV WA2IKF WA2ZYM N2GXJ. They heard W2DHT talk on computers in amateur radio. WARA held a Q and A session on varied topics. WECA announces several new officers/directors K4ZGE-Treasurer, KB2BMU-Activities, AC2V-Membership. A special thanks to WB2EAG who has stepped down as Bulletin Manager and congrats to WB2IXR who has taken the job. If your club is having a test session, hamfest, or other activity, please advise WB2NHC enough in advance of the ENY Newsletter. A calendar of events will appear but only if you supply the information. All have an enjoyable and safe summer. Don't forget you can leave info for WB2NHC, K2ZM or me on WB2QJA-4. MAY PSHR: NQ2H WB2EAG WB2VUK KA2MYJ N2EQM K2ZM K2ZVI MAY Traffic: WB2EAG 201, NQ2H 198, WB2VUK 169, N2FTR 70, K2ZM 67, K2ZVI 51, KA2MYJ 51, N2EQM 41, KA2TQW 11, K2HNW 5, N2FSJ 5.

NEW YORK CITY-LONG ISLAND: SM, Walter Wenzel, KA2RGI—ASM: K2IZ. ASM/VE W2NL. ACC: KA2WIJ. SEC: KA2LAD. OOC: NB2T. TC/RFI: WA2YNK. STC: K2MT. SGL: WA2HYS. The following are traffic nets in and around the section:

NCVHF	146/745/r	1930 m-f	KA2HPG Mgr
BAVHF	146.670	2000 m-f	K2YQK Mgr
SCVHF	145.370	2000 m-f	KA2JMA Mgr
NYS/M	3677 kHz	1000 daily	WB2EAG Mgr
NYS/E	3677 kHz	1900 daily	KU2N Mgr
NYS/L	3677 kHz	2200 daily	KU2N Mgr
NYPON	3913 kHz	1700 daily	KA2UBD Mgr
ESS	3590 kHz	1800	W2WSS Mgr
BBS	145.010	Packet Node Station AI2Q	

All times are local, please note that AI2Q is the Packet Node Station and that all incoming NTS traffic should be routed through him. LIMARC will continue to conduct examination sessions on the second Saturday of the month at the NY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" 2-117	10W	IN =	170W OUT	" 3-112	10W	IN =	120W OUT
" 2-317	30W	IN =	170W OUT	" 3-312	30W	IN =	120W OUT
" 2-417	45W	IN =	170W OUT				

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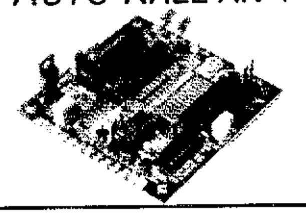
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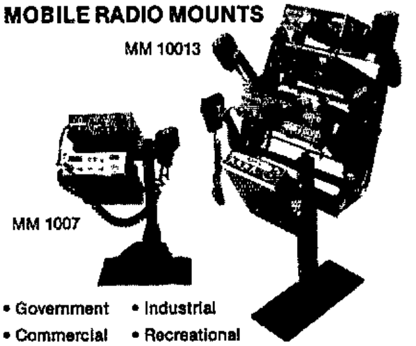

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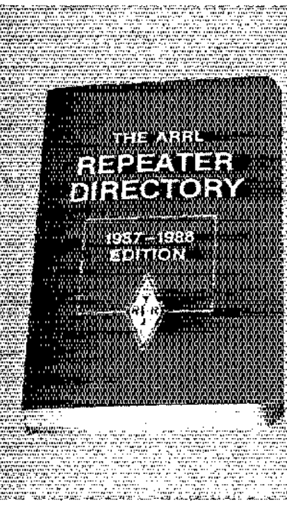

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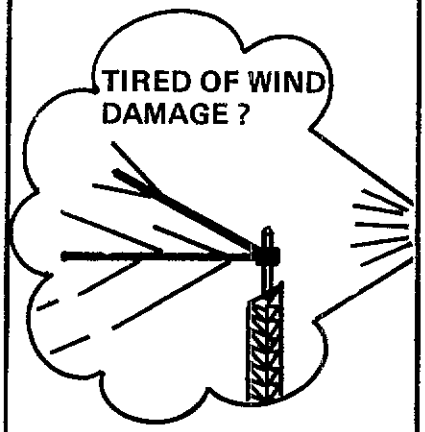

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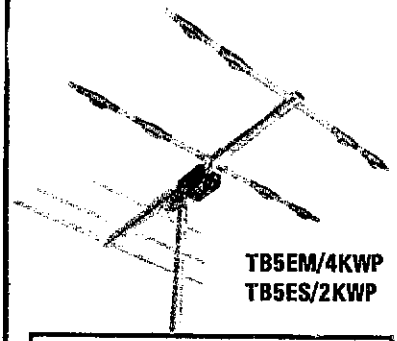

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MA-40	40'	21'6"	2	242	3"sq.	4½"	$ 735.00
MA-550	55'	22'1"	3	435	3"sq.	6"	$1245.00
MA-550MDP*	55'	22'1"	3	620	3"sq.	6"	$2640.00
MA-770	71'	22'10"	4	645	3"sq.	8"	$2385.00
MA-770MDP*	71'	22'10"	4	830	3"sq.	8"	$3780.00
MA-850MDP*	85'	23'6"	5	1128	3"sq.	10"	$5090.00

Shown w/ optional MARB 550 rotor base and motor drive

*MDP models complete with heavy-duty motor drive with positive pull down.

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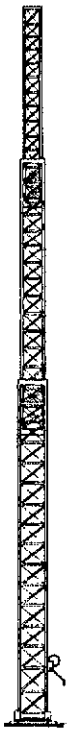

Will handle 18 sq. ft. antennas at 50 MPH winds.

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	12½"	15"	$ 925.00
TX-455	55'	22'	3	670	12½"	18"	$1395.00
TX-472	72'	22'8"	4	1040	12½"	21¾"	$2295.00
TX-472MDP*	72'	22'8"	4	1210	12½"	21¾"	$3695.00
TX-489	89'	23'4"	5	1590	12½"	25⅝"	$3995.00
TX-489MDPL*	89'	23'4"	5	1800	12½"	25⅝"	$5995.00

*TX-472MDP includes heavy-duty motor drive with positive pull down. TX-489MDPL 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"	21⅝"	$2095.00
HDX-572	72'	22'8"	4	1420	15"	25⅝"	$3595.00
HDX-572MDPL*	72'	22'8"	4	1600	15"	25⅝"	$5495.00
HDX-589MDPL*	89'	23'8"	5	2440	15"	30⅜"	$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.

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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	12½"	20¾"	$1195.00
TMM-541SS*	41' w/o mast	12'	5	430	10"	20¾"	$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.

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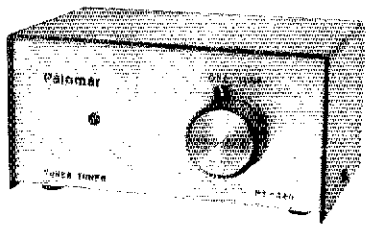

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VU-9600 [illegible] S.C. VID/CNVTR	25	Call
SP-55 Rer SPKR	24	Call
[illegible] NDI[illegible] KIES		
FT23R	269	Call
FT [illegible]	299	Call
FT73[illegible]	279	Call
FT73P [illegible]	314	Call
[illegible]		Call
[illegible]	61	Call
NC29 [illegible]	84	Call
FNB10	41	Call
FNB1 [illegible] mAh	[illegible]	Call
FBA10 "AA" Cell [illegible]er	12	Call
FT109 RH 220 MHZ	379	Call
FT 209 RH 2 MTR	359	Call
FT 709 RH 440 MH	359	Call
FT 727 HF/VW Dual B		*Call*
FNB4 "[illegible]		Call
FNB4A "	9	Call
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PA3 Mob"		
FTS-6		
FT-290R/[illegible]		Call
FT-690R/"		
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ELH[illegible]		Call
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Institute of Technology, Rt. 25A, Olk Westbury, in Seten Hall, Rm 2. Applicants are reminded to bring 2 forms of ID, original and a copy their FCC license, check for $4.50 made payable to ARRL/VEC. 2 pens/pencils and calculator for the math questions. For further info, please contact Joe Kolk, W2NL. Grumman ARC also has exams, starting Sept. 2, the exams will be on the first Wed. For further info call Howard W2QUV at 516-354-6861. Suffolk County ARC is also conducting exams on the 2nd Sat. at the Islip Arts Bldg. RM 106 at Suffolk Community College in Selden. For further info call George WA2VNV at 516-751-0894. Looking for something to do on a Sunday? Want to get out in the fresh air and meet lots of new people? Would you like a front row seat to a major event? If you can answer yes to even on of these questions, please contact Hudson Division Director Steve Mendelsohn, WA2DHF and sign up for the 1987 New York City Marathon. Plenty of prime locations are available, parking for your car is no problem, and you get a chance to see some of the top runners in the world. SEC: KA2LAD has appointed N2GUG of Mastic as DEC. Traffic (May): N2AKZ 193, K2YQK 146, K2MT 84, N2GPA 74, KB2BKE 41, N2GNQ 39, NB2D 38, KA2ZYX 38, NF2N, K2MPG 29, KB2ARY 26, KA2UIU 24, K2TWZ, KA2JMA 9, N2GQS 6.

NORTHERN NEW JERSEY: SM, Robert R. Anderson, K2BJG—ASM (VE Liaison): N2XJ. ASM (FO Info): NW2L. SEC: N2BMN. STM: KA2F. OO/AA: KA2BZS. ACC: KY2S. SGL: W2KB. TC: K2BLA. BM: N2CXX and PIO WB2NQV (PH 735-8550). Please accept my thanks for your support in my election to my 2nd term as your SM. I am pleased to announce the endorsement of several section leadership official appointments for the next two year term: ASM (VE Liaison) Carl Felt, N2XJ; BM Bill Dixon, N2CXX; PIO Charles Kosman, WB2NQV; SGL: Ken Brown, W2KB; and TC Al Helfrick, K2BLA. The call of ASM Rich Moseson is changed from N2BFG to NW2L. Other endorsements are: W2CC NM of NJ Phone Net; OBSs N2CXX, W2FMN, WA2SNA, and WA2UPK; ORSs KA2HNQ, N2AAM, W2RRX, and W2YV; PIA N2EJO. New appointments are: WA2EPI as NM of NJT(wo)T(wenty)TN and NJN/L. KA2F remains NM of NJN/E. A NM for NJN/E is still needed to allow KA2F time to better serve NNJ as STM. KV2BOJ as ORS. I am sorry to have to report that Tom Ryan, W2NKD, DEC of Union County has resigned due to poor health. He is replaced by KA2DAU. STM KA2F has prepared a slide/tape program on traffic handling and after a very successful presentation at an Ocean/Monmouth club meeting he is ready to take to the road. To schedule this program at your club meeting, contact KA2F at 842-9179. Communications for the LPGA tournament at the Navesink country club had 65 amateur operators participating. An amateur radio exhibit was part of the Monmouth Council celebration of the 75th anniversary of Girl Scouting. Congratulations to the following who were newly licensed or upgraded during May sessions conducted by: NNJ VE Board, Bergen ARA and Old Bridge RA. Novice: E Minowicz, W Comerford, P Zausmet, N Briggs, D Tardiff, and G Martinock. Technician: KB2AMF, KB2CZO, P Lennan, P Lannuier, KB2DKC, KB2DJU, KB2ANF, KB2DOP, KB2DAB, KB2YNB, KB2AUI, D McCave, J Bastedo, S Kiraly, KB2AIY, KB2CNJ, and KA2UFO. General : KB2CFQ, KA2ZHL, KA2CXG, KA2ZVS, KB4BKR, and KA2UXL. Advanced: A Toncza, KA2DAA, KB2CBH, N2GHU, WB2CLJ, and N2GWH. Extra: KA2TPY, KD2RJ, and K2PFS.

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NJM	WB2ZJF	3695	1000	Dy	31	124	217
NJPN	W2CC	3950	1600	Dy	30	161	395
NJN/E	KA2F	3695	1900	Dy/P	29	122	208
NJN/L	WA2EPI	3695	2200	Dy/P	31	85	125
OBTTN	K2SC	147.12	2000	Dy	31	166	301
TCETN	WD2AHD	146.685	1930	Dy29	26	113	
NJVN/E	WB2FTX	146.895	1930	Dy/p	27	18	111
NJVN/L	WB2ANK	146.49	2230	Dy/P	76	187	
NJTTN	WA2EPI	223.88	2100	Dy	28	75	174
NJSN	WB2PKG	3735	1830	Dy	31	13	172
NNJ/PL	W2QNL	145.01	24 Hr via		WA2SNA-1		PBBS

SAR/PSHR: N2DXP 154/65, N2XJ 224/97, W2RRX 132/103, KA2F 242/140, WB2QMP 30/87, WD2AHD 42/63, W2QNL 140/102, K2VL 92/95, KB2WI 6/, WA2EPI 164/117, WB2FTX 8/, KA1INE 42/73, W2XD 9/, K2SC 22/, W2CC 44/, K2SPH 21/81, WA2PAC /60.

MIDWEST DIVISION

IOWA: SM, Wade Walstrom, WØEJ— ASM: WBØAVW. SEC: KDØBG. STM: KCØXL. ACC: NUØP. OOC: WAØQMU. BM: KØIIR. TC: KØDAS. The resignation of WØVX as Official Observer Coordinator has been accepted with regret. Dave has been an excellent OOC during his short tenure and is accepting a big job promotion in southern Calif. Good luck and thank you, Dave! WAØQMU has been appointed the new OOC. Steve is an associate professor of electrical engineering at ISU and is well qualified for the appointment. Packet radio continues to grow and improve in the section. The packet bulletin board network continues to improve and more NTS traffic is being handled on this network. KØGP has been appointed Section Packet Manager and will be responsible for managing NTS traffic activities on the section packet network. Ivan is active on the CW and phone nets as well as on packet. The Cedar Rapids Hamfest will be August 1 and 2 at the Five Seasons Center. Amateur exams will be given starting at 8 AM on August 2. Walk-ins are welcome. Contact WØFO to sign up. The ARRL Midwest Convention will be held September 26 and 27 at the Adventureland Inn near Des Moines. New calls in the section include NXØW and KAØZXI. Regretfully, WØKRU, WØEOE, and WAØIOA are now Silent Keys. KØVZR is moving to a new rural QTH and will grow antennas. Traffic: WØSS 267, KØGP 158, WØYLS 77, KAØADF 72, KAØGSA 51, WBØAVW 41, KCØXL 22, WBØJFF 20, WØBW 6, NUØG 6, KAØVBA 5.

KANSAS: SM, Robert M. Summers, KØBXF—SEC: NØBLD. STM: WØOYH. ACC: KØBXF. TC: WBØNQM. BM: KØJDD. SGL: NØBLD. Net Mgr's: CW- WBØZEN, Tone-WØFHC, RTTY-KAØCUF, Slow Speed CW-WØMYM: WX Net-WAØHOZ. PKT R[illegible] DEC's WØOAG, WØEB and WBØYJT. NKØB has indicated that he no longer has the time to devote to the co-ordination of the PACKET RADIO activity going on in the state of KS. By any chance is there a league member somewhere near the center of the state that might be interested in the position of co-ordinator for KS. If so contact your SM, ASAP. The position of PUBLIC INFORMATION OFFICER is vacant and needs to be filled also. If someone interested in this one???? The past month has had several on the ailing list, including Mike WAØLBB and KØBXF. Mine was brought on by long hours and little sleep. Easy to correct!! Others were of different circumstances. Net activity for APRIL KSBN QNI 1136 QTC 100, KPN 466/19, KMWN 678/640, KWN 750/591, CSTN 2074/53, OKS 228/56, OKS-SS 37/8. No emergency sessions of either traffic net or the weather net have been reported this past month, hopefully KS will miss the TORNADO season this year. See you all at the HAMFESTS this year. Come on out! Traffic: WØFRC 460, WØFIR 195, WØFDJ 70, WØOYH 69, WADHOZ 59, WØQMT 50, KØBXF 50, WBØZEN 45, NØBDG 25, NØGZT 24, WØMYM 20, WØPB 4.

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2-30 MHz 12V (= 28V)*

P/N		Rating	Net Ea.	Match Pr.
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MRF422*		150W	38.00	80.00
MRF433		12.5W	11.00	26.00
MRF449, A	Q	30W	12.50	30.00
MRF450, A	Q	50W	14.00	31.00
MRF453, A	Q	60W	15.00	35.00
MRF454, A	Q	80W	15.00	34.00
MRF455, A	Q	60W	12.00	28.00
MRF475		12W	3.00	9.00
MRF476		3W	2.75	8.00
MRF477		40W	12.00	26.00
MRF479		15W	10.00	23.00
MRF485*		15W	6.00	15.00
MRF492	Q	90W	16.75	37.50
MRF492A	Q	90W	19.75	43.50
SRF2072	Q	65W	13.50	31.00
SRF3662	Q	110W	25.00	54.00
SRF3775	Q	75W	13.50	31.00
SRF3795	Q	90W	16.00	37.00
3800	Q	100W	18.75	41.00
2SC2290	Q	80W	19.75	45.50
2SC2879	Q	100W	25.00	54.00

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	Rating	MHz	Net Ea.	Match Pr.
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MRF237	4W	136-174	2.70	—
MRF238	30W	136-174	13.00	30.00
MRF239	30W	136-174	15.00	35.00
MRF240, A	40W	136-174	15.00	35.00
MRF245	80W	136-174	28.00	65.00
MRF247	75W	136-174	27.00	63.00
MRF248	80W	136-174	33.00	71.00
MRF641	15W	407-512	22.00	49.00
MRF644	25W	407-512	24.00	54.00
MRF646	40W	407-512	26.50	59.00
MRF648	60W	407-512	33.00	69.00
SD1441	150W	136-174	74.50	170.00
SD1447	100W	136-174	32.50	78.00
2N6080	4W	136-174	6.25	—
2N6081	15W	136-174	8.00	—
2N6082	25W	136-174	9.50	—
2N6083	30W	136-174	9.75	24.00
2N6084	40W	136-174	13.00	31.00

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JO3055	31.00	2N3866	1.25
MRF134	16.00	2N4048	11.95
MRF136	21.00	2N4427	1.25
MRF137	37.00	2N5590	8.00
MRF138	35.00	2N5591	11.00
MRF140	89.00	2N5642	11.00
MRF148	35.00	2N5643	13.75
MRF150	89.00	2N5646	13.00
MRF172	62.00	2N5945	10.00
MRF174	80.00	2N5946	10.25
MRF208	11.50	2N6255	2.50
MRF406	12.00	2SC1307	2.50
MRF458	20.00	2SC1946	16.50
MRF497	10.00	2SC2097	29.50
MRF515	2.50	2SC2312	4.75
MRF607	2.50	2SC2630	24.75
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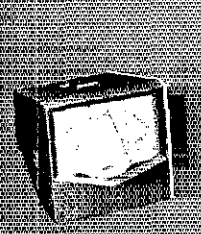

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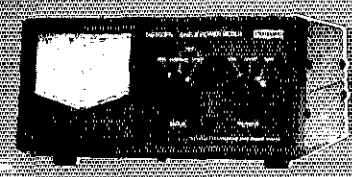

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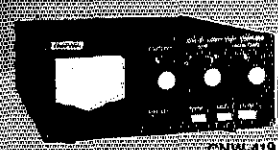

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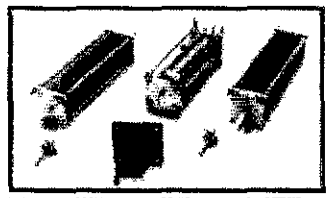

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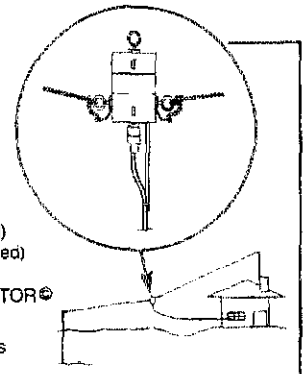

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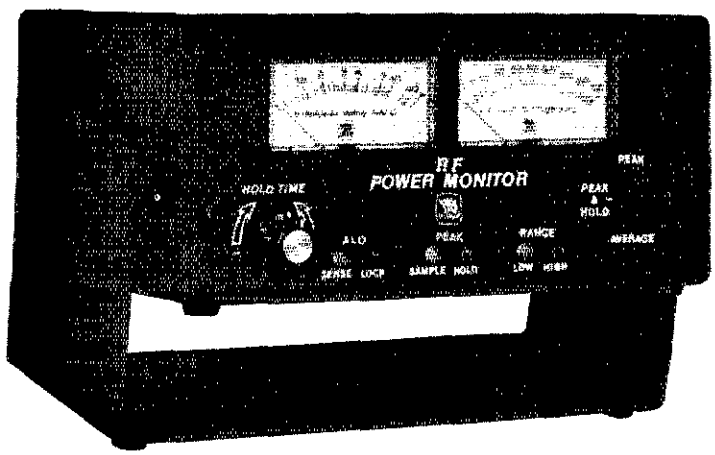

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MISSOURI: SM, Ben Smith, KØPCK--At the Ozarks Amateur Radio Society April Banquet KØLAF was presented the club's "Ham of the Year" award. The St. Charles ARC assisted in *community events by providing communications for the St.* Charles County YMCA Biathalon. Members helping were: KAØFNV, NØGLY, WØHPH, KAØIKU, KBØJ and KAØZDI. The club also provided operators for the Diabetes Bikeathon. This project was organized by KDØH and assisted by N6CTT, NØECE, KAØIKO and NFØQ. The SCARC joined with the St. *Charles County ARES to provide communications for the* Hardin Middle School Race. Operators for this event were: KAØFNV, KEØIE, WBØRAB, NFØQ, KAØMJI and KAØQQD. Newly elected officers of the Lake Ozark ARC are: Pres. NØGRD, VP KAØPGN and Sec-Treas. KDØAW. NØHVO is the Net Manager of the club's local nets. The CMRA and the Mid-MO ARC provided communications for the Ozark 100 Triathlon. WBØTEG was in charge of the amateur operations. CMRA members helping were: NDØN KØONL KØSI NUØT KAØIBS and KØPCK. From Mid-Mo ARC: NØSS, KAØDLD and WBØTPK. The Heart of America ARC assisted the March of Dimes WalkAmerica with 2-meter communications for the event. WØAIB directed the amateur operation and was assisted by club members: KAØSXY KAØSZY KBØUH KØUAA KDØAJ, WØCKN WDØEIG KAØWZX KAØWZY KAØYJE WBØRHR KØBKE NØCGN WDØFVM WAØURJ WAØITU WØCQE WØQAU WAØRLB WAØMBG WDØGMR WAØBVX and NØRK. The Mayor of Aurora proclaimed the week June 21-28 as "Amateur Radio Week" in Aurora. At their April club meeting, the St. Charles ARC celebrated the club's 15th anniversary. We hope they celebrate many more. The Kansas City, MO city council has passed a zoning ordinance permitting 60-foot high antennas residential areas. Silent Key reported, WØRXD.

NET	SESS	QNI	QTC	MGR
ARESN	5	59	3	NØFQW
CMEN	5	116	3	KØPCK
HBN	27	247	14	KØDSQ
HARCN	6	83	2	KØRWL
JCCN	3	33	0	WBØDZX
LOZBC	26	481	0	NØHVO
LOZFM	5	106	0	NØHVO
MCARES	4	31	0	WBØELJ
MEOW	30	505	57	KØDSQ
MOFQ	4	32	0	AIØO
MOSSB	31	609	82	KØORB
MTTN	15	23	8	NØBKE
PHD	4	118	9	WAØKUH
RRABN	29	389	3	KAØLLN
SLAN	4	229	4	KØWEX
SWARC	4	96	2	KDØUD
TCN	4	48	0	KAØILO
ZAEN	5	73	5	NOØE
CMYLN	4	21	0	NØHVO
PHDTEN	4	41	3	NJØX
MMARCNN	5	52	0	NSØB

Traffic: WØBMA 378, KØSI 256, AIØO 186, NDØN 131, KØPCK 83, KCØAS 75, WAØYJX 73, KØORB 71, WAØHJN 55, WØVTF 33, WØOUD 30, K9OCU 25, WDØELL 23, NØBKE 23, KGØL 12, WBØCJB 6, NØSS 6, KDØAJ 5, KØUAA 2, WAØKUH 2.

NEBRASKA: SM, Vern Wirka, WBØGQM—STM: Jerry Kohn, WDØEGK. SEC: Michael Ruhrdanz, NØFER. The Nebraska Section Affiliated Club Coordinator, Larry Lehmann, KCØOA, of Albion reports the Buzzards Roost Repeater Association of Neligh is now an ARRL affiliated club. The new Net Manager of Midlands ARES 2 Meter Net is Ken Noel, AJØA of Ralston. The Midlands ARES 2-Meter Net meets Sunday evenings on the 146.34-94 MHz Omaha repeater at 2100 local during daylight time and 2000 local during standard time. The Nebraska Section Emergency Coordinator, Michael Ruhrdanz, *NØFER, of Lincoln is still looking for more volunteers to* participate in emergency communications. Contact your local emergency coordinator or if you don't know your local EC, contact NØFER in Lincoln. If there is no local EC for your area, perhaps you could be the one to organize an ARES group and further enhance the emergency communications capability of *Amateur Radio in Nebraska. Nebraska nets handling traffic* and their totals for the first part of 1987, according to STM Jerry Kohn, WDØEGK, of Lincoln: NE, 40 Mtr: 36; NE 75 Mtr: 2; Cornhusker 86; NE CW: 182; Morning Phone: 78 Novice Net: 4; Storm Net: 37 ; Western NE: 10; Blue Valley: 17; Cheyenne County: 1; Eastern NE: 27; Buzzards Roost: 6; Total 494. WDØGEK reports the top five individual traffic handlers for the first part of 1987 are: KØDKM 1254, WØKK 247, WBØTED 138, KAØKPT 129, and WAØBOK: 86. There is always room for more traffic handlers, so join in on the fun. Traffic: KØDKM 239, WØKK 112, KAØBCB 44, WBØGPM 16, WAØBOK 13, NOØA 11, WBØGQM 6, WDØCRD 2.

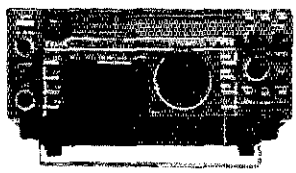
NEW ENGLAND DIVISION

CONNECTICUT: SM, John Ronan, K3ZJJ—STM: K1EIC. SEC: KA1ECL. ACC: KG1M. OOC: NA1I. TC: W1HAD. BM: K3ZJJ. PIO: KX1B. SGL: W1AH.

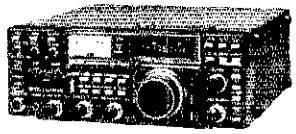
NET	SESS	QNI	QTC
CN	60	281	169
CPN	31	334	68
WESCON	31	260	147
NVTN	30	87	56
CSN	21	135	47
10-METER RAGCHEW	5	82	2

ECARA did an excellent job at the Danielson Festival in May. KB1VM officiated at the reviewing stand, K1UQE, N1BBI, N1EVG, KA1HTX, KA1MAF did a super job lining up the parade *units. KB1H, K1APE, K1DNW, WA1MNS backed up* runners and walkers. FARA held a round table on 20 meters with Julius HA6NY with N1NU as the master of ceremonies. W1GDZ, W9GMS, N1CLD, WA1FUV joined in. Julius has just returned to Hungary after a six-month visit to Connecticut during which time he became the first Hungarian Extra Class *licensee (NJ1C). ECARA provided communication for the May* 25 Woodstock 10K Road Race. The event was covered by KB1VM, K7DNW, KA1HTX, KB1SP, K7APE, N7EDG, KA1LMU, NE1N with N7BBI riding his bike behind the last runners! Congratulations to SARA members N7JAF and KB1CH who passed their Extra Class at the Dayton Hamvention! N7JAF passed his Novice at the SARA VE Exam last November! The following volunteered their much needed help during the Bridgeport L'Ambiance Plaza Disaster: FARA-N1CBM (who provided equipment) W1IKB, N1AMC, KN1X. SARA-K1GF, WA1VOU, W1LUH, WA1WVF. Waterbury ARC provided communications for the April Cerebral Palsy walk-a-thon and conducted VE Exams at UConn on May 9. GNARC is conducting CP drills at 7:30 PM on 147.39 every second Monday of the month with KA1IPC as NCS. GNARC by percentage probably has more members involved in MARS than any other club according to coordinator KA1AIA/AFB1UC. CARA joined BEARS for Field Day "to work with the kids." BEARS is a High School level educational program in Amateur Radio. NA1O is organizing CARA communication for the Red Cross "Candlewood Challenge" Swimathon on July 31. The Newington ARL held another very successful fleamarket on May 31. It was well attended with a number of vendors and a large variety of wares. Waterbury ARC provided communi-

ICOM



IC-735



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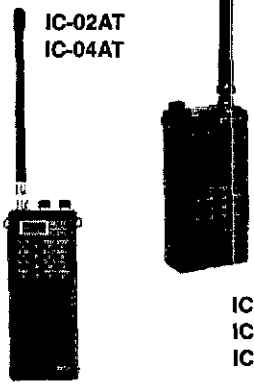

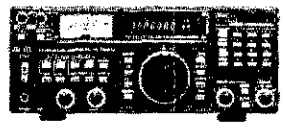

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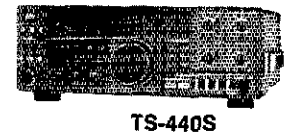

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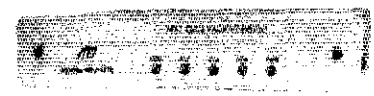

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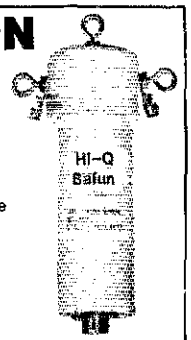

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SD-40	40	45'	23.95
Parallel dipoles			
PD-8010	80,40,20,10/15	130'	43.95
PD-4010	40,20,10/15	66'	37.95
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cation for the Waterbury area "Walk America 87" during which 1400 participants walked a 20 km course. Sponsor was the March of Dimes Birth Defects Foundation. Participanting were KA1OGY, N1CHP, N1EDD, N1ELH, WA1JCC, KA1OHI, KA1EGJ, K1RDO, KA1WF, KA1MKM, KA1MVQ, WB1COU. FARA members nearing DXCC honor roll status are W1OR, W1IKB, W9GMS. Already on the honor roll is W1NU (with all countries worked). KA1FVY is back from the hospital, best wishes for a speedy recovery Carol! SARA provided communication for the Greenwich Memorial Day 5-mile run with WA1CMF, WA1PDK, KA1FOT, KA7AOA, WB1WVF, N1AWJ and many others participating. In June SARA provided communication for the June Greenwich Biathelon— 5-mile run plus 20-mile bike race. Participating with a 6 AM starting gun were KA1AOA, KA1FOT, WA1YOU, W1ICH, WA7CMF. Traffic: KA1MDM 301, N1EDD 133, WB1GXZ 120, W1NJM 105, KA1MJK 78, KY1F 75, KA1GWE 68, W1WP 59, W1YOL 55, N1DMV 41, WB8SIV 38, KA1BHT 37, K1HUE 31, KB1ZC 27, KB1XD 25, WB2SGI 15, W1BDN 15, WA1NLD 14, KA1OCZ 5, W1CUH 4.

EASTERN MASSACHUSETTS: SM, Luck Hurder, KY1T—ASM: K9HI. SGL: K3HI. OO/AA: KA1KF. SEC: KB1PA. PIO: K1HLZ. BM: KB1AF. STM: KW1U. TC: KA1IU. ACC: KA1KCU. EMASS Hot Line-437-0111. Westlink 449-2226.

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EMRI	N1AJJ	3658	1900/2200 DY	230	231
EMRIPN	WA1FCD	3880	1730 DY	73	124
EM2MN	KA1HFO	145.23	2000 DY	209	427
NEEPN	K1BZD	3945	0830 SN	2	56
HHTN	NG1A	04/64	2230 DY	164	427
EMRISS	N1CVE	3715	1600/2030 DY	31	87
CITN	KB1AF	745/045	1930 DY	76	235

K1DYA reports that his father W1GLF of Kingston became a silent key. Vern was first licensed as 1AGL in 1922 and then as W1GLF in 1933 which he used actively until just a few weeks prior to his passing. Congratulations and a very warm "Welcome aboard!" to Jim Lentini NI1A who takes on the responsibilities of Official Emergency Station as well as Emergency Coordinator in the town of Medford. Ditto for Dave Crocker, W1TMO, who is not only an Official Emergency Station, but also a District Emergency Coordinator for packet radio. It's nice to see people combining their expertise in different areas like that. Bulletin Manager/ Net Manager KB1AF reports the return of KB1TA as NCS on CITN and that the OBS appointees (particularly packet ones) are still cranking out the bulletins in ever-increasing numbers - FB! From the various club newsletter offerings I've seen this month, I see that many clubs are already gearing up for Novice classes *for this fall as well as upgrade classes. Good- it'll keep* Volunteer xaminers W1QLT and KZ1V off the streets and gainfully employed! Section Traffic Manager KW1U reports that KA1PHP beat her out on the Public Service Honor Roll this month with a whopping score of 115 points! M.O. also sez that 10 others made PSHR and that 31 stations reported their *traffic scores for May. They were KW1U 703, KN1K 400,* WA1FGD 266, NG1A 219, WA1TBY 214, KB1AF 164, KA1PHP 128, KA1HFO 119, N1AJJ 103, N1BHH 102, W1CE 92, W1ZHC 90, K1ABO 80, K1BA 58, KA1LIH 58, K1SEC 54, WA1KLG 48, KA1NOI 40, KA1MWD 30, KA1BBU 28, N1EGN 20, WA1SNH 18, KA1EID 14, WA1FNM 14, K1LCQ 14, WB1GWS 12, K1BZD 10, KA1KCU 6, KA1EDY, WA2FKE 2, KA1AMR 1. Have you expressed your opinion to your Div Director and Section Manager lately?

MAINE: SM, Cliff Laverty, W1RWG—ASM: Bill Mann, W1KX. ASM/P: N1AHH. SEC: KA8UVQ. STM: AK1W. BM: W1JTH. ACC: KA1FKS. OOC: W1KX. PIO: KY1E. SGL: K1NIT. TC: KQ1L. It is my pleasure to announce the appointment of Ron Gregory, N1AHH, as assistant section manager for packet/NTS development. He brings considerable packet experience and expertise to the leadership cabinet. I also welcome Dave Hawke, KQ1L, back to the cabinet as technical coordinator. We are fortunate to secure his electronic experience and expertise over a wide range, including packet. It is with regret that I announce that Virgil Thompson, K1SEJ, and Patrick Curran, KA1BMZ, are Silent Keys. We shall miss *their good fellowship on the air. W1JTH, BM, reports* 54 bulletin transmissions of 5 ARRL, 2 Maine, 6 propagation by 6 OBS 1 PBBS. Traffic: WB1CBP 82, WA2ERT 61, W1ISO 58, W1RWG 51, AK1W 48, ND1A 46, KA1JOJ 40, W1KX 29, KA1ODT 22, W1BMX 17, W1JTH 11 (Apr. 31), W1VEH 9, WA1YNZ 5, NB2K 5.

NET	SESSIONS	CHECKINS	TRAFFIC	MGR
Sea Gull	26	858	103	K1GUP
Pine Tree	31	322	67	ND1A
Aroostook E	4	60	2	WA1YNZ
RACES	5	79	14	W1RWG
CMEN	no report			W1WCI
Me Pub Svc	no report			KA8UVQ

The first annual Bangor Hamfest on June 6 was a complete success with over 300 attending. Congrats. Hamfests: St. Albans Aug. 7/8/9, Bangor HamBand Aug 21-23, Windsor Sept. 12. The week before June 27, the SM made his annual pilgrimage to Aroostook County for Field Day at Presque Isle.

NEW HAMPSHIRE: SM, Bill Burden, WB1BRE—SEC: K1ACL. BM: K1OSM. Well, it's May and the adventure continues! Everyone put thier snow shovels away, charged up their H/T's and got in high gear!! They even put me to work! The Nashua club provided comm for the March of Dimes Walkathon with Ann, N1DMW, as net control and about a dozen club members supporting the effort. Several new Novices participated using the 220 MHz port on the local repeater. Upstate, 14 hams, including CVFMA and KARS members worked on the *Spring Granite State Bike Trek over* a 150-mile route. Comm direct or was KB1DL and N1CIR served as checkpoint manager. The team included KA1NYP (a medical tech), N1DRE, K1NQR, NC1O, N1BQD WB5DLV, WA1JYV, N1BVI, W1IXA, W1GUX, and WB1EAE. NC1P biked the route and was on the net. May was the month of *the spring fleamarket at Deerfield. Thanks to perfect weather,* about 10,000 people turned out for an all-time record! We manned the ARRL booth with Rick Palm, K1CE, from ARRL HQ, and it was a wild day! Thanks to WA2MBQ and KX1L and the 4-H radio club group for helping at the booth. I visited the Great Bay Club this month at the invitation of club Pres *NA1E. GBRA has a stong ARES operation supported by* K1ACL and the EC staff. A generous, anonymous member donated caps printed with "Seacoast ARES." With several new faces in the group, it's clear that this club is in a growth mode! Let's look at individual efforts this month—both John, WB1ASC and Mike NW1V have received the hard-earned Golden Jubilee DXCC award. Contrats on a fine effort! Dave, KA1CRP described his St Pierre DX-Pedition to the Twin State Club at the Montshire Museum in Hanover. Congrats to Rob, KA1LGL, who graduated with a BS in business admin from UNH. Mack, W1PNR, was appointed an OO for the section—welcome aboard! AF1T reports continued 902 activity with a home-brew mobile rig tested in a recent contest. On the nets, KB1XI reports tht the NH Novice Tfc Net is still rolling along with Don now the official net manager and Warren, WB1HBB, as Asst NM. The Concord Brasspounders sponsored another VE session this month—Tnx to club members and Vol Examiners for their their efforts! The 13th annual Eastern VHF/UHF Conference was held at Rivier College in Nashua this month— sponsored by the northeast VHF assoc. Are you doing some good local PR, either newspapers, radio or TV? If you have clippings or videos, contact Phil, WA2MBQ, our public information officer. He is looking for input on Pub Serv, demos, Field Day activities, etc. If you need ideas or material for PR, contact Phil—thats his specialty! Finally, we had 97% rep on FRN—a continued measure of the dedication of our traffic handlers—try it! You'll like it!!

