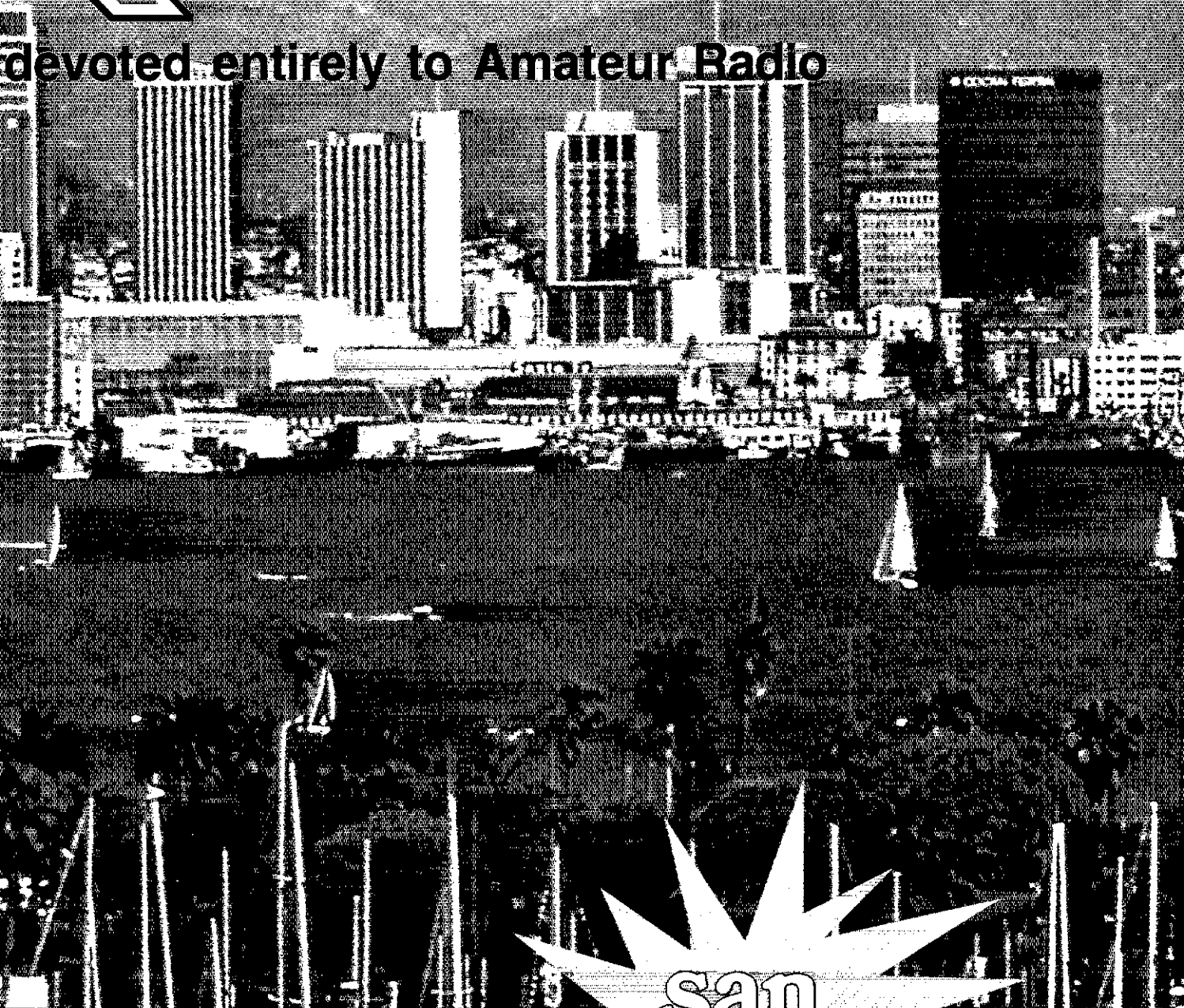


# QST

devoted entirely to Amateur Radio



Find your "Sun Spot" in **San diego** at the

1986 National Convention  
September 5, 6 & 7



# We have a wonderful world of RF at Henry Radio

Many Amateurs are professional electronics engineers. This message is for them.

In the beginning Henry Amplifiers were for communications. Many still are. Amateur, commercial, MARS, military, short wave broadcast, FM broadcast, VHF link, domestic, foreign. . . Henry amplifiers go everywhere for diverse services. HF point-to-point, VHF, UHF, SSB, AM, FM, RTTY, packet, meteor burst, digital, marine shore station. . . are you beginning to get the idea? If you need a special purpose vacuum tube amplifier for a specific frequency from

2 MHz to 500 MHz at power levels up to 10,000 watts, we invite your inquiry.

But communications is only the beginning. Think about plasma generation, sputtering and etching, thin film deposition, laser excitation, nuclear magnetic resonance (NMR), photo-emissions and mass spectrometry, scientific research, industrial production. . . Henry equipment is used in all of these applications. We have always been customer driven and still are.

## Recent projects include:

- |  |  |
|--|--|
| <b>10,000 watt 41 MHz Meteor Burst</b><br>U.S. Air Force   | <b>4,000 watts 145 MHz VHF</b><br>Point-to-Point — Indonesia                                     |
| <b>10,000 watts 60 Mhz</b><br>U.S. Air Force   | <b>3,000 watts 320 MHz</b><br>Pulse for Satellite Test station, Hughes Aircraft.                 |
| <b>2,000 watts 45 MHz</b><br>numerous customers including SHAPE Headquarters<br>U.S. Dept. of Interior, The Mitre Company, M-A Comm, Etc | <b>5,000 watts 400 MHz</b><br>Pulse for Laser Excitation, University of California               |
| <b>2,000 watts 13.5 MHz</b><br>Plasma generator for vacuum etching, many customers   | <b>2,000 watts 27.12 MHz</b><br>to ignite Argon Torch Photo-Emissions Spectrometry — Switzerland |
| <b>1,000 watts 13.5 MHz</b><br>Same application as previous listing  | <b>1,500 watts 40 MHz</b><br>same application as above — The Baird Corporation                   |
| <b>5,000 watts 13.5 MHz</b><br>Same application as previous listing  | <b>2,000 watts 27.12 MHz</b><br>Mass Spectrometry, VG Isotopes, England                          |
| <b>5,000 watts various Marine HF frequencies</b><br>Shore Stations   | <b>2,000 watts 13.56 MHz</b><br>Sputtering — Munich, Germany                                     |
| <b>10,000 watts 90 MHz</b><br>Laser Excitation, Aluminor Co  | <b>3,000 watts 6 MHz</b><br>Shortwave AM — Broadcast, Iraq                                       |
| <b>2,000 watts 110 to 150 MHz</b><br>United Technology   | <b>2,000 watts 70 MHz</b><br>Airborne Radar Research, England                                    |
| <b>3,000 watts 450 MHz</b><br>Western Research   | <b>5K Classic Amplifiers</b><br>Japan  |

If you have a requirement for high power RF, please call Ted Shannon, Mary Silva or Ted Henry (Los Angeles office). And don't forget, Henry Radio still produces the world's broadest line of fine Amateur amplifiers!