NET	TIME	FREQ	MGR
GSPN	6 PM	3942	WA1YZN
NHN	7 PM	3547	N1NH
NHNTN	7 PM M-F	28330	KB1XI
GSFMS	8:30 PM	146.94	K6UXO
GSFMN	8:30 PM	146.475	K6UXO

Traffic: GSFM 222, NHN 125, GSPN 35, NHNTN 21, W1PEX *565 BPL, N1CXP 468, N1NH 117, W1ALE 115, KK1E 114,* N1AKS 113, WA1FHB 106, K1PQV 88, W1TN 87, KA1LBW 46, NE1J 43, N1ALM 34, KA1OU 27, WB1HBB 25, KA1NXT 25, KA1PFS 22, K1TQY 21, KI1M 20, KA1LMR 20, KA1HOP 15, WB1GXM 12, WA1JYV 9, K1ACL 7, N1DQA 4. PBBS WB1DSW-1 (VHF) - 123, WB1DSW-0(HF)-44.

VERMONT: SM, Frank L Suitor, W1CTM—ASM: KD1R. STM: AE1T. SEC: W1KRV. PIO: WA1YOY. Here Ye! Here Ye! The Burlington ARC invites one an all to partake in Vermont's largest hamfest on Aug.8-9 at the Essex Jct. Fairgrounds. Activities will include indoor/outdoor flearmarkets, ARES seminars, VE exams, ATV demo, ARRL meetings, etc. Contact Sarb (N1DLE) for all hamfest info. ARES May 1987 newsletter indicates we have 161 members from all corners of the Green Mtn state. KA1DLK (Mike) DEC for Bennington County has been named DEC of the quarter for his outstanding organizational efforts by W1KRV (SEC). In addition the Bennington Red Cross now has a new two-meter antenna. Tnx to W1ADV/KA1DLK and the high school station should now have packet capability. Our section expanded emergency communications capability will no doubt be exercised with the arrival of summer and its usual variety of wx. Rule of thumb is to tune into the nearest repeater whenever the wx turns nasty! BARC has generated a club public relations booklet—contact K1AUE for a free copy. All clubs/individuals who would like to provide free copies of the Archie Comic Book to our *local schools should contact W1CTM or ARRL HQ/Archie* Radio Club for details. Tnx to N1BRQ, COE, DLE, W1EXZ, ICW, VSA, WA1SVR, KA1LEX, NRR and K2KBT for providing the Diabetes bikeathon with such excellent communications. CVARC has activated its W1BD autopatch. Tnx to the skills of WA1ODL and N1BRT. Contact KB1UF for guidelines on *how to used this new open autopatch. CVARC Sept. VE exams* are scheduled 9/19 in Montpelier—contact is K1HKI. Section Net reports: VTN 31/170/185. TSEN 4/38/0, HHN 10/48/0. VTPHN 5/74/10. GMN 26/420/34. CAR 26/549/60. Traffic: KT1Q 540, WA2SPL 474, N1DHT 182, WA1JVV 140, AE1T 119, W1KRV 41, KD1R-1 19, K2KBT 8, WA1VXW 4. CU at ARRL table at BARC Hamfest!

WESTERN MASSACHUSETTS: SM, Bill Voedisch, W1UD—STM: KA1IXJ. TC: KA1JJM. PIO/ACC: K1BE. SEC/SGL: WB1HIH. Field Day is over. Contests for the year are over. Clubs in the section are not meeting until fall. Amateur Radio *activity is on the back burner for the summer. We in the* Western Massachusetts have an additional responsibility. Many tourists from all parts of our great nation visit New England each summer and many of them will be in or traveling through our area. When you hear that strange callsign on your local repeater, make him or her welcome. Have a map close by so you can give accurate directions. You might suggest points of interest. You might even suggest places that are not highly publicized that you have visited. Make these visitors feel that they are wanted. You'll be surprised how good you *feel after helping and just maybe make a lifelong friend. Traffic:* W1UD 173, KA1T 166, KA1IFC 123, W1KK 80, KA1EXJ 57, WB1HIH 31, W1SJV 29, KA1OFC 28, N1FJ 19, KA1EKQ 16, WA1OPN 7, W1ZPB 1.

NORTHWESTERN DIVISION

IDAHO: SM, Don Clower, KA7T—SEC: K7REX. STM: W7GHT. OOC: W7CYO. ACC: N7BI. PIO: WB7PFQ. The Twin Falls ARC provided the communications for the Western Days parade in Twin. A group of Boise area hams provided communications for the regional soccer matches in Boise. The Kootenai ARC provided communications for the Marathon race. I attended the Northwest Division convention at Seaside, OR, May 29 & 30th. The Section Managers had a meeting with our Division Director and Vice Director. Rush and Bill provided a lot of info and answered a lot of our questions. Rick, K1CE, from ARRL Hdqs was also present and provided a lot of helpful info. A special tnxs to Randy, KZ7T, for all of his help. Traffic: K7CXG 22, W7JMH 20, N7BHL 131, W7GHT 270, NW7K 16, WB7CYO 5.

Net	Freq	Time	Sess	QNI	QTC
ID QD	3.990	8:10 AM M-F	21	718	25
NWTN	146.38/98	7:30 PM Da	31	978	42
IMN	3.635	9 PM Da	31	*322*	*89*

General: See you at the WIMU Hamfest 8/31/87. 73s, Don.

MONTANA: SM, Ken Kopp, K0PP—Gov. Schwinden proclaimed June 17- 21 as AMATEUR RADIO RECOGNITION WEEK, tnx efforts of Anaconda ARC. Two days training and info for SM K0PP and ACC N7HKW at ARRL HQ in May. ARRL books available from K0PP. WB7ODN new DEC, WA7TUW new OBS. W7OIQ new EC for Park County. OTs W7CBY and W7OCH SKs in early June. Three new Scout hams in Libby. Tnx those who helped bikers through state in June. Good PR *for all. When does your license expire? Traffic: WA7TUW 37* (Apr 6), WB7WVD 104 (PSHR), N7HKW 2.

NET	SESS	QNI	QTC	MGR
IMN	31	322	89	WA7GQO
MSN	5	79	0	K0PP
MTN	30	860	140	KF7R

OREGON: SM, Randy Stimson, KZ7T— ASM:KM7R. STM: W7VSE. SEC: N7CPA. PIO: KC7YN. SGL: KA7KSK. ACC: WB7TWD. RFT: AK7T. OO: N7SG. STC: N7ENI. Sea-Pac Ham Convention was a great success. There were more people than last year and they had more exhibitors than ever before. *There was an all time high in VE exams. Next year it will be* the 1988 National Convention. Vic Seeberger, W7VSE, was given an award for submitting 120 continuous monthly traffic reports to ARRL. That is dedication and something to be proud of. Congratulations, Vic. The state had an SET which involved the seven coastal counties and the hams had a rather large *part in it. We had to send messages on Packet, 2 meters and* HF. The band conditions on HF were poor but with relays we got it handled. The Packet was a little different story. There weren't enough digipeaters up or people to handle the traffic. But because of Bren, KM7R and Doug, W7XI working over time we pulled it off and in good fashion. There was a lot to be learned working from the Capitol Building and we are looking forward to the next one. Traffic (P = Packet) W7VSE 459, N7BGW 231, KA7EEE 114, WB7VSN 110, N7APC 103, N7DRP 78, N7FXJ 70, N7ELF 70, KM7R 36P, W7FBP 29, KA7AID 12, W7HLF 12, WB7SZM 6P, N7LNE 6.

WASHINGTON: SM, Brad Wells,KR7L. STM: KD7ME. SEC:

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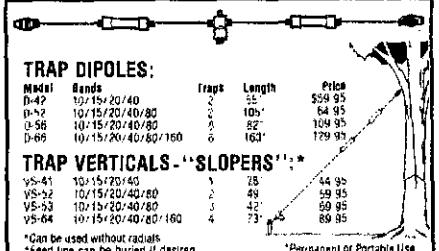

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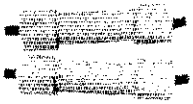

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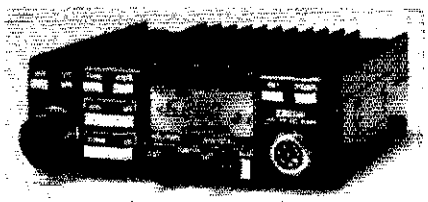

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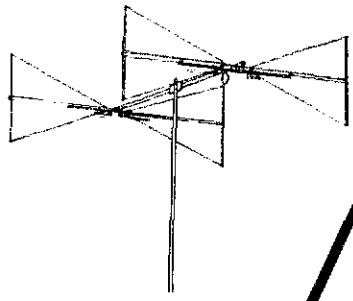

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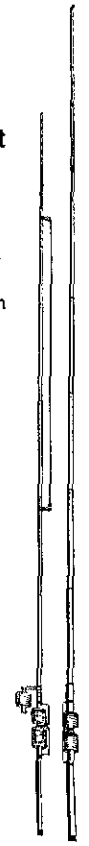

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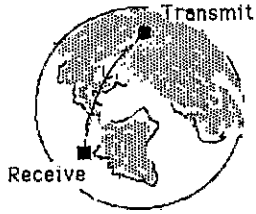

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KA7INX. OOC: N7DVR. ACC/ASM: KC7PH. SGL: KD7AC. BM: N7CAK. TC: W7BUN. ASM: KD7G. The big news this month is the Northwestern Division Convention and Tacoma Hamfest on August 22 & 23. The location is Pacific Lutheran University. From I-5, take exit 127, go east on State Route 512, then south on Pacific Avenue and follow the signs. Talk in frequencies are 147.98/147.38 and 222.92/224.52 MHz. This is one of the Northwest's largest displays of commercial gear in additon to 10,000 square feet of flea market space. Seminiars include 80 and 160 Antennas; Trouble Shooting Ham Gear; Packet Radio; Improving CW skills; Computers *and Traffic Handling. There will also be forums on Volunteer* Examinations, ARRL, QRP, MARS, Emergency Communications and Traffic. Bob Schetgen, KU7G, and Mac McGrath, KZ1A, will attend representing ARRL Headquarters. Additional League representatives include W7RM, W7QMU and the Washington Section Staff. See us at the ARRL booth in the *commerical display area. The Saturday night banquet program* is "China Odyssey" by Norm Ray, W7LFA. Don't forget the traditional Loggers Breakfast Sunday morning. Exams for all classes of license will be given beginning Saturday morning at 10AM. (Contact W7BUN). Convention hours are 9 AM-5 PM. Saturday and 9 AM-1 PM. Sunday. Dorm rooms are available. RV parking is available Thursday through Sunday. Congrats to Mike Sinnett, N7IPJ on becoming an Official Observer. K7QMI has installed a public service phone. Call 206-634-3636 for the latest Westlink and public service announcements. Public service events this month include Lake City Seafair Parade Aug 1 (contact WA7EBH 206-392-5303), Hydro race communications Aug. 2 (contact KA7GOO 206-746-7702), Equestrian event and horse show Aug 22 (contact KD7TJ 206-634-0870). Attention EC's and DEC's: Beginning next month, I would like to publish each county's public service hours in the column. Please forward this information to KA7INX with your monthly reports. Walla Walla County ARES net meets every Thursday at 0300Z (8:00 PM) on 147.28/147.88 MHz. Skagit County ARES/RACES meets at *1900 local time (7:00 PM)* every Wednesday on *145.19/144.59* MHz. WWDXC ran a successful 48 hour operation June 20-21 commemorating the first over-the-pole flight between Moscow and Vancouver, WA. Kudos to all the clubs and individuals who turned out for Field Day. ARES: Kitsap-1 search; Pierce-2 searches, 2 public service; Spokane-2 public service. Traffic: *N6EQZ 285, W7IGC 224, K7GXZ 199, W7LG 194,* WB7WOW 173, W7GB 134, KH7F 84, N7GGJ 79, WA7CBN 70, N7DIP 59, K7SUX 41, WA7PIN 39, KE7EO 32, W7APS 29, KA7PMD 28, KE7PI 22, W7LBK 22, K7AJT 14, W7IEU 7, N7FXM 1. Category 2/3 KD7ME.

PACIFIC DIVISION

EAST BAY: SM, Bob Vallio, W6RGG— ASMs: W6ZF, N6DHN. EC: W6LKE. OOC: NY6Z. TC: N6AMG. HARC's "The Chewed Rag" featured an excellent article by KA6ITV explaining the operation of their club repeater (and all other repeaters) in a clear, easily understood format. Nice job, Rich. *NBARA meets the fourth Wednesday each month at* Homestead Savings, 440 Santa Clara St., Vallejo, at 1930 hours. LARK has Pacific Division Director, KB6ZV, as featured speaker. They welcomed new members KG6UN, WA6BVL, WB6WOC and KB6QDW. Their repeater fund went over the top, and then some. The excess funds will be set aside for future improvements/repairs. MDARC's licensing classes are now over, with many having taken their exams by now. The Extra Class passing rate was 100%. EBARC's W6CUS-1 now boasts an IC-38A for 220. BARC meets the second Wednesday of each month at 1900 at the West End Hose Company, Solano and Hastings Sts., Benicia. Visitors are welcome. May Traffic: WB6DOB 161, K6APW 82, WB6UZX 27.

NEVADA: SM, Joe Lambert, W8IXD—Congrats to TARA on their classes which produced ten novices and one technician—also in their helping the new hams get on the air. Hope everybody had a good time at Field Day. New officers of NARA are W7MXW Pres, W7SRN Vice Pres., KA7YDZ Secretary/Treasurer. LVRAC is expanding repeater/remote capability greatly including 144-440 linking, message store and 10-meter remote over the next year. MRO Electronics is new *parts house in Reno. SNARS putting more equipment on their* Mountain. For those who play around on packet and don't know it, there is a new packet digipeater on Mt. Lewis. That is by Battle Mtn. and has the call of WA6TLW-3 or BAM. So now there is WA6TLW-1 (Reno) on Slide Mtn, WA6TLW-2 (HTH) on Corey Peak and WA6TLW-3 (BAM) on Mt. Lewis. *The Reno call is on WA16TLW-1 on Slide and RNO call is* WA7DIA-1 on Peavine (Tnx SNARS newsletter). WADG has a new antenna on Ballya (147.30) linked to 220 & 440 on Peavine. Congrats to Herb, KW6HF, who celebrated 50 years as a ham on May 29.

PACIFIC: SM, Army Curtis, AH6P—Aloha and hafa adai to *all of the Pacific. The upgrades continue. Congrats to new* extras KH6DLW and NH6JC, and to new tech WH6AXW, all on Kauai. If you are on packet, ARRL bulletins are available on WH6C and KH6GPI-1 PBBS. New calls heard include ex NH6HD, now AH6HW, and ex WH6BJE now NH6JR. 16 members of the Marianas ARC provided comm for the JAL Guam marathon. *Over 500 runners were entered. Sorry to* hear that the clubs on Oahu decided not to enter a bid for the 1989 ARRL National Convention. Perhaps now that folks are thinking conventions, its time to consider a State Convention. What think?? The EARC net reports QTC 18, QNI 299 in 29 sessions. Have you checked in? Traffic: KH6S 38, KH6H 32, WX4J 8, KH6PP 2, AH6P 2.

SACRAMENTO VALLEY: SM, Bob Watson, W6IEW—*SECTION NET: First Sunday each month, 8 PM on 146.085,* input up, Yuba/Sutter repeater WD6AXM/R. Net Control - W6IEW or W6RFF. Check-ins on the Section Net have been so sparse lately that Section Traffic Manager, Al Biegler, WA6WJZ and Section Emergency Coordinator, Deane Coats, NR6A have been named to recommend what should be done. Discontinue? Change date? Change time? Pass on your thoughts to them. It you looked for the Section meeting on July 12, as stated in last month's QST, I am sorry. It had to be changed to June 14 because the ARRL Board meeting was moved earlier than usual. I tried to let everyone know. By this time all but very new ARRL members should have received the 'Spring 1987' Section letter. It describes the ARRL Field Organization with emphasis on our Section and tells of opportunities for you to help yourself and your fellow hams as a Field Appointee. Read it carefully and see what you can do to help. If you have not received one please contact me (W6IEW) at the phone or address given on page 8 of QST. Our new Official Observer Coordinator John Canaris, WY6Q *is in high gear. He reports that there are three new OO* volunteers. They will be listed after they become certified. More are needed, particularly in the northern part of the Section. Traffic: N6LUY 225, WA6WJZ 144, K6SRF 59, WA6ZUD 36, WD6BZQ 19, N6LAM 15, WB6SRQ 6.

SAN FRANCISCO: SM, Bob Smith, NA6T—This year's FD *is a Memory, Did You Participate with YOUR local Club, You* missed out if you didn't! The SFRC Packet BBS is now Level 3 W6RLI. Is W6PW rare DX? Ask Jim, WA6DDM for the full scoop. Congrats to Lyle, WW6F, on His Second QST Cover, both from Field Days Past. VOMARC is Meeting at the

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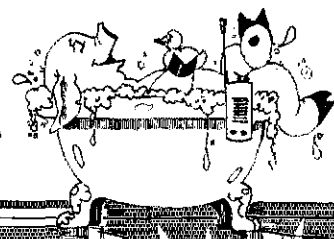

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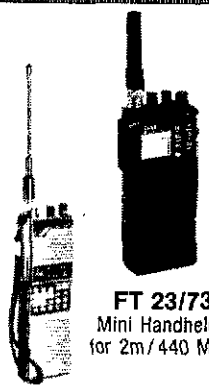

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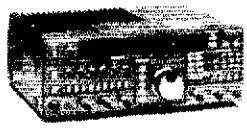

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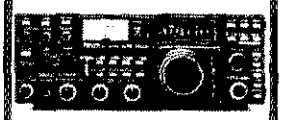

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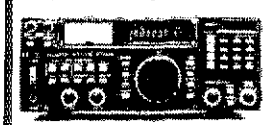

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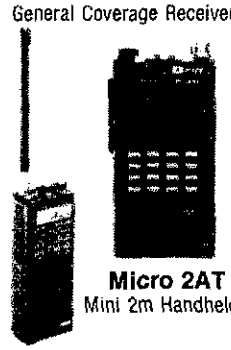

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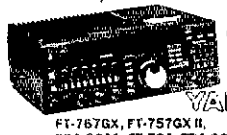

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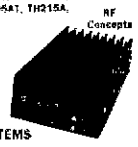

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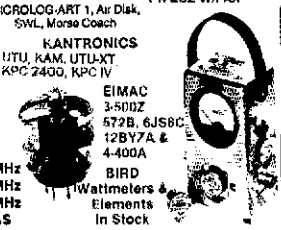

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Sonoma City Police Dept. Training Room this summer. The New DEC for Humbolt es Del Norte Counties is Pete, KE6LF. I hope all the Amateurs in the Northern part of the section will help Pete Make the Emergency Program a great success. MARC Had W6SG/Golden Gate for the Celebration, Did You Work them? Have you signed up to help with the 12 major PS events in Marin County? See Dick, K6LRN if you can help. LCARS, es SCRA ARES/RACES is out in full Force this year with the Dept of Forestry VIP program. Congrats to Karl, KK1A, on his Assoc. Degree in Electronics Tech. N6IT passed his BAR EXAM, now MARC has a resident Lawyer in their fold. Your Club Special Events Chairman are looking for people to SELL and ADVERTISE Amateur Radio, get out and help support YOUR clubs public Service Events. Traffic: KK1A 182, N6FWG 26. (Apr.) KK1A 148.

SAN JOAQUIN VALLEY: SM, Charles McConnell, W6DPD—SEC: WC6U. STM: N6AWH. TC: WA6EXV. ACC: W6DPD. Asst. SMs: W6TRP and K6YK. Emergency Coordinators are needed in Mono, Mariposa, and Madera Counties. Contact WC6U if you are interested. The Southern Sierra ARS is building emergency alert devices for use in ARES. The Turlock ARC is a Special Service Club(SSC). Are any other SJV clubs going to join them. W6QOE and W6EKO are SILENT KEYS. RG6WG is extra. KB6ECF and KB4HTF are general. KB6SLE, KB6NKB and KB6KNX are Tech. KB6QFR is N6PLE. Pacificon 87 (The 1987 ARRL Pacific Division Convention is October 2-4, 1987 at the Le Baron Hotel in San Jose. Traffic: N6MCY 84, N6AWH 33, WA6YAB 14, W6DPD 10.

ROANOKE DIVISION

NORTH CAROLINA: SM, Rae Everhart, K4SWN—SEC: AB4W. STM: K4NLK. BM: K4IWW. ACC: WC4T. PIO: WA4OBR. TC: K4ITL. SGL: KE4ML. ASHEVILLE Hamfest Aug 1-2. League Planning Meeting—LPM was held with good attendance. Items adopted at the meeting were: 1. Continue Section NEWS Column in QST and attempt to put all Section News together. 2. League encouraged to promote the Amateur Radio Service as a PUBLIC SERVICE rather than a "hobby" in all league publications. 3. League move expeditiously on PRB-3 (Callsign proposal). 4. Issue a moritorium on new Memorandum of Understanding—MOU, and examine MOUs now in effect. WB1EYI gave interesting talk on clubs and training which was the theme of the LPM. A good time was had by all. WANTED: A club to sponsor the LPM 1988. Let SM or Director know. Packet Radio is growing expeditiously. More digipeters are needed to cover our section for traffic handling. Do you have an idea on traffic handling via packet? Let SM know. KB4AKM had good write up about A/R in SCOUTGRAM newsletter. N4MQU reports 10 M. Net in Johnston Co for Novices is now in operation with excellent results. K4EG group now has a 10M. ARES Net to include Novices. If you are planning a 10M. Novice Net let K4NLK, STM or SM know. Monthly reports indicate more amateurs in section are becoming involved in Public Service. That's what A/R is all about. Thanks to all involved. There are 10,000 amateurs in Section NOW. Watch out for BIG EARS in Shelby. He is listening. I bet he's getting ready for big hamfest. FCC has decided on one question pool for everyone to use. Exams: Kernersville Aug. 1. Lexington Aug. 15. They are walk-in no pre-registration required. Instructors make your plans now for fall Amateur Radio classes Novice thru Extra. Schools open so drive safely. There are 70 radio clubs in section. This SM would like to know how you feel about the formation of a state radio council or assgciation. Your input is welcomed. Traffic: K4NLK 294, AA4MP 147, AA4TE 143, AA4ZV 126, K4IWW 102, WB4HRR 87, KA4EYF 74, WD4HTE 60, AK1E 58, K4SWN 57, WB4WII 57, KA4TLC 56, WA4MNR 51, WB4N 51, W4EHF 33, NE4J 33, N4MMM 32, WD4MRD 27, N4LST 25, AJ5F 24, N4LUO 17, WB4CYN 12, N4CJJ 11, WD4EQK 11, K4GI 11, N4JEO 10, WD4RMQ 9, WA2EDN 7, WD8DQL 6, KB4NWX 2, NT4K 1, WB4HRR (Apr.) 132, AK1E 103, W4EHF 37. Totals: 34 reports 1,906 pieces of traffic.

SOUTH CAROLINA: SM, Jimmy Walker, WD4HLZ— Last month we asked that you plan to participate on the Noon Net (3905 M-SAT Noon, SUN 12:30 PM) and this month we will feature our other Section Net. Times for these nets are set to interface with 4RN, to which our Section nets send representatives. The Noon Net rep goes to Cycle Two of 4RN (afternoon session) and the SCSSB rep goes to Cycle Four of 4RN (evening session). The South Carolina Single Sideband Net meets daily on 3915 at 7 PM to route traffic coming from the afternoon session of 4RN, to handle traffic to local nets meeting later in other parts of the Section, and to send traffic to the evening session of 4RN. The Net Manager of the SCSSB Net is Milt, WA4HNA who seeks daily representation from all areas in the Section. In order to perform our responsibilities under NTS, this net has the job of making sure that all of the day's traffic gets moved to the local nets for final delivery. PLEASE HELP!! Traffic: KB4BZA 121, W4ANK 64, WØIKT 62, KA4LRM 48, WB4UDK 36, W4DRF 14.

VIRGINIA: SM, Claude Feigley, W3ATQ—STM: KB4WT. SEC: N4EXQ. ACC: NT4S. OOC: W4HU. BM: AB4U. TC: WB4MAE. SGL: W4UMC. PIO: AA4VP.

VTN	1 PM	3907	KB4NGO
VSBN	6 PM	3947	KI4BR
VSN	6:30 PM	3680	N4KSO
VN (EARLY)	7 PM	3680	N4GHI
VN (LATE)	10 PM	3680	WB4KSG
VLN	10:15 PM	3947	KJ4MF
SVEN	7:15 PM	146.82	NT4S
STARES	9 PM	146.97	KJ4VT

Note, the STM has approved the STARES Net as a NTS Net. If your Net would like to meet the standards of an NTS net contact the STM, KB4WT, for details. The Roanoke Division Planning meeting held in Salem, VA., in May was very successful. Our thanks to those members of the Roanoke Valley Amateur Radio Club who worked so hard to provide the excellent facilities. Many Hams in Virginia missed a chance to learn more about the League's field operation and the chance to make their needs known. N4EXQ announces N4CWP as DEC for the National Capitol District replacing K4BAV who has resigned after many years of faithful service. A job well done Jim. N4AOP is the EC for Charlottesville Albermarle and Green counties. WD4MVZ and WD4DHW have been certified as OO/Auxiliary stations. New ORS stations: KI4BR, WA4LTO, KA4TWI, and WB4ZTR. AB4U has named N4NIG as an OBS for the Tidewater area. To those who have been missing the call of WA4CCK on the traffic nets, Warren is now living in Nathalie, VA. Thanks to the Valley Amateur Radio Assoc. for sending me copies of their fb newsletter. Packet activity continues to grow. For those interested in trying HF traffic there is a group meeting on 7097.5 kHz around 10 AM on Monday, Saturday and Sunday. With the increasing DX action it is important that ALL stations working DX have a SASE on file with your QSL Bureau contact NK4U or the SM if you need info on how to file your envelops. Some future VE exams: SVARC Hamfest, Berryville, Aug. 2 contact NC4B-Vienna Wireless Soc., Vienna, Aug. 9, contact NK4U-Hampton Roads Radio Assn. Aug. 23, contact H. Bommhower- Williamsburg Area ARC, Sept. 19 contact WJ4X— Richmond ARC, Sept. 19, contact WU4G. Traffic for

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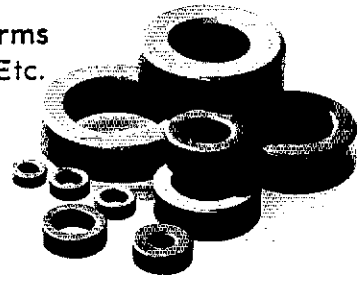

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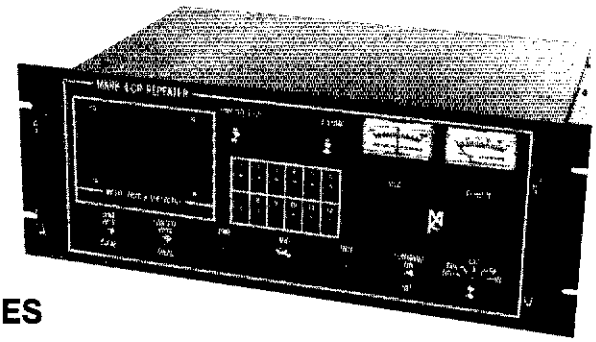

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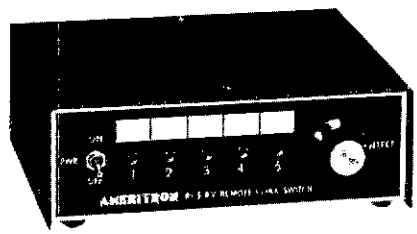

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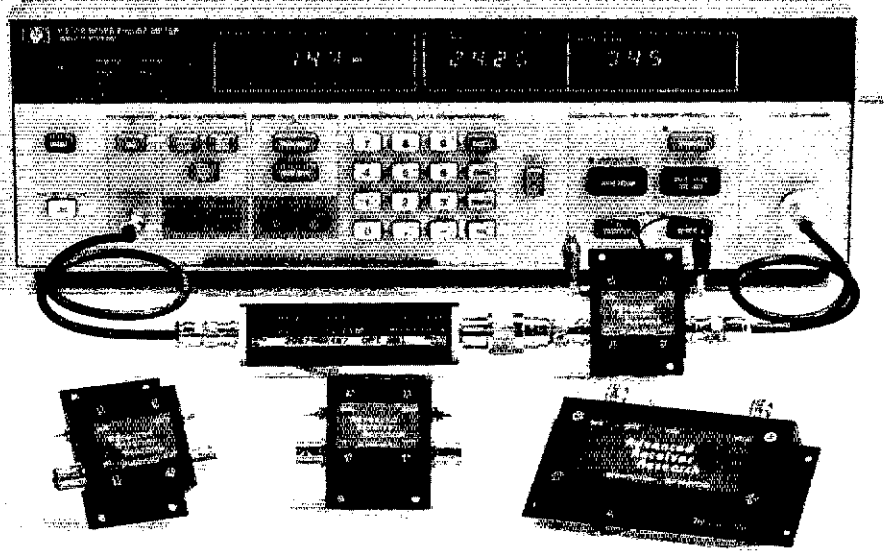

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P220VD	220-225	<1.8	15	0	DGFET	$29.95
P220VDA	220-225	<1.2	15	0	DGFET	$37.95
P220VDG	220-225	<0.5	20	+12	GaAsFET	$79.95
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SP50VDG	50-54	<0.55	24	+12	GaAsFET	$109.95
SP144VD	144-148	<1.6	15	0	DGFET	$59.95
SP144VDA	144-148	<1.1	15	0	DGFET	$67.95
SP144VDG	144-148	<0.55	24	+12	GaAsFET	$109.95
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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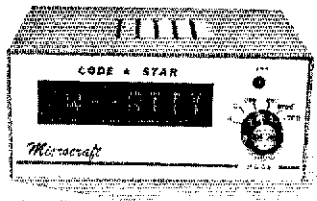

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the month was 5505 with 45 stations reporting their traffic activity. K4DOR, N4GHI, N4EXQ and KA4TWI made BPL. By this time all appointees should have received the latest issue of the "Virginia HAM." The editor, NN4I and the publisher, W3ATQ would be interested in any suggestions you may have. See you at Berryville, Aug 2nd. Traffic: K4DOR 936, N4GHI 697, N4EXO 572, KA4TWI 483, KB4WT 315, WB4PNY 245, AA4AT 189, K4MTX 188, AA4GL 166, W4JLS 156, W3ATQ 146, K4JST 136, WB4ZNB 119, WB4EDB 111, KB4NGO 109, N4KSO 91, KI4BR 84, WD4OCW 81, WD4MIS 75, KJ4MF 73, K4JM 59, WB4KSG 58, WD4ALY 54, K4BGZ 50, WA4LTO 50, NT4S 45, W4TZC 27, K4MLC 24, NW4O 23, NN4I 17, K4AXF 12, WA4TVS 10, WB4KIT 9, KB4LIH 8, KI4W 8, K4GR 7, N4FNT 5, KA4IUM 5, KB4UKN 5, K4VWK 5, WB3ANC 3, WA1VRL 3, W4YE 2.

WEST VIRGINIA: SM, Karl Thompson, K8KT—SEC: K8QEW. STM: N8FXH. SGL: K8BS. ACC: WA8CTO. TC: K8CG. Rpt Coord. WD8OZT. WV has 596 ARES members and 26 county ECs reported during May. KC8CR is again active on WVFN, nice to have Bob back. Glad to report that Don, W8MHR is doing well after back surg. and is back on the air. Sorry to report that W8MBC is a Silent Key.

net	freq	time	QNI	QTC	sess	NM
WVFN	3865	6:00	803	167	31	W8YP
WVMD	7235	11:45	678	24	31	W8FZP
Hillbilly	14209	Noon su	132	22	5	W8YP
WVN	3567	7:00	273	102	31	KZ8Q
WVNN	3730	5:15	143	28	29	WD8LDY
WVRN	3640	6:30	174	31	31	K8LG

Traffic: KA8WNO 359, W8YP 256, KZ8Q 136, W8FZP 126, K8UQY 120, KA8TIK 112, K8TPF 112, KE8FI 97, N8FXH 80, K8QEW 45, K8KT 33, NC8G 16, W8JWX 15, WD8DHC 14, KA8OGF 4.

ROCKY MOUNTAIN DIVISION

COLORADO: SM, Bill Sheffield, KØJU—ASM: KAØMQA. SEC: WBØFQB. STM: KBØZ. ACC: WBØDUV. OOC: KCØUD. BM: KAØCZW. PIO: NØFOE. TC: NCØF. SGL: WDØGQL. Clubs, groups and individuals have been gearing up for the VHF/UHF QSO Party and the annual Field Day event. I hope that you obtained one of the rare grid squares that our Mountain Top groups gave out. This year will see Packet Radio used to its full advantage for getting points as most groups are automatically adding this mode along with the traditional stations of voice and CW. Congrats to WØGVT and WA6ERB for coordinating the RMPRA Packetfest . . . it was well attended by the Front Range, Western Slope, New Mexico & Wyoming. A very interesting seminar, which was enjoyed by all. The annual Ski Country ARC Swapfest and CCARC meeting will be held on Aug 8th in Glenwood Springs. Talkin on 146.07/67. This is a fun place to take the family for a weekend of swimming, fishing and camping out. 73, KCØJU. NETS: CWN: QNI 60, QTC 70, QNF 327, 24 sess. CWXN: QTC 2343, QNF 2790, 31 sess. HHN: QNI 1754, QTC 112-313, QNF 1114, 31 sess. Col: QNI 933, QTC 36 - inf 6, QNF 327, 30 sess. NCTN: QNI 264, QTC 125, QNF 341, 29 sess. SCTN: QNI 292, QTC 87, QNF 371, 30 sess. Traffic: NØBQP 2063, WAØHJZ 1800, KEØNI 275, WAØOYI 115, NXØJ 112, KBØZ 108, WBØFVV 104, NØHMR 89, WBØBLV 48, WØNFW 19, AIØW 24.

NEW MEXICO: SM, Joe T. Knight, W5PDY—ASM: K5BIS. SEC: K6YEJ. DEC: WD5HCB. STM: ND5T. NMs: WA5UNO K5LL W5QNR. TC: W8GY. ACC: KA5BEM. Southwest Net (SWN) meets daily on 3583/7083 at 0230 UTC and handled 102 msgs with 216 checkins. New Mexico Roadrunner Net meets daily on 3939 at 0100 UTC and handled 70 msgs with 1154 checkins. New Mexico Breakfast Club meets daily on 3939 and handled 149 msgs with 988 checkins. Yucca 2-mtr Net 78/18 handled 18 msgs with 434 checkins. Caravan Club 2-mtr Net 66/06 handled 0 msgs with 172 checkins. SCAT Net 66/06 handled 5 msgs with 616 checkins. Info Net 13/73 with 98 checkins. WIMU 87 HAMFEST ARRL Division Convention in Jackson Hole, WY, July 31, August 1 & 2., Flagstaff, AZ (Ft Tuthill) HAMFEST, July 24, 25, 26. VY SORRY to report the passing of our dear friends W5UR and WA5TJC. ISE Show in ABQ with Amateur Radio and QCWA exhibits was a huge success thanks to W5IH and many others. Traffic: KN5D BBS 1339 connects, W5DAD 120.

UTAH: SM, Jim Brown, NA7G—SEC: Rich Fisher, NS7K, STM: John Sampson, W7OCX. Hope everyone that participated had a good time at Field Day. Don't forget about WIMU the first weekend of August. Utah will probably be asked to sponsor WIMU next year — we should be thinking about that. In September, a major exercise is planned for Wasatch Front hams, using packet radio under emergency condx. Call me for more info. 73 de NA7G. Traffic: WA7MEL 104, WA7KHE 93, NA7G 61, KB7AKJ 21, NS7K 20, N7ASY 14, W7OCX 9.

WYOMING: SM, Jim Raisler, N7GVV—ASM: Steve Cochrane, WA7H. SEC: Jim Anderson, W7TZK. Don't forget WIMU Hamfest in Jackson Hole on July 31 thru August 2. It's the 55th annual. Jim, W7TZK, reports we have 140 ARES members in WY, lets get those FSD-98 registration forms filled in and give to your EC or mail to Jim. Recent data from FCC shows Casper and Sheridan leading the pack in recruiting new hams. There's a few outstanding Elmers at work, right? Traffic: NN7H 245. Net Reports: Cowboy: 21 sessions, QNI 730, QTC 7; Pony Express-5 sessions; Wy ARES/ARES-5 sessions; Albany ARES-36 QNI/0 QTC. Looking for an ARRL appointment or just want ot give the SM a jab, give me a call! 73 until next month.