## Henry Radio

2050 S. Bundy Dr., Los Angeles, CA 90025  
Butler, Missouri 64730

(213) 820-1234  
(816) 679-3127

# KENWOOD

...pacesetter in Amateur radio

All New Compact HF!

## “DX-citing!”

### TS-440S Compact high performance HF transceiver with general coverage receiver

Kenwood's advanced digital know-how brings Amateurs world-wide “big-rig” performance in a compact package. We call it “Digital DX-citement”—that special feeling you get every time you turn the power on!

• **Covers All Amateur bands**

General coverage receiver tunes from 100 kHz—30 MHz. Easily modified for HF MARS operation.

• **Direct keyboard entry of frequency**

• **All modes built-in**  
USB, LSB, CW, AM, FM, and AFSK. Mode selection is verified in Morse Code.

• **Built-in automatic antenna tuner (optional)**

Covers 80-10 meters.

• **VS-1 voice synthesizer (optional)**

• **Superior receiver dynamic range**

Kenwood DynaMix™ high sensitivity direct mixing system ensures true 102 dB receiver dynamic range. (500 Hz bandwidth on 20 m)

• **100% duty cycle transmitter**

Super efficient cooling permits continuous key-down for periods exceeding one hour. RF input power is rated at 200 W PEP on SSB, 200 W DC on CW, AFSK, FM, and 110 W DC AM. (The PS-50 power supply is needed for continuous duty.)

• **Adjustable dial torque**

• **100 memory channels**

Frequency and mode may be stored in 10 groups of 10 channels each. Split frequencies may be stored in 10 channels for repeater operation.

• **TU-8 CTCSS unit (optional)**

Subtone is memorized when TU-8 is installed.

• **Superb interference reduction**

IF shift, tuneable notch filter, noise blanker, all-mode squelch, RF attenuator, RIT/XIT, and optional filters fight QRM.

• **MC-42S UP/DOWN mic. included**

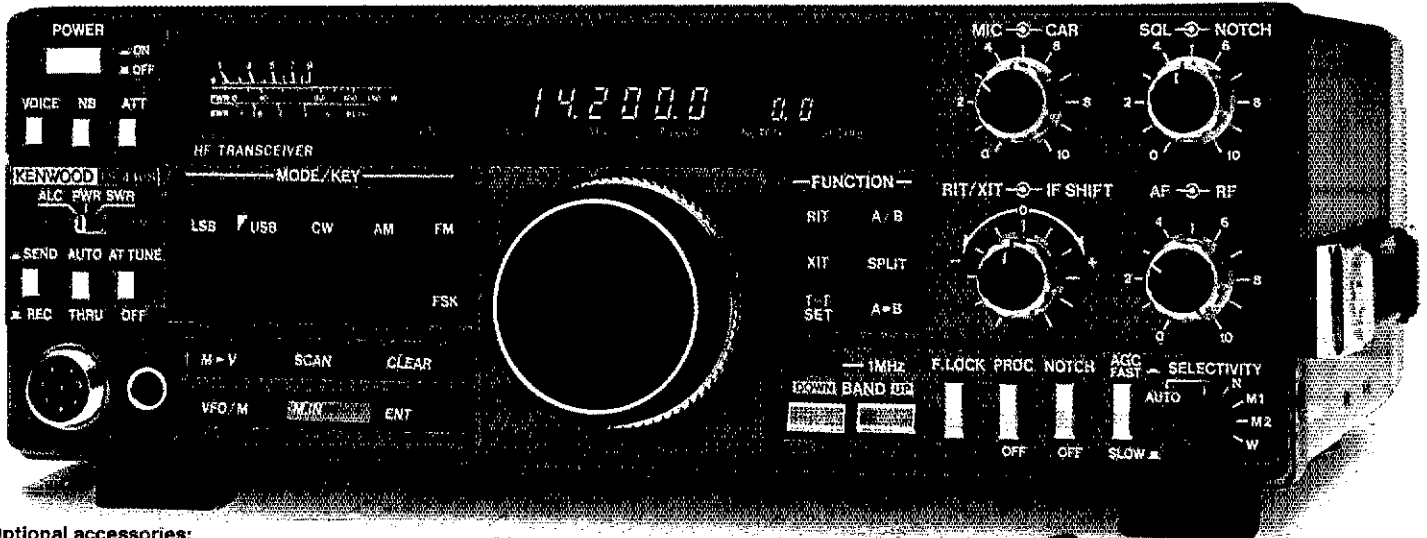
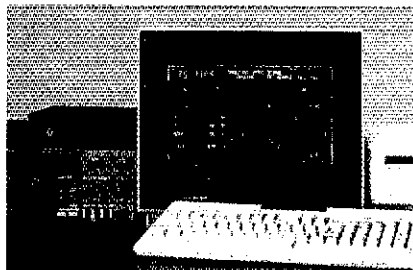
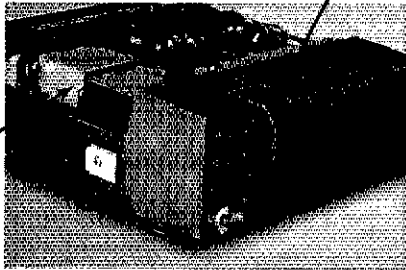
• **Computer interface port**

• **5 IF filter functions**

• **Dual SSB IF filtering**

A built-in SSB filter is standard. When an optional SSB filter (YK-88S or YK-88SN) is installed, **dual** filtering is provided.