SOUTHEASTERN DIVISION

ALABAMA: SM, Joseph E. Smith, WA4RNP—STM: N4JAW. SGL: KA4WVU. BM: KF4VV. OO/A AUX: AA4BL. TC: N4AU. ATC: WB4BYQ. ACC: WA4RNP, "act" SEC: WA4RNP. Congratulations to Lindy Watkins, K4ASF, on being chosen for the "Outstanding Service Award" by the members of the Alabama Traffic Net Mike. Sam Haley, KB4MRR, of Birmingham has been made an Official Emergency Station. I have one Silent Key to report: W4JDG, Joseph Watkins of Anniston. The Ala. Repeater Council has these new district directors: WA4ZVJ, Bill Matthews and WD4CPR, Leigh Bartlow, North; K4TQR, Bert Hays and WD4KTY, Jim Vice, Central; K4HKR, Buck Bowdoin and N4AU, Bobby Chandler, Southeast W4YXO, Cal Pucket and WO4W, James Spann, Southwest. Traffic: CAND reports 618 messages in 31 sessions with DRN5 rep 100% by WA4JDH, W4CKS and NW4X. DRN5 reports 687 messages in 62 sessions with Alabama rep 90% by WA4JDH, W4CKS, NW4X and W4WJF. AEND reports 53 messages passed in 30 sessions with other nets rep by WA4JDH, W4CKS, NW4X, AA4YJ, WD5NYL, WX4I and N4DSC. AENB reports 52 messages passed in 36 sessions. Brass Pounders League: WA4JDH, W4CKS, W4PIM and WA4RNP. Totals: WA4JDH 894, W4PIM 161, W4CKS 150, KB4RWC 50, WA4RNP 36, K4AOZ 20, W4WJF 13, W4DGH 8, K4HJX 2.

GEORGIA: SM, Eddy Kosobucki,K4JNL—SEC: NC4E. STM: WB4WQL. ACC: WA4ABY. BM: WB4ZOJ. OOC: NA4I. PIO: WB4DEB. SGL: W4BTZ. TC: WD4PAH. First of all I want to thank my staff, section appointees, VEs, instructors, clubs and all of you FB hams in the GA section for the wonderful cooperation given me as your section manager for the past eight years. Once again I ask for your continued support as

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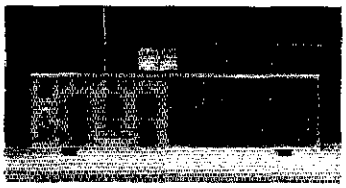

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CD 45 II	CALL	KR-2000 / -2000RC	449.95 / 479.95
AR-40	CALL	KR-5400A / -5600A	315.00 / 399.00

ALLIANCE HD-73 ..... $109.00

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Crank-up towers. Self-supporting, steel, galvanized, with base & rotor plate. Rated at 9 & 16 sq. ft. All accessories available.

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Free shipping on Hy-gain towers and all Hy-gain antennas and rotors ordered with tower.

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HBX40	$215.00	HDBX40	$272.00
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Galvanized, self-supporting towers with base and rotor plate. Today's best tower buy. Freight additional.

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25G	$51.00	45G	115.00
TB3 Thrust Bearing			51.95

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FK2548	$695.00	FK2558	$1059.00
FK2568	1105.00	FK4544	1315.00
FK4554	1405.00	FK4564	1495.00

Fold-overs shipped FREIGHT PREPAID in U.S. Prices 10% higher in western states.

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Guywire: 3/16 EHS / 1/4 EHS, per ft.	$0.15 / 0.16
CCM Cable Clamps: 3/16 / 1/4	0.39 / 0.49
Turnbuckles: 3/8" E & E / E & J	6.95 / 7.95
1/2" E & E / E & J	12.95 / 13.95
Thimbles: 1/4" (3/16 & 1/4" cable)	0.39
Earth Anchor: 4 ft. Screw-in	13.95
Preformed "Big Grips": 3/16 & 1/4	2.49 / 2.99
Guy Insulators: 500 D / 502	1.69 / 2.99

PHILLYSTRAN GUY SYSTEMS

HPTG-2100 / -4000 / -6700 Cable	0.24 / .40 / .67
Cable Ends: 9901LD / 9902LD	7.95 / 9.50
Socketfast Potting Cmpd	14.50

WIRE & CABLE

BELDEN COAX

9913 low loss	$0.42/ft.	RG-8X (9258)	0.19
RG-213/U (8267)	0.40	RG-11A/U (8261)	0.37
RG-8/U (8237)	0.32	RG-58A/U (8259)	0.13
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450 Ohm Ladder Line 0.10

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Solid: 12 ga. / 14 ga. ..... 0.10 / 0.08
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Others in stock!

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PL-259: std / silver / teflon ..... 0.69 / 1.25 / 1.45
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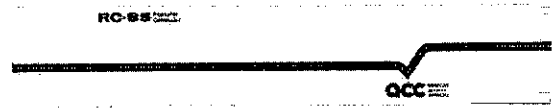
The RC-85 Repeater Controller . . . the affordable controller for your repeater.



The RC-85 controller offers the high tech basics of repeater control, plus! Of course, much of what we consider to be the "basics" aren't found *anywhere else, at any price.*

Remote programming lets you configure the operating characteristics of your repeater and change them at any time — without a trip to the hill. Non-volatile memory remembers your parameters, even after a power loss.

Synthesized speech makes it easy for users to interact with the repeater. Commands are acknowledged and information is available to users through remotely programmable ID, tail, and bulletin board messages. The new, larger speech vocabuary is ideal for repeater groups, emergency and public service needs. And since your repeater talks, it's friendly and fun to use.

The patch provides ten Emergency autodial numbers and 190 user loadable autodial slots. With toll restrict, "cover tone", and more.

The remote base port lets you hook up a transceiver to your repeater for remotely controlled linking to other repeaters and simplex channels. With full frequency control! Frequency agile linking is invaluable for public service uses, and it's fun!

There's even more ... a talking S-meter so users can check how well they're getting into the repeater, a site alarm for security, paging, and remote control outputs for controlling equipment at the site.

Any repeater can be brought up-to-date at a price that's right with ACC's RC-85 Repeater Controller.

acc advanced computer controls, inc.

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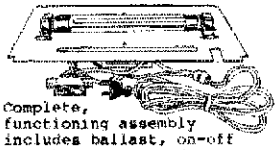
BLACK LIGHT ASSEMBLY



Complete, functioning assembly includes ballast, on-off switch, power cord, sockets and F4T5-BL black-light. Mounted on a 7 1/8" X 3 1/8" metal plate. Use for special effects lighting or erasing EPROMS.
CAT# BLTA $10.00 EACH

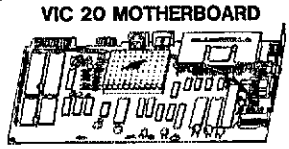
FLASHER LED

5 volt operation jumbo T 1 3/4 size
RED FLASHER
CAT# LED-4 $1.00 each
GREEN FLASHER
CAT# LED-4G $1.00 each

1 mA METER

Modutec 0-1 mA signal strength meter with KLM logo. 1/4" X 1 3/4" X 7/8" deep.
CAT# MET-2 $2.00 each

VIC 20 MOTHERBOARD



26 IC's including 6502A and 6560. Not guaranteed but great for replacement parts or experimentation.
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Compact, well regulated switching power supply designed to power Texas Instruments computer equipment. INPUT:
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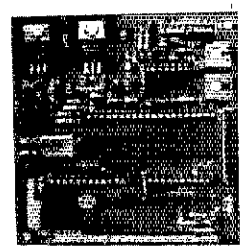
MICROCOMPUTER REPEATER CONTROL



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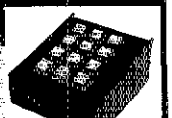

If you enjoy hamming — whether contesting, mobiling, or DX hunting — you'll love the convenience and speed of a QSYer frequency entry terminal. Call or write for details.

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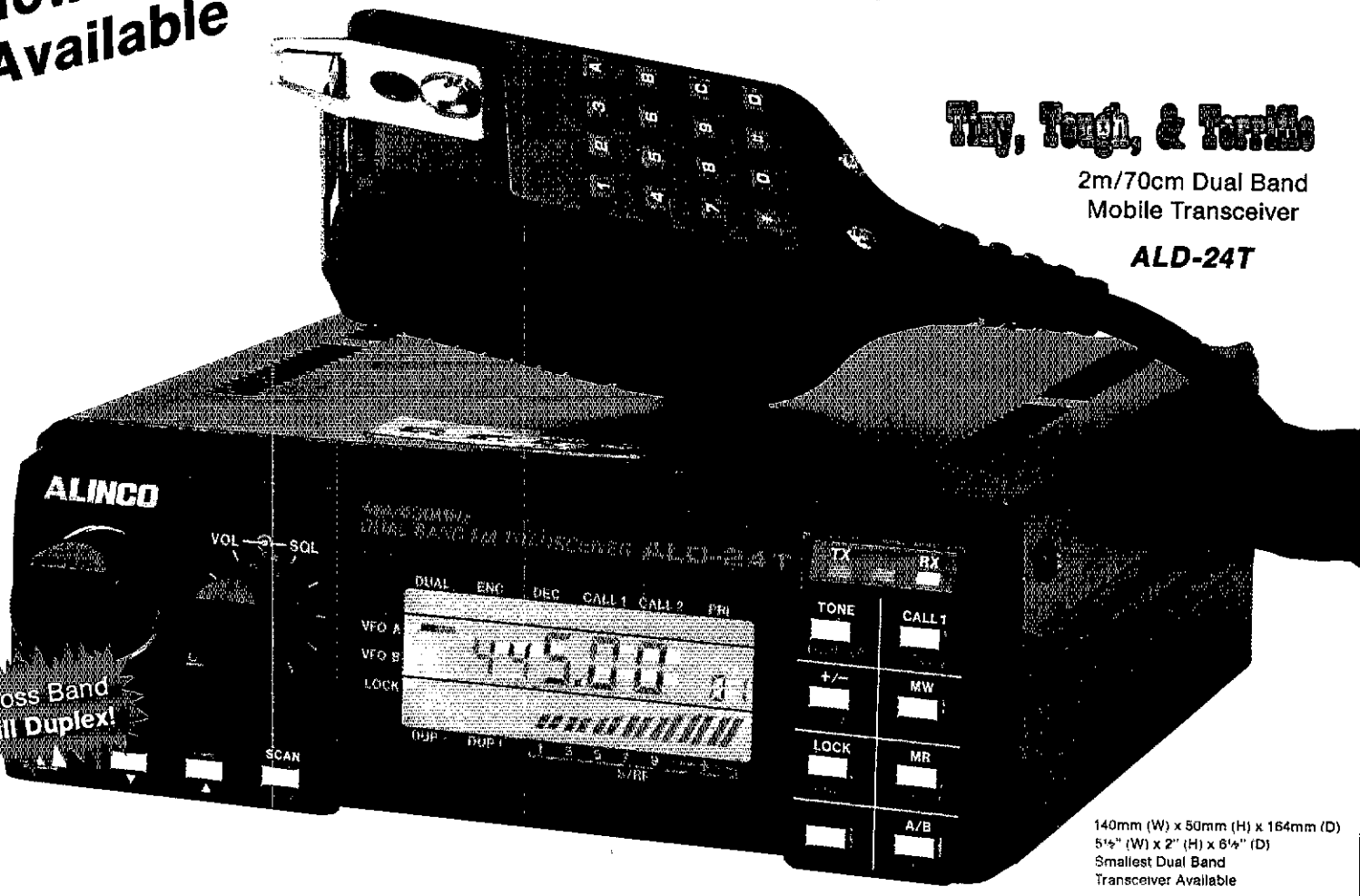

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Smallest Dual Band
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With ALINCO's advanced engineering and technology, the ALD-24T 2m/70cm Dual Band Mobile Transceiver is designed to be the ultimate in compact size with an impressive array of features, allowing maximum flexibility in installation and ease of operation.

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- 25 Watt High - 5 Watt Lower Power both bands
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- Programmable Band Scan
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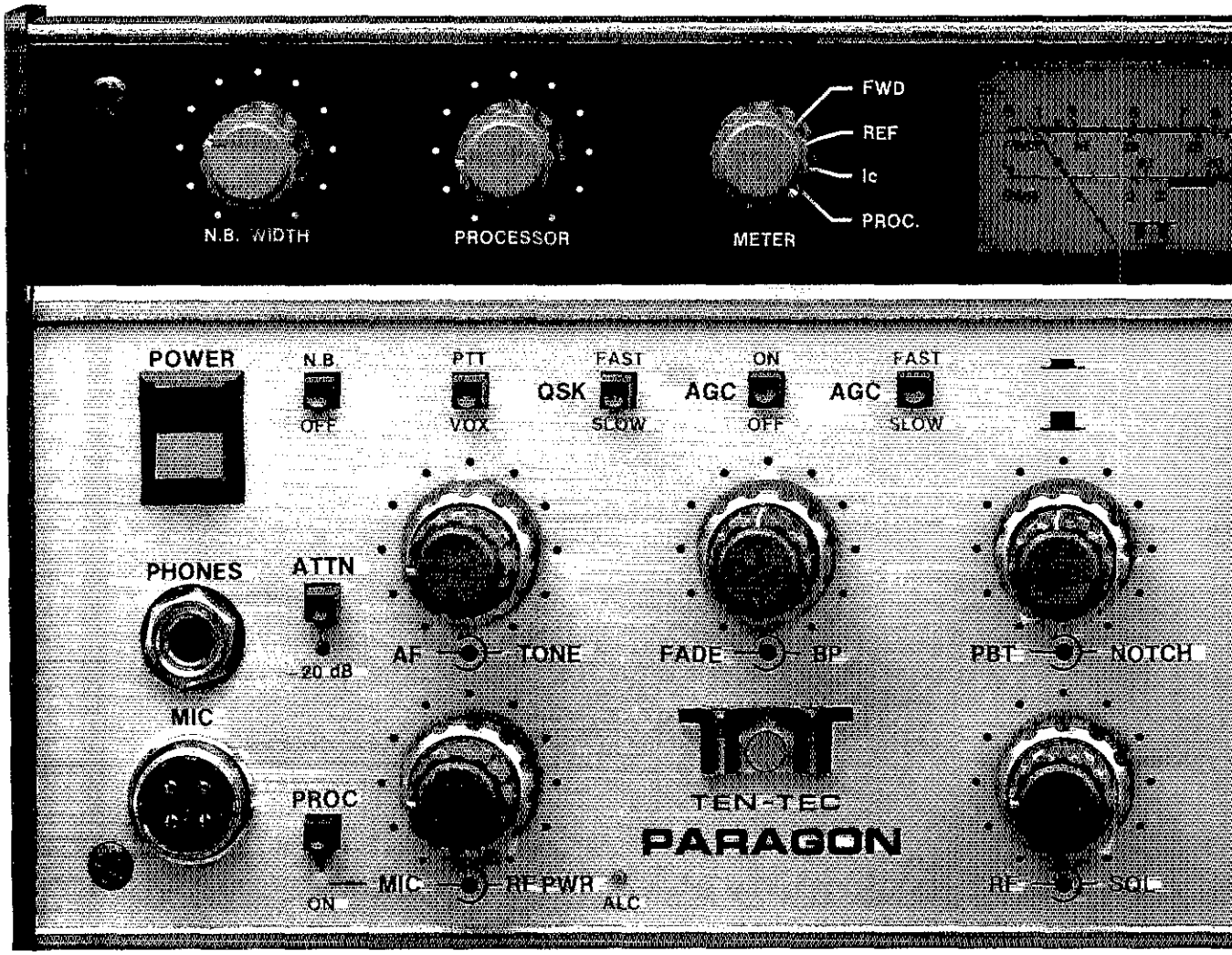


You're face to face

Meet America's Newest, the Ten-Tec Paragon, Model 585

PARAGON HF TRANSCEIVER.
Model 585 . . . $1995

The Paragon Model 585 is a full featured, synthesized transceiver. General coverage all mode receiver tunes from 100 kHz to 29.999.99 MHz. Transmit at 100 watts output on all authorized frequencies from 1.8 to 29.999.99 MHz. SSB, CW, FSK and optional FM. Noise blanker and speech processor are standard equipment. Dual VFOs, RX offset, TX offset, QSK with a changeover time of less than 30 ms, five i-f filters (standard 6 kHz AM and 2.4 kHz SSB, optional 1.8 kHz, 500 Hz and 250 Hz) that are front panel selectable independent of mode, selectable tuning rates with automatic speed-up at rapid tuning knob rotation, passband tuning, audio bandpass filtering, tone control, squelch, notch filtering and more!

Sixty-two programmable memories that include frequency, mode, filter selected, channel number and a 7 character alpha-numeric tag for entering a net name, call sign or I.D. of your choice. As the memory channels are scanned, all of the information is displayed (what a light show!) and the receiver automatically sets up mode, filters, tag and frequency as stored in each channel. Channels scanned are totally controllable with global lock-out, global reset and individual lock-out and reset.

The construction is impressive too. All circuit boards are glass epoxy (G-10) and all of them can be removed without desoldering. The front panel is hinged to provide *access to all sections of the chassis. All aluminum construc*tion keeps the weight of the rig reasonable too. And of course, the front panel is a spacious arrangement which makes the critical controls easy to use.

Frequency selection can be made using the main tuning knob, keypad direct entry or up/down buttons that can shift one MHz or to the next ham band. Frequency readout is selectable to display to 100 Hz or 10 Hz. *Front panel clock is* in 24 hour format. Rear panel input and output provisions keep the all-mode operator in mind too. Fixed level audio out and FSK keying (170 Hz shift), auxiliary dc jack, amplifier control circuits plus all the other connections that you could possibly need, including RS-232 computer interface option.

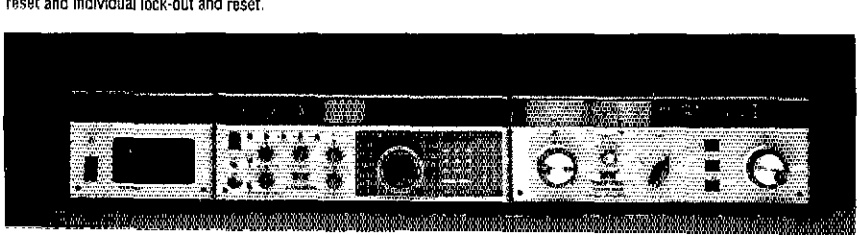
The Paragon is the end result of a three year engineering effort. Much of that effort was invested in improving the receiver performance and controlling the phase noise inherent in a PLL oscillator. We are proud of the performance of the Paragon and we think it has set new standards of excellence in synthesized rigs. All we ask is that you take the time to check it out. We think that you will share our pride in the Paragon.

GENERAL SPECIFICATIONS

Frequency Range: Receive: 100 kHz to 29.9999 MHz. Transmit: 1.8 to 29.9999 MHz.
Frequency Control and Readout: Microprocessor controlled digital PLL synthesizer. 10 Hz resolution.
Frequency Stability: Worst case, 1 PPM per degree C. at 29.999 MHz.
Frequency Accuracy: ± 100 Hz @ 25 degrees C.
Tuning Rate:

	Normal	Normal Shifted
CW/USB/LSB/FSK	10 Hz 4.8 kHz per turn	20 Hz 9.6 kHz per turn
AM/FM	50 Hz 24 kHz per turn	100 Hz 48 kHz per turn
	Fast	**Fast Shifted**
CW/USB/LSB/FSK	20 Hz 9.6 kHz per turn	50 Hz 24 kHz per turn
AM/FM	100 Hz 48 kHz per turn	500 Hz 240 kHz per turn

Antenna Impedance: 50 ohm unbalanced.
PC Boards: 14 double-sided, 9 single-sided .062" glass-epoxy.
Power Required: Receive = 1.5A. Transmit = 20A. 12-14 VDC.
Dimensions: HWD 5¼" x 14¾" x 14¼". 13 x 37 x 36 cm.
Net Weight: 16 lbs. 7.25 kg.



Paragon Station with Model 960 Matching Power Supply ($229), and the Mighty Titan Amplifier ($2685).

Shown actual size.

with the Paragon.

TRANSMITTER

Modes: USB & LSB (J3E), CW (A1A). FSK (F1A); FM (F3E) optional (Model 256).
DC Power Input: Typical 200 watts.
RF Power Output: ALC stabilized, adjustable, 10 to 100 watts (into 50 ohms) with front panel RF OUT control.
Microphone Input: Low impedance, bias voltage for electret provided.
CW Sidetone: Internally generated, adjustable tone and volume independent of AF GAIN control.
SSB Generation: 9 MHz, 8-pole crystal ladder filter. Balanced modulator.
Carrier Suppression: Greater than 60 dB
Unwanted Sideband Suppression: Greater than 60 dB at 1.5 kHz AF input.
Harmonic Emissions: Greater than 45 dB below peak power output.
Spurious Output: Greater than 50 dB below peak power output.
Third Order Intermod Products: -30 dB from two-tone at 100 watts PEP.
Metering: Switchable forward power, SWR, collector current or audio processing level on SSB.
CW Offset: 750 Hz automatic.
FSK Shift: 170 Hz.
Transmit Offset Tuning Range: ± 99.9 kHz.

RECEIVER

Modes: USB, LSB, CW, FSK, AM, (FM optional).
Sensitivity:

	.1 - 1.6 MHz	1.6 - 29.999 MHz	
SSB/CW/RTTY	.5 uV	.15 uV	10 db S/N@ 2.4 kHz
AM	3.5 uV	1.0 uV	10 dB S/N @ 6.0 kHz
FM	1.0 uV	.3 uV	12 dB SINAD @ 15 kHz

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	1.87:1
Opt. 1.8 kHz SSB (Model 282)	1.8 kHz	2.9 kHz	1.60:1
Opt. 500 Hz CW (Model 285)	500 Hz	1.4 kHz	2.80:1
Opt. 250 Hz CW (Model 282)	250 Hz	.85 kHz	3.40:1
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).
Image Rejection: Greater than 80 dB.
I-F Rejection: Greater than 70 dB.
Noise Blanker: Switchable on/off with adjustable width.
Dynamic Range: 100 dB.
Blocking Dynamic Range: + 16 dBm for 1 dB compression of an S9 signal, frequency offset = 50 kHz. -2 dBm for 1 dB compression of an S3 signal, frequency offset = 50 kHz.
Third Order Intercept: + 18 dBm.
Noise Floor: -132 dBm @ 2.4 kHz BW.
Squelch Sensitivity: Less than .6 uV.
Receiver Recovery Time: Less than 27 ms.
Receiver Offset Tuning Range: ± 99.9 kHz.
Pass Band Tuning I-F Shift: ± 1.2 kHz.
Audio Output: 1.5 watts @ 8 ohms, 5% distortion max.
Notch Filter: 250 Hz to 2.2 kHz, greater than 50 dB notch depth.
Audio Bandpass Filter: 4 pole, variable center frequency 220 to 1.7 kHz, 35% bandwidth @ -6 dB.
Tone Control: Variable 15 dB rolloff @ 5 kHz.

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Ken says, "In spite of terrible power line regulation, we've had no problems with EIMAC tubes. In fact, in the last two years, our standby transmitter has operated less than two hours!"

Transmitter downtime means less revenue. EIMAC tube reliability gives you *more* of what you need and *less* of what you don't want. More operating time and less downtime!

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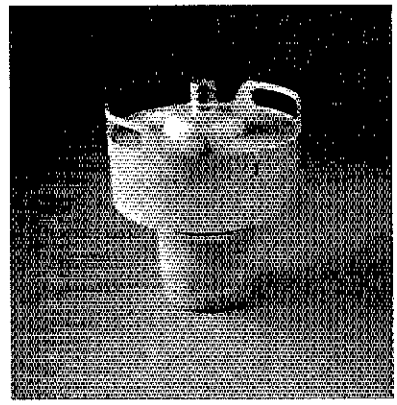

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It's the "New Sound" on the 2 meter band—Kenwood's TR-751A! Automatic mode selection, versatile scanning functions, illuminated multi-function LCD and status lights all contribute to the rig's ease-of-operation. All this and more in a compact package for VHF stations on-the-go!

- Automatic mode selection, plus LSB

144.0 144.1 144.5 145.8 146.0 148.0 MHz

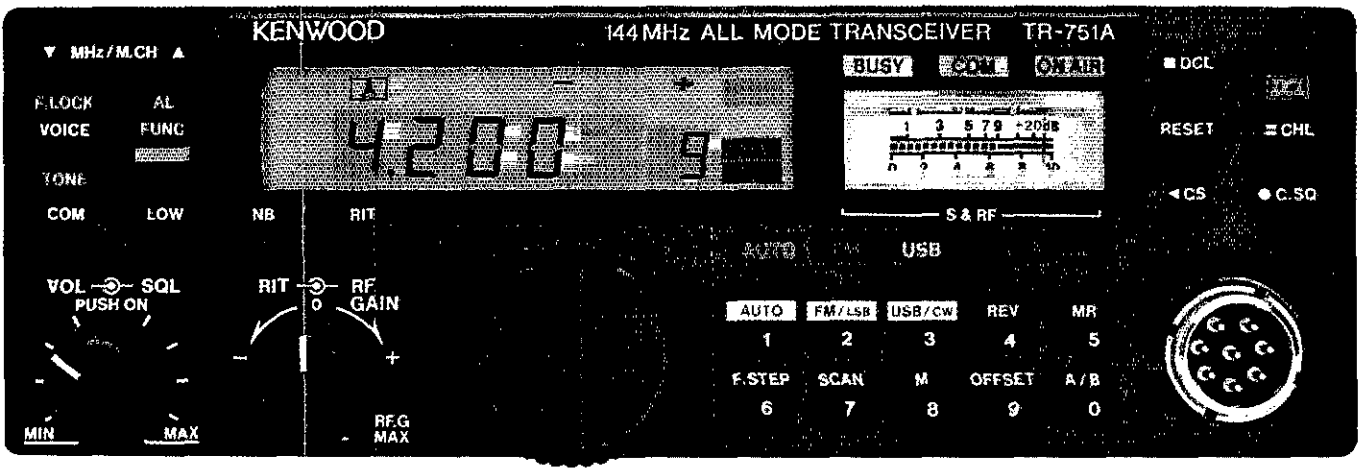
CW	USB	FM	USB	FM

- 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



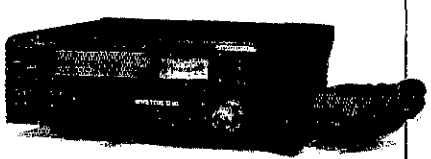
Actual size front panel

TR-851A

70 cm SSB/CW/FM transceiver

The same winning features are yours on 70 cm with the TR-851A!

- Covers 430-439.999 MHz
- 25 W high power/5 W adjustable low
- MC-43S UP/DWN mic. and mic. hook included



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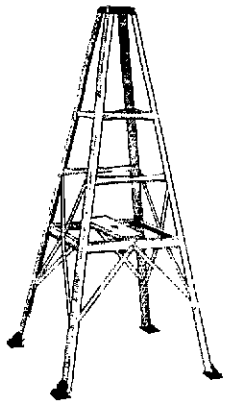
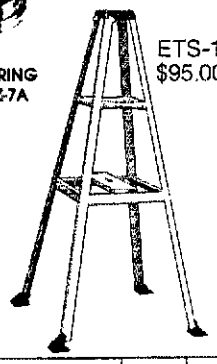
RTTY-AMTOR Packet



THRUST BEARING MODEL AAZ-7A

$44.00

ETS-210 $126.00



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MODEL	ETS-180	ETS-210
Base For Bearing (top)	6"	6"
Max. Opening Width (leg)	2'7"	2'10"
Actual Height	5'7"	6'6"
Angle	80°	80°
Legs	Adjustable Step	Adjustable Step
Weight	22 lb	26 lb

ROHN

20G	10' sect	43.50
20AG	top sect	48.00
25G	10' sect	54.50
25AG	2.3 top sect	64.95
45G	10' sect	121.00
45AG	2.3 top sect	133.95
AS25G	access shelf	18.75
AS45G	access shelf	48.75
TB-3	thrust bear	53.95
M200	10' mast	22.25
SB25G	short base	26.25
SB45G	short base	48.75
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AND MORE!

CUSHCRAFT

A4	4 el. triband	300.00
A3	3 el. triband	224.00
R3	10,15,20 remote tuned vert.	275.95
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215WB	15 el. wide band 2mt. boomer	83.95
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A144-10T	10 el. OSCAR 145.9 MHz	53.00
AOP-1	OSCAR pack 2mt. & 70cm	150.00
AR-2	2mt. vert. ringo	24.50
ARX-2	2mt. vert. ringo ranger	31.00
ARX-2B	2mt. vert. ringo ranger II	37.00

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HF6V	80-10 vertical	125.00
HF2V	80-40 vertical	114.00
2MCV5	2MT vertical	53.95
RMKII	roof mtg. kit	45.00
TBR160S	160m add on	47.00
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AND MORE!

HY-GAIN

TH7DXS	7 el. triband
TH5MK2S	5 el. triband
EX-14	4 el. triband
TH3JRS	3 el. 750W pep
18AVT/WBS	5 band trap vert
14AVQ/WBS	4 band trap vert
V2S	2mt. omni-direct
V4	70cm omni-direct
HB144MAG	2mt mag mt

AND MORE!

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T2X	20 sq. ft	
HAM IV	15 sq. ft	
CD45II	8.5 sq. ft	

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KR5400A azimuth/elevation

DAIWA 750E ROTOR

Compare These Specs & Pricing-

MR750E	1 Motor	2 Motor	4 Motor
Wind Load Sq. Ft	16.1	21.5	30
Turn. Pwr. Lbs.	610	1200	2400
Break Pwr. Lbs.	5200	9600	18300

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G7-144	Fix stat. 2mt. collinear 116.95
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RM20/RM20S	std. & super resonator 15.95/21.95
RM30	30mt. std. resonator 16.95
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RM75S/RM80S	75 or 80 super 36.95
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SSM-2	stainless ball mt. 17.95
SSM-1	stainless ball & spring mt 32.95
QD-1	quick disconnect 14.95
SGM-2	2mt. 5/8 mag. mt 28.95
HOT	trunk mt w/swivel ball 16.95

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PD8010	80-10 dipole kit	34.95
PD8040	80-40 dipole kit	32.50
PD4010	40-10 dipole kit	30.95
SD80	80 shortened dipole	28.95
SD40	40 shortened dipole	25.95
ALL BANDER	160-10mt	28.95

AND MORE!

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LM150MM	2M mag mt	41.90
NLA150MM	2M mag mt	45.90
NMO150MM	2M mag mt	45.90

AND MORE!

THIS IS ALL THAT'S LEFT

TET

HB433SP - 40, 15, 10, 3 el		244.95
MV3AH	7,21,28 vert	48.95
MV3BHR	14/21/28 vert 80 45	
MLA-4	loop 3.5/7/21/28	139.95

KLM

KT34A	triband 4 el
KT34XA	triband 5 el
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2M-22C	2mt. satellite
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435-40CX	70cm satellite
432-30LBX	70cm satellite
2M-13LBA	2 meter
2M-16LBX	2 meter

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N-Male for 8/U		4.00	
BNC(M)-UHF(F)		4.80	

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Columbia Low Loss .39

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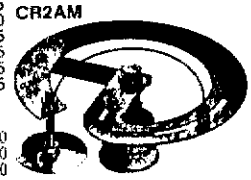
Butternut HF4B	Mini Beam	199.95

UNTENNA

CR2A

CR2AM



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I just have been notified that I have been re-elected to another two year term beginning Oct 1st. I am very proud to be the elected ARRL official representing one of the finest sections of the 73 that comprise the League. Without you I can't accomplish anything. Amateur Radio continues to grow in the Georgia Section. Presently we have over 8,000 licensed amateurs with over 2,000 being ARRL members. Many ask me why I devote so much time to the ARRL and ham radio. My only response is: "I've been in it since I was a kid and I love people," now that the Novice Enhancement program is in full swing all of us need to confront young people and help give them a start. By helping a youngster we can continue to make the hobby grow, otherwise we can fall flat on our faces. Read the monthly Silent Key Reports in QST and I'm sure that all who have left us are not reported and see how many we're losing. We have to replace these FB hams with some new blood to keep the finest hobby in the world growing. So please talk it up with some youngster you know and see if you can get him or her interested. We had two Silent Keys reported in May: W4CAN and W4DJF. Our sympathy goes to their loved ones. PSHR for May: WB4DVZ, AA4JV, W4QO (also made BPL), WA4LLE, KF4FG, W4HON, KB4JPN. One again thank you for your support and I'm hoping to see most of you at a Hamfest or club meeting. 73 and God bless. Traffic: W4QO 266, WB4DVZ 156, WB4WQL 106, AA4JV 87, KF4FG 70, WA4LLE 67, W4HON 25, KA4HHE 19, K4EV 16, N4UZ 14, N4MWR 10, K4BAI 9.

NORTHERN FLORIDA: SM, Roy Mackey, N4ADI—ACC: WD4RIQ. ASM/BM: KB4LB. TC: W8RAO. SGL: KC4N. PIO: WA4PUO. SEC: WA4PUP. OCC: K4JJE. Last month I forgot to list the Sun Country ARS newsletter by Jim, N4KIM, as one of the papers that comes to me each month. They're new and I had misplaced the copy of the last issue. Truly sorry! Now we have two new appointments for our Section and we are very pleased to have Ed, W8RAO, as our TC join the LOs of the Section. He will be looking for ATCs from all parts of NFL to work with ham and the members of all the clubs on technical problems and ideas. KB4LB, Wimpy, who wears many hats in this radio game has agreed to be my ASM so he can help with reports and liaison with the other LOs in my absence. He has previously helped with my SAR and PSHR numbers, and I sure thank him for his willingness to assist! Now we have a full staff of volunteers and can look ahead to serving the Section better than we may have been doing. I have had some letters about what has been printed in these columns and I encourage further two-way communications. If there is something that you question, or have comments to make, send them to me, or one of the LOs near you and we will be sure to get word back to you. By now the National ARRL meeting will be history. Hope you had a chance to be there and if you did, I hope we had a chance for an eye-ball. I'm looking forward to meeting other SM's and their LOs too! 73, Roy N4ADI. Traffic: WX4H 540, WA4QXT 404, N4PL 393, KB9LT 229, WD4IIO 180, KC4VK 143, AA4HT 138, WA4EYU 132, KB4LB 131, N4GMU 123, W7YWF 98, K4CY 86, WC4D 55, KI4CQ 51, KC4FL 50, N4JAQ 44, WB4GHU 41, N4JHI 39, NS4C 36, WB4TZR 29, WA4SXW 23, WD4FJY 19, N2AQX 18, KA4KAH 18, W4DTV 17, N4DY 15, NQ4P 15, WD4HBP 12, W8IM 10, W4KIX 8, WD4RJI 8.

SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PFK—SEC: W4SS. STM: K4ZK. TC: KI4T. BM: WD4KBW. PIO: W4WYR. SGL: KC4N. OOC: W4TAH. ACC: K4EUK. WD4KBW reports 58 bulletins received and 107 sent by AA4BN 21, W4DL 22, WA4EIC 32, KA4GUS 8,WD4KBW 32, WT4F 10, KA1EK 15 and WA4RLV 25. Congrats to Benji Hara, WU4O who has earned the 50-year plaque and pin. WA4EIC reported that Elmer, KZ8O, has become a Silent Key. Our thoughts and prayers go to Peggy, KY8Y, his wife. Frank Ziegler, K4EUK in Tampa has agreed to accept the appointment as Affiliated Club Coordinator - good luck in your new job! Beginning July 1 new net managers will be QFN, WX4H Mort in Pensacola, Gator Net will be N4ET Don in Venice and QFNS is KA4SIH, Willard in Pompano Beach. Congrats to all. For the record, previous managers for QFNS are W4WZR, the first manager, 1976 WB4GHU, 1977 KM4G (exWA4JPV), 1978 WD4LOG, 1979 WA4PFK, 1980 WD4DNC, 1981 KA4LNA, 1982 WA4QXT, 1983 KA4AMC and AF3S, 1984 KJ4UW(exWB4YQP), 1985 KA4FZI, 1986 WA4QXT, 1987 KA4SIH. Thanks to KA4FZI, historian for QFNS. WA4HDH is still trying to put the history of QFN in order but he is having trouble getting input from those in a position to provide the info - please send him any information you think might help! KA4YHS is the new manager of the Southeast Florida Traffic Net - many thanks to KF4RL who has done a FB job for many years. W4DWN reports he is active on ten meter short skip evenings in the novice-tech section. N4ORZ certainly received a novel Mother's Day greeting! She received it from KB4KWS as he was parachuting at 6000 feet! He has over 600 jumps and is employed by EAL as a mechanic. N4ORZ also said that K4KRY aided nine girl scouts with their communication badges using braille writer talking devices for communicating with N4ORZ via amateur radio. I was very sorry to hear that Cotton, KB9LT, newly appointed STM for Northern Florida suffered a heart attack - fortunately it was not too severe and served as a warning to him to cut down some on his activities. As a consequence he has curtailed much of his net activity but still can be heard on the nets on a more limited basis. W4TAH asks that anyone experiencing Offical Observer/Amateur Auxilliary related problems contact him via either telephone or letter. 73 de WA4PFK. Traffic: W3CUL 3211, W3VR 1156, WA4PFK 375, K4EUK 205, W4NFK 196, KA4FZI 177, K4ZK 161, K4SCL 150, WB4WYG 149, KJ4WJ 147, WD4KBW 148, KA4NXF 125, K4IA 115, N4ET 113, AA4BN 108, WA9VND 102, W4TAH 96, WA4RLV 84, KA4GUS 77, N4NZI 75, KB4KXV 74, N4MML 67, N4HAS 63, WA4EIC 60, KA4YHS 49, W3TLV 47, KA4SIH 45, WB4AID 44, N4ORZ 35, KB4MON 33, K4JI 33, WB4GCK 32, KI4ZW 26, W4DL 24, WD4NXK 20, WA4HDH 20, KF4RL 19, K4FQU 18, AA4CH 16, WT4F 15, KB4FO 14, N4KB 13, W3IJR 13, WD9AEP 13, WA4VWJ 12, KA9AKY 12, W4MFD 11, WA1BWV 10, K4BLM 8, NX5Q 7, W4MPV 6, KA4GDU 6, KB4EWO 5, N4PSV 5, WK4F 5, W4NSY 5, KD4GR 5, N4PFQ 4, AA4IF 4, K9ALX 4, KA3KNZ 4, KF4JA 3, WD4MCC 3, KA4WIV 3, KA8CXQ 3, N4KWB 2, KA8GYF 2, W4DWN 1.(APR.) K4JI 19, W4MFD 2.

WEST INDIES: SM, Jose A. Purcell, Jr., KP4IG—ASM: M. Selousse, WP4ETG. ASM: E. Gonzalez, NP4WI. SEC: T. Gonzalez, WP4FKJ. STM: W. Padilla, KP4JW. PIO: A. Rivera, NP4XM. BM: G. Nieves, KP4EW. TC: R. Sanchez, KP4ARY. SGL: A.L. Valdejuli, WP4CGS. NM-WINC: J. A. Ferrer, NP4WR. NM-WINS: W. Wagner, KP4DJ. NM-WINE: B. Dennisson. VP2VI - Congrats to Tito, WP4FKJ, SEC and his staff for the excellent support in the organization of ARES. By contacting Tito you assure that you will be providing the much needed assistance at the right place at the right moment. On May 23, 1630 UTC, NP4XX helped WP4KAH on a rescue service by contacting the U.S. Coast Guard. Congrats NP4XX! The Sabana Seca Station KP4USN, operated a special event during the Armed Forces Day. Although it faced bad bands conditions it was able to make 18 contacts on SSB/CW/PACKET. The station will be active during summer Field Day as well as by the 4th of July. KB4RAC is one of the operators. Only 7% of the total ARRL membership is from P.R. Hams. Your assistance in increasing this percentage is of the

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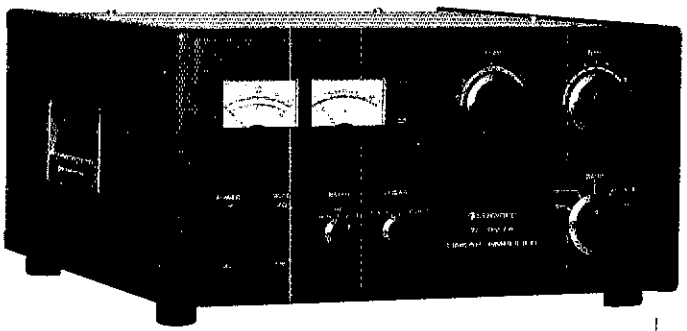
Accessories

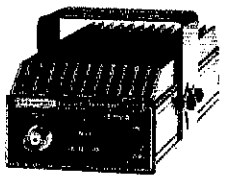


TL-922A 160-15 m 2 KW PEP/1 KW DC Input Linear Amplifier. Pair of EIMAC 3-500Z tubes and excellent IMD characteristics. Perfect safety protection with blower turn-off delay circuit.

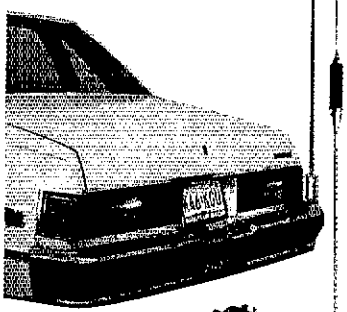
PC-1A Phone Patch (FCC Part 68 registered).

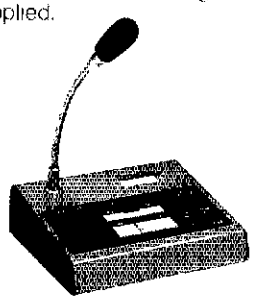
MA-5 80/40/20/15/10 meter mobile antenna. All resonators supplied. 200 W PEP max., VSWR 1.5:1 or less. Easily adjustable for center frequencies.

VP-1 Bumper mount for above.



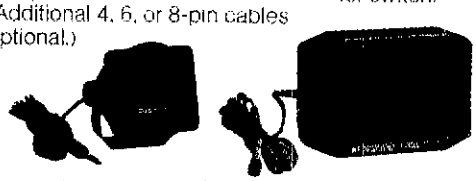
VB-2530 25 W RF Power Amplifier (input 1-4 W). BNC-BNC cable, and mounting bracket supplied.





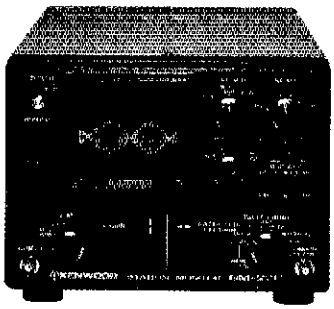
MC-85 (8-pin) Multi-function desk-top microphone (8-pin) 700 Ω unidirectional electret condenser mic. Built-in audio level compensation with output and tone control, meter, and UP/DOWN switch. Selector switch for up to three transceivers. (Additional 4, 6, or 8-pin cables optional.)

MC-60A (8-pin) Deluxe desk-top microphone. Pre-amp built-in, PTT, LOCK and UP/DOWN switches. Hi/Lo Z selector switch.

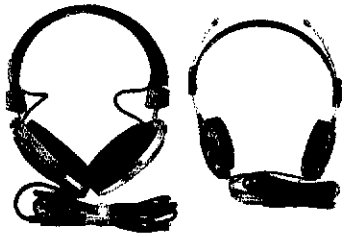


SP-40 Compact mobile speaker.

SP-50B Mobile speaker.



SM-220 Station monitor/10 MHz oscilloscope Pan display capability with optional BS-8 (for TS-940S, TS-830S). Monitor transmitted waveforms and/or received signal waveforms. Built-in 2-tone generator.



HS-5 Deluxe headphones.
HS-6 Lightweight headphones.

LF-30A Low pass filter. 1 kW, 50 Ω. Insertion loss: less than 0.5dB at 30 MHz.

MA-4000 2 m/70 cm dual band mobile gain antenna. Duplexer supplied. Ideal for use with the TW-4000A "Dual Bander" and TM-211A/TM-411A. (Mount not supplied.)

MJ-Series
Microphone adapters

Not Shown:

MC-50 Desk-top microphone. Hi/Lo Z. 4-pin connector.

MC-80 Desk-top microphone. 700 Ω unidirectional electret element with flexible boom. Built-in mic. pre-amp and UP/DOWN switch, with lock. (8-pin).

MC-48B Hand microphone with 16-key DTMF pad and UP/DOWN switches. (8-pin).

MC-46 As above, but with 6-pin connector.

MC-43S Hand microphone with UP/DOWN switches. (8-pin).

MC-35S Noise cancelling hand microphone, 50 k Ω (4-pin).

MC-30S As above, but 500 Ω.

PG-4A Microphone cable for MC-60A. Converts MC-60A to 4-pin connector.

PG-4B As above, but 6-pin.

PG-4C As above, but 8-pin, as supplied with MC-60A.

PG-4D Extra 4-pin cable for MC-85.

PG-4E As above, but 6-pin.

PG-4F As above, but 8-pin.

HS-7 Micro-headphones.

KPS-7A 13.8 V DC, 7.5 A intermittent DC power supply.

RA-3 2 m, ⅝ λ telescoping antenna with BNC connector.

RA-5 2 m ¼ λ /70 cm ⅝ λ telescoping antenna with BNC connector.

RA-8B 2 m StubbyDuk™ with BNC connector.

RA-9B As above, for 220 MHz.

RA-10B As above, for 440 MHz.

RD-20 Dummy load, 50 Ω DC-500 MHz 20 W continuous, 50 W intermittent.

PG-3B DC line filter for mobile use.

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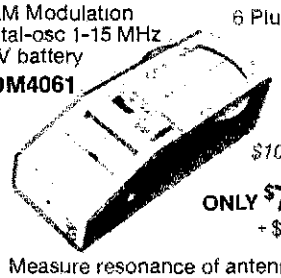

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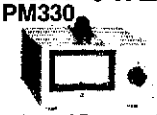
- 100 KHz - 150 MHz to 450 MHz on harmonics.
- RF Output 100 mVs.
- *Modulation:* Int. - 1 KHz Ext. - 50 Hz to 20 KHz.
- Crystal OSC 1 - 15 MHz.

$219.95 Value **ONLY $149.95** + $4 UPS

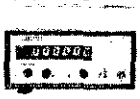
RF POWER METER/LOAD
PM330



- 1.8 to 500 MHz.
- 50 OHM-N-J Connector.
- 5W, 20W, 120 Watts.
- Accurate to +/- 10%.

$109.95 Value **ONLY $79.95** + $4 UPS

FREQUENCY COUNTER
FC5250



- 10 Hz to 150 MHz.
- 7 Digit readout.
- Gate 1s & 6 sec.
- Accurate to +/- 1 count.

SENSITIVITY: 25 - 100 mV to 30 MHz; 100 - 300 mV to 150 MHz

$169.95 Value **ONLY $129.95** + $4 UPS
AC Adapter is included with unit.

RF ATTENUATOR DC—500 MHz
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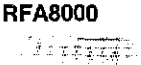

- 0 - 81 dB in 1 dB steps.
- Accurate to +/- .3 dB
- Steps 1, 2, 3, 5, 10 and 20 dB
- 50 OHm = ½ Watt Insertion Loss .5 dB.

$299.00 Value **ONLY $149.95** + $4 UPS

SWR/RF ANTENNA METER
SWR3P

- Read SWR, RF power and field strength.
- 1.7 to 150 MHz.
- 10 or 100 watt range.
- SWR +/- 5%; POWER +/- 10% accuracy.

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utmost importance. Join the ARRL NETS: WINC (NP4WR) sessions 31, QTC 58, QNI 782. WINS (KP4DJ) NM) sessions 31, QTC 16, QNI 126. WINE (VP2VI NM) sessions 26, QTC 26, QNI 82. WINC-RTTY 60 (KP4IG NM) sessions 17, QTC 112, QNI 102. Traffic: KP4DJ 30.

SOUTHWESTERN DIVISION

ARIZONA: SM, Jim Swafford, W7FF—STM: W7EP, NMs: K6LL, K7POF, WB7CAG. Congratulations to Joe, W7DRR, of Page. He has been appointed Ass't Dir. by our SW Div'n Dir. WA6WZO. He also holds OBS app't. Jim Cushing, KD7FW, is Chairman of Scottsdale ARC's Committee preparing for big SW Div'n Convention there Oct. 9-11. Mark your calendars for this one. Marshall, W7DQS, reports a recent ham radio exercise supporting the Maricopa Co. Sheriff's Dept. with communications when the emergency services 911 telephone and computer system failed. A Sheriff's posse with ham radio operators patrolled the Sun City West area and provided emergency serives until the 911 system was restored. Good publicity in the Sun City Daily News-Sun.FB. The 147.75 ZIA linked repeater on Mt. Lemmon along with the new 145.01 digipater were both knocked lightning strikes during May. As of this writing, neither has been restored, but hopefully will be by the time your read this. We Tucson hams miss the ZIA link when it's off. Understand the Gauadalupe Mtn repeater near Quartzite is being activiated into the ZIA system thus extending the link into Calif. Look for it on 144.71/145.31. Verde Valley ARC sent in annual report. Cal Turner, WI6S is editor of their FB N.L., " Feedback." Cal is also President and his XYL, Mary, KA6RCM, is Secretary. Welcome to Arizona! They have forty-two members which is a lot for a community of that size. They meet on the second Thur. at Cottonwood Fire Stn. So. AZ DX Association, with Jerry, NN7C, as prexy meets last Wednesday of mo. at Country Home Restuarant in Tucson at 7PM. Their DX repeater is on 146.66. Reg, W7JQM, will again head up the FD operation for *Catalina RC. Central DX Association* plans a DX breakfast as well as a hospitality suite for DX'ers at the SW Divn Convention Oct. 9-11. Tnx, KY7M. He also reports DXer ND7O was killed in aircraft crash in Hawaii recently. Mike Riley, KX1B, our ARRL Public Service Mgr., has accepted invitation to visit and speak at ARRL forum at Ft. Tuthill hamfest July 24-26. See you there. As of April 16 (FCC Memo Opinion and *Order 97-141), it appears that the FCC will be cracking down* on amateurs violating Sect. 97.119 of the Commission's Rules, which relates to obscene and indecent language on the air. License revocation, as well as fines can be imposed. Thanks, FCC. This action is long overdue. Your SM has temporarily relocated to Pinetop in the White Mtns and have an all-band dipole up at fifty feet. It works! Continue to send mail reports *to Tucson QTH for forwarding, and I'll also be checking into* the Cactus, ATEN and RACES nets to keep updated. 73 Jim.

NET	QNI	QTC	SESS
SWN	216	102	31
ACN (HF)	581	48	31
ACN (VHF)	274	59	31
ATEN	858	100	31

Traffic: KA7MUL 362, W7EP 141, W7AMM 136, KB7FE 103, K6LL 90, WB7CAG 81, KE7KZ 78, N7ETP 37, K7POF 21, W7GAQ 20, W7KXE 19, W7JKM 17. (Apr) W7AMM 189.

LOS ANGELES: SM, Bob Poole, AJ6F— ASM:K6IYK. SEC:AK6Y, STM:W6INH. SGL:K6KSY. TC:WA2KDL. ACC:KB6AXK. The Southbay ARC was present as usual for the Torrance Armed Forces Day activities, including a footrace and a parade; this club is very active in public service and serves as a continual reminder to Southbay city governments of the positive aspects of ham radio. Our newest affiliated club, The Hilltop Amateur Mastertie System, is now putting out a first-class newsletter; they point out that their member KB6LAK, a teacher at Horrace Mann School in Beverly Hills, generated much-needed publicity for hams with media coverage of his ham radio program at school - well done, Craig. K1DFO and the Palos Verdes ARC were on their usual stations for the annual Palos Verdes Marathon; the club also supported a booth at the Rancho Palos Verdes "Country Days" event on July 4th. W6CBA and RHARC report that *Whittier's disaster drill on June 4th "was an unqualified* success"; Vi indicated that the disaster scenario was that of a commuter aircraft forced to land in the city and that "the realism was extraordinary." An important "first" in the section occurred when ARES and MARS staged a joint exercise according to W6UPN and AK6Y. The folks from Hughes, Downey, SCRAN and others joined to present ham radio to *the Boy Scouts at the Dominguez Hills Campus, UC; KN6H* provided Archie Ham Radio Comics to those scouts who could generate enough power to light up a lamp connected to an electricity-generating exercycle. Lot of comics went to scouts that day. The SCDXC has announced a contest (above and beyond on-the-air contests) whereby one may win a free registration to next year's International DX Convention by vir*tue of designing the winning design for the patch to be worn* proudly by the attendees; contact N6CGB via the club for details. The W6FNO annual report indicates that over 3,000 emergency calls were handled through the repeater facilities; May totals were: 178 vehicular, 6 fire and 12 medical emergencies, with N6AHT leading the effort (thanks to KB6LTL for the report). WB6QNR managed to get a foot in the door with the L.A. County Fair people for a ham radio booth in September; N6GXZ will be organizing the activity for this event with the assistance of the over 50 member clubs of the LAACARC. The Lockheed ARC, W6LS, and friends supported the Tri-Valley Special Olympics May 2nd; 9 of 16 volunteers were W6LS club *members. WB6ZGF reports that the Downey club displayed* their communications van at Fire Station 1 on Fire Service Day there; Fire Chief Ron Irwin thanked the club and presented them with a Certificate of Appreciation. Adding to the ever-present and important public service picture was the SGVARC who put on a good effort at the Monrovia Day Parade in spite of the nasty weather; I enjoyed the rather descriptive *and humorous article in the Loudspeaker about this effort.* Packet continues to grow both in numbers of participants and in technology; the network continues to expand at a good pace with higher levels being developed according to the SCDCC. Speaking of packet, AJ6F-1 operates from Torrance as a WA7MBL/W6RLI style system; it links to the WestNet System of BBSs for forwarded traffic and bulletins. Drop me a line to AJ6F sometime. Several schedules going by the board due to vacancies during vacation season. Traffic count low also. Traffic: N6LHE 364, W6INH 285, N7CZF 106, WB6VPY 27, W6NKE 20.

ORANGE: SM, Joe H. Brown, W6UBQ—ASM: Riv Co, Bob W6LKN (714 686 3823). ASM: Org Co Ralph WB5JBI (714 776 9272). ASM SB Tony WB5QHB (714 981 1836). ACC: *Sandy, WA6WZN. We are lucky to have this lady accept the* ACC slot, past SM of our section, now President of OCORA and XYL sec/tres for SW Div Dir Fried WA6WZO. Seems that busy people always have time for one more responibility. Good luck Sandy! The Henry Radio ARC with Kuby N6JSX at the helm is the latest ARC to apply for ARRL affiliation. Club Info. Joseph A Cira. KB6AXK ACC LA Section is compiling a list for publication, a list of training and test sites (dates/time/place). All clubs should submit their schedules to 3075 Oneida St. Pasadena, CA WESTLINK. The Coachella Valley ARC suggests, keep informed about current happenings at the FCC, what ARRL is up to, what is going on in Ham Radio by supporting WESTLINK. Next time you pay your bills drop a check to c/o Dr. Norm Chalfin, K6PGX, P.O. BOX 463, Pasadena, CA 91102. (WESTLINK) It takes money to provide what they offer. From the Victor Valley SPECTRUM Editors Desk. Take part in things people, don't leave it all up to a chosen few to do all the work. The more who help with things, the less each person has to do. Think about it, People! What can YOU do to help YOUR club? Pres. Joyce, KB6BLD. Southern Cal 6 Meter Club, Pres Bob K6PHE. VP Will AA6DD. Tre George WT6U. Pres sez, I would like to see novices take part in club activities. They are amateurs and they need help like we did when we got started in Amateur Radio. So welcome all novices to our nets, club meetings and ARC activities. SEC: Ken *WA6ZEF (714-983- 1272,* has completed a list of ARES/RACES Officials and their area of responsibility. Those Amateurs dealing with recruiting or public service/safety Officials should have this info. Contact Ken for copy. EC/Orange Co RACES Officer Jim N6GVO (714-548-8424) has compiled an excellent "HOW TO" information folder for those people trying to establish a RACES Organization in a municiple government. Do not go to a presentation without one. DEC: Rive Co Lee N6HGT. Riv Co Fire Dept(RACES) has installed an Amateur Radio one skip Digi system that covers the county. Some Digies have dual ports, in an emergency could interface with private fire frequencies. Packet System engineering and installation under Mike Burton, N6KZB. Assit. Div. Chief/ESD. Riv Co is 7200 sq. miles big folks. Org Co Adapt a School Program headed by Mary KA6IGG(EC) (714-772-5451) is making good progress. We now need hams living close to those schools. GIVE HER A CALL. TC: John KD7XG. (714-737-8949) Handling inquires and keep*ing busy with BBS. If you have traffic for SM W6UBQ use* KD7XG-1 145.05 MHz. ATC Orlo, WA6UDR has an excellent presentation on effect of sun spots (what they are and how they affect Communications). ATC George W6RPD has resolved a problem concerning TVI/RFI in a neighbors phone and TV. It seems the Rig was clean; problems was in the accessories in the shack. A positive approach by the Ham and *a TVI filter by the neighbor resulted in smiles from all con*cerned. Packet Racket, N6MVB, rpts 322 total msgs forward, 106 to N6CQW, 129 to N6CUS-1 67 to WB7QKP-1, 13 to KD7XG-1, 7 to K7FYK.WF60 packet traffic report. Total TFC 125. Packet outlets for traffic to augment SCN. N4KRA liaison for San Diego Area, WB6SAN for San Fernando Valley, N6HIW and N6OKS for S Riv Co. HF/VHF Gateway thru KR5S, *KD7XG. STM: Ernie WA6QCA. PSHR WF60, WB6QBZ,* WB6QCA, WB6QND. Brass Pounders League WF60 TFC Total 629.

SCN/1	359	31	316	230	1830	WF60
SCN/2	3598	29	170	48	2015	WF60
SCN/V	146.645	31	327	230	2100	WA6QCA

Traffic: WF60 629, KA6HJK 126, AD6A 111, N6GOT 98. *WA6QCA 82. WB6QBZ 84. W6CPB 59,* K6DD 35, W5TZR 32. KA6TND 27. KA6HMS 18. W6SX 5.

SAN DIEGO: SM, Arthur R. Smith, W6INI—PIO: KG6LF. TC: N6JZE. STM: N6GW. SEC: W6INI. There's still time to write U S Senators and Congressmen to enlist their assistance in defeating the 220 docket 87-14. Don't forget the SW Div Conv. Oct 9-11, 1987, in Scottsdale, AZ. New club officers: SD Amateur Radio Council Chairman WD6BBW, VChmn W6GIC, Sec KB5MW, Trs N6CQW, 220 Club Pres N6PC, VP K6PD, Sec WB6QYO, Trs W6UZL. Licensing classes: Poway ARS Tech/General class starting Sept. 21, 1987. Pres N6KGM (484-0469) for info: Palomar ARC will start class for beginners in Sept., Pres W9FQN (749-0276) for info. ARC of El Cajon will help city of El Cajon celebrate 75th birthday with special events station. WA6BGS will be operated on Oct 17,18,24,25 and Nov 7, 1987. Details in next Oct (1987) QST. Evacuation during fire, May 22, in National City, saw ARES response with WD6CSS, W6IPQ, KA6OMK, WA6RPP, K6SJA, W6VMN, W6YVY, W6ZVA providing communications for the incident *CP, hospitals, evacuation points and the Red Cross. Picnics:* Poway ARS, Aug 16 at Poway lake: Palomar ARC, Aug 23, Brengle Pk, Vista. NCTN sessions 30, tfc 37. ARES cw sessions 5, ck-ins 15. Traffic: N5GW 57, N4KRA 52.

SANTA BARBARA: SM, Byron Looney, K6FI—Tom Geiger, W2KVA, of Santa Maria became the new Section Manager effective June 1. Tom is on vacation in Europe, but will be home for Field Day. It has been a pleasure to work with the many amateurs in this Section, and I know Tom will also appreciate the help which I have received from so many of you. OO W6WRA reports that the 147.12 Lompoc repeater no longer rebroadcasts the local FM station after a complete rt cleanup in the building. Good going, gang! Most every weekend sees the emergency van from SBARC on a Search and Rescue mission. Amateur Radio is getting some good TV coverage as a result of this. Paso Robles ARC University Dean W7CB turned out a record number of novices in their latest class. Watch for the score this gang piles up on Field Day. Traffic: W6NOR 202, N6FOU 25, KB6IEC 15. (Apr.) KB6KCW 11.

WEST GULF DIVISION

NORTHERN TEXAS: SM, Phil Clements, K5PC—ASST SM: K5MXQ, STM: W5VMP, SEC: W5GPO, BM: W5OXK, PIO: K5HGL, OOC: WB5JBP, TC: W5LNL. Ham-Com '87 is now in the record books, with attendance well over 6,500. I cannot recall a more enjoyable time! It was good to renew old acquaintanences, put faces on familiar callsigns, and enjoy all the trappings of a truly great hamfest. Congrats to the Ham-Com staff for a job well done and to all the volunteers who make these things a reality. Over 100 exams were given. I hope you all received that sought after ticket! Congrats to Ron, KB5ADE, your new Texas Slow Speed Net (TSN) Manager, who upgraded to General at Ham-Com. KA5SPT is now WZ5N: and an ORS. Congrats, Dana! Sorry for the error last month: Kevin, WB4HML is now WV5Z. KD5Z belongs to Fred in Temple. Sorry about that, guys! WG5S assumes the helm of the Southwest Traffic. Net July 1. KL7QS is the new EC for Corvell and Lampasas Counties. It is in the works for Baylor and Callahan, Coleman and Shackelford Co's will be in the *West Texas Section. The 7290 Traffic Net for May:(QNI/Z38* QTC/395 in 47 sessions. The Dallas ARC has put a fine 220 repeater in service on 224.88 MHz. Your new Affiliated Club Coordinator is Dan Dansby, W5URI, who is also the trustee of K2BSA the Boy Scout station. They have a fine new newsletter designed to get hams and interested scouts together. For subscription info, write Editor Lary Eichel, K2NA P.O. Box *13278, Boulder CO 80308-3278. K2BSA will be portable in* Belize August 1-15 and plans are to donate a Scout Amateur Radio station to their hosts. PSHR (Public Service Honor Roll) for May: K5MXQ, K5UPN, KB4ADE and W5VMP. Traffic:(attached).W5TNT 278, K5MXQ 188, WV5Z 154, N5BT 150, K5UPN 123, W5VMP 109, KA5AZK 90, KB5ADE 83, W5YOZ 73, W9OYL 38, KM5L 28, KC5NG 13, N5IUI 10, WY5O 13.

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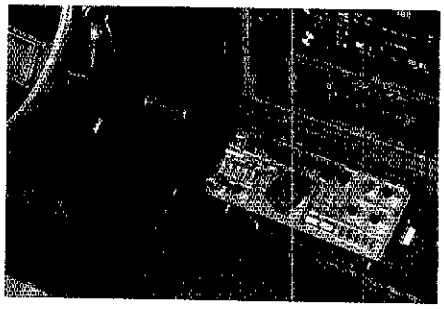

- **Covers all Amateur bands** 160 through 10 meters, as well as the new 30, 17, and 12 meter WARC bands. High dynamic range, general coverage receiver tunes from 150 kHz to 30 MHz. Easily modified for HF MARS operation.
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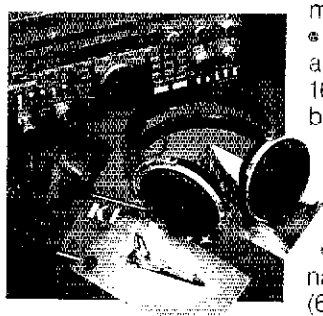
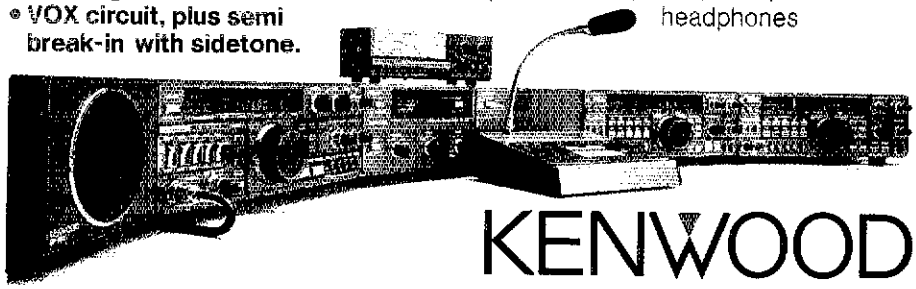
- **Programmable, multi-function scan.**
- **Speech processor built-in.**
- **Dual digital VFOs.**
- **VOX circuit, plus semi break-in with sidetone.**



Optional accessories:
• PS-430 compact AC power supply • SP-430 external speaker • MB-430 mobile mounting bracket • AT-130 compact antenna tuner covers 80-10 meters, incl. WARC bands • AT-250 automatic antenna tuner covers 160-10 meters, incl. WARC bands • TL-922A 2 kW PEP linear amplifier • FM-430 FM unit • YK-88C (500 Hz) or YK-88CN (270 Hz) CW filters • YK-88SN (1.8 kHz) narrow SSB filter • YK-88A (6 kHz) AM filter • MC-42S UP/DOWN hand mic. • MC-60A/80/85 deluxe desk mics. • SW-2000/200A SWR/power meters • SW-100A SWR/power/ volt meter • PC-1A phone patch • HS-4, HS-5, HS-6, HS-7 headphones



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The classic proverb, "If you can't hear them, you can't work them," holds special significance in today's world of high performance transceivers. Indeed, contacting low power stations in distant lands often calls for literally pulling signals from thin air while ignoring a variety of man-made and communications-related noises. That high sensitivity and complimenting immunity to "undesired influences," however, are only part of a receiver's overall design criteria. Modern transceivers must also exhibit crystal clear reception of strong local stations without "front end" overload and consequent gain compression or intermodulation distortion products. While such requirements seem miraculous compared to receiver designs of previous times, **ICOM's industry-leading technology is providing those capabilities in an unbelievably effective manner.**

Establishing a transceiver's overall RF sensitivity, or its ability to raise a desired signal above a particular noise level, requires that several stages operate in tandem and within specific limits. **Wide dynamic range,** or the span over which a receiver produces a true replica of its input signal, is also very important in HF receiver designs. Its low end is established by a receiver's background noise, or its "**noise floor,**" and its high end is the threshold where strong signals introduce intermod noises. Notice this is a stage-by-stage design criterion rather than a range over which AGC (hopelessly) tried to control receiver sensitivity.

Low "front end" and mixer stage gain yield an attractive noise floor, but reduced sensitivity can place excessive amplification duties (and consequent noise generation) on selectivity-influencing IF stages. High "front end" and mixer stage gain allows strong signals on one frequency to create intermod noise that masks weaker signals on other frequencies. **Achieving a perfect balance within the previously described and rather critical limits was ICOM's first objective in obtaining maximum transceiver sensitivity, lowest noise floor, and widest possible dynamic range.**

ICOM's exciting new **IC-761 HF base station transceiver is a prime example of the previous design innovations. It exhibits a noise floor of approximately -140dB and an intermod threshold point of -35dB** (with zero dB representing a one milliwatt signal). The difference between those points yields a superb **dynamic range of 105dB.** Bear in mind this is accomplished while maintaining an overall **receiver sensitivity of at least .15 microvolts** within the 1.6 to 30MHz range!

This outstanding performance is accomplished with the use of an **ICOM-developed high level Direct Feed Mixer (DFM) and panel selectable Balanced RF preamplifier.** Applying incoming and band-pass filtered signals to that first DFM stage and advantageously utilizing its IF conversion gain produces high sensitivity under a wide variety of operating band conditions. This arrangement also frees IF stages to "work their magic" on selectivity.

Both the Direct Feed Mixer and the Balanced RF preamp incorporate **JFET transistors** in their designs. JFETs are superior to conventional (bi-polar) transistors because they provide excellent weak signal reception with low noise generation. The balanced circuit design used in the DFM is simply "icing on the cake," adding additional noise immunity and placing ICOM's new IC-761 transceiver in an elite class of its own.

The IC-761's panel selectable RF preamplifier increases receiver sensitivity when switched into operation, yet overall dynamic range is **maintained at an impressive 100dB.** The operating flexibility of this selectable RF preamp is most attractive when we compare average signal levels on various HF bands. Excellent signal propagation and widespread use of gain antennas on 20 through 80 meters requires a high performance first mixer circuit for top quality reception. Weaker signals or less favorable propagation, especially on other HF bands, often calls for adding preamplification for smooth, comfortable copy. Having the versatility to fit those ever-changing requirements right at your fingertips can't be equalled.

Although specifications regarding the innovative **IC-761** were highlighted in the previous discussion, ICOM's popular **IC-751A** and **IC-735** include similar Direct Feed Mixer and balanced RF circuitry with complimenting JFET transistors. These units also exhibit exceptionally high sensitivity with a very low noise floor and a solid 100dB dynamic range. When you demand top performance, there's only one name to remember. **ICOM...Leading the competition and continuously widening the gap!**

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- **SSB, CW, FM, AM, RTTY**
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- **160-10m/General Coverage Receiver**
- **Passband Tuning plus IF Shift**
- **QSK up to 60 WPM**

The IC-761 ushers in an exciting ew era of amateur radio communica-ions; an era filled with all the DX'ing, ontesting, and multi-mode operating leasures of a fresh new sunspot cycle. he innovative IC-761 includes all of oday's most desired features in a sin-le full-size cabinet. This is ham radio t its absolute best!

Work the World. The IC-761 gives ou the competitive edge with stand-rd features including a built-in AC ower supply, automatic antenna tuner, 2 fully tunable memories, self-refer-ncing SWR bridge, continuously vari-ble RF output power to 100 watts in ost modes, plus much, much more!

Superb Design, Uncompromised Quality. A 105dB dynamic range receiver features high RF sensitivity and steep skirted IF selectivity that cuts QRM like a knife. A 100% duty cycle transmitter includes a large heatsink and internal blower. The IC-761 transceiver is backed with a full one-year warranty and ICOM's dedicated customer service with four regional factory service centers. Your operating enjoyment is guaranteed!

All Bands, All Modes Included. Operates all HF bands, plus it includes general coverage reception from 100kHz to 30MHz. A top SSB, CW, FM, AM, and RTTY performer!

Passband Tuning and IF Shift plus tunable IF notch provide maximum operating flexibility on SSB, CW, and RTTY modes. Additional features include multiple front panel filter selection, RF speech processor, dual width and adjustable-level noise blanker, panel selectable low-noise RF preamp, programmable scanning, and all-mode squelch. The IC-761 is today's most advanced and elaborate transceiver!

Direct Frequency Entry Via Front Keyboard or enjoy the velvet-smooth tuning knob with its professional feel and rubberized grip.

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Automatic Antenna Tuner covers 160-10 meters, matches 16-150 ohms and uses high speed circuits to follow rapid band shifts.

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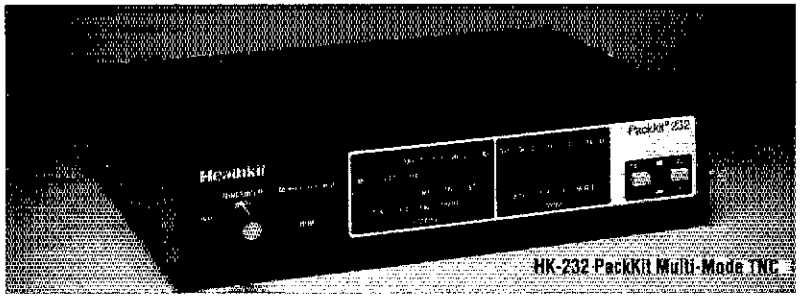
We continue our commitment to provide only the best Amateur Radio gear with the NEW Heathkit® SB-1000 and HK-232 kits.

SB-1000 Linear Amplifier



HK-232 PackKit Multi-Mode TNC

Our commitment to Amateur Radio means the Heathkit line is always expanding to meet the demands of even the most veteran ham. Our introduction of the SB-1000 Linear Amplifier and HK-232 PackKit Multi-Mode Terminal Node Controller Kits gives you two more value-packed amateur products to build and use.

The Heathkit SB-1000 Linear Amplifier Kit continues our commitment to produce the most popular linear amplifiers in the industry. Designed to operate at a full 1000 watts PEP output on SSB, 850 watts on CW or 500 watts for 30 minutes continuous on RTTY, this amp covers all bands from 160 to 15 meters including WARC bands. The SB-1000 uses a single 3-500Z tube in a high efficiency circuit for unparalleled performance at the price. Its high silicon E-I core transformer takes up less room and runs cooler. And it features a quiet computer-style fan, a stiff full-wave power supply with computer grade capaciters, adjustable ALC, and plate and load controls with smooth vernier tuning. And the SB-1000 is yours for only **$739.95.**

Consider the Heathkit HK-232 TNC. This versatile unit works on CW, RTTY, ASCII, AMTOR, both HF and VHF Packet, and now even WeFAX. You can work Packet in both HF (300 baud) and VHF (1200 baud or up to 9600 baud with external modem). Operate Morse from 5 WPM to speeds you never dreamed of, or print Weather Facsimile pictures on an Epson compatible printer. Connects to your computer through a standard RS-232 port. Connects to both your HF and VHF radios' PPT line, microphone input and speaker output. The same connections for Packet work on all other modes. Includes bar graph display to make HF tuning a breeze. Operates on 12 VDC at 750 mA with 10% ripple or less. The HK-232 is priced at only **$279.95.**

Because you build these kits, there aren't any surprises inside. And at Heath we are just as committed to you after the sale. All Heathkit products are backed by our highly respected manuals and even our technical consultation service.

Simply call Toll-Free: 1-800-253-0570 and ask for operator 18 to order your kits today.

We also have 66 Heath/Zenith Computers and Electronics stores in North America. Call 616-982-3614 for the store location nearest you.