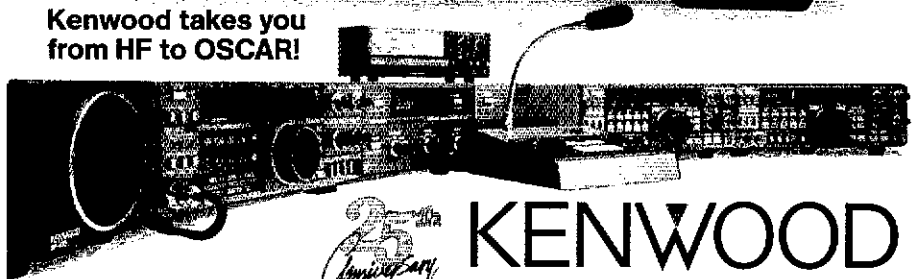
• **VOX, full or semi break-in CW; AMTOR compatible.**



**Optional accessories:**

- AT-440 internal auto. antenna tuner (80 m—10 m)
- AT-250 external auto. tuner (160 m—10 m)
- AT-130 compact mobile antenna tuner (160 m—10 m)
- IF-232C/IC-10 level translator and modem IC kit
- PS-50 heavy duty power supply
- PS-430/PS-30 DC power supply
- SP-430 external speaker
- MB-430 mobile mounting bracket
- YK-88C/88CN 500 Hz/270 Hz CW filters
- YK-88S-88SN 2.4 kHz/1.8 kHz SSB filters
- MC-60A/80/85 desk microphones
- MC-55 (8P) mobile microphone
- HS-4/5/6/7 headphones
- SP-40/50 mobile speakers
- MA-5/VP-1 HF 5 band mobile helical antenna and bumper mount
- TL-922A 2 kw PEP linear amplifier
- SM-220 station monitor
- VS-1 voice synthesizer
- SW-100A/200A/2000 SWR/power meters
- TU-8 CTCSS tone unit
- PG-2C extra DC cable.

**Kenwood takes you from HF to OSCAR!**

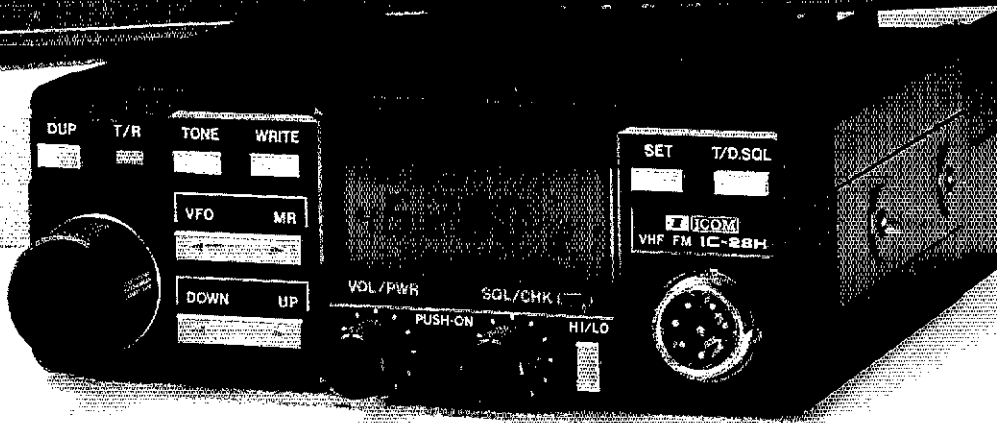
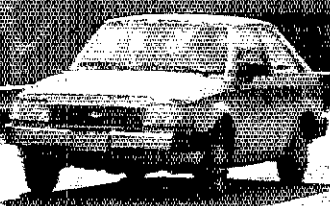


# KENWOOD

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

TRIO-KENWOOD COMMUNICATIONS  
1111 West Walnut Street  
Compton, California 90220

**440MHz IC-48A  
Now Available!**



# ICOM IC-28H THE ONE FOR THE ROAD

- Compact Size
- Simple to Operate
- Large LCD Readout
- 25 or 45 Watts
- Packet Compatible
- 21 Memory Channels

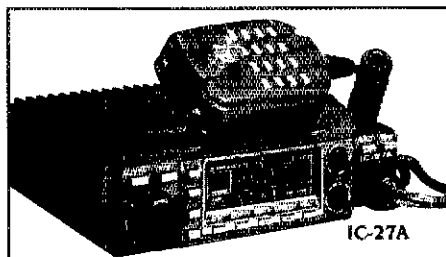
The IC-28H has all the features you need for carefree 2-meter mobile operation. The only thing it doesn't have is a big price.

**45 Watts.** The IC-28H provides a full 45 watts of powerful output. The IC-28A 25-watt version is also available. Both units have a selectable low power.

**Large LCD readout.** A wide-view LCD readout can be easily read even in bright sunlight. An automatic dimmer circuit reduces the brightness for evening operation.

**Wideband Coverage.** The IC-28H performs from 138-174MHz (specifications guaranteed from 144.00-148MHz) and includes weather channels. Ideal for MARS and CAP operation.

**Compact Size.** The IC-28H measures only 2 inches high by 5 1/2 inches wide by 7 1/4 inches deep (IC-28A is 5 1/4



The IC-27H 45 watt and IC-27A 25 watt ultra compact 2-meter mobiles continue to be available.

inches deep). Great for mobile installations where space is limited.

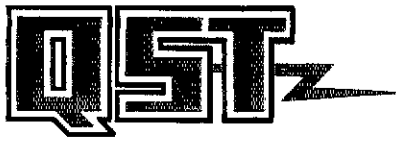
**21 Memory Channels.** Store 21 frequencies into memory, or lock out certain memory channels. All memories are backed up with a lithium battery.

**Scanning.** Scan the entire band or the memory channels from the provided HM-12 mic.

**Easy to Operate.** With only 11 front panel controls, the IC-28H is simple to operate.

**Available Options.** IC-HM14 DTMF mic, PS-45 13.8V 8A power supply, UT-29 tone squelch unit, SP-10 external speaker, IC-HM16 speaker mic and HS-15/HS-15SB flexible boom mic and PTT switchbox.

 **ICOM**  
First in Communication



**OUR COVER**

Whether you're looking for a weekend devoted entirely to Amateur Radio, or an excuse to absorb some California sun, this year's National Convention's for you—and your family. For a preview, see page 44. Cover photo courtesy CONVIS, San Diego, California.

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- David Sumner, K1ZZ  
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# CONTENTS

## TECHNICAL

- 15 Electromagnetic Pulse and the Radio Amateur—Part 1 *Dennis Bodson, W4PWF*
- 21 Construct a Wire Log-Periodic Dipole Array for 80 or 40 Meters *John J. Uhl, KV5E*
- 25 Inexpensive RF Switches for the Ham Shack *Paul Follini, VE1CZX*
- 28 An Alternative Method of Mounting Large-Size Antennas *Peter Meyer, N0AFW*
- 30 *Under Construction—Part 10: The QRP Transmatch—A Novel Approach*  
*Doug DeMaw, W1FB*
- 34 A CW-Program Cartridge for the Atari Computer *Stephen Stuntz, N0BF*
- 39 Technical Correspondence
- 41 *Product Review: Dick Smith Electronics K-6345 Radio Direction Finder*

## NEWS AND FEATURES

- 9 *It Seems to Us: What Has the ARRL Done for YOU Lately?*
- 11 Up Front in QST
- 44 1986 ARRL National Convention, San Diego *Walt Hicks, W6UZL*
- 46 Robbing the Cradle: Aggressive Recruitment of Young Hams  
*David P. Koch, W8LNU*
- 48 The K7DBV Guide to Easy CW QSOs *Gene A. Williamson, K7DBV*
- 50 *Happenings: ARRL Executive Committee Meeting*
- 69 *IARU News: Continental News*
- 72 *Washington Mailbox: Those Mysterious FCC Rules—Part 2*
- 79 *Public Service: Management and Net Managers*