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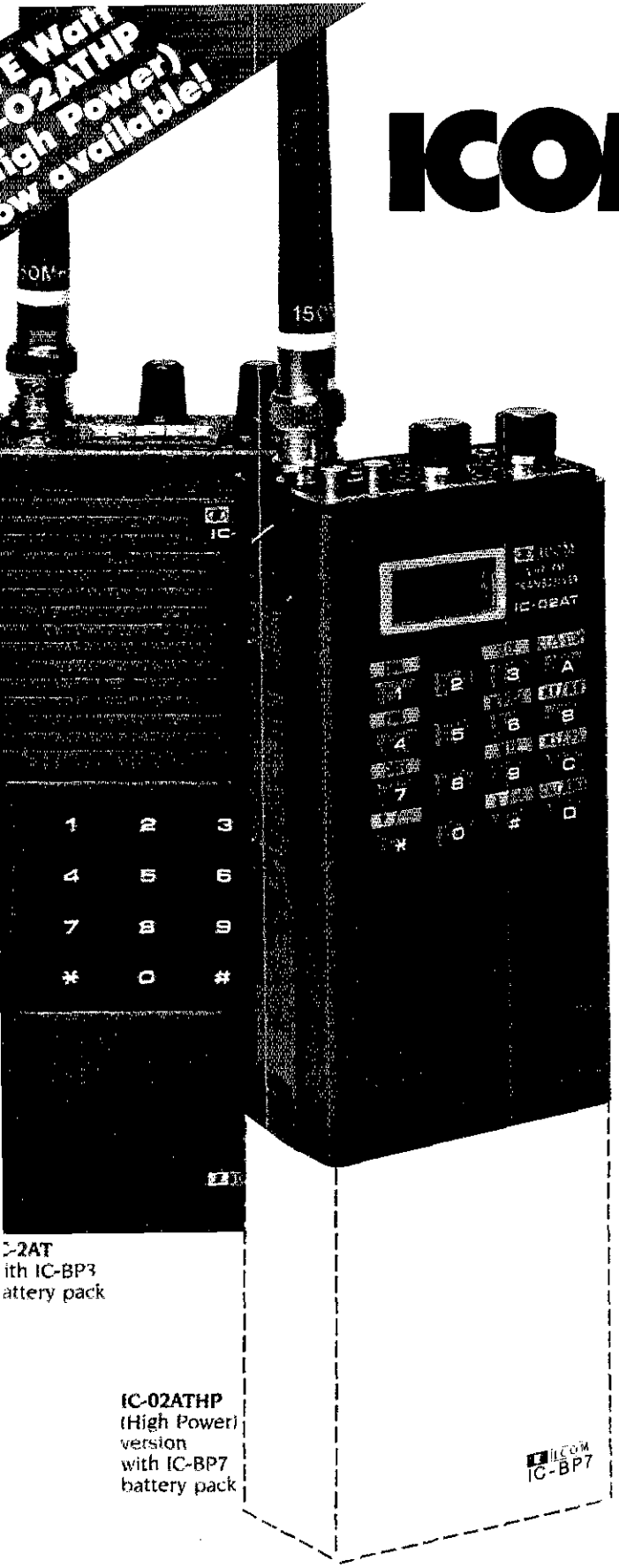
KB-101

ICOM IC-02AT



Full Size, High Power

If you want a 2-meter handheld with exceptional features, quality built to last, and a wide variety of interchangeable accessories, take a look at the ICOM IC-02AT and IC-2AT handhelds.

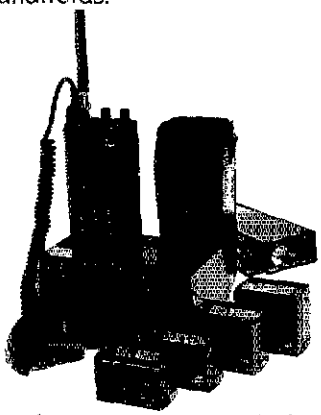
Frequency Coverage. The IC-02AT covers 140.000 through 151.995MHz and the IC-2AT, 141.500 through 149.995MHz...both include frequencies for MARS operation.

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

- DTMF/direct keyboard entry
  LCD readout
- 3 watts (IC-BP3 battery pack) standard, or 5 watts (IC-BP7 battery pack)
- 10 memories which store duplex offset and PL tone (odd offset can be stored in last 4 memories)
- Frequency dial lock
- Three scanning systems: priority, memory and programmable band scan (selectable increments of 5, 10, 15, 20, or 25kHz)

IC-2AT Features. The IC-2AT is ICOM's most popular handheld on the market. The IC-2AT features a DTMF pad, 1.5 watts output, and thumbwheel frequency selection. The IC-2A is also available and has the same features as the IC-2AT except DTMF.

Accessories. A variety of slide-on battery packs are available for the IC-02AT and IC-2AT, including the new long-life 800mah IC-BP8 which can be used with both handhelds.



Other accessories include the HS-10 boom headset, HS-10SB PTT switchbox, HS-10SA VOX unit (for IC-02AT), and an assortment of battery pack chargers.

The IC-02AT and IC-2AT come standard with an IC-BP3 NiCd battery pack (IC-02ATHP comes with IC-BP7 battery pack), flexible antenna, AC wall charger, belt clip, wrist strap, and ear plug. See the IC-02AT and IC-2AT 2-meter handhelds at your local ICOM dealer.

Often imitated, never duplicated.

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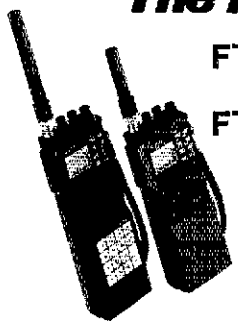
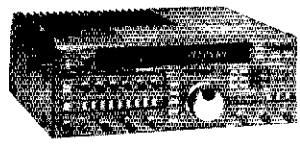
ICOM

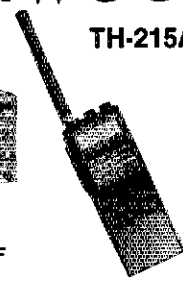


FT-23R

FT-73R

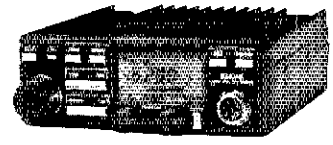


FT-767GX HF/VHF/UHF



TH-215A

IC-28A/28H IC-38A



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SOLID STATE DESIGN

BACK BY POPULAR DEMAND!

Solid State Design for the Radio Amateur was first released in 1977 as a theoretical and practical guide for the radio amateur interested in using solid-state devices in RF design work. In the just released second printing, the occasional errors and omissions which inevitably creep into a work of this magnitude have been corrected, making this publication even more valuable not only to amateurs, but professional RF designers as well.

Solid State Design is among the select few technical books that have sold more than 50,000 copies. Why has it achieved this enviable sales milestone? For one thing, its 9 chapters and 256 pages are chock full of good basic information on circuit designs and their applications. Much of the data such as transistor modeling, cannot be found in other publications. Some of the topics covered are: basics of transmitter design, power amplifiers, matching networks, receiver design basics, advanced receiver concepts, modulation methods and test equipment. 1st edition, 2nd printing. $12.00 in US funds. Add $2.50 for shipping and handling ($3.50 for UPS).

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ICOM MICRO
THE WINNING HAND

Deal yourself a winning hand in modern technology with ICOM's new micro-size 2-meter FM transceiver. The IC-μ2AT combines maximum performance, reliability and easy operation in a thin-styled handheld that's perfectly suited for today's active lifestyles.

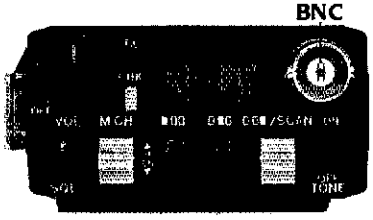
The IC-μ2AT. A breakthrough that ends every amateur radio operator's quest for that one true, go-anywhere 2-meter handheld.

Miniaturization. The MICRO gives you all the advantages and performance of a larger handheld, in a package so small, so refined, so well-built that only ICOM could build it.

Measuring only 4.6" high by 2.3" wide by 1.1" deep, the MICRO fits in your pocket or purse as easily as a cassette tape.

This miniaturization doesn't compromise ICOM quality. It's exactly what you'd expect from ICOM: high performance in a micro package.

Full Featured. And ICOM hasn't compromised features for size. The IC-μ2AT DTMF version includes ten



programmable memories, transmit offset capability from the back panel including odd offsets, an LCD readout on the top panel for easy readability, up to three watts of output (optional), 32 built-in subaudible tones AND wideband receive coverage from 138 to 162.995MHz in 5kHz steps for MARS and CAP operation plus weather broadcasts.

There's also a simple-to-use digital **TouchStep Tuning System** for fast shirt-pocket frequency adjustments. The MICRO also includes a band or memory manual scan function. An A version is also available without DTMF and PL tones.

Personalize your ICOM MICRO. The MICRO utilizes most existing ICOM handheld accessories, plus it hosts a new line of versatile accessories including the BP-24 2.6 watt high-power battery pack, BP-23 long-life 1.6 watt battery pack, BC-50 desktop rapid charger, and a variety of carrying cases.

See the ICOM MICRO at your local ICOM dealer. Play your cards right with ICOM!

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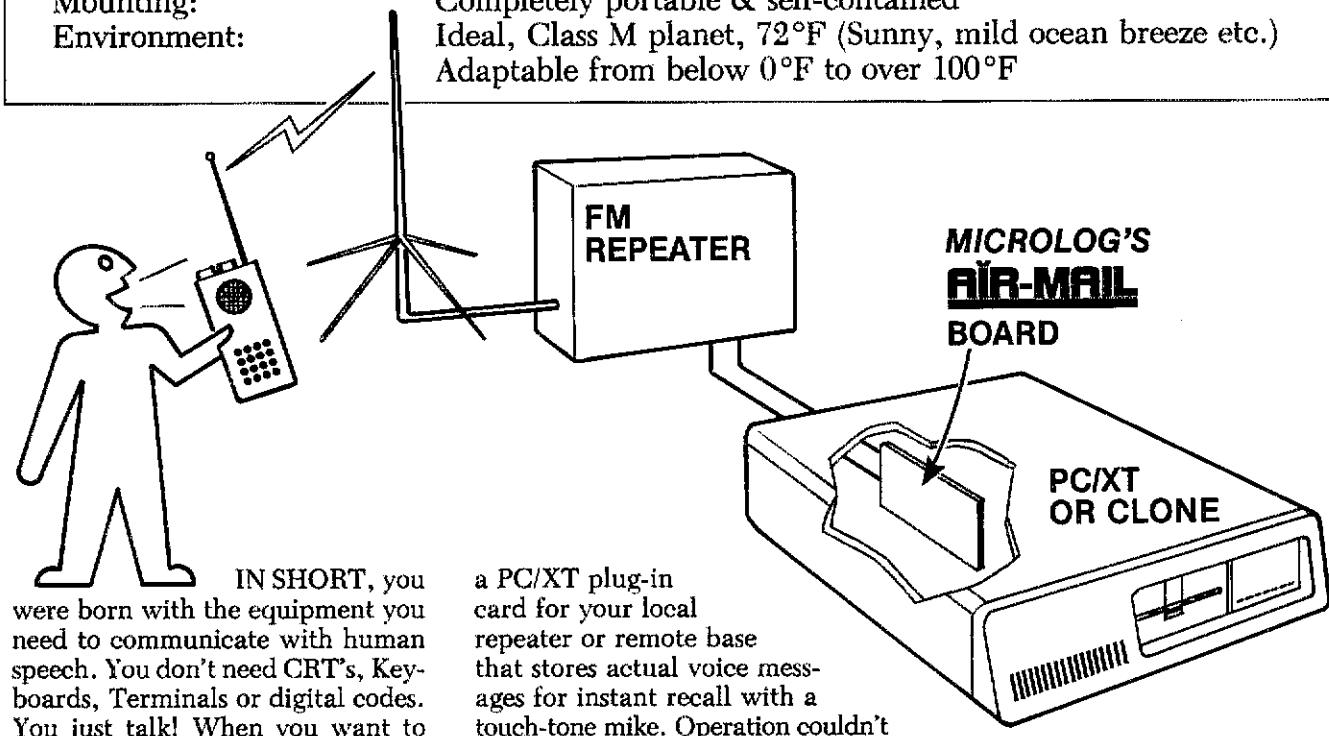
SPEECH

. . . the ultimate information code

Equipment required:	**One pair, vocal chords**
Transmission medium:	Air
Data rate:	200 WPM optimum
Auto-Sync:	Instant auto speed lock 0 to over 300 WPM
Code:	Any language
Output level:	0 to >100 db
Power Supply:	Draws power from main life support system
Mounting:	Completely portable & self-contained
Environment:	Ideal, Class M planet, 72°F (Sunny, mild ocean breeze etc.) Adaptable from below 0°F to over 100°F

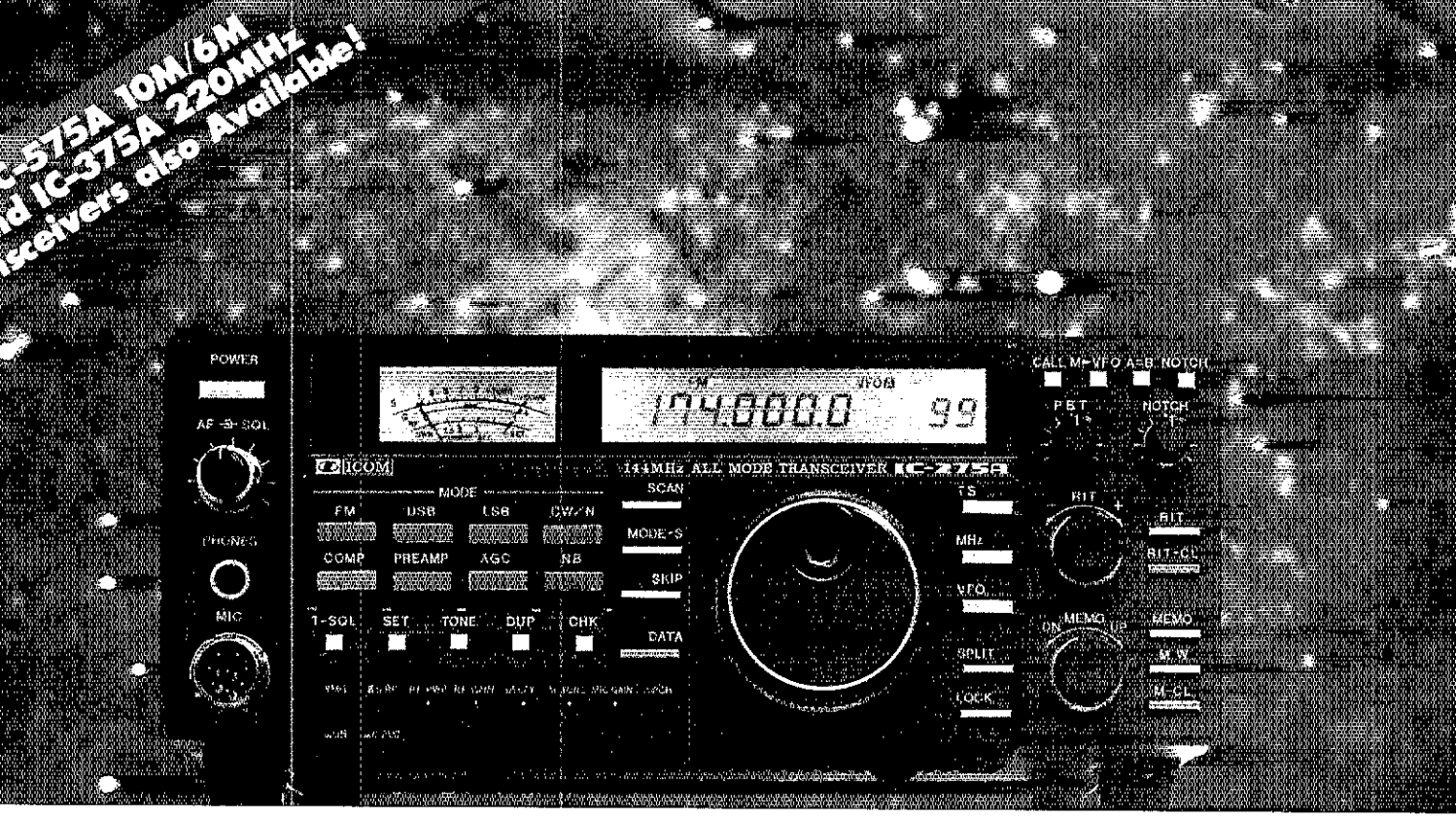


IN SHORT, you were born with the equipment you need to communicate with human speech. You don't need CRT's, Keyboards, Terminals or digital codes. You just talk! When you want to leave a message for someone on a fancy electronic mailbox, wouldn't you really rather use voice? Who needs all the mysterious miscellaneous digital stuff just to tell your buddy Fred that "You'll be over Saturday morning for the antenna party"? Why bother with any thing but normal speech? That's the conclusion we at Microlog came to. So, we got busy and designed just that, a PC/XT plug-in card for your local repeater or remote base that stores actual voice messages for instant recall with a touch-tone mike. Operation couldn't be simpler. Punch up the repeater, hit a couple keys on your pad and talk. Later, your friend will key-up, enter the access code and hear YOUR VOICE speak the message you left hours or days before. Isn't that what you wanted in the first place? An easy to use 'Bulletin Board' without the hassle of packet or RTTY! Sure, packet has its place for lengthy programs, but you just can't beat voice for 99% of your Mailbox operational requirements.

Fifty minutes of high quality speech recording per 10 mByte in your PC/XT or clone. Put the AIR-MAIL system to work for your group. AIR-MAIL voice board, $895.00 from Microlog Corp., 20270 Goldenrod Lane, Germantown, Maryland 20874. Telephone (301) 428-3227.

MICROLOG

BRINGING A PERSONAL VOICE TO MASS COMMUNICATIONS



ICOM IC-275
THE VHF SUPERSTAR!

- **All Mode Operation: FM, SSB, CW, Packet**
- **Wideband Reception (from 138 to 174MHz)**
- **Packet Compatible (with front panel DATA switch)**
- **2-Meter Transceiver with the features of an HF**
- **DDS (Direct Digital Synthesizer)**

When you're ready to experience ll the multimode excitement 2 meters ffers today's amateur, you're ready or the glamorous new IC-275. Its M capabilities are unlimited, its ideband receiver coverage (138 to 74MHz, Tx 140.1 to 150MHz) in- ludes public services and NOAA eather bands, plus CAP and MARS, nd its SSB/CW operations are an SCAR enthusiast's and VHF DX'er's elight. No other VHF transceiver is omparable to the IC-275 in features, erformance, reliability and ease of peration.

Outpacing the Competition. The IC-275 includes dual VFOs, 99 tunable full function memories, true passband tuning, crystal resonant notch filter, noise blanker, built-in SWR bridge, semi or full CW break-in, multifunction meter, velvet-smooth tuning knob and an easy-to-read amber LCD readout with variable backlight.

Four Scanning Modes. Full spectrum, programmable limits, mode scan and memory scan with selectable lock-out (scans 99 memories in five seconds!).

An FM'er's Dream Rig. Separate knobs for band tuning and memory selection. Standard repeater splits built-in; odd splits programmable. Includes 32 built-in subaudible tones, and actual subaudible frequency is displayed. Unit supplied with HM-12 up/down scanning mic and DC cord.

It's Packet Ready with rear connector for audio input/output and front panel data switch that reduces switching time to less than 5 ms and mutes the mic.

Two Versions to Fit Your Needs. The **25 watt IC-275A** includes a built-in AC supply. The **100 watt IC-275H** uses an optional external AC supply. Both units are the same size as the ultra compact IC-735 HF rig, and are DC cord interchangeable. You can alternate their fixed or mobile use!

The Matching ICOM IC-475 UHF Transceiver is also jam-packed with deluxe multimode features, and it's the ultimate OSCAR mate for the IC-275. Two versions, the 25 watt **IC-475A** and the 75 watt **IC-475H**, are available to suit your needs.

Exciting New Options include a tone squelch unit, speech synthesizer, an OSCAR module that allows tracking with a companion IC-475, FL-83 500Hz 10.7491MHz CW filter and an AG-25 mast mounted preamp.

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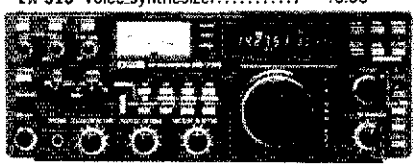
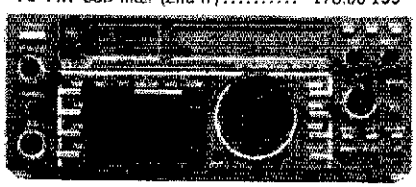
HF Equipment	Regular	SALE
IC-761 HF xcvr/SW rcvr/ps/AT	2499.00	2149
SP-20 Ext. speaker w/audio filter	149.00	134.95
FL-101 250 Hz CW filter	69.95	
FL-102 6 kHz AM filter	56.00	
CI-V Computer interface adapter	TBA	
EX-310 Voice synthesizer	46.00	



IC-751A 9-band xcvr/.1-30 MHz rcvr	1649.00	1399
PS-35 Internal power supply	199.00	179.95
FL-32 500 Hz CW filter (1st IF)	66.50	
FL-63 250 Hz CW filter (1st IF)	54.50	
FL-52A 500 Hz CW filter (2nd IF)	108.00	99.95
FL-53A 250 Hz CW filter (2nd IF)	108.00	99.95
FL-33 AM filter	35.25	
FL-70 2.8 kHz wide SSB filter	52.00	
RC-10 External frequency controller	39.25	
IC-745 9-band xcvr w/.1-30 MHz rcvr	1049.00	899.95
PS-35 Internal power supply	199.00	179.95
EX-241 Marker unit	22.50	
EX-242 FM unit	44.00	
EX-243 Electronic keyer unit	56.00	
FL-45 500 Hz CW filter (1st IF)	66.50	
FL-54 270 Hz CW filter (1st IF)	53.00	
FL-52A 500 Hz CW filter (2nd IF)	108.00	99.95
FL-53A 250 Hz CW filter (2nd IF)	108.00	99.95
FL-44A SSB filter (2nd IF)	178.00	159.95



IC-735 HF transceiver/SW rcvr/mic	999.00	799.95
PS-55 External power supply	199.00	179.95
AT-150 Automatic antenna tuner	445.00	349.95
FL-32 500 Hz CW filter	66.50	
EX-243 Electronic keyer unit	56.00	
UT-30 Tone encoder	17.50	

Other Accessories	Regular	SALE
IC-2KL 160-15m solid state amp w/ps	1999.00	1699
PS-15 20A external power supply	169.00	154.95
PS-30 Systems p/s w/cord, 6-pin plug	299.00	269.95
MB Mobile mount, 735/745/751A	24.50	
SP-3 External speaker	61.00	
SP-7 Small external speaker	49.00	
CR-64 High stab. ref. xtal (745/751)	63.00	
PP-1 Speaker/patch	159.25	149.95
SM-6 Desk microphone	44.95	
SM-8 Desk mic - two cables, Scan	78.50	
SM-10 Compressor/graph EQ, 8 pin mic	136.25	124.95
AT-100 100W 8-band auto. antenna tuner	445.00	389.95
AT-500 500W 9-band auto. antenna tuner	559.00	489.95
AH-2 8-band tuner w/mount & whip	625.00	549.95
AH-2A Antenna tuner system, only	495.00	429.95

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Other Accessories - continued:	Regular	SALE
GC-5 World clock	91.95	89.95
6-meter VHF Portable	Regular	SALE
IC-505 3/10W 6m SSB/CW portable	549.00	489.95
EX-248 FM unit	55.50	
LC-10 Leather case	39.50	
VHF/UHF base multi-modes	Regular	SALE
IC-551D 80W 6-meter SSB/CW	799.00	719.95
EX-106 FM option	140.00	126.95
BC-10A Memory back-up	9.50	
IC-271A* 25W 2 meters ... CLOSEOUT	859.00	699.95
AG-20* Internal preamplifier	64.00	
IC-271H 100W 2m FM/SSB/CW	1099.00	969.95
AG-25 Mast mounted preamplifier	95.00	
IC-275A 25W 2m FM/SSB/CW w/ps	1199.00	1049
IC-275H 100W 2m FM/SSB/CW	1389.00	1229
IC-475A 25W 440 FM/SSB/CW w/ps	1399.00	1249
IC-471A* 25W 430-450 ... CLOSEOUT	979.00	769.95
AG-1* Mast mounted preamplifier	99.50	
IC-471H* 75W 430-450 ... CLOSEOUT	1399.00	999.95
AG-35* Mast mounted preamplifier	95.00	

*Preamp $9.95 with 271A/471A/471H Purchase

Accessories common to 271A/H and 471A/H	Regular	SALE
PS-25 Internal power supply for (A)	115.00	104.95
PS-35 Internal power supply for (H)	199.00	179.95
SM-6 Desk microphone	44.95	
EX-310 Voice synthesizer	46.00	
TS-32 CommSpec encode/decoder	59.95	
UT-15 Encoder/decoder interface	14.00	
UT-15S UT-15S w/TS-32 installed	92.00	
VHF/UHF mobile multi-modes	Regular	SALE
IC-290H 25W 2m SSB/FM, TTP mic	639.00	569.95
IC-490A 10W 430-440 ... CLOSEOUT	699.00	499.95
VHF/UHF/1.2 GHz FM	Regular	SALE
IC-27A Compact 25W 2m FM w/TTP mic	429.00	369.95
IC-27H Compact 45W 2m FM w/TTP mic	459.00	399.95
IC-37A Compact 25W 220 FM, TTP mic	499.00	439.95
IC-47A Compact 25W 440 FM, TTP mic	549.00	479.95
PS-45 Compact 8A power supply	139.00	129.95
UT-16/EX-388 Voice synthesizer	34.99	
SP-10 Slim-line external speaker	35.99	
IC-28A 25W 2m FM, TTP mic	459.00	399.95
IC-28H 45W 2m FM, TTP mic	489.00	429.95
IC-38A 25W 220 FM, TTP mic	489.00	429.95
IC-48A 25W 440-450 FM, TTP mic	489.00	429.95
HM-14 TTP microphone	55.50	
UT-28 Digital code squelch	37.50	
UT-29 Tone squelch decoder	43.00	
HM-16 Speaker/microphone	34.00	
IC-900 Transceiver controller	589.00	529.95
UT-29A 2m 25W unit	295.00	269.95
IC-3200A 25W 2m/440 FM w/TTP	599.00	529.95
UT-23 Voice synthesizer	34.99	
AH-32 2m/440 Dual Band antenna	37.00	
AHB-32 Trunk-lip mount	34.00	
Larsen PO-K Roof mount	20.00	
Larsen PO-TLM Trunk-lip mount	20.18	
Larsen PO-MM Magnetic mount	19.63	
RP-3010 440 MHz, 10W FM, xtal cont.	1229.00	1089
IC-1200A 10W 1.2 GHz FM Mobile	699.00	629.95
IC-1271A 10W 1.2 GHz SSB/CW Base	1229.00	1069
AG-1200 Mast mounted preamplifier	105.00	
PS-25 Internal power supply	115.00	104.95
EX-310 Voice synthesizer	46.00	
TV-1200 ATV interface unit	129.00	119.95
UT-15S CTCSS encoder/decoder	92.00	
RP-1210 1.2 GHz, 10W FM, 99 ch. synth	1479.00	1289

MasterCard VISA

Hand-helds	Regular	SALE
IC-2A 2-meters	279.00	249.95
IC-2AT with TTP	299.00	259.95
IC-3AT 220 MHz, TTP	339.00	299.95
IC-4AT 440 MHz, TTP	339.00	299.95
IC-02AT 2-meters	365.00	299.95
IC-02AT/High Power	399.00	339.95
IC-03AT for 220 MHz	449.00	399.95
IC-04AT for 440 MHz	449.00	389.95
IC-u2A 2-meters	299.00	269.95
IC-u2AT with TTP	329.00	289.95
IC-u4AT 440 MHz, TTP	369.00	329.95
Accessories for micros - CALL $		
IC-12AT 1W 1.2GHz FM HT/batt/cgr/TTP	459.00	399.95
A-2 5W PEP synth. aircraft HT	499.00	449.95

Accessories for IC series	Regular
BP-7 425mah/13.2V Nicad Pak - use BC-35	74.25
BP-8 800mah/8.4V Nicad Pak - use BC-35	74.25
BC-35 Drop in desk charger for all batteries	74.50
BC-16U Wall charger for BP7/BP8	20.25
LC-11 Vinyl case for Dlx using BP-3	20.50
LC-14 Vinyl case for Dlx using BP-7/8	20.50
LC-02AT Leather case for Dlx models w/BP-7/8	54.50
Accessories for IC and IC-O series	Regular
BP-2 425mah/7.2V Nicad Pak - use BC35	47.00
BP-3 Extra Std. 250 mah/8.4V Nicad Pak	37.50
BP-4 Alkaline battery case	15.25
BP-5 425mah/10.8V Nicad Pak - use BC35	58.50
CA-5 5/8-wave telescoping 2m antenna	18.95
FA-2 Extra 2m flexible antenna	11.50
CP-1 Cig. lighter plug/cord for BP3 or Dlx	13.00
CP-10 Battery separation cable w/clip	22.50
DC-1 DC operation pak for standard models	23.25
MB-16D Mobile mtg. bkt for all HTs	24.50
LC-2AT Leather case for standard models	54.50
RB-1 Vinyl waterproof radio bag	34.95
HH-SS Handheld shoulder strap	16.95
HM-9 Speaker microphone	47.00
HS-10 Boom microphone/headset	23.25
HS-10SA Vox unit for HS-10 & Deluxe only	23.25
HS-10SB PTT unit for HS-10	23.25
ML-1 2m 2.3w in/10w out amplifier ... SALE	99.95
SS-32M Commspec 32-tone encoder	29.95

Receivers	Regular	SALE
R-71A 100 kHz-30 MHz, 117V AC	$949.00	799.95
RC-11 Infrared remote controller	67.25	
FL-32 500 Hz CW filter	66.50	
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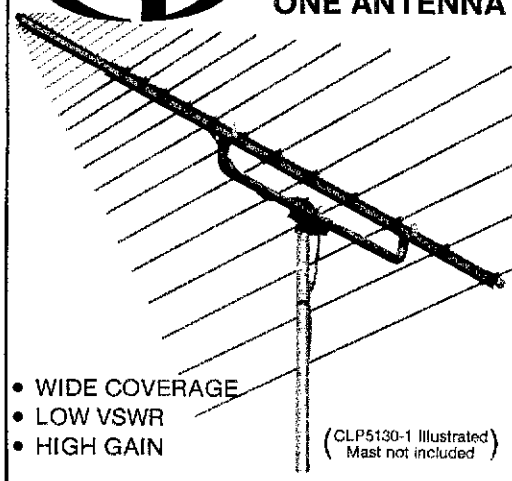

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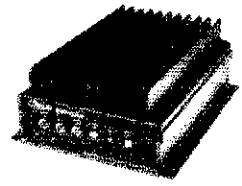

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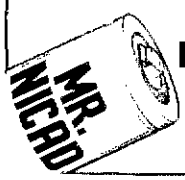

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OKLAHOMA: SM, Bill Goswick, K5WG—ASM/ACC: NB5N. BM: W5AS. OOC: K5WG. PIO: WB4SYT. SEC: W5ZTN. SGL: W5NZS. STM: KV5X. TC: W5QMJ. Ham Holiday/ARRL State Convention is here! The flea market opens at 0900 Saturday August 1, and an ARRL forum will be held that afternoon. In addition, Tom Comstock, N5TC, the ARRL West Gulf Vice Director will speak on the ARRL Blue Ribbon Committee's findings concerning the National Traffic System. Many interesting seminars and demonstrations are planned including presentations on fast scan TV, packet radio, antennas, weather facsimile, AMSAT, and others. Amateur license examinations will be held both Saturday and Sunday with walk-ins welcome. See you in Oklahoma City July 31, August 1-2. The next major event will be the Texoma Hamarama in October. Plans are well underway for this year's event which will be an outstanding hamfest. The Texoma Hamarama has seen a steady growth the past few years and is well worth the trip south. Make plans now to attend. The Texoma Hamarama Association sponsors a $500 yearly college scholarship; for application details contact Dave Cox, NB5N or Joe Blair, N5WB. Traffic: WB5SRX 200, KV5X 115, K5GBN 82, W5AS 79, WA5QUV 78, W5RB 75, N5IKN 68, KA5WGS 68, KF5RD 43, WA5ZOO 40, WD5IFB 38, W5VOR 26, WA5OGC 25, K5CAY 14, K5WG 9, NI8W 6, W5JJ 1.

SOUTHERN TEXAS: SM, Arthur R. Ross, W5KR— SEC: N5TC. PIO: WA5UZB. OOC: WA2VJL. STM: K5QEW. TC: NZ5U. ACC: WB5YDD. BM: K5CVD. SGL: K5KJN. PIA WD5H reports good PR from Brady Standard with items about radio classes and weather emergency class; Heart of Texas Ham Operators Group (HOT HOG) bulletin looking for packet articles and ops. ORS KA6JDT reports ECHO Society (Houston) had 18 ops for Transco Fun Run; Northwest ARS (Houston) and ECHO Society had 13 ops for March of Dimes "Walk America"; ECHO Society put ops on line for Clean Air Bikathon for American Lung Assn. and Road to Liberty display of historical documents. STM K5QEW reports 7290 Net (independent) passed 395 messages in 47 sessions; 2381 check-ins kept NM KA5AZK busy. PIA NZ5J (Seguin) reports KA5WZX won grand prize at Regional High School Science Fair in San Antonio; his computer directed/controlled weather satellite system went on to Internationals at Puerto Rico; N5IVU is on duty NAS Pensacola for flight training; N5KEI, N5IVU, N5KDQ, W5MTO, K5IG, W5FFG, W5TPI, WD5DLN provided communication for the Seguin March of Dimes "Walk America"; N5KQZ is new call of ex-WD6GXF; KY9V and KS5V formed Central Texas Traffic Net (147.14/.74) to cover Austin to San Antonio corridor. OBS W5KLV in May gave 8 ARRL bulletins, 31 satellite bulletins, 3 propagation forecasts, 4 DX bulletins, 5 CRRL bulletins, 143 readings on 9 nets. Brazos Valley ARC (Ft Bend & Harris Countries) set a station in Sharpstown Mall to send Mother's Day traffic. PIO WA5UZB reports some clubs are informing their ARRL members when renewal time arrives; K1TU is new PIA. CAND NM W5KLV reports 618 messages in 31 May sessions; DRN5 represented 100%; STX stations were KD5KQ, WB5YDD, N5DFO, NX5V, WB5FQU, W5KLV, WB5EPA. PIA K5PFE reports Lakes Area ARC (Jasper) elected KA5ESE Pres; WD5BTU VP; K5PFE secy/treas; N5AKI Activities Director. PIA KA5TPN reports Golden Cresent ARC (El Campo) joined "Adopt A Highway Campaign" and learned much about consumer preference in "picking up" along 2 miles of freeway; 20 students attending Novice class. Kendall ARS (Boerne) reports packet station operating 145.01 MHz; KA5WJI upgraded to Tech. DRN5 NM WB5YDD reports 687 messages passed in 62 May sessions; STX represented 100% by W5CTZ, N5DFO, W5KLV, K5WOB, NX5V, KD5KQ, WB5EPA, WB5FQU, WA5ZJY, N5BHQ, WB5HZQ, WB5YDD. Williamson County ARC bulletin reports KA5AOJ and KD5JX will sing in Papal Choir in San Antonio. Bay Area ARC (La Porte) VE test results: N5KEM, N5BGY to Advanced: KA5JLE to General: KA5WLW, KB5AWO, KB5CAB, KB5AWR to Technician. Bryan ARC newsletter reports 11 ops turned out to help with March of Dimes "Walk America" event: EC N5ETD reports 680 men, women and children walked the 10 miles. Traffic: K5KLV 482, WB5YDD 350, WD5J 104, WA2VJL 98, WB5EPA 65, AC5Z 52, WB5FQU 44, W5BGE 6, KA6UYV/T 4, NZ5J 4.

WEST TEXAS: SM, Gene Smith, AE5I—Tornadoes have been popping up all over Texas this month. Thanks to a bunch of good operators in West Texas the town of Saragosa had communications from the very begining. George Toone, WB5FBJ is to be commended or his quick action on two meters. The West Texas Connection on two meters worked out very good tying West Texas together. The gang on The Big Bend Emergency Net did a great job with the Red Cross and The Texas DPS. KE5OG, WA5ROE, KE5NO, KA5STE and a bunch of others deserve a lot of credit. A lot of good operators were working 24 hours or more. Our new Section Manager has been decided, W5OVH will take over July 1. Good luck Millie. EC report from N5FHR of El Paso County. 5 sessions. Traffic: AE5I 89, W5ERT 11.