## OPERATING

- 82 Rules, September VHF QSO Party
- 84 Rules, CRRL Can-Am Contest

## DEPARTMENTS

Affiliated Clubs in Action	73	Mini Directory	69
Canadian NewsFronts	66	Moved and Seconded	53
Coming Conventions	75	The New Frontier	62
Contest Corral	83	New Products	27,43
Correspondence	54	Next Month in QST	33
DX Century Club	58	On Line	65
Exam Information	73	QSL Corner	57
Feedback	40	QST Profiles	71
FM/RPT	64	Section News	85
Ham Ads	141	Silent Keys	74
Hamfest Calendar	75	Special Events	83
Hints and Kinks	37	VHF/UHF Century Club	63
How's DX?	55	The World Above 50 MHz	60
Index of Advertisers	158	W1AW Schedule	77
In Training	78	YL News and Views	70
League Lines	14	50 and 25 Years Ago	74

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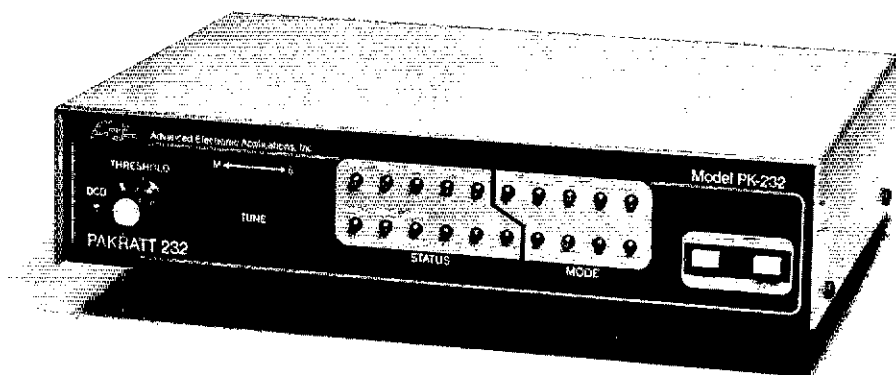
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RS-232 Compatible

# Goodbye to Packet Only Controllers



PAKRATT™  
Model PK-232

Late last year AEA broke new ground by introducing the first five mode amateur radio computer interface with Morse, Baudot, ASCII, AMTOR, and Packet...the PK-64. Now AEA has another breakthrough....the PK-232.

## Five Mode Versatility

The PK-232 makes any RS-232 compatible computer or terminal the complete Amateur digital operating position. By using a simple terminal program any computer with a standard RS-232 I/O can connect directly to the PK-232 and be ready for operation in minutes. The internal autobaud program allows 300, 1200, 2400, 4800, and 9600 baud communication between the computer and the PK-232. All decoding, signal processing, and protocol software, for Morse, Baudot, ASCII, AMTOR, and Packet, is on ROM in the PK-232. The PK-232 is a Z-80A based system and has hardware HDLC using the Zilog 8530 SCC. The internal modem of the PK-232 can transmit Packet at baud rates of 300 and 1200, with the option of using an external modem for 2400, 4800, and 9600 baud.

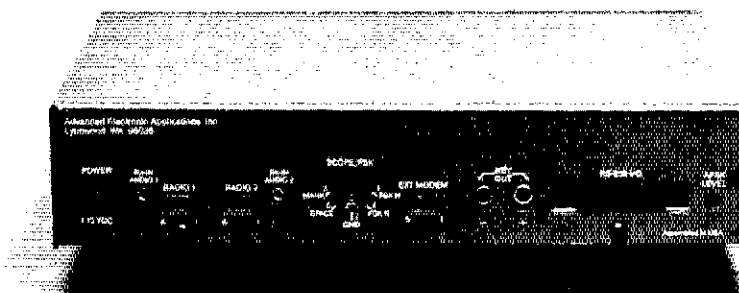
Prices and specifications subject to change without notice or obligation

## An Operators Dream

With twenty-one front panel indicators it's easy to monitor operation. Separate indicators show operating mode, current operating status, and data carrier detect. A front panel switch allows selection of two separate radio connectors, no more switching cables when jumping from HF to VHF. The front panel threshold control adjusts squelch for both HF and VHF. The AEA standard discriminator style tuning indicator makes tuning easy in any mode and on any band.

## Serious VHF/HF/CW Modem

The PK-232 also includes a no compromise VHF/HF/CW modem with an eight pole bandpass filter followed by a limiter discriminator with automatic threshold correction. Once the operating mode is selected the modem automatically selects the proper bandwidth, 200 hz for CW, 450 Hz for HF, or 2600 Hz for VHF. Transmitter tones are low distortion sine wave phase continuous AFSK. The PK-232 will receive wide shift RTTY signals, but only transmits 200 Hz shift on HF.



## AEA Quality and Price

All this plus the high quality you expect from AEA. An easy to read and understand manual, most cables and connectors included, and a service department to answer your questions. The PK-232 is the one unit that does it all with your IBM, Apple, Radio Shack, or almost any computer. With an Amateur Net price of \$319.95 you can't wait any longer. Call your local AEA dealer and order the new PK-232 today.

**AEA**  
Brings you the  
Breakthrough!

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P.O. Box C-2160, Lynnwood, WA 98036-0918

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# Ringo Ranger II

## Simply the best

The best combination of gain, bandwidth and low angle radiation for simplex or repeater operation.

**Quick easy assembly and installation**

**Mount anywhere with compact dimensions and neat appearance**

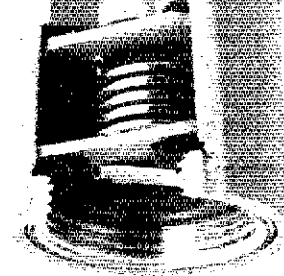
**Proven performance and durability in all environments**

**Complete FM band coverage**

**One year warranty**

Cushcraft antennas created the FM antenna revolution by making the best performance and value available to every ham. We continue to set the pace with a broad line of antennas for every FM application. Tune across the band and you will find the overwhelming majority of hams using one, two, or more Cushcraft antennas. The reason is very simply that they are the best. Now is the time for you to enjoy the value of a Cushcraft antenna. See your nearby dealer today.

## New Mobile Antennas

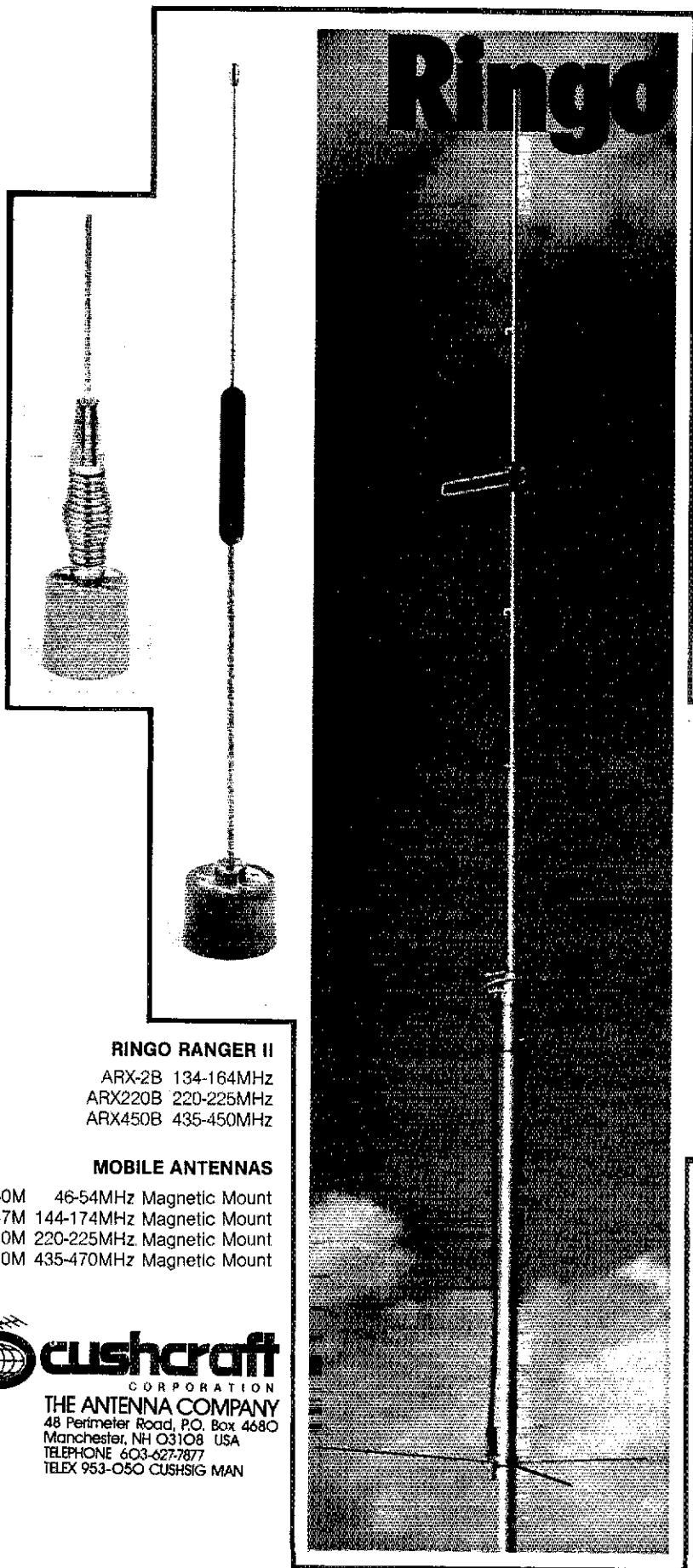


Exciting news for HAMS! the same high performance and quality, CUSHCRAFT/SIGNALS antennas, used by professionals and business, are now available to improve your mobile communications.

### FEATURING

- SILVER PLATED LOADING COILS
- TAPERED 17-7PH STAINLESS STEEL WHIPS
- STRONG, MOISTURE PROOF ABS COIL CASES
- CADMIUM PLATED NON-SEIZING HARDWARE
- FULL BRAID COVERAGE RG 58A/U CABLE
- COAXIAL CONNECTORS
- EACH COMPLETE WITH CABLE, CONNECTORS AND THREADED BASE TO TAKE EITHER THE STAINLESS STEEL SPRING OR STRAIGHT WHIP
- CHOICE OF 3 MOUNTING OPTIONS
  1. 90 POUND MAGNET MOUNT
  2. TRUNK LIP MOUNT
  3. 3/4 INCH HOLE MOUNT

**ONLY CUSHCRAFT/SIGNALS MOBILE ANTENNAS GIVE YOU ALL OF THESE IMPORTANT PERFORMANCE FEATURES.**




### RINGO RANGER II

ARX-2B 134-164MHz  
ARX220B 220-225MHz  
ARX450B 435-450MHz

### MOBILE ANTENNAS

CS50M 46-54MHz Magnetic Mount  
CS147M 144-174MHz Magnetic Mount  
CS220M 220-225MHz Magnetic Mount  
CS450M 435-470MHz Magnetic Mount

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TELEX 953-050 CUSHSIG MAN

# KENWOOD

...pacesetter in Amateur radio

Just arrived!

## All-Mode Mobility!

### TR-751A

#### Compact 2-m all mode transceiver

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

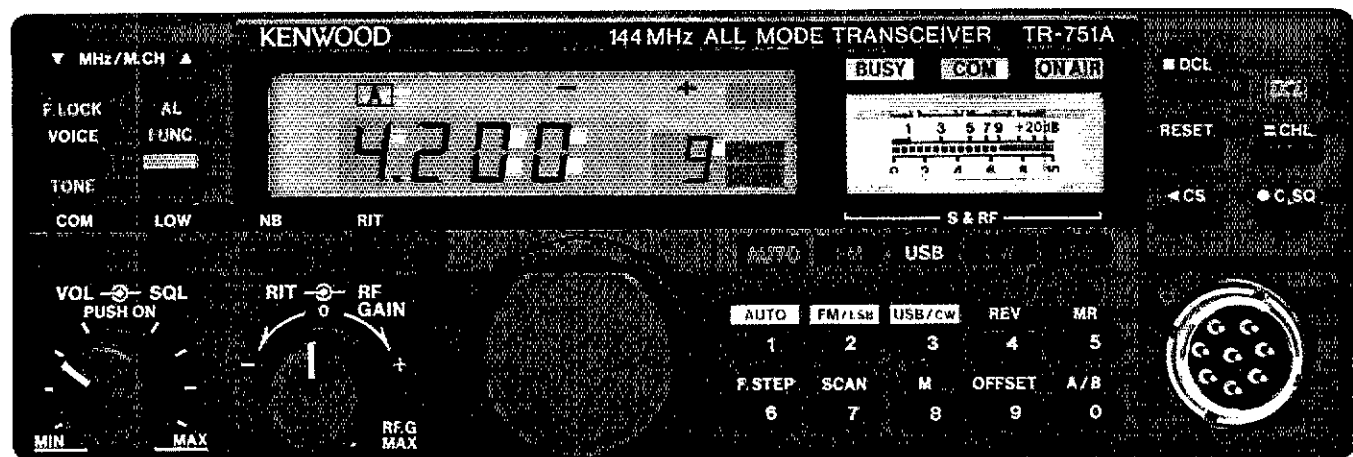
- 25 watts high/5 watts adjustable low
- Programmable scanning—memory, band, or mode scan with "COM" channel and priority alert
- 10 memory channels for frequency, mode, CTCSS tone, offset. Two channels for odd splits.
- All mode squelch, noise blanker, and RIT
- Easy-to-read analog S & RF meter