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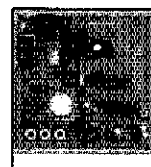

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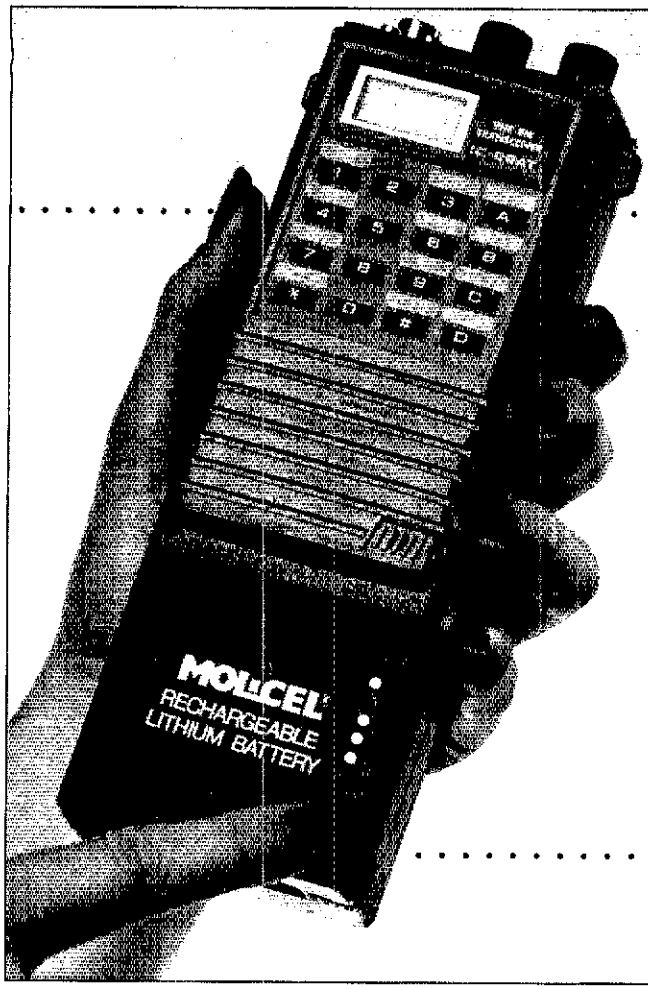

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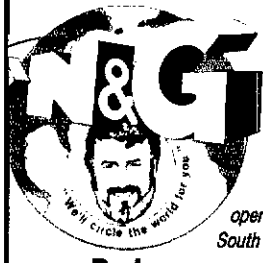

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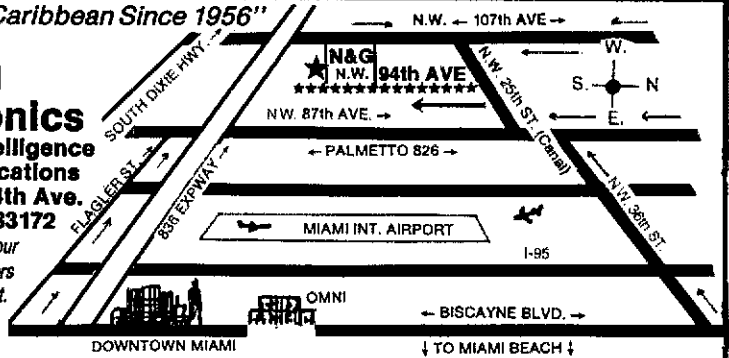

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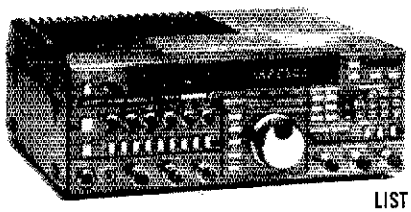

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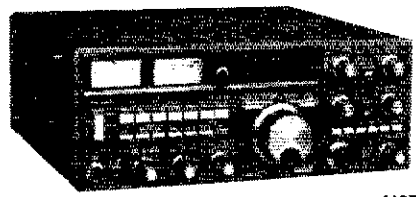

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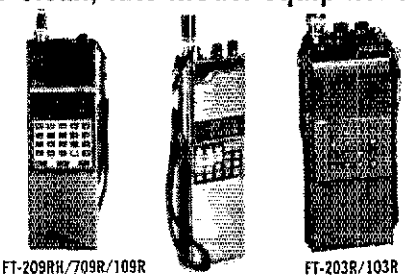

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3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied. Submitted ads should be typed or clearly printed on an 8-1/2" × 11" sheet of paper.

(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 August 14 through September 13 will appear in November *QST*. If the 13th falls on a weekend or holiday, the Ham-Ad deadline is the previous working day.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A last name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permitted in *QST* advertising.

(6) New firms or individuals offering products or services for sale must submit a production sample (which will be returned) for our examination. Dealers are exempted, unless the product is unknown to us. Check with us if you are in doubt. You must furnish a statement in writing that you will stand by and support all claims and specifications mentioned in their advertising before their ad can appear.

The publisher of *QST* will vouch for the integrity of advertisers who are obviously commercial in character, and for the grade or characters of their products and services. Individual advertisers are not subject to scrutiny.

The League reserves the right to decline or discontinue advertising for any reason.

CLUBS/HAMFESTS

QCWA Quarter Century Wireless Association is an international nonprofit organization founded in 1947. You are eligible for membership if licensed 25 or more years ago, and presently licensed. It is not necessary to have been licensed the entire 25 years. Members receive QCWA publications and participate in QCWA activities. Come grow with us! Write QCWA, Inc., 1409 Cooper Drive, Irving, TX 75061.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't., police etc. invited to join Society of Wireless Pioneers—W7GAQ/6 Box 530, Santa Rosa, CA 95402.

IMRA-International Mission Radio Association Helps missionaries by supplying equipment and running a net for them daily except Sunday, 14.280 MHz, 1900-2000 GMT. Br. Bernard Frey, 1 Pryor Manor Rd., Larchmont, NY 10538.

THE Veteran Wireless Operators Association, a non-profit organization of communications people founded in 1925, invites your inquiries and application for membership. Write VWOA, Ed F. Pleuler, Jr., Secretary, 46 Murdock Street, Fords, NJ 08863.

HAVE A-M capability? Join S.P.A.M. (Society for Promotion A-M) Membership is free. Write: F.A. Dunlap (S.P.A.M.), 14113 Stoneshire, Houston, TX 77060 (S.A.S.E. please).

FCC EXAMS. Novice-Extra. Sunnyvale VEC ARC. 408-255-9000, 24/hr. Gordon, W6NLG, Pres. Flea Market, Los Altos, CA March-September.

THANK YOU for attending Warren, Ohio Hamfest. See you August 16, 1987. W.A.R.A.

HAMFEST TICKETS. Printed Quickly, Cheaply! Samples SASE. Howelab, Box 73, Folly Beach, SC 29439.

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.

1987 "BLOSSOMLAND BLAST" Sunday, September 20, 1987. Write "BLAST", P.O. Box 175, St. Joseph, MI 49085.

RV OPERATORS are invited to check in Sun 2PMC, 14.240 + 5 Tues, Thurs 8 PMC 3,880 + 5 - Good Sam RV net - info SASE KJ4RO.

HAMFEST SUNDAY Sept. 20, 1987. LIMARC ARRL Long Island Hamfair at the New York Institute of Technology Route 25A/Northern Blvd., Old Westbury, NY. Outdoor tailgating, no reservations needed, sellers car space $5, general admission $3. Non-Ham women & children free. Exit 39 North on Route 495, go North on Glen Cove Road 2 miles to 25A, turn right 1 mile to site. Talkin 146.25/85. Food, refreshments available with many awards to attendees. Open 7:30 AM for sellers, 9:00 AM for buyers. For further info call Hank Wener, WB2ALW at night 516-484-4322. Next fests 2-14, 5-15 & 9-18, 1988.

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Rugged, all steel Hy-Gain antenna crank-up towers are galvanized after welding. Precision welding fixtures assure straight and true alignment of tower sections for close tolerance crank-up guide systems. Diamond web bracing, 2.5 times the strength of ordinary "W" bracing, adds strength where tower sections meet. Open-end tubular steel legs are galvanized inside and out and permit unrestricted moisture drainage. It all adds up to long lasting, massive tower strength for antenna loads of up to 16 sq. ft. at 60 mph.

	Height Extended	Height Retracted	Antenna Square Foot Windload Limit
HG-37SS	37 ft.	20.5 ft.	9.5 @ 50 mph
HG-52SS	52 ft.	21 ft.	9.5 @ 50 mph
HG-54HD	54 ft.	21.5 ft.	16 @ 60 mph
HG-70HD	70 ft.	21.5 ft.	16 @ 60 mph

Towers come complete with hinged base, installation steelwork, predrilled rotator plate and a manual winch.

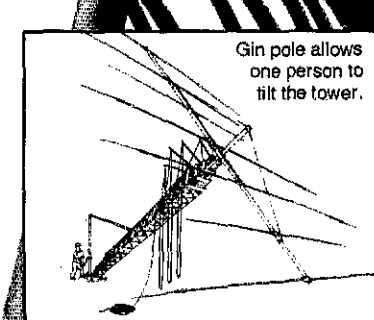
Hy-Gain crank-up towers require no guying and conform to EIA, to the Uniform Building Code, and are approved by Los Angeles (license 1095). UBC documents for building permits are available on request (specify tower model) **before** you buy the tower.

OPTIONAL TOWER ACCESSORIES

• Mast • Thrust Bearing • Coax Arms • Rotators • Tower Gin Pole

FREE FREIGHT

Order any Hy-Gain tower from your dealer for factory shipment direct to you. Hy-Gain will pay the freight on the tower and any of our antennas, rotators and accessories ordered for shipment at the same time. This offer is limited to within the 48 contiguous United States.



Gin pole allows one person to tilt the tower.

For detailed information call toll free

1-800-328-3771

In Minnesota call 612-887-5528

TELEX® hy-gain®

TELEX COMMUNICATIONS, INC.

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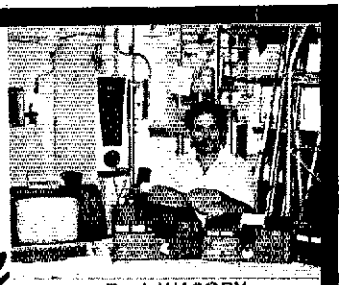
Minneapolis, Minnesota 55420

Rob, WA3QLS

Delaware Amateur Supply



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NO Sales Tax in Delaware! one mile off I-95

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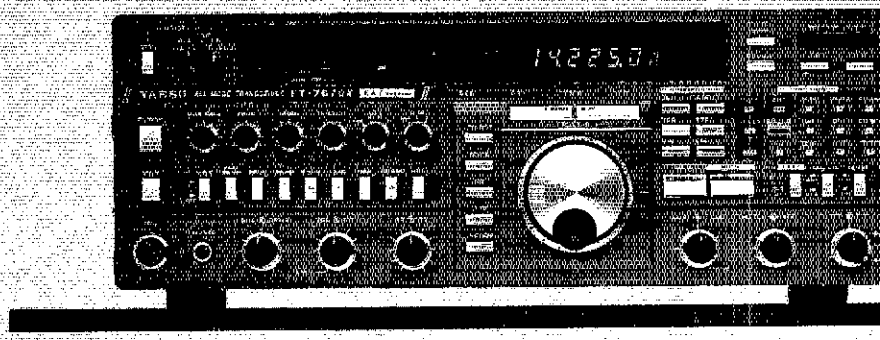


GET THE BRAINS

To transform your shack into a DX powerhouse, combine the intelligence of Yaesu's FT-767GX HF/VHF/UHF base station and the muscle of our powerful FL-7000 HF amplifier.

You'll be amazed at how you can cut through pile-ups. Be heard anywhere in the world. And wake up otherwise inactive bands.

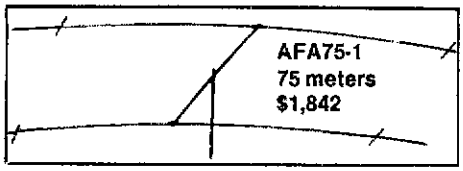
The brains of the operation: The FT-767GX. This intelligent HF/VHF/UHF base station includes four microprocessors for unparalleled flexibility and ease of operation.

Features include 160 to 10 meter transmit, including WARC bands. Optional plug-in modules for 6-meter, 2-meter and 70-cm operation. Receiver coverage from 100 kHz to 30 MHz. AM, FM, SSB, CW, AFSK modes built in. Ten memories that store frequency, mode, and CTCSS information (optional CTCSS unit for controlled-access repeaters). Memory check feature for checking memory status without affecting operating frequency. Dual VFOs with one-touch split frequency capability. VFO tracking for slaved VFO-A/VFO-B operation at a constant offset. Digital display in 10 Hz steps. Slow/fast main dial tuning. Synthesizer step programming at up to 99.99 kHz per step. Digital SWR meter. Digital RF power meter. Built-in RF preamplifier. Adjustable drive level from 0 to 100 watts. Blue fluorescent display. Built-in AC power supply.

Up to 30 minutes continuous transmit (100% duty cycle). Full CW break-in. Built-in CW electronic keyer. Audio peak filter for CW (Yaesu patent). CW and AM wide/narrow filters. Woodpecker noise blanker. RF clipping speech processor. IF shift for both receive and transmit (TX side allows you to adjust voice frequency response pattern). IF monito IF notch filter. Audio low-pass filter.

Built-in antenna tuner with mer ory of settings on each band. Separate antenna connectors for each VHF o UHF optional unit. Separate beverage antenna receive input on rear panel Quick turnaround time from TX to RX for AMTOR, Packet, and QSK CW. AGC slow/medium/fast/off selection. Push-pull MRF422 transistors

PHASED ARRAYS

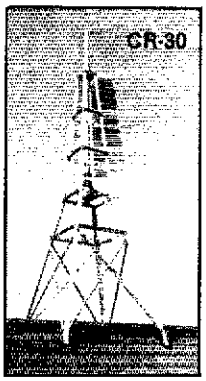


Create's phasing system allows the highest forward gain and F/B ratio obtainable with 2 elements. 40m model also available.

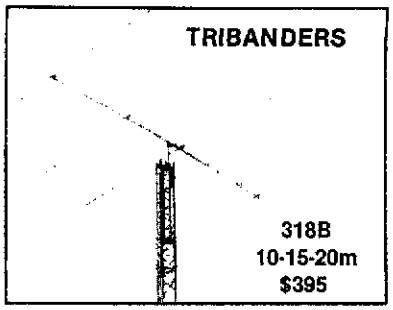
ROOF TOWERS

CR-18 6′ $123
CR-30 9′ $218
CR-45 15′ $328

Heavy duty roof towers with provision for inside mounting of rotator will meet your antenna requirements. (Guying is required, rotator and mast **not** included.)



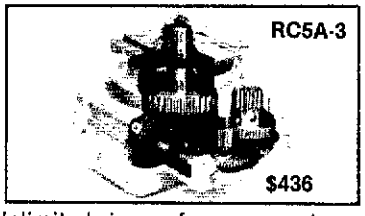
TRIBANDERS



Easy to assemble, built to last, high efficiency traps offer performance comparable to full size elements.

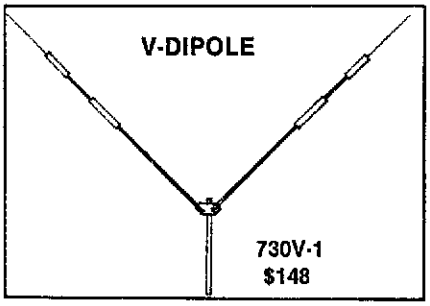
CREATE Creative Design Co., Ltd.

ROTATORS



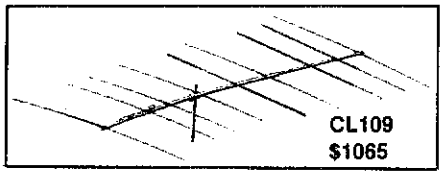
Unlimited in performance, strength and features! Handles 25 sq. feet, has preset function, speed control . . .

V-DIPOLE



Unique V-shaped dipole for 10-40 meters! Low noise, easy to mount, **no** radials required!

MONOBANDERS



World's largest commercially made 10 meter monobander! 9 elements on a 62′ boom! Other high performance monobanders available.

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To Order Any CREATE Product Call 1-800-255-7020
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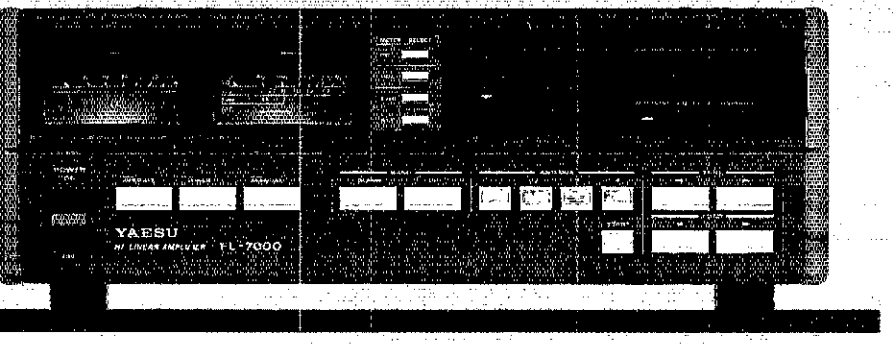

AND THE BRAWN.

(rated dissipation 290 watts each) operated at 24 volts for excellent intermodulation rejection in transmitter.

Enhanced C.A.T. system for external control of transceiver from personal computer. (Software for Apple IIe/MAC, Commodore C-64, and IBM-PC is available through your Yaesu dealer.) There's also data communication with the FL-7000 linear amplifier for hands-free amplifier operation.

The muscle to get you out: The FL-7000. This solid-state amplifier covers 160 to 15 meters, and includes a built-in power supply, automatic tuner and lots of powerful operating features.

There's fast turnaround time for break-in (QSK) CW, HF packet radio, and AMTOR. Only 70 watts excitation for full output, and 1200 watts PEP input power. Fully protected push-pull parallel wideband "no-tune" amplifier circuit powered by 47V, 25A DC power supply. Yaesu's exclusive "DVC" (Direct Vertical Cooling Heatsink System) with bottom-mounted fan. Automatic antenna matching sensor turns off amplifier and rematches tuner circuitry if SWR rises above 2:1. Hands-free automatic band change when used with FT-767GX, FT-757GX or FT-980. Lithium battery backup remembers antenna selection and tuner settings. Dual 2-speed fans with independent thermal sensors. Connection to up to four antennas, including automatic selection via optional unit. Eight front panel LED status indicators. And more.

Get the DX advantage. Just combine the FT-767GX's brains, the FL-7000's brawn, and your special operating knowledge. What an impact you'll make on the world!

YAESU

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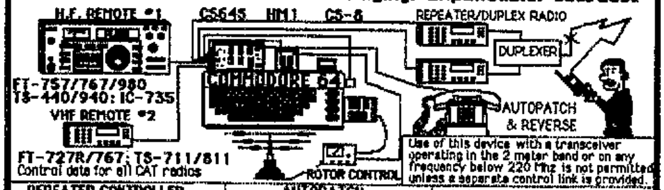
(513) 874-3100

Prices and specifications subject to change without notice.

** Super Comshack 64 **

Programable Repeater Controller/HF & VHF Remote/patch Rotor control/Voice & Sub Tone Paging/Expandable/LowCost



Use of this device with a transceiver operating in the 2 meter band or on any frequency below 220 Mhz is not permitted unless a separate control link is provided.

REPEATER CONTROLLER
- Change all access codes remotely
- Synthesized male/female voice
- Program personal mail box or tell mess. with T.T. from HT
- Alarm clock & auto excute mode
- String commands; 22 digits max
- **32 CTCSS** manual & auto paging
- Code practice; voice readback
- Multi-function voice alarm clock

H.F. REMOTE #1
- **10** Memories/auto mode sel.
- Scan up/down sel. rate or 100Hz
- Voice ack. all control commands

AUTOPATCH
- **300** Auto/quick dial recall
- **300** calls paged/32 sub tone
- **50** enable/disable tel. #'s
- Hi/Lo priority access codes
- Directed/general/rev. page
- Full or Half duplex operation
- Secure mode/ TT repeat on/off
- Store MCI/Sprint tel. #'s
- Reverse Patch active all modes
- Call waiting/ patch auto reset

V.H.F. REMOTE #2
- Dual VFO's/ Rev/Split/COR
- Set Scan/offset/var. resume

SUPER COMSHACK 64
MODEL CS64S $349.95
Plus $4.00 shipping USA
Inc. interface, disk, cables, manual

SYSTEM OPTIONS
- Relay Control; 3 DPDT +5 trans. o/c outputs **CS-8 $79.95**
- EPROM CMOS Auto boot Cartridge custom system ...... **CART$99.95**
- Rotor control voice beam bearing & voice "S" meter **HM $49.95**
- Manual(Refunded **MN $15.00**
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TOUCHTONE DECODER 4 DIGIT SEQUENCE on/off latch; all16 Digits

Repeater Master on/off
- Low power CMOS 5/12 vdc
- Program 50,000 4 digit codes
- 4 dig. code toggels latch on/off
- Latch drives relay directly
- LED displays latch state;
- Optional extra 4 digit custom latch IC's; $8.95 ea.

Model TSD $59.95

TOUCHTONE to RS232
Decode touchtone strings alarms, secret codes, display on any computer @ 300 Baud out; inc. basic program example included.
"Decode-A-Pad"
Model DAP $89.95

MINI (BEAR CAT) SCANS/PROGRAM FT-727R
Programs and Scans 100 ch. in Ham/General coverage. Converts HT into a powerful 100 ch. scanner & programs all for field use!

*Digital "S" meter; stops scan S(1-9); Auto resume
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MODEL 727-S $39.95

"Audio Blaster"
IC02/04/2AT;U16;FT727/208
Module installs inside the radio in 15 Min. Boosts audio to 1 watt! Low standby drain; Corrects low audio 1000's of happy users. Minature audio amplifier module--> Used by Police, Fire, Emergency, when it needs to be **loud!**
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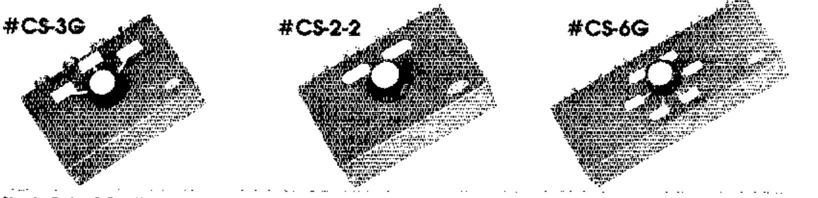
Heavy Duty switch for true 1 Kw POWER - 2 Kw P.E.P.



Single Pole, 3 Position. Desk or wall mount. All unused positions grounded
#CS-3G - UHF connectors / **$27.25***
#CS-3G-BNC - BNC connectors / **$36.50***

2 Pole, 2 Position, bypasses, linears, reflectometers, antenna tuners, etc.
#CS-2-2 UHF connectors / **$34.25***

Single Pole, 5 Position, all unused positions grounded.
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* Shipping and handling for any item add $2 each.

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2 METER AMPLIFIERS • ATV CONVERTERS

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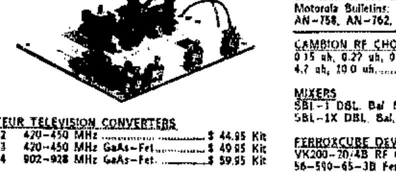

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Available in: Kit or Assembled/Tested

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2-30 MHz, 600 Watts (2 Port or 4 Port)

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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. Little Print Shop, Box 1160, Pflugerville, TX 78660.

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QSLs & RUBBER STAMPS. Top quality. QSL samples and stamp information 50 cents. Ebbert Graphics D-3, Box 70, Westerville, OH 43081.

EMBROIDERED EMBLEMS, custom designed club pins, medallions, trophies, ribbons. Highest quality, fastest delivery, lowest prices anywhere. Free info: NDI, Box 6665 M, Marietta, GA 30065.

QSLs-1)FAMOUS KØAAB custom collection. 2)Railroad employees and railan'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, WØMGI, 2095 Prosperity Ave., St. Paul, MN 55109-3621.

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COLORFUL QSLS by WA7LNW - Improve your QSL returns! Revolutionary printing process combines brilliant rainbow colors with sparkling metallic inks. The ultimate QSLs! Free samples, stamps appreciated. COLORFUL QSLs, P.O. Box 5358, Glendale, AZ 85312- 5358.

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QSL CARDS: Have us make your call into a personalized emblem for QSLs and stickers, or choose from our selection of high quality illustrated cards. For brochure send 22 cent stamp to: Select Design Cards, P.O. Box 1012, Palo Alto, CA 94302.

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ANTIQUE-VINTAGE-CLASSIC

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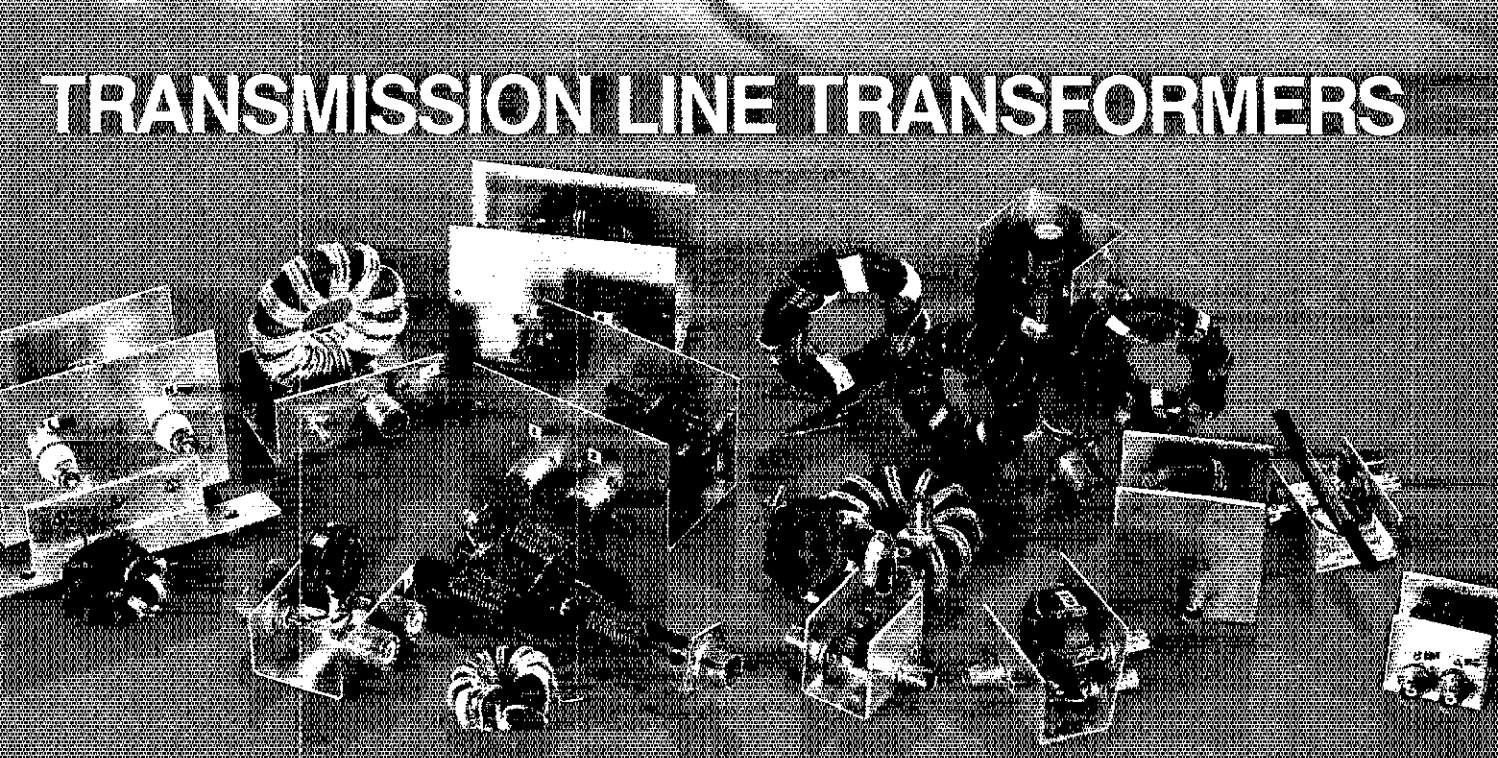
TRANSMISSION LINE TRANSFORMERS



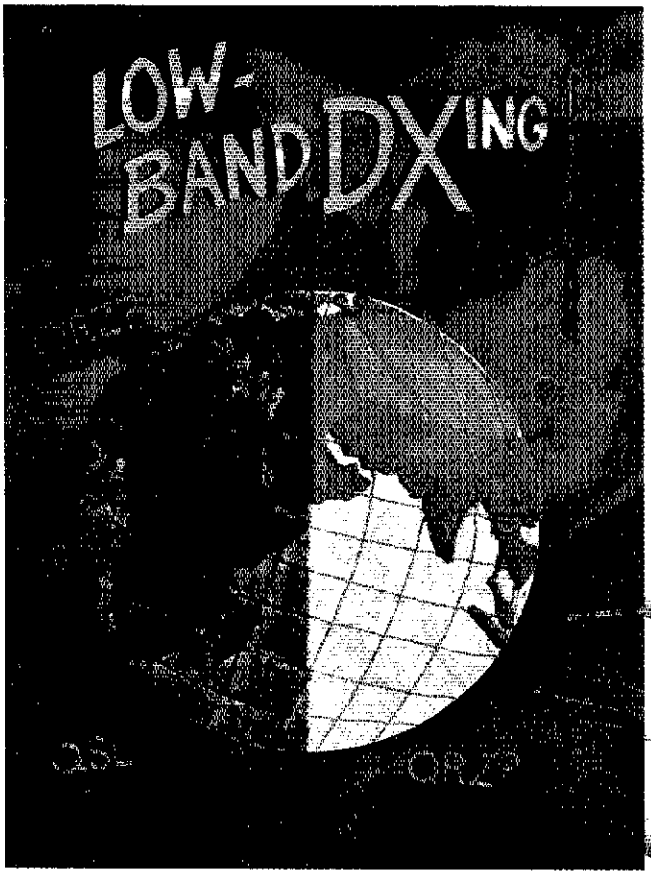
A new ARRL Publication by Dr. Jerry Sevick, W2FMI

Despite the popularity of transmission line transformers in both commercial and amateur applications, little practical design information has been published concerning these devices. The lack of data was made abundantly clear to Jerry Sevick, W2FMI when he began designing matching transformers for the short vertical antennas that are the subject of his classic series of articles that appeared in *QST*. In order to fill in the gaps of available knowledge, Jerry decided to study the subject of transmission line transformers in depth and the results of his findings are contained in this new ARRL publication!

Transmission Line Transformers covers types of windings, core materials, fractional-ratio windings, efficiencies, multiwinding and series transformers, baluns, and limitations at high impedance levels. There is also a chapter on practical test equipment. This book is must reading for everyone interested in antenna and transmission line theory. Copyright 1987, 128 pages $10 hardcover only.

CONTENTS

The American Radio Relay League, Inc
225 Main St., Newington, CT 06111



WHEN, WHERE & HOW ON 160, 80 & 40 METERS

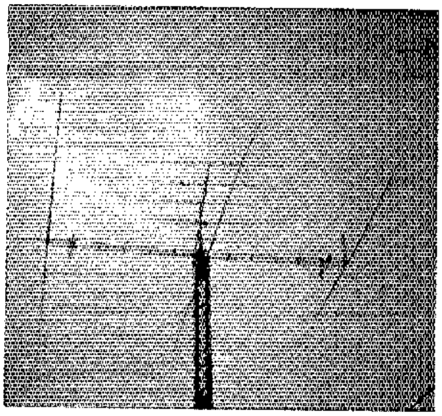
Written by John Devoldere, ON4UN, published by ARRL

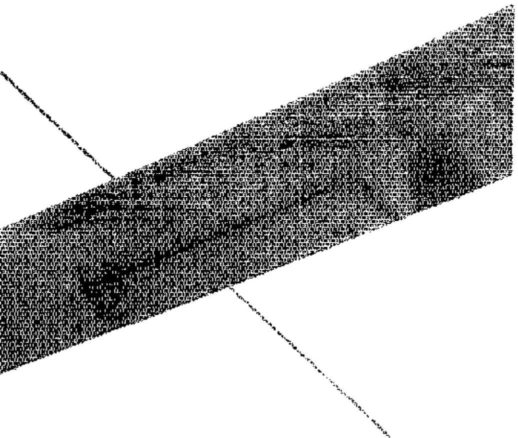
It's the first really brisk day of autumn, and the trees have begun to shed their leaves. It's been crisp and clear for the past couple of days and there is not hint of rain in the forecast, so there should be no QRN. Propagation bulletins are predicting low absorption. It's going to be a great night for Low Band DXing!

This is an over-simplification. Radio amateurs know practicaliy by instinct that 160, 80 and 40 meters "open up at night." But anyone in the Eastern U.S. who has worked Western Australia on 40-meters in the middle of the afternoon or West Coast amateurs who work into the Middle East on 80 meters just after daybreak know that, depending on the time of year, these bands have many secret hiding places for their DX-treasurers! Now, John Devoldere, ON4UN, has put together a treasure map in the form of a 210-page book published by ARRL where he completely explores the 160, 80, and 40-meter bands.

John draws on his vast knowledge and years of experience, as well as that contained in over 500 references which are listed in their own chapter. A large portion of the book is devoted to the design and building of efficient antennas for these frequencies. Receiver, transmitter and transceiver characteristics are also covered. The propagation chapter is the key to understanding when to work DX. The operating chapter tells where to find DX and gives tips on maximizing the effectiveness of your station for low band work. There is also a chapter of interesting and useful BASIC programs. But you don't have to keyboard these programs; there is inexpensive software that can be purchased separately which is available for use on many popular personal computers. (See next page.)

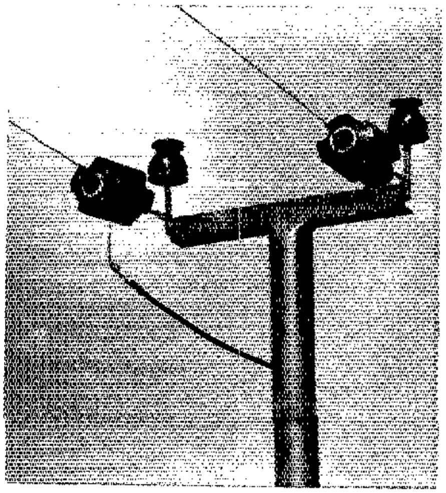
This new ARRL publication is copyright 1987. It is available in softcover only for $10 plus $2.50 ($3.50 for UPS) shipping and handling from ARRL.

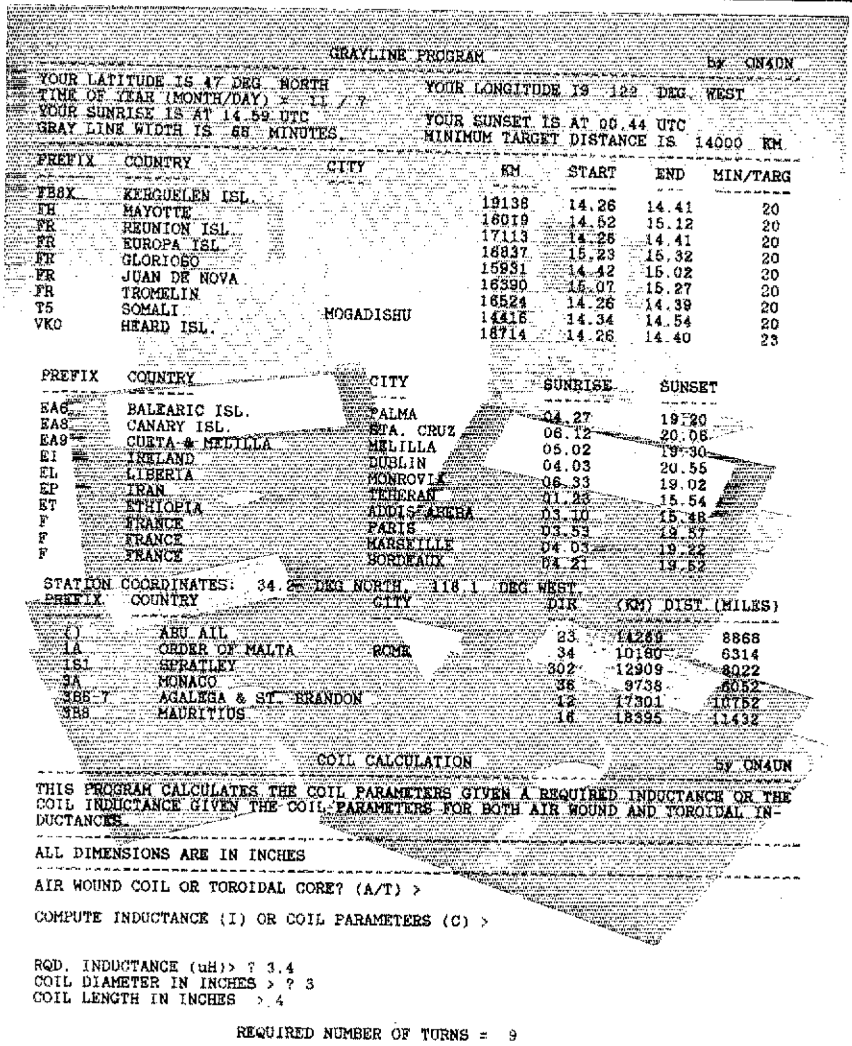




WORK DX

Top to bottom: Just some of the antennas described: the full-sized 3-element 80 meter array at I5NPH, dwarfs the 20 meter beam. OH1RY checks the driven element of his 80 meter Yagi before it's hoisted up the tower. While the use of impressive hardware is often the case on the low bands; the simple and classic Beverage shown below helps with receiving.





GRAYLINE PROGRAM by ON4UN

YOUR LATITUDE IS 47 DEG. NORTH   YOUR LONGITUDE IS 122 DEG. WEST
TIME OF YEAR (MONTH/DAY) = 11 / 7
YOUR SUNRISE IS AT 14.59 UTC   YOUR SUNSET IS AT 00.44 UTC
GRAY LINE WIDTH IS 66 MINUTES   MINIMUM TARGET DISTANCE IS 14000 KM

PREFIX	COUNTRY	CITY	KM	START	END	MIN/TARG
FB8X	KERGUELEN ISL.		19138	14.26	14.41	20
FH	MAYOTTE		16019	14.52	15.12	20
FR	REUNION ISL.		17113	14.26	14.41	20
FR	EUROPA ISL.		16837	15.23	15.32	20
FR	GLORIOSO		15931	14.42	15.02	20
FR	JUAN DE NOVA		16390	15.07	15.27	20
FR	TROMELIN		16524	14.26	14.39	20
T5	SOMALI	MOGADISHU	14416	14.34	14.54	20
VK0	HEARD ISL.		18714	14.26	14.40	23

PREFIX	COUNTRY	CITY	SUNRISE	SUNSET
EA6	BALEARIC ISL.	PALMA	04.27	19.20
EA8	CANARY ISL.	STA. CRUZ	06.12	20.06
EA9	CUETA & MELILLA	MELILLA	05.02	19.30
EI	IRELAND	DUBLIN	04.03	20.55
EL	LIBERIA	MONROVIA	06.33	19.02
EP	IRAN	TEHERAN	01.23	15.54
ET	ETHIOPIA	ADDIS ABEBA	03.10	15.48
F	FRANCE	PARIS	03.53	19.57
F	FRANCE	MARSEILLE	04.03	19.22
F	FRANCE	BORDEAUX	04.21	19.52

STATION COORDINATES: 34.2 DEG NORTH, 118.1 DEG WEST.

PREFIX	COUNTRY	CITY	DIR	(KM)	DIST. (MILES)
()	ABU AIL		23	14269	8868
1A	ORDER OF MALTA	ROME	34	10160	6314
1S1	SPRATLEY		302	12909	8022
3A	MONACO		36	9738	6052
3B6-7	AGALEGA & ST. BRANDON		12	17301	10752
3B8	MAURITIUS		16	18395	11432

COIL CALCULATION by ON4UN

THIS PROGRAM CALCULATES THE COIL PARAMETERS GIVEN A REQUIRED INDUCTANCE OR THE COIL INDUCTANCE GIVEN THE COIL PARAMETERS FOR BOTH AIR WOUND AND TOROIDAL INDUCTANCES.

ALL DIMENSIONS ARE IN INCHES

AIR WOUND COIL OR TOROIDAL CORE? (A/T) >

COMPUTE INDUCTANCE (I) OR COIL PARAMETERS (C) >

RQD. INDUCTANCE (uH)> ? 3.4
COIL DIAMETER IN INCHES > ? 3
COIL LENGTH IN INCHES > 4

REQUIRED NUMBER OF TURNS = 9

Low Band DXing Software

by John Devoldere, ON4UN

This inexpensive software will save you plenty of time. DXers will find these programs useful: grayline, great circle, and sunrise/sunset time listings. Of particular interest are the types of problems you can solve that have to do with antennas and transmission lines: mutual impedance, element driving impedance, voltage or impedance along with feedlines, feedline transformer, shunt or series input L network iteration and design, shunt or series impedance network, Pi or T line stretcher, feedline T junction/parallel impedances, SWR iteration and calculation, stub matching, horizontal antenna wave angle, vertical antenna design program, top loaded vertical design program, vertical array pattern calculation, element taper, coil calculation, RC/RL circuit transformation and obtaining precise resistance and capacitance values.

When ordering specify format; these versions are available for $20: **MS-DOS** for IBM and IBM compatables, **DOS 3.3** for Apple 2C or 2E, **CP/M** for Kaypro or Xerox, **CB-128 CP/M** for the Commodore C-128. The **MacIntosh** version is $25. Please add $2.50, ($3.50 for UPS) shipping and handling.

THE AMERICAN RADIO RELAY LEAGUE
225 MAIN STREET
NEWINGTON, CT 06111

The New 688-page ARRL Operating Manual is HOT...

On July 8, 1986, a railroad tanker carrying toxic phosporous derailed and caught fire near Miamisburg, Ohio. The success of the Monsanto Amateur Radio Association's emergency plan in helping local authorities deal with this potential disaster is documented in November 1986 *QST*. The photograph above which was taken over the scene by Mike Carter, WD8BSI, shows what could happen in your backyard! Would you be ready for such a situation? The Emergency Communications chapter by Richard Regent, K9GDF, in the new *ARRL Operating Manual* tells how to prepare for such an eventuality. Emergency Communications and efficient message handling go hand-in-hand. Maria Evans, KT5Y, tells all about this subject and how you can become a part of the National Traffic System in the expanded Traffic Handling chapter.

Over forty percent of the radio amateurs licensed today were at one time or still are shortwave listeners. With modern transceivers, it's possible to hear what is going on outside our ham-bands. David Newkirk, 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 pounding a telegraph key. Carol Smith, AJ2I, and Bill Jennings, K1WJ, have prepared a chapter on Basic Operating. It is just what the newcomer needs in order to get started, and it's good review for some of us who have been away from ham radio for a while. Almost everyone can qualify for the Rag Chewer's Club Certificate, but do you realize that there are hundreds of Amateur Radio awards from throughout the world? Well you can see dozens of these awards in *full color* along with their requirements in the Awards chapter by Bob Halprin, K1XA.

Clarke Greene, K1JX, tells all about competitive operating. Clarke has won almost every major contest, HF, VHF/UHF, from home and away, using full power and QRP. Now he tells how it's done!

Almost everyone seems to be interested in digital communications these days. Stan Horzepa, WA1LOU, covers Packet Radio in detail; while Larry Wolfgang, WA3VHL, 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.

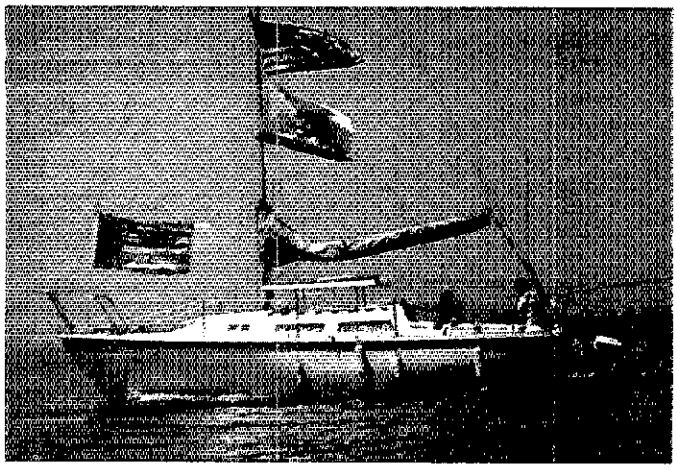
Besides "packet," WA1LOU tells what is new in the area of FM and Repeater operation. This chapter is "must" reading for Novices who want to use repeaters for the first time or for those who want to upgrade their existing repeater operations. There is a lot doing these days on weak signal VHF/UHF work 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.)

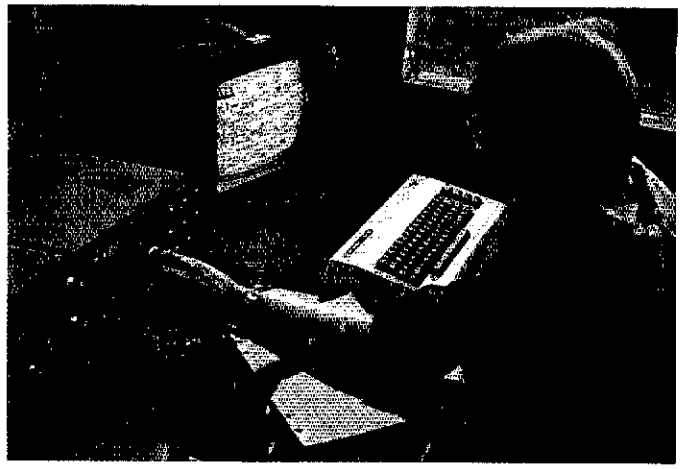
For even more information, turn the page!

but it's also

FUN!

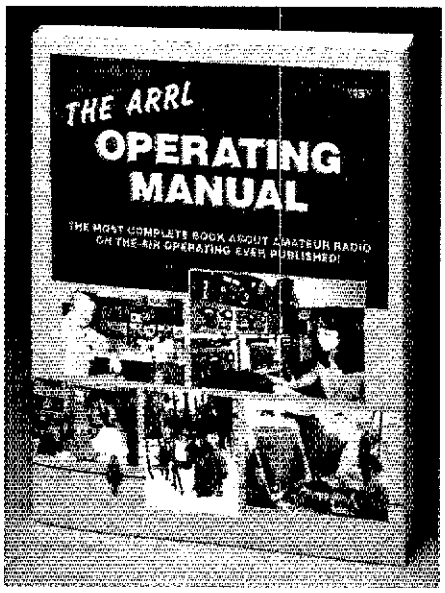


Can you think of a better spot for some relaxing operating than this? KB6AIB and N6ESB ride the waves after catching some waves on HF. Fun like this is covered in the Basic Operating chapter of the **new ARRL Operating Manual**.



WB7RPJ shows visitors to a county fair what RTTY is all about. We've doubled the amount of material on digital communications in the new edition so you can learn how to join in. (KC7YN photo)

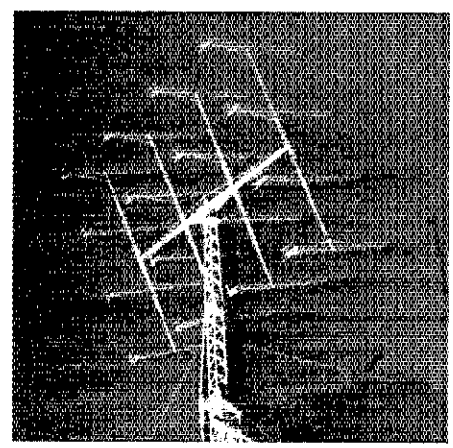
A brief look at the new ARRL Operating Manual



N1CXV is shown here checking out the W1AW 2-meter repeater. The new *Operating Manual* does an excellent job in describing just about all you need to know about this popular means of communication.

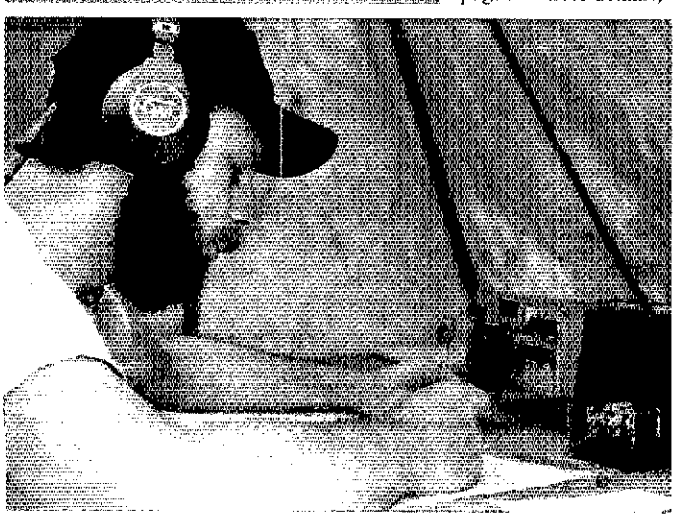
There is no better book on operating for the new Novice. Now that Novices are allowed operation on FM and other modes on the VHF/UHF bands, the new *ARRL Operating Manual* is *the* source for information on the proper procedures to use. Many beginners are nervous because they haven't tried a particular band or mode before. Now, newcomers can find out what is going on and explore new frontiers of operating with confidence. Even the beginner can use the propagation tables to determine when there will be openings to particular parts of the world on the HF bands.

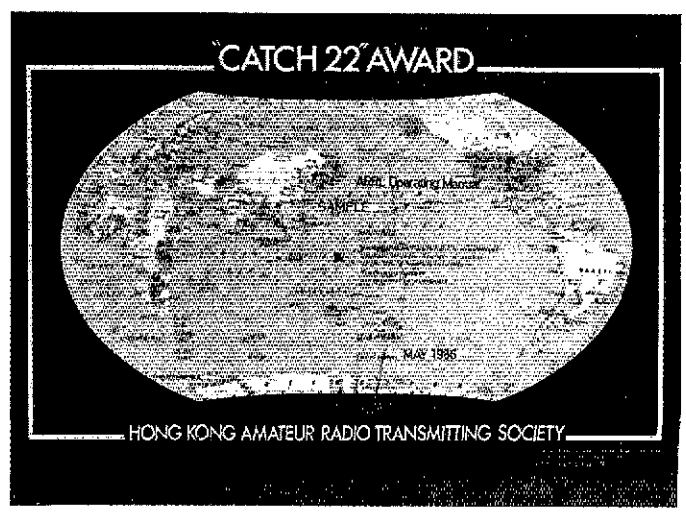
Weak signal work on VHF/UHF is always fascinating. The array at right is used by I2ODI for moonbounce. There is also meteor and tropospheric scatter, and if that isn't enough there are Sporatic E and auroral openings. ARRL's VUCC awards for working grid squares make VHF/UHF operating all the more fun! The VHF/UHF chapter tells what you need to know.



Practically all of the popular operating awards are described in the Awards chapter. Like the "Catch 22" Award, most are reproduced in full color!

N8HLE is shown here operating Field Day. "FD" is an emergency exercise, an operating event, and a learning experience. Those terms also capture the essence of the new *ARRL Operating Manual*. The new edition belongs in every Amateur Radio operator's library. (See the preceding page for more details.)

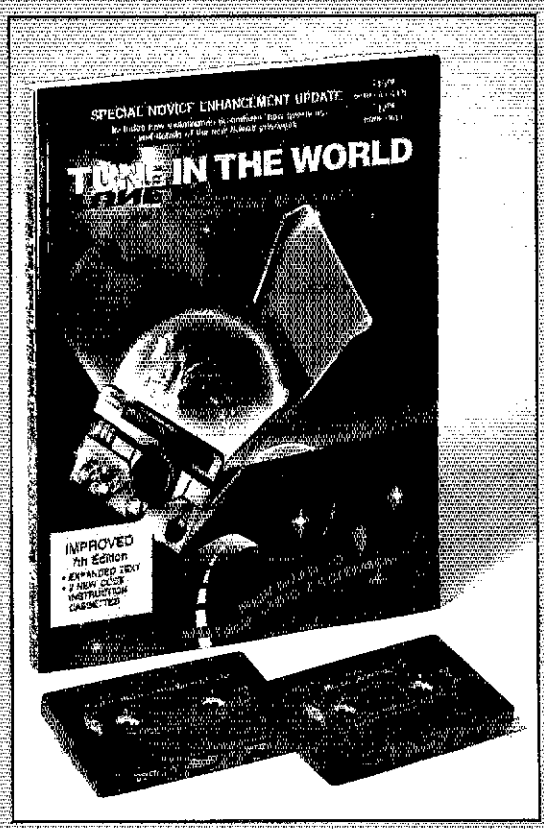




TUNE IN THE WORLD WITH HAM RADIO

YOUR ROAD TO HAM RADIO EXCITEMENT

Tune in the World with Ham Radio has put the fun back into learning what Amateur Radio is all about. Enhanced Novice class privileges have brought the fun back into operating. Now beginners with their Novice licenses no longer have to spend all of their time on the air using only Morse code. Novices can now use voice communications on 10-meters and use VHF and UHF repeaters. The new privileges include the use of digital communications so that home computers can be linked through packet radio networks.



Imagine being able to personally communicate with an astronaut as the Space Shuttle circles the globe. Perhaps you would like to become a friend over the airwaves with someone on a remote island in the South Pacific or on an ice-flow in the Arctic. There are hams everywhere!

The FCC requires that Novices know something about their new privileges and that's where the expanded *Tune in the World with Ham Radio* text comes in. You'll find what you need to know explained in clear, concise bite-sized chunks of information. You'll find all 300 possible questions on the Novice exam with their distractors and answer key. Besides improving the text, we've added almost three times the code practice material to the package in the form of two C-90 tape cassettes. One tape teaches the code, the other provides practice. They are recorded in stereo so you can switch off the voice portion for even more practice. These new tapes make learning the code a snap!

The *Tune in the World with Ham Radio* package including the text and both tapes is available for $15. The text alone is $12 and the set of tapes is $10. Add $3.50 for shipping and handling.

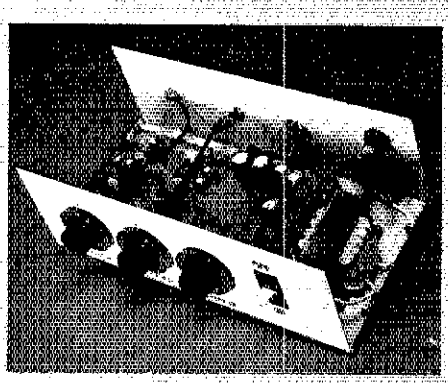
How We Made *Tune In the World With Ham Radio* Even Better!

Two new tapes with almost three times the code practice material and an expanded text covering Novice Enhancement changes make this edition a winner.

Tune In the World With Ham Radio has proven to be one of the League's most popular courses of instruction for the aspiring ham, and the 7th Edition of this package has just been released.

The **BIG NEWS** about our beginner's package is that we have replaced the 60-minute cassette with two 90-minute cassettes to give almost three times the Morse Code instruction. Production of these tapes was a team effort. First, selected ARRL registered instructors were asked to review prototype tapes. ARRL Training Manager John Foss, W7KQW and Club Resources Manager Curt Holsopple, K9CH reviewed the suggested changes and these were incorporated into the 3-hour script that was prepared by Assistant Technical Editors Larry Wolfgang, WA3VIL and Bruce Hale, KB1MW.

Although it is easy to get an IBM® PC to generate code, it is very difficult to get acceptable code reproduction on even the highest quality audio equipment. The keying wave-form coming from a PC is uncomfortably "hard," which makes copy difficult for the beginner. To overcome these problems, one of our ARRL Laboratory engineers Ed Hare, KA1CV, designed and built a keying interface which allows proper shaping and audio levels for use with mixing and recording equipment.



Ed Hare, KA1CV, designed and built this active filter in order to improve the quality of the code practice audio. It *really* makes a difference!

At the recording studio: Curt Holsopple, K9CH, reads the voice-over and Larry Wolfgang, WA3VIL, monitors the code sent from the IBM® PC.

An audio engineer prepares the deck on which the master tape for the **new** *Tune In the World With Ham Radio* cassettes will be recorded.

The result is vastly superior to the code practice material contained in the previous editions. The popular Farnsworth method is used: the letters are sent at 18 WPM with appropriate spacing so that the actual speed is 5 WPM. The code is recorded on both stereo channels, but the voice-over is recorded only on one. Students with a stereo tape player can learn the code as the text is described on the tape, and then switch to the "code only" channel to test themselves as they go along.

The first tape is devoted to teaching the letters of the alphabet, prosigns, and numbers; the knowledge of each is required on the code portion of the Novice exam. Each new letter (or character) is sent several times, then words are sent containing previously learned letters and the new letter before going on to the next. The audio channel explains what is being sent. The first side of the second tape consists of 9 practice sessions; which are described on the tape and in greater detail in Chapter 3 of the *Tune In the World* text. The other side of the second tape consists of six sample Amateur Radio contacts for use as final practice by the student. Sample 10-question tests covering each of the QSOs are also presented in the text in order to give the student a feel for what the code portion of the exam will cover. The new tapes should make learning the code a fun experience.

We've improved the text too! Material has been added to the text to cover what the prospective Novice needs to know in order to pass the new 30-question Novice exam. The question pool has been expanded with all 300 possible questions and distractors presented along with an answer key. The new chapters are written in the style that has made the most recent editions of *Tune In the World With Ham Radio* so popular among students and instructors. Editorial responsibility for the package belongs to ARRL Assistant Technical Editor Bruce Hale, KB1MW. Additional editorial support came from Senior Assistant Technical Editor Mark Wilson, AA2Z.

Tune In the World With Ham Radio is suitable for individual or classroom instruction. With the expanded text and improved code-learning cassettes, this package should be *your* choice for Novice instruction material. Complete kit with text and two C-90 code instruction cassettes, $15. Text only, $12. Set of both cassettes, $10.

IT'S NYE TIME TO TUNE UP WITH A NYE VIKING MB-V-A

Discover this durably built, feature packed MB-V-A Antenna Tuner. You'll find operating conveniences that make antenna tuning a snap. The MB-V-A is value engineered to do the job over wide operating ranges. Compare quality, features and the exclusive NYE VIKING TWO YEAR WARRANTY!

Maximize Power Transfer. Match your transmitter output impedance to almost any antenna system for maximum power transfer.

PI Network. Low Pass Pi Network tuning – 1.8 to 30MHz. Heavy duty, silver plated continuously variable inductor with 25:1 vernier dial. 7000 volt variable capacitor and 15,000v switch selected fixed capacitors on output side. Tunes 40 to 2000 ohm antennas. Also provides harmonic suppression.

Automatic SWR. Hands free metering of SWR. No reset or calibration needed. Separate power meter – 300 or 3000 watts – automatically switched. Easy to read 2½" recessed backlighted meters show SWR and power continuously. Precision Jewel meters.

Antenna Switch. PUSH-BUTTON antenna switching to 4 antennas (2 coax, single wire and twin lead). Tuner bypass on first coax output. We designed this rugged switch to handle the power.

3KW Balun. Trifilar wound, triple core toroid gives balanced output to twin feeders from 200 to 1000 ohms and unbalanced output down to 20 ohms.

Model Options. MB-IV-A1 includes all MB-V-A features less antenna switch and balun. MB-IV-A2 is identical to MB-IV-A1 with the addition of a triple core balun.

* 1.8 MHz will not tune on some antennas.

OTHER NYE VIKING PRODUCTS: Straight Keys. Squeeze Keys. Code Practice Sets. Electronic and Memory Keyers. Phone Patches. 2KW Low Pass Filters. Automatic SWR and Power Meters for HF and 2m (plus a model for the blind). 200w PEP antenna tuner. All-Band Antenna and more!

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Bellevue, WA 98005
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HALLICRAFTERS Service Manuals. Amateur and SWL. Write for prices. Specify Model Numbers desired. Ardco Electronics, P.O. Box 95, Dept. Q, Berwyn, IL 60402.

WANTED: Radio, magazines, horn speakers, pre 1930. W6THU, 1545 Raymond, Glendale, CA 91201, 818-242-8961.

MICROPHONES AND related memorabilia used in radio/TV broadcasting prior to 1960 wanted. Cash paid: trade terms available. Write: James Steele, 160 West 77th Street, New York, NY 10024-6942.

WANTED: *QST* VOLUME 1. W6ISQ, 82 Belbrook Way, Atherton, CA 94025.

SCHEMATICS: Radio receivers 1920's/60's. Send Brand-name, Model No., SASE Scaramella, Box 1, Woonsocket, RI. 02895-0001.

TELEGRAPH BUGS, paddles, old keys wanted. Collector seeks all models and variations to date. Keys by Martin-United Electric-Vibroplex wanted working or not. Donations of parts, partial or damaged keys appreciated. Write: John Hensley, WJ5J, 5054 Holloway Avenue, Baton Rouge, LA 70808.

WE MAY HAVE the tubes you need. (Thousands in stock). Send S.A.S.E for our list. Fala Electronics, P.O. Box 1378-1, Milwaukee, WI 53201.

ANTIQUE RADIO CLASSIFIED. If you buy, sell or collect old radios, subscribe to Antique Radio's largest circulation monthly magazine. Old radios, TVs, Ham Equip., 40's & 50's Radios, Telegraph, Books & more. Ads and Articles. Free 20-word ad monthly. Sample free. Six-month trial: $10. Yearly rates: $18 ($24 by 1st Class). Write for foreign rates. ARC, P.O. Box 2-B2, Carlisle, MA 01741

WANTED, BOOKS: Pre-1900 Electricity and Telegraphy, Pre-1925 Radio, Pre-1940 Television. Books, Magazines or any other related literature. Jim Kreuzer, N2GHD, 6270 Clinton St., Elma, NY 14059 716-681-3186

BUY, sell, collect and restore early tube equipment? Early receivers, tubes and telegraph gear? Join the Antique Wireless Association which sponsors old-time "meets", flea markets, museum and journal with technical articles and free want ads. Membership and annual dues only $10. Write for information and Museum hours: Bruce Kelley, W2ICE, Route 3, Holcomb, NY 14469.

WANTED: NATIONAL SW3 Receivers. Also parts and accessories for these recievers. Dean Showalter WA6PJR, 38308 Panorama Drive, Yucaipa, CO 92399.

NATIONAL RADIO equipment manuals or NCL 2000 factory parts lists. SASE Max Fuchs, 11 Plymouth Lane, Swampscott, MA 01907.

WANTED: SW-3, HRO-7, one-tube regenerative, w/coils. The earlier the version the better. Jack, W7HWX, 20 Santa Fe, Prescott, AZ 86301, 602-445-0999.

OLD CALLBOOKS WANTED: prior 1940. W2OC, 2 Barnard Road, Armonk, NY 10504, 914-273-3058.

WANTED: BC-610, any model. Also parts including tuning units, xmtr coils, etc. Please write stating condition and price. KØGPX, Gerry, 3420 Birdie Street NE, Fargo, ND 58102.

WANTED: McINTOSH Tube-type Audio Equipment, Accessories, and literature for personal collection. All inquiries answered; information and appraisals gladly given. Marcus Frisch, WA9IXP, Box 385, Elm Grove, WI 53122-0385, 414-545-5237.

R-390A RECEIVER: $115, electronically complete, reparable (Government-removed meters, operation unaffected). R-390 Parts: Info SASE. Mint military-spec pull-out 12AT7, 6AG5, 6BA6: $15/dozen. CPRC-26 six meter FM transceiver with crystal, handset: $22.50, $42.50/pair. Add $4.50/item shipping except R- 390A, shipped collect. Baytronics, Box 591, Sandusky, OH 44870.

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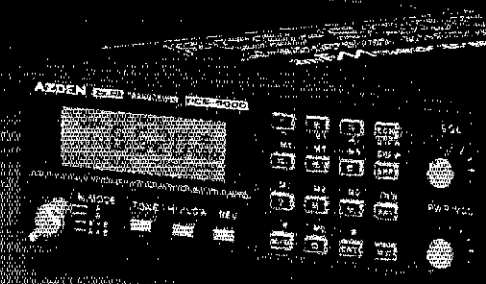

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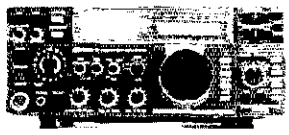

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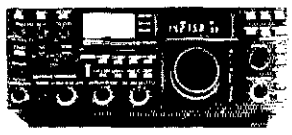

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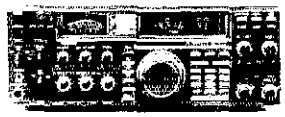

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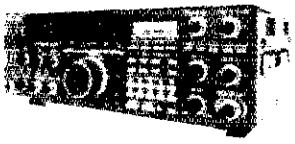

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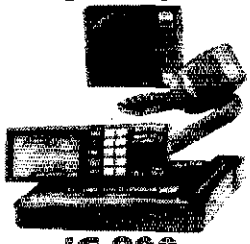

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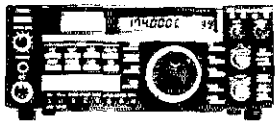

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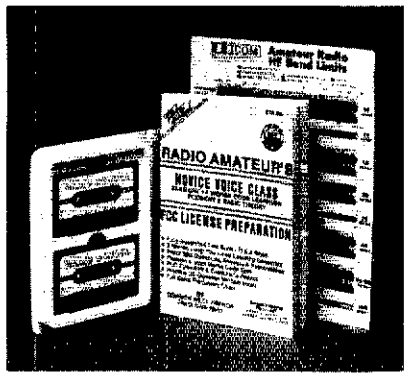

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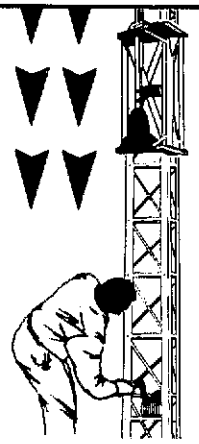

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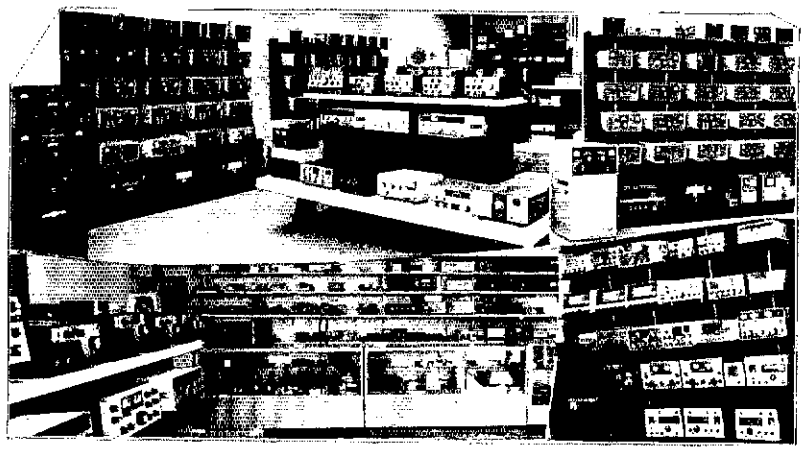

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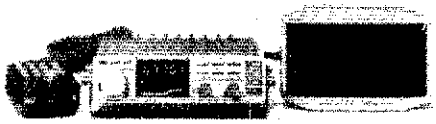

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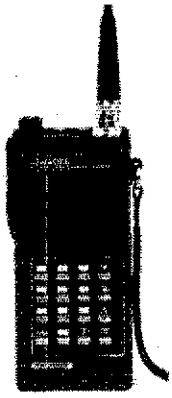

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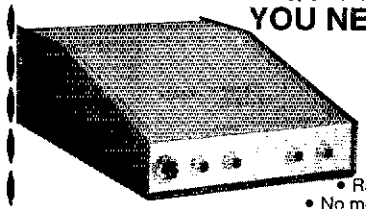

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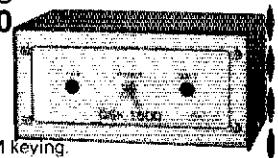

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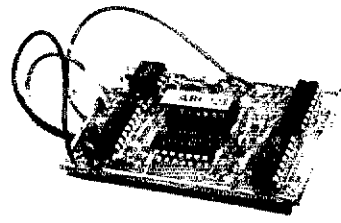

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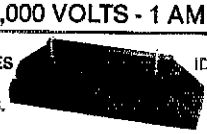

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WANTED: 5CX1500A used or new. Call or write please: Harold Bramstedt, 6104 Egg Lk Road, Hugo, MN 55038, 612-429-9397.

DRAKE TR-7, Power Supply, SB Filter, N.B., desk mic, mint; complete with manuals. $800 plus UPS. K5MEC, 4 Sombrero Lane, St. Rose, LA 70087. SELL 726R with 6M module mint. WB2DHC, 201-316-9444.

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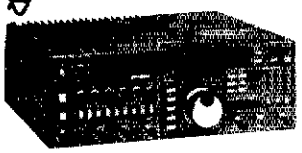

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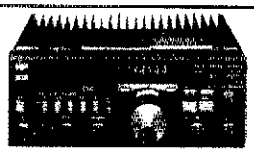

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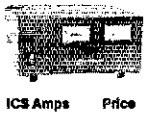

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RS35M	25	35	149
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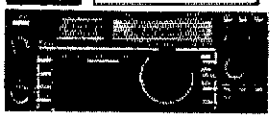

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B108	2M	Yes	10W	80W	$159
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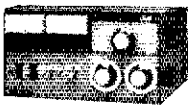

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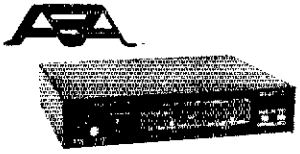

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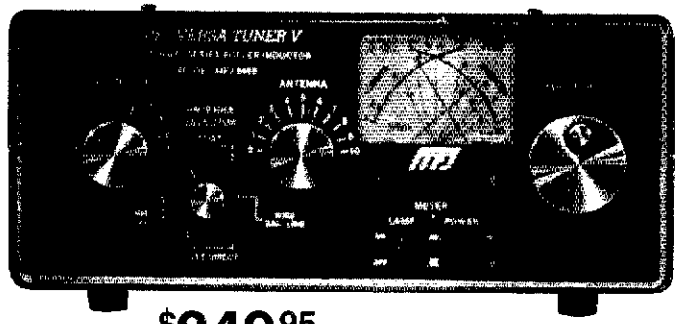
(Prices & Availability Subject To Change Without Notice)

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 10¾"Wx4½"Hx14 7/8"D.

Matches coax, balanced lines, random wires—1.8 to 30 MHz. 3 KW PEP —the power rating you won't outgrow (250pf-6KV caps).

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.

Lighted Cross-needle Meter reads SWR, forward and reflected power all in one glance. Has 300 and 3,000 watt ranges. Meter light requires 12 VDC.

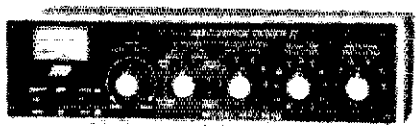
6 position antenna switch (2 coax lines, through tuner or direct, random/balanced line or dummy load). SO-239 connectors, ceramic feed-throughs, binding post grounds.

Deluxe aluminum low-profile cabinet with sub-chassis for RFI protection, black finish, black front panel with raised letters, tilt bail.

MFJ989B **$349.95**

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: 10¾ × 4½ × 14⅞ inches. Flip stand for easy viewing. Requires 12V for light.

MFJ's Best VERSA TUNER

MFJ-949C **$149.95**

MFJ's best 300 watt tuner is now even better! The MFJ-949C all-in-one Deluxe Versa Tuner II gives you a tuner, cross-needle SWR/Wattmeter, dummy load, antenna switch and balun in a new compact cabinet. You get quality conveniences and a clutter-free shack at a super price.

A new cross-needle SWR/Wattmeter gives you SWR, forward and reflected power—all at a single glance. SWR is automatically computed with no controls to set. Has 30 and 300 watt scale on easy-to-read 2 color lighted meter (needs 12 V).

A handsome new black brushed aluminum cabinet matches all the new rigs. Its compact size (10 x 3 x 7 inches) takes only a little room.

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**

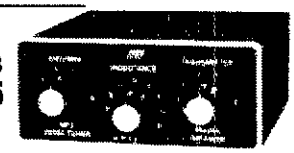
MFJ-1702. $19.95. 2 positions. 60 dB isolation at 450 MHz. Less than .2 dB loss. SWR below 1:1.2.

$29.95 MFJ-1701

MFJ-1701, $29.95. 6 positions. White markable surface for antenna positions.

MFJ's Smallest VERSA TUNER

MFJ-901B **$59.95**



MFJ's smallest 200 watt Versa Tuner matches coax, random wires and balanced lines continuously from 1.8 thru 30 MHz. Works with all solid state and tube rigs. Very popular for use between transceiver and final amplifier for proper matching. Efficient airwound inductor gives more watts out. 4:1 balun for balanced lines. 5 x 2 x 6 inches. Rugged black all aluminum cabinet.

MFJ's Random Wire TUNER

MFJ-16010 **$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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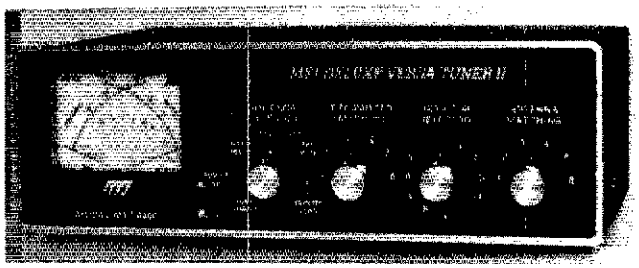
MFJ ACCESSORIES

MFJ's BEST 300 WATT TUNER HAS A CROSS-NEEDLE METER THAT READS SWR, FORWARD AND REFLECTED POWER – ALL AT A GLANCE.



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 compact cabinet. You get quality conveniences and a clutter-free shack at a super price.

A 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 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 give you safe arc-free operation. A 4:1 balun is built-in to match balanced lines.

Order your convenience package now and enjoy.

MFJ 12/24 HOUR LCD CLOCKS

MFJ-108 $19.95 **MFJ-107 $9.95**

Huge 5/8 inch bold black LCD numerals make these 24 hour LCD clocks a must for your ham shack. Choose from a dual clock that displays UTC and local time or the single unit that displays 24 hour time.

Mounted in a brushed aluminum frame, these clocks feature 5/8 inch LCD numerals and a sloped face for easy across the room reading. Both also feature easy set month, day, hour, minute and second functions that can be operated in an alternating time-date display mode. MFJ-108, 4½x1x2 inches; MFJ-107, 2¼x1x2 inches. Battery included.

MFJ-962B VERSA TUNER III

MFJ-962B $229.95

Run up to 1.5KW 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 200 and 2000 watt ranges. 6 position antenna switch handles 2 coax lines, random wire and balanced lines. 4:1 balun. 250 pf, 6 kv variable capacitors. 12 position ceramic inductor switch. Smaller size matches new rigs: 10¾ x 4½ x 14 7/8 inches. Flip stand for easy viewing. Requires 12V for light.

MFJ RANDOM WIRE TUNER

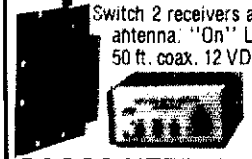
MFJ-16010
$39.95

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. Tunes 1.8-30 MHz. 2x3x4 inches.

REMOTE ACTIVE ANTENNA

54 inch remote active antenna mounts outdoor away from electrical noise for maximum signal and minimum noise pickup. Often outperforms long-wire hundreds of feet long. Mount anywhere-atop houses, buildings, balconies, apartments, ships.

Use with any radio to receive strong clear signals from all over the world. 50 KHz to 30 MHz. High dynamic range eliminates intermodulation. Inside control unit has 20 dB attenuator, gain control. Switch 2 receivers and auxiliary or active antenna. "On" LED. 6 x 2 x 5 in. 50 ft. coax. 12 VDC or 110 VAC with MFJ-1312. $9.95.



MFJ-1024
$129.95

CROSS-NEEDLE SWR/WATTMETER

MFJ-815
$59.95

MFJ's cross-needle SWR/Wattmeter gives you SWR, forward and reflected power -- all at a single glance! SWR is automatically computed -- no controls to adjust. Easy-to-use push buttons select three power ranges that give you QRP to full legal limit power readings. Reads 20/200/2000 W forward, 5/50/500 W reflected and 1:1 to 1:5 SWR on easy-to-read two color scale. Lighted meter needs 12 V. ±10% full scale accuracy. 6½x3¼x4½ inches.