- Dual digital VFOs
- Semi break-in CW with side tone
- MC-48 16-key DTMF hand microphone included
- Frequency lock, offset, reverse switches
- Digital Channel Link (DCL) option

#### Optional accessories:

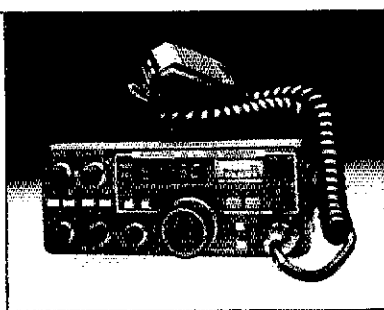
- CD-10 call sign display
- PS-430, PS-30 DC power supplies
- SW-100A/B SWR/power meter
- SW-200A/B SWR/power meter
- SWT-1 2-m antenna tuner
- TU-7 38-tone CTCSS encoder
- MU-1 modem unit for DCL system
- VS-1 voice synthesizer
- MB-10 extra mobile mount
- SP-40, SP-50 mobile speakers
- PG-2K extra DC cable
- PG-3A DC line noise filter
- MC-60A, MC-80, MC-85 deluxe base station mics.
- MC-42S UP/DOWN mic.
- MC-55 (8-pin) mobile mic.



Actual size front panel

### TR-9500 70 CM SSB/CW/FM transceiver

- Covers 430-440 MHz, in steps of 100-Hz, 1-kHz, 5-kHz, 25-kHz or 1-MHz.
- CW-FM Hi—10 W, Low—1 W, SSB 10 W.
- Automatic band/memory scan. Search of selected 10-kHz segments on SSB/CW.
- 6 memory channels.



## KENWOOD

TRIO-KENWOOD COMMUNICATIONS  
1111 West Walnut Street  
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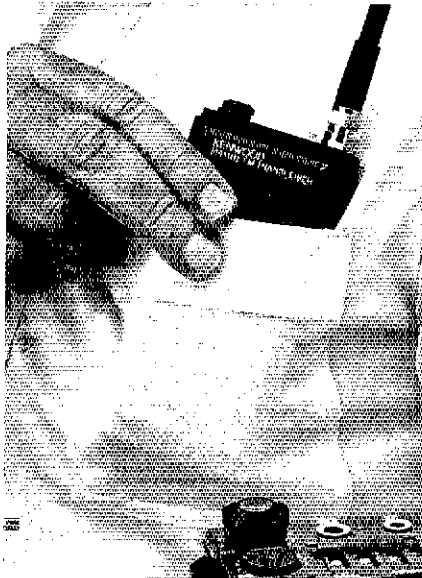
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## The Smallest HT!

### TH-21AT/31AT/41AT

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

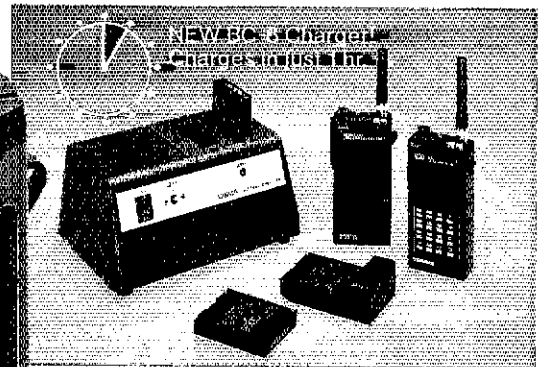
- **High or low power.**  
Choose 1 watt high—enough to "hit" most local repeaters; or a battery-saving 150 mW low.
- **Pocket portability!**  
Kenwood's TH-series HTs pack convenient, reliable performance in a package so small, it slips into your shirt pocket! It measures only 57 (2.24) W x 120 (4.72) H x 28 (1.1) D mm (inch) and weighs 260 g (.57 lb) with PB-21.
- **Expanded frequency coverage (TH-21AT/A).**  
Covers 141,000-150,995 MHz in 5 kHz steps, includes certain MARS and CAP frequencies.  
**TH-31AT/A:** 220,000-224,995 MHz in 5 kHz steps.  
**TH-41AT/A:** 440,000-449,995 MHz in 5 kHz steps.



- **Easy-to-operate, functional design.**  
Three digit thumbwheel frequency selection and handy top-mounted controls increase operating ease.



- **Repeater offset switch.**  
**TH-21AT/A:**  $\pm 600$  kHz, simplex.  
**TH-31AT/A:** -1.6 MHz, reverse, simplex.  
**TH-41AT/A:**  $\pm 5$  MHz, simplex.
- **Standard accessories:**  
Rubber flex antenna, earphone, wall charger, 180 mAH NiCd battery pack, wrist strap.
- **Quick change, locking battery case.**  
The rechargeable battery case snaps securely into place. Optional battery cases and adapters are available.
- **Rugged, high impact molded case.**  
The high impact case is scuff resistant, to retain its attractive styling, even with hard use. See your authorized Kenwood dealer and take home a pocketful of performance today!



#### Optional accessories:

- HMC-1 headset with VOX
- SMC-30 speaker microphone
- PB-21 NiCd 180 mAH battery
- PB-21H NiCd 500 mAH battery
- DC-21 DC-DC converter for mobile use
- BT-2 manganese/alkaline battery case
- EB-2 external C manganese/alkaline battery case
- SC-8/8T soft cases
- TU-6 programmable sub-tone unit
- AJ-3 thread-loc to BNC female adapter
- BC-6 2-pack quick charger
- BC-2 wall charger for PB-21H
- RA-8A/9A/10A StubbyDuk antenna
- BH-3 belt hook

## KENWOOD

TRIO-KENWOOD COMMUNICATIONS  
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Compton, California 90220

TH-series transceivers shown with optional StubbyDuk antenna. TH-31AT shown with PB-21H. Specifications and prices are subject to change without notice or obligation. Complete service manuals are available for all Trio-Kenwood transceivers and most accessories.



## 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.

MOI MAIL (electronic mail system) ID: 215-5052

Canadian membership inquiries and correspondence should be directed to CRRL Headquarters, Box 7009, Station E, London, ON N5Y 4J9, tel 519-225-2188.