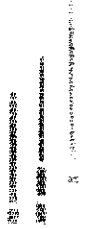
COMPACT SPEAKER

MFJ-280 $18.95

Mobile speaker. Tilt bracket on magnetic base. 3½ mm phone plug. Use with 8 and 4 ohm impedances. Handles 3 watts audio.

HANDHELD TELESCOPING ANTENNAS WITH BNC

MFJ-1710, $9.95, 3/8 wave 2 meter. Pocket clip. 5¾" - 24½".
MFJ-1712, $14.95, ¼ wave 2 meter; 5/8 wave 440 MHz. 7¼" - 19".
MFJ-1714, $16.95, ½ wave 2 meter. End-fed halfwave dipole. Shorter, lighter, more gain, less stress than 5/8 wave mounted on handheld. When collapsed it performs like rubber duck.



MFJ "DRY" DUMMY LOADS

MFJ-262
$64.95

MFJ-260
$26.95

MFJ's "Dry" dummy loads are air cooled -- no messy oil. Just right for tests and fast tune up. Non-inductive 50 ohm resistor in aluminum housing with SO-239. Full load to 30 seconds, de-rating curve to 5 minutes. **MFJ-260 (300 watt),** SWR 1.1:1 -30 MHz, 1.5:1, 30-160 MHz, 2½x2½x7 inches. **MFJ-262 (1 KW),** SWR 1.5 :1-30 MHz. 3x3x13.

MFJ DELUXE ELECTRONIC KEYER

MFJ-407B
$69.95

MFJ-407B Deluxe Electronic Keyer sends iambic, automatic, semi-auto. or manual. Use squeeze, single lever or straight key. Plus/minus keying. 8-50 WPM. Speed, weight, tone, volume controls. On/Off. Tune. Semi-auto switches. Speaker. RF proof. 7x2x6 inches. Uses 9 V battery. 6-9 VDC or 110 VAC with AC adapter. MFJ-1305, $9.95.

ANTENNA CURRENT PROBE

MFJ-206 $79.95

MFJ Antenna Current Probe lets you monitor RF antenna currents -- no connections needed! Determine current distribution, RF radiation pattern and polarization of antennas, transmission lines, ground leads, building wiring, guy wires and enclosures.

- **Determine if ground** system is effective.
- **Pinpoint RF leakage** in shielded enclosures.
- **Locate best place** for mobile antenna.
- **Use** as tuned field strength meter.
- **Indicate transmission line radiation** due to high SWR, poor shielding, antenna unbalance.
- **Detect re-radiation** from gutters, guy wires that can distort antenna field patterns.

Monitors RF current. 1.8-30 MHz. Has sensitivity, bandswitch, tune controls, telescoping antenna for field strength meter. 4x2x2 inches.

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System 400

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Power Rating 400W SSB

RM-10	11.55
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RM-20	15.25
RM-40	17.75
RM-75	19.25
BM-1 Bumper Mount	14.95
RSS-2 Res. Spring	7.95
3 Res. Adapter	5.95
MO-1 or MO-2 Mast	21.25

System prices include 5 resonators & 4 Access.

System 1000

1KW SSB	169.95
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RM-20S	21.95
RM-40S	27.50
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- H frame built with extruded aluminum
- 3/8-24 thread to match most mobile whips
- Built to hold the biggest mobile antennas

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The best antenna mount made! 3/8-24, SO-239, 5/8 hole

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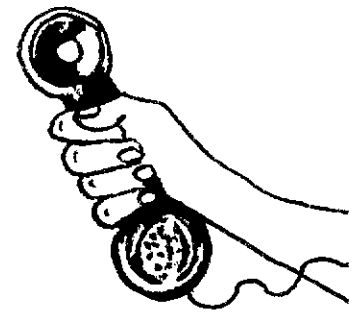

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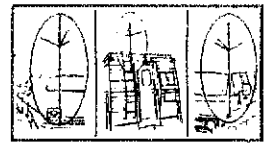
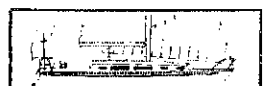
The Spider™ Antenna will help you keep in touch with your ham friends around the world. Four bands — 10, 15, 20 and 40 (or 75) meters. Needs no antenna tuner. Custom made with highest quality workmanship and materials.

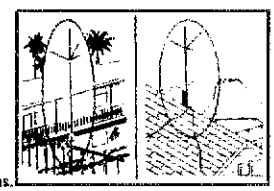
On Land . . . Suitable for use on any motor vehicle from a compact automobile to a motor home. Work four bands without stopping to change coils.





Or Sea . . . The Spider™ Maritimer™ is for use on or near the ocean. Highly polished non-magnetic stainless steel and nickel-chrome plated brass.

At Home . . . If you live in an apartment, condominium or restricted area, the Spider™ may well be the answer to your antenna problems.



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Boost Your Contest Power!

THE NEW LK-500ZC
This self-contained, full QSK high frequency linear power amplifier is capable of amateur continuous operation at output power levels of 1500 watts. It is manually tunable from 1.8-2.4 and 3.5-22 MHz continuous. The HF tank coil and Centralab bandswitch are silver-plated.

INTERNAL POWER SUPPLY
All 500 Series amplifiers have a Peter Dahl Hipersil plate transformer and a separate filament transformer. The fullwave bridge rectifier system—unlike other systems that utilize weak voltage doublers—uses computer grade electrolytic capacitors.

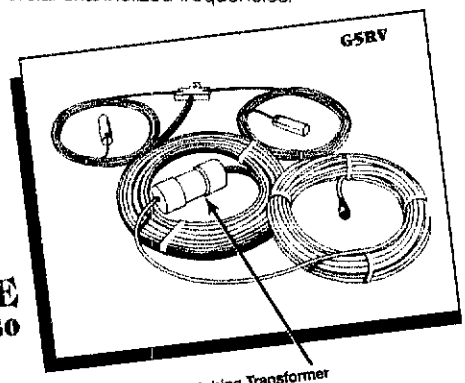
COMPATIBILITY GUARANTEED
Customer feedback in 1986 insisted on system compatibility. Responding to this challenge, a special Plug and Play Harness to hook your favorite radio to the LK500 is offered as an accessory. Of course, all Amp Supply amplifiers have our famous ATI-6 tuned input systems, assuring a perfect 50 ohm load to your transceiver.

AUTOMATIC LOCK OUT "NEW"
All the new LK-500ZC Series amplifiers are equipped with the ALO which stops amplifier operation when it senses an unacceptable SWR, improper tuning, or overcurrent on the tubes..

2-SPEED FANS
Most manufacturers have had to compromise on fan speed, one of the noisiest and objectionable aspects of amateur radio operation. But, our 500 Series amplifiers are different; they are the result of our perfected system of customer communication and engineer response.

THE LK-500ZC WITHOUT QSK
A version of the 500ZC is available without the Jennings vacuum antenna changeover relay and a companion sealed relay QSK system. A super buy at $1199.00!

THE LK-500NTC NO-TUNE
Our no-tune amplifier is the same dependable amplifier as the LK-500ZC with the new ALO system and full QSK, and completes our popular 500 Series. This desirable version allows you to merely switch to your favorite amateur band and transmit at full power. We have preset internal capacitors and coils for each of the traditional six amateur bands. The LK-500NTC is also available for special MARS and commercial channelized frequencies.



New Matching Transformer

SALE $49.50

THE G5RV ANTENNA **Reg. $60.00 SALE $49.50**
The G5RV Signal Injector™ antenna is an excellent all band (3.5-30 MHz) 102 ft. dipole. On 1.8 MHz the center and shield of the coax at the transmitter end may be joined together and the antenna may be used as a Marconi with a tuner and a good earth ground. The proper combination of a 102 ft. flat-top and 31 ft. of 300 ohm tranmission line achieves resonance on all the amateur bands from 80 to 10 meters with only one antenna. There is no loss in traps and coils. The impedance present at the end of the 300 ohm line is about 50-60 ohms, a good match to the new RG8X mini foam coax.

- 2 KW PEP
- Completely assembled
- Use as horizontal or "V" configuration
- Consists of: 102 ft. copper antenna wire, 31 ft. 300 ohm transmisison line, 70 ft. RG-8X coax, 2 end insulators, 1 center insulator, 1 PL-259 and sleeve, connector and the **new transformer coupler.**

SPECIFICATIONS LK-500ZC
Frequency Range: 160 Meters 1.8-2.2 MHz, 80 meters 3.5-4.5 MHz, 40 meters 7.0-7.5 MHz, 30 meters 10.1 to 10.15 MHz, 20 meters 14.0-14.9 MHz, 17 meters 18.0-19.2 MHz, 15 meters 21.0-21.5 MHz, Export models: 12 meters 24.8-24.9 MHz, 10 meters 28.0-29.7 MHz.
Drive Power: 100W Nominal for 1500 Watt SSB PEP output, 125W Nominal for 1500 Watt CW output.
RF Output SSB 1.5 KW PEP continuous, CW 1.2 KW Average continuous, RTTY, SSTV 1 KW Average 1.5 KW PEP.
Plate Voltage: RTTY/AM/SSTV/CW/SSB 3.2 KV DC
Harmonic Suppression: -50 dB minimum.
Intermodulation Distortion Products: -33 dB down minimum.
Circuit Type: Class AB_2 grounded grid. Type of Emission: SSB, CW, RTTY, AM, SSTV
Duty Cycle: Amateur continuous duty in all modes at specified output.
Output Circuit: Pi-network (silver plated tubing HF coil).
Power Requirements: 115/230 VAC, 30/15 amps (230 VAC factory wired and recommended).
Dimensions: 8" H x 14" W x 16" D (including knobs).
UPS Shippable: 59 lbs.
Warranty: Two years on amplifier.

LK-500ZC Full QSK . . . . . **$1395.00 Reg. $1295.00 SALE**
LK-500ZC Without QSK . . . . . **$1199.00 Reg. $1099. SALE**
LK-500NTC No-Tune Version . . . . . **$1695.00 Reg. $1595. SALE**
Plug & Play Harness (Specify your radio) **$9.95**
AT3000 Matching 3K Tuner **$499.00**
LK-550 New 3 Tube w/Power Pac **$1895.00**
LK-450 New Single 3-500Z Amp **$899.50**

Add an automatic SWR lock-out brain to your present amplifier (any brand). Self contained plug and play.
ALO-1 Accessory . . . . . **$ 94.50**

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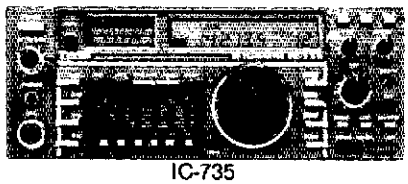

IC-735

HF Equipment	List	Juns
IC-761 New Top Of Line	$2499	Call $
IC-735 Gen. Cvg Xcvr	999.00	Call $
IC-745 Gen. Cvg Xcvr	1049.00	Call $
IC-751A Gen. Cvg. Xcvr	1649.00	Call $
Receivers		
IC-R7000 25-1300+ MHz Rcvr	1099.00	Call $
IC-R71A 100 kHz-30 MHz Rcvr	949.00	Call $
VHF		
IC-275A All Mode Base w/PS	1199.00	Call $
IC-275H All Mode Base 100w	TBA	Call $
IC-271A All Mode Base 25w	859.00	Call $
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IC-27H FM Mobile 45w	459.00	Call $
IC-28A FM Mobile 25w	429.00	Call $
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IC-02AT FM HT	399.00	Call $
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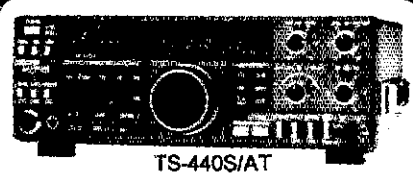

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HF Equipment	List	Juns
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TS-940S Gen. Cvg Xcvr	2049.95	Call $
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TS-440S Gen. Cvg Xcvr	999.95	Call $
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TR-751A All Mode Mobile 25w	599.95	Call $
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TM-2550A FM Mobile 45w	469.95	Call $
TM-2570A FM Mobile 70w	559.95	Call $
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TH-205 AT, NEW 2m HT	259.95	Call $
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TR-9500 10w All Mode	649.95	Call $
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TM-411A FM Mobile 25w	449.95	Call $
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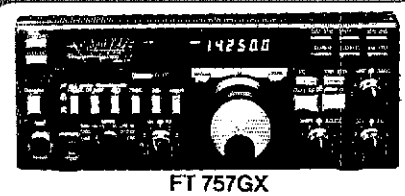
TM-3530A FM 220 MHz 25w	449.95	Call $
TH-31BT FM, 220 MHz HT	269.95	Call $



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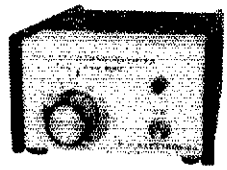

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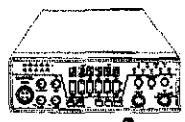

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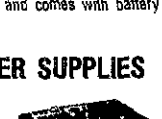

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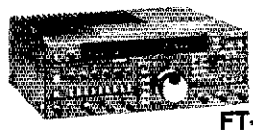

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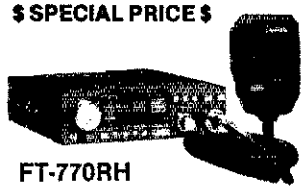

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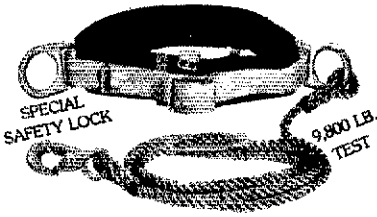

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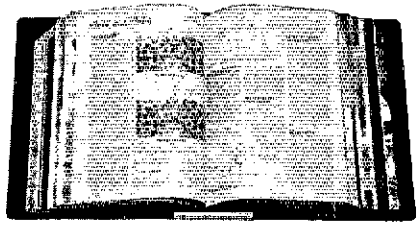

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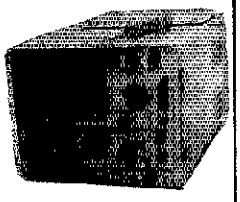

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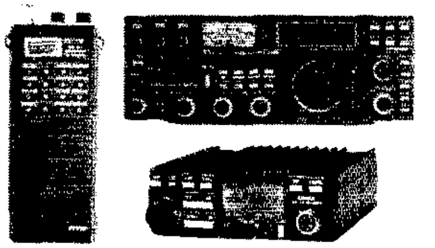

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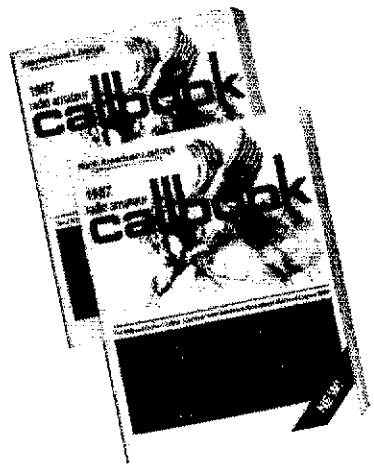

The "Flying Horse" sets the standards

Continuing a 66 year tradition, there are three new Callbooks for 1987.

The North American Callbook lists the calls, names, and address information for licensed amateurs in all countries from Canada to Panama including Greenland, Bermuda, and the Caribbean islands plus Hawaii and the U.S. possessions.

The International Callbook lists the amateurs in countries outside North America. Coverage includes South America, Europe, Africa, Asia, and the Pacific area.

The 1987 Callbook Supplement is a new idea in Callbook updates; it lists the activity in both the North American and International Callbooks. Published June 1, 1987, this Supplement will include all the new licenses, address changes, and call sign changes for the preceding 6 months.

Publication date for the 1987 Callbooks is December 1, 1986. See your dealer or order now directly from the publisher.

☐ North American Callbook	
incl. shipping within USA	$28.00
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☐ International Callbook	
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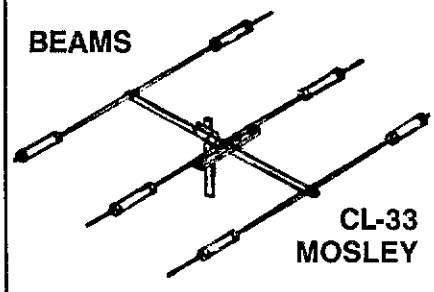

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ELECTRONIC BACKYARD SALE, like 'Hamfest', will be held by George, WA9JEZ, 5631 W. Irving, Chicago, on August 22 & 23 and August 29 & 30, both Sat. & Sun., 9 AM - 5 PM.

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TEN-TEC TITAN. New, never used. $2100. Bob Sullivan, WØYVA/4, POB 579, Great Falls, VA 22066, 703-478-3100 Days.

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USED WORKABLE or repairable Hy-Gain HDR-300 Rotator wanted. WB6AEA - phone or write - 209-784-4591 or 1041 North Cobb Street, Porterville, CA 93257.

ROCK STABLE Digital VFO-230, with memories, for Kenwood TS830S or 530S, Excellent condition with manual, cable & carton. List price $359 - only $200. U-ship. Sid, KB4LX, 804-596-7461, after 0200Z.

COMPLETE STATION: Heath HW-101, Power Supply, Speaker, Microphone, HM-2140 SWR Power Meter, Hy-Gain 18AVT/WB 10-80M vertical antenna. All in good working condition. Must sell $400. I ship. Call or write. Joe, KA2AEY, 716-225-6723, 182 N. Autumn Drive, Rochester, NY 14626.

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YAESU - FT757GX - FP757 HD - mic. - mint condx - $825. W2DOR - 201-349-1892.

WANTED: EX-106 FM option for IC-551. Must be reasonably priced. Also, need schematic for Hallicrafters WR-4000 receiver. Keith, WB4BYH; 8909 Carlton Circle, Knoxville, TN 37922, 615-694-0680.

WANTED: THEORY of Linear Antennas by Ronald W.P. King, Collins Mechanical Filter F455FA-05, W5KH, 505-822-9183.

COLLINS KWM-380 HF Transceiver, excellent condition, all factory modifications, all filters, noise blanker, speech processor, blower kit, DC power cable, owners manual, service manual, noise cancelling microphone $2100. I ship UPS anywhere USA. K3HW, Howard Weinstein, 15 Lakeside Drive, Marlton, NJ 08053, 609-596-3304.

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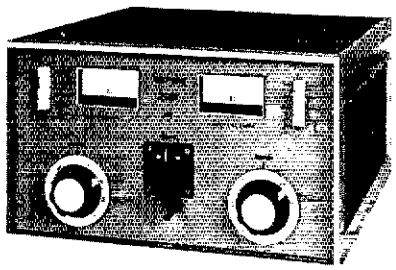

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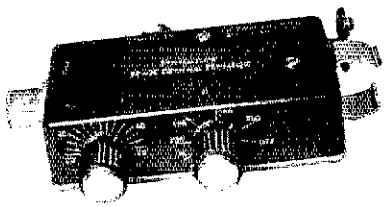

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The Palomar R-X Noise Bridge tells you if your antenna is resonant or not and, if it is not, whether it is too long or too short. It gives resistance and reactance readings on dipoles, inverted Vees, quads, beams, multiband trap dipoles and verticals from 1 to 100 MHz.

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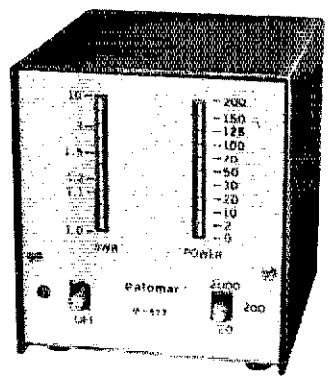

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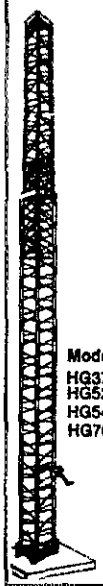

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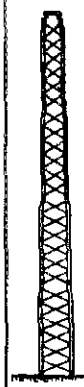

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*Your Total Delivered Price Anywhere in Continental 48 States. Antenna Load Based on 70 MPH Wind.

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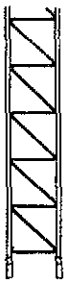

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TX472	23'	72'	18 sq ft	2099
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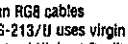

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- 100% shielded-braid & foil

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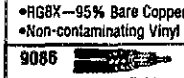

Lowest Loss for VHF/UHF!

½" Alum. w/poly Jacket	$.79/ft.
⅞" LDF4-50 Andrew Heliax®	$1.79/ft
⅞" LDF5-50 Andrew Heliax®	$3.99/ft

select connectors below.
Heliax® is a Registered Trademark of the Andrew Corp.

Coaxial Cable Loss Characteristics (DB/100 ft)

Cable Type	Imped.	10MHz	30MHz	150MHz	450MHz
RG-213/U	50	.6	.9	2.3	5.2
RG8X	52	.8	1.2	3.5	5.8
9086	50	.4	.64	1.7	3.1
½" Alum	50	.3	.5	1.2	2.2
½" Heliax	50	.2	.4	.9	1.6
⅞" Heliax	50	.1	.2	.5	.9

HARDLINE & HELIAX® CONNECTORS

Cable Type	UHF FML	UHF MALE	N FML	N MALE
½" Alum	$19	$19	$19	$25
⅞" Heliax®	$25	$25	$25	$25
⅞" Heliax®	$49	$49	$49	$49

COAX CONNECTORS

Amphenol Silver PL259	$1.25
UG21B N Male	$2.95
9086/9913 N Male Connector	$4.95

ANTENNA WIRE & ACCESSORIES

Stranded Copper 14ga	$.10/ft.
¼ mile 18ga copper-clad steel wire	$30
Dog bone end Insulator	$.79 ea.

Van Gordon

1:1 Balun $11 Center Insulator $6
Dipole Kits ... D80 $31.95/D40 $28.95
Short Dipole Kits ... SD80 $35.95/SD40 $33.95
All-band Dipole w/ladder line $29.95
G5RV all band antenna $49.95

ALPHA DELTA

DX-A 160-80-40 Sloper	$49

CUSHCRAFT

A3 3-el Tribander	$229
A4 4-el Tribander Beam	$299
A743 & A744, 30/40 mtr KIT for the A3 & A4 ea	$79
AP8 80-10 mtr Vertical	$139
AV5 80-10mtr Vertical	$109
D40 40mtr Dipole	$159
40-2CD 2-el 40 mtr Beam	$299
A50-5 5-el 6 mtr Beam	$85
215 WB NEW 15-el 2 mtr Beam	$85
230 WB NEW 30-el 2 mtr Beam	$229
4218 XL 18-el 2 mtr Beam	$105
3219 19-el 2 mtr Beam	$99
220B 17-el 220MHz Beam	$99
424B 24-el 432MHz Beam	$85
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Discoverer 2-el 40-mtr Beam	
Discoverer 3-el Conversion Kit	
EXPLORER-14 SUPER-SPECIAL	
QK710 30/40 mtr. Add-On-Kit	
V2S 2-mtr Base Vertical	
V4S 440MHz Base Vertical	
TH5MK2S Broad Band 5-el Triband Beam	
TH7DXS 7-el Triband Beam	
TH3JRS 3-el Triband Beam	
205BAS 5-el 20-mtr Beam	
155BAS 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	
18AVT/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	
2B00 80/40 mtr Trap Dipole	
5BDD 80-10 mtr Trap Dipole	
BN86 80-10 mtr KW Balun W/Coax Seal	

HUSTLER

6BTV 80-10 mtr Vert $129 5BTV 80-10 mtr Vert $109
4BTV 40-10 mtr Vert. $89 G7-144 2-mtr Base. $119
G6-144B 2-mtr Base. $89

Mobile Resonators	10m	15m	20m	40m	75m
400W Standard	$16	$17	$19	$22	$26
2KW Super	$20	$22	$25	$29	$39

Bumper Mounts - Springs - Folding Masts in Stock!

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- Full Legal Power
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TBR160 160m Coil Kit	$49
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FREE UPS on ACCESSORIES when purchased w/antenna

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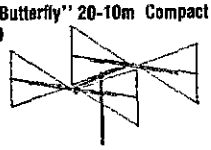

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Daiwa MR 750 PE (16.1 sq ft rating)	$289
Additional Motor Units	$89
Alliance HD73 (10.7 sq ft rating)	$119.95
Alliance U110 (3 sq ft rating)	$49
Telex CD 45II (8.5 sq ft rating)	$Call
Telex HAM 4 (15 sq ft rating)	$Call
Telex Tailtwister (20 sq ft rating)	$Call
Telex HDR300 Heavy Duty (25 sq ft rating)	$Call
Kenpro KR500 Heavy Duty Elevator Rotator	$189
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ROTOR CABLE

Standard 8 cord cables $.19/ft (vinyl jacket 2-#18 & 6-#22 ga)
Heavy Duty 8 Cond cable $.36/ft (vinyl jacket 2-#16 & 6-#18 ga)

ROHN GUYED TOWER SECTIONS

10 FT. STACKED SECTIONS
20G ..... $45.00 45G $116.00
25G ..... $52.00 55G $160.00

ALL ACCESSORIES IN STOCK—CALL

ROHN FOLDOVER TOWERS

Model	Height	Ant. Load*	Price
FK2548	48 ft.	15.4 sq. ft.	$ 999.
FK2558	58 ft.	13.3 sq. ft.	1049.
FK2568	68 ft.	11.7 sq. ft.	1099.
FK4544	44 ft.	34.8 sq. ft.	1319.
FK4554	54 ft.	29.1 sq. ft.	1399.
FK4564	64 ft.	28.4 sq. ft.	1499.

25G Double Guy Kit ... $249.
45G Double Guy Kit ... $269.

*Above antenna loads for 70 mph winds w/guys at hinge and apex. All foldover towers shipped freight prepaid in 48 states. Prices 10% higher west of Rockies.

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3/16 EHS Guywire (3990 lb rating)	$.15/ft
1/4 EHS Guywire (6650 lb rating)	$.18/ft
5/16 EHS Guywire (11,200 lb rating)	$.29/ft
5/32 7 × 7 Aircraft Cable (2700 lb rating)	$.15/ft
3/16 CCM Cable Clamp (3/16" or 5/32")	$.45
1/4 CCM Cable Clamp (1/4" Cable)	$.55
1/4 TH Thimble (fits all sizes)	$.45
3/8EE (3/8" Eye & Eye Turnbuckle)	$6.95
3/8EJ (3/8" Eye & Jaw Turnbuckle)	$7.95
1/2 × 9EE (1/2" × 9" Eye to Eye Turnbuckle)	$9.95
1/2 × 9EJ (1/2 × 9" Eye & Jaw Turnbuckle)	$10.95
1/2 × 12EE (1/2" 12" Eye & Eye Turnbuckle)	$12.95
1/2 × 12EJ (1/2" × 12" Eye & Jaw Turnbuckle)	$13.95
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502 Guy Insulator (1/4" Cable)	$2.99
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PHILLYSTRAN GUY CABLE

HPTG2100 Guy Cable (2100 lb rating)	$.29/ft
HPTG4000 Guy Cable (4000 lb rating)	$.49/ft
HPTG6700 Guy Cable (6700 lb rating)	$.69/ft
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Heavy Duty Steel Masts 2 in OD - Galvanized Finish

Length	5 FT	10 FT	15 FT	20 FT
.12 in Wall	$29	$49	$69	$89
.18 in Wall	$39	$69	$99	$129
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- *Programmable Scanning*
- High Stability, Dual Digital VFO's
- 40 Channel Memory
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- 100 memories
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- Optional Built-in AT

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"FULL FEATURED 2m HT"

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- 2.5w Output (5w Optional)
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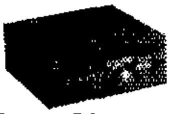

FT-757GX "CAT SYSTEM"

- All Mode Transceiver
- Dual VFO's
- Full Break-in CW
- 100% Duty Cycle

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FT-767GX HF/VHF/UHF BASE STATION

- Add Optional 6m, 2m & 70cm Modules
- Dual VFO's
- *Full CW Break-In*
- Lots More Features

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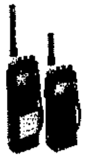
FT23/73R



- Zinc-Aluminum Alloy Case
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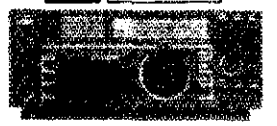

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- FM Standard
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- Subtones built in

RX 215-230 MHz
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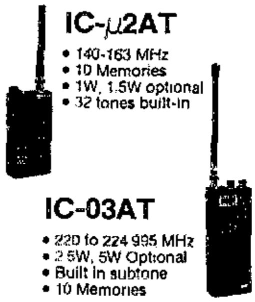

- 140-163 MHz
- 10 Memories
- 1W, 1.5W optional
- 32 tones built-in

IC-03AT

- 220 to 224.995 MHz
- 2.5W, 5W Optional
- Built in subtone
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KAM

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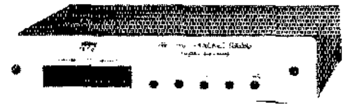

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- VHF and HF Packet
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- More!

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Should you choose one, two, or all three?

Choose one—Yaesu's FT-109RH, FT-209RH or FT-709R—and you gain the maximum performance available in any single-band HT.

Choose two—or even three, and you also get interchangeable accessories, options and operating procedures. Making it easy and affordable to work all your favorite VHF and UHF bands.

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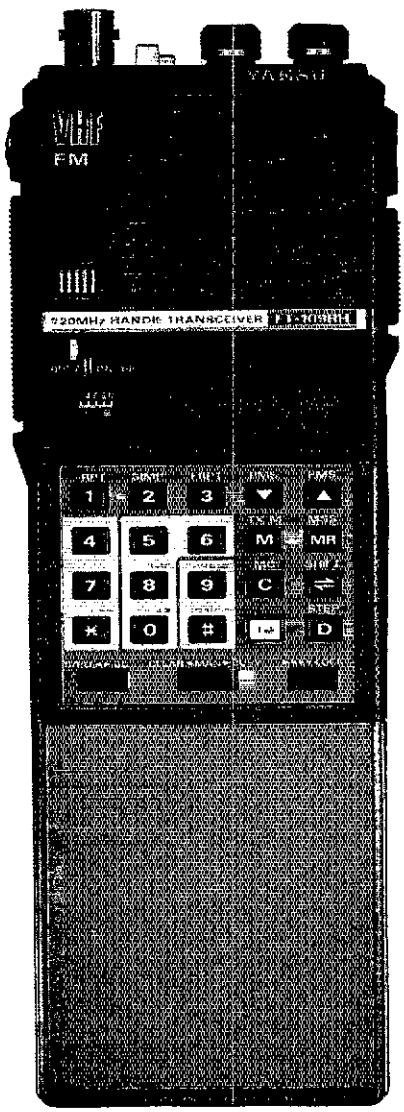
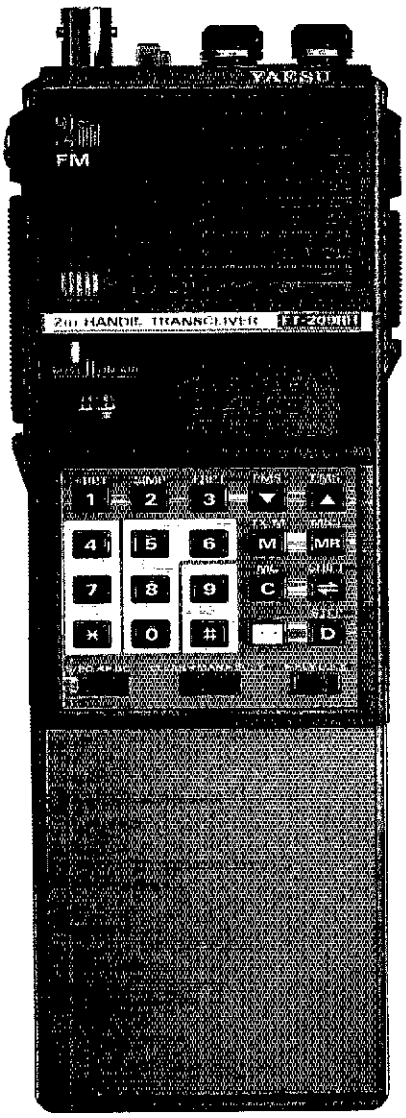
You also get a high/low power switch, power meter, backlit display, 500-mAh battery, wall charger, and soft case. Plus a choice of many interchangeable options, including a VOX headset, fast charger, hard leather case, and plug-in subaudible tone encoder/decoder for controlled-access repeaters.

Let Yaesu's 220-MHz FT-109RH, 2-Meter FT-209RH and 440-MHz FT-709R give you the decided advantage in HT performance and upgrade ability. It may be the most enjoyable HT buying decision you ever make.

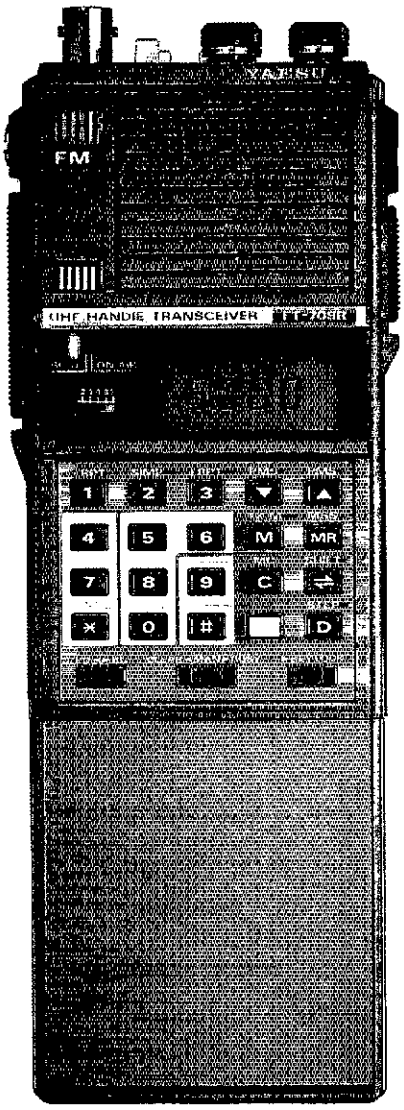
220 MHz



2 Meters



440 MHz



YAESU

Yaesu USA 17210 Edwards Road, Cerritos, CA 90701 (213) 404-2700. **Repair Service:** (213) 404-4884. **Parts:** (213) 404-4847.
Yaesu Cincinnati Service Center 9070 Gold Park Drive, Hamilton, OH 45011. (513) 874-3100.

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#1 Rated HF

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TS-940S

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

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

Optional accessories:
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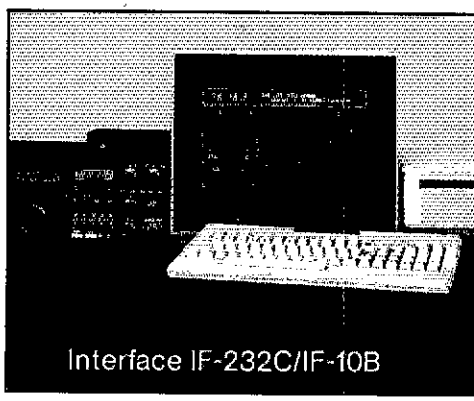

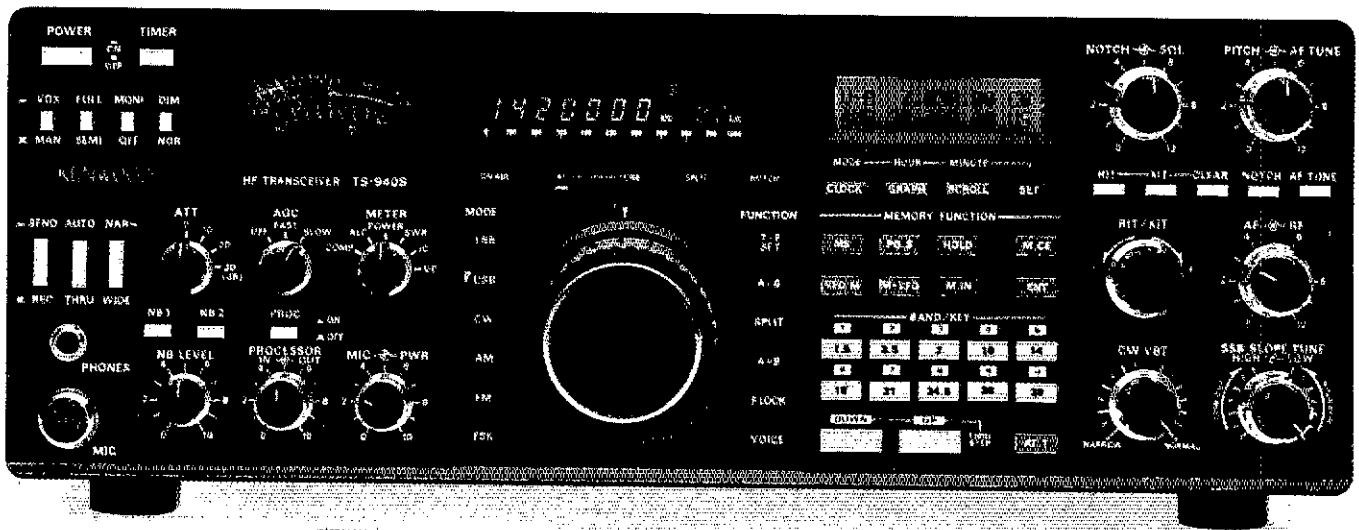

Complete service manuals are available for all Kenwood transceivers and most accessories
Specifications and prices are subject to change without notice or obligation

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

KENWOOD

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