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\*Executive Committee Member

## "It Seems to Us ..."

### What Has the ARRL Done for YOU Lately?

The gentleman had been having massive problems with neighbors and the town zoning board over a combination of TVI complaints and a restrictive antenna law. He was discussing his problems at his local radio club meeting with three people who had been working closely with him to identify and rectify the TVI problem, and to rally support at the zoning board hearing.

"You know," he said, "I'm really disappointed. The League hasn't done a thing for me in all this."

The three people he was addressing looked at each other, then back to him, in amazement. He was complaining about lack of League support to the Division Director, the Section Manager and the Affiliated Club Coordinator. All three had attended his most recent zoning board hearing, the director and the SM had spoken on his behalf, and earlier, the SM had come to his house, along with the Section Technical Coordinator, to run tests on his equipment. But "the League" was doing nothing for him—because there hadn't been a lawyer dispatched from Newington to help argue his case.

It was then pointed out to him that we were the League—not just the three of us with him, but every League member in the room. The three of us had taken on leadership roles in the League, in part, to make sure "the League" was there to provide help locally, when needed.

Later, the gentleman said to me,

### A Sad Postscript To Field Day

Just at press time, we received word of a Field Day accident which cast a shadow across this usually fun and festive occasion. North Dakota Section Manager Mike Mankey, WB0TEE, was killed when an antenna he was helping to install at a Field Day site came into contact with power lines. The unfamiliar site had trees that looked ideal as antenna supports, but it was discovered—too late—that

"You know, I never saw the League in that light before. I'd always thought of 'the League' as the people in Newington. I've gotten a whole new perspective tonight." And he added, "I've been a ham for 30 years, a League member for the past seven. I'm sorry I didn't join sooner."

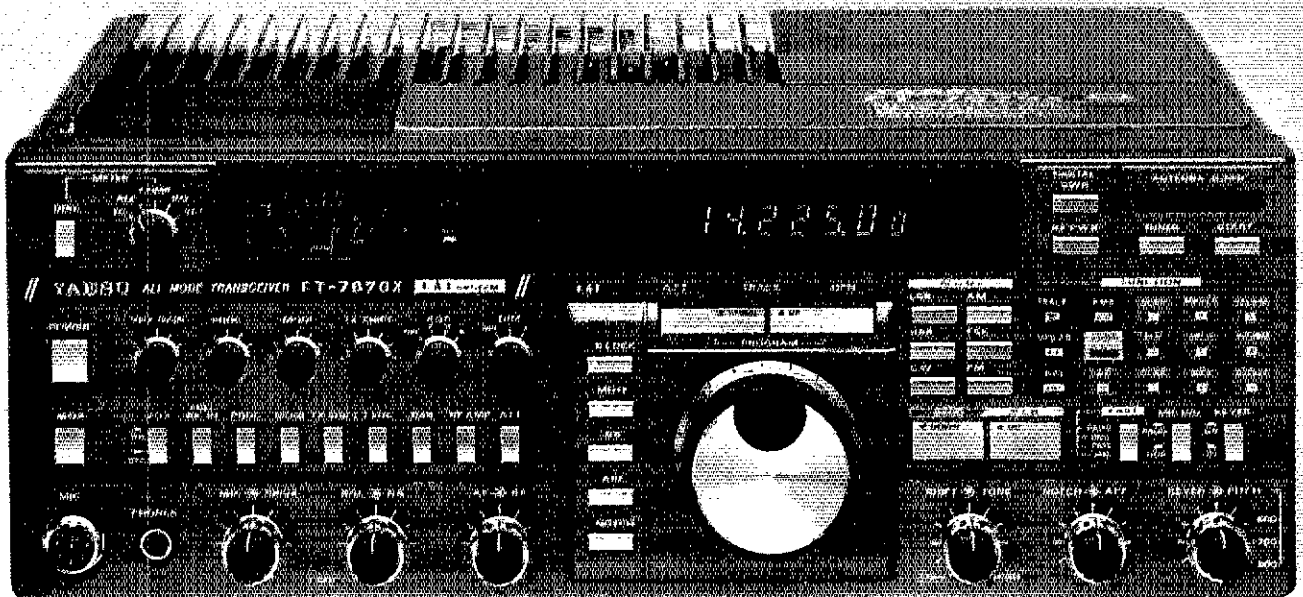
He found out what the League is doing for him. What is the League doing for you? Not much—just providing Washington representation, equipment insurance, incoming and outgoing DX QSL bureaus, technical advice, volunteer counsel for legal problems, *QST*, *Gateway*, *QEX*, training publications, "Field Forum" and "Section Leader," plus local services from the legion of ARRL volunteers—volunteer examiner team members to members of the Board of Directors—who make it all work. And yes, there are also the 145,000+ League members whose financial contributions keep it all running.

But there are another 275,000 or so hams out there who don't belong. Much of what the ARRL does benefits all hams, whether or not they're League members. They're getting something for nothing—and you're paying part of their share. So when nonmembers ask you, "What has the League done for us lately?" you might ask in return, "What have you done for ham radio lately?"—*Rich Moseson, N2BFG, Chairman, ARRL Public Relations Advisory Committee & Affiliated Club Coordinator, Eastern New York*

there were power lines hidden behind them. Mike was 36 years old. Our deepest sympathies go to his family.

While it cannot in any way reduce the loss to Mike's family, and to the Amateur Radio community, we hope this note will remind all of us to put safety at the top of the check list for antenna projects, at home or in the field.—*David Sumner, K1ZZ*

# Announcing the HF/VHF/UHF base station you'll hear about on the air.



Listen for Yaesu's FT-767GX everywhere you might hear it: HF, 6 meters, 2 meters and 70 cm.

You'll hear operators calling it the ideal HF/VHF/UHF base station for small ham shacks and apartments.

And they'll rave about its full-featured performance and highly attractive price.

You see, the FT-767GX continues the price/performance tradition of our popular FT-757GX. But with even more features:

When you're ready to expand beyond HF coverage, just plug in optional modules for 6-meter, 2-meter, and 70-cm operation.

As standard equipment, you get a built-in HF automatic antenna tuner, AC power supply, digital SWR meter, digital power output meter, electronic keyer, and CW filter.

And operation is smooth and intuitive with keyboard frequency entry. Dual VFOs that tune in 10-Hz steps. A digital display in 10-Hz steps. And ten memories that store mode, frequency, and CTCSS tone information.

The FT-767GX is ready to operate full duty cycle at full rated power

output for up to 30 minutes. And it listens from 100 Hz to 30 MHz.

Plus your station is really complete with full CW break-in, our patented Audio Peak Filter for CW operation, a CW TX offset variable 500/600/700 Hz, IF shift, an IF notch filter, a Woodpecker noise blanker, a VFO tracking system for slaved A/B VFO tuning, and optional CTCSS unit for repeater operation. And that's just a partial list!

But the best way to discover its full-featured performance is to visit your Yaesu dealer today.

Yaesu's FT-767GX. The affordable way to be heard on HF, VHF and UHF.

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*Our 30th Anniversary.*

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Prices and specifications subject to change without notice.



**Calls It Quits:** After 21 years of helping chart new trails into space, NASA Astronaut Owen Garriott is hanging up his space suit for good. This nation's most experienced current space traveler, Owen has logged some 1650 hours in space. He spent 59 days aboard Skylab in 1973 and nine days on the Space Shuttle's first Spacelab mission in 1983. It was during the Spacelab mission that Owen immortalized his amateur call sign—W5LFL—by becoming the "first ham in space," working some 275 stations around the world on 2-meter FM from aboard the *Columbia*. Owen says he left the NASA Astronaut Corps because the Shuttle program has been grounded temporarily as a result of the January 28 *Challenger* accident and he expected a three- to four-year wait before he could fly in space again. (NASA photo)

### New Publication Looks to Grab Youth

It's no joke, but it should be a lot of fun—and may help to recruit more young people into Amateur Radio. What is it? A comic book introducing ham radio to young people 9-15 years old. Being published by Archie Comics, it should be ready for distribution by the start of the school year.

Half the publication cost is being paid by the Amateur Radio industry, the other half by the ARRL. Thirty-two pages long, the comic book will have a 24-26 page story, a crossword puzzle, a quiz based on facts in the story, a glossary of terms and other fun items.

### PRB-1 Package: Amateurs' Zone Defense

Having trouble with an overly restrictive antenna-height ordinance? The ARRL has put together some materials that will help you communicate the amateur side of the story to local zoning officials. Among the items included in the PRB-1 package are a copy of the federal-preemption order, sample zoning ordinances, and the names and addresses of local ARRL Volunteer Counsels. For your copy, send \$3 (to cover postage) to ARRL.

### No-Code in Canada?

If the CRRL and CARF have their way, Canada's Amateur Service will have a decidedly different look. Among the changes the two national organizations have officially proposed to the Department of Communications (DOC) are a no-code entry-level license and incentives to encourage more newcomers to upgrade. For the full text of the CRRL/CARF proposal, see this month's Canadian NewsFronts column.



**Class Act:** What started as small talk at a Christmas party between Tom Thompson, W0IVJ, and a junior high school teacher developed into a project with big results for these kids in Ft Lupton, Colorado. Their teacher was looking for a new challenge for her students—and Tom had just what the teacher ordered: a ham radio receiver construction project. Details were worked out over the winter, and that spring the project got underway. For three weeks, in two three-hour classes a week, Tom and the kids diligently built and tested the various components until, one by one, each 20-meter receiver was completed. Ear-to-ear grins covered everyone's faces as each rig passed the ultimate test and crackled to life. An antenna party, with some parents helping, added the finishing touch. Total cost of the project? \$57 per radio (including a dipole). There are now 10 ham receivers at work in Ft Lupton, and four of the kids have purchased *Tune in the World* kits. There's even talk of starting a school radio club and a code class... (Margaret Rider photo)



**Operation Phone Patch:** When Bill Tackett, KN4N (right), found out his Army Engineer Battalion was going to Panama for their annual training, he saw an opportunity to use Amateur Radio. Their base camp would be in a remote part of the country, without commercial power or telephones—ideal for sending messages back home via ham radio for the GIs who would be there. Putting the plan into action took some doing, however. First, Bill had to clear the amateur operation with his superiors to avoid any breach of security regulations. Next, with help from HP1XRRL, he had to make arrangements to obtain a license in Panama upon arrival. And, finally, because his antenna got sidetracked during transit, Bill had to do some quick thinking to devise an antenna system until his 3-element tribander arrived at camp. From mid-January to late March, Bill and another ham, WA4FRP, handled more than 1000 messages back home. Bill says that many of the GIs were amazed at Amateur Radio's capabilities and that several will likely become hams because of this experience. (US Army photo)

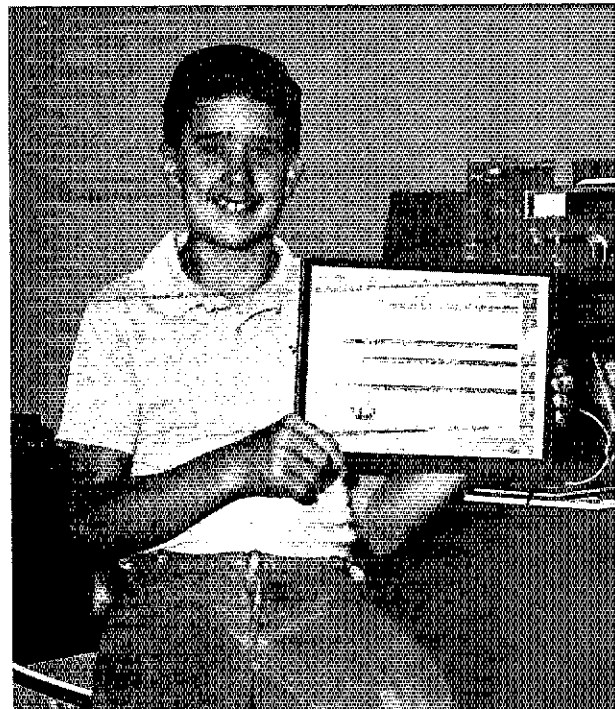
### Grace-Period Refresher

HQ has received a number of inquiries on renewing an amateur license, particularly about the grace period, so here's a quick refresher course. If you have a license good for a five-year term, its grace period, should you fail to renew on time, is five years. After two years of the grace period has elapsed, you lose your call sign and are assigned a new one, but you don't have to retake an exam

until the full five years has elapsed. The new 10-year-term licenses, which have been issued since January 1984, have a two-year grace period, after which you lose your license and have to retake an exam. To renew your amateur license, use Form 610, available from any FCC Field Office or from the ARRL. There is no fee for renewing an amateur license.



**State of the Art:** Thanks to Trio-Kenwood Communications' recent donation of a new TS-440S/AT transceiver with power supply and accessories, the ARRL HQ club station, W1INF/W1AW, has been completely modernized. Now operational on all bands from 1.8 through 432 MHz, with equipment for CW, SSB, FM, RTTY and OSCAR, W1INF/W1AW can be found on the air weekends and holidays. Here, Assistant Technical Editor Rus Healy, NJ2L, puts the new equipment through its paces.



**Extra Special:** Every time Mark Pearson, KB6HRK ("Ham Radio Kid") thinks about his success with the Extra Class exam, he can't help but flash a big smile. Just two months after receiving his Novice license, last April, the Ontario, California ham upgraded to Extra. Mark, 14, teaches code classes for the West End ARC of Ontario and has been net control station for a local RACES net. His proud father is K6PLK.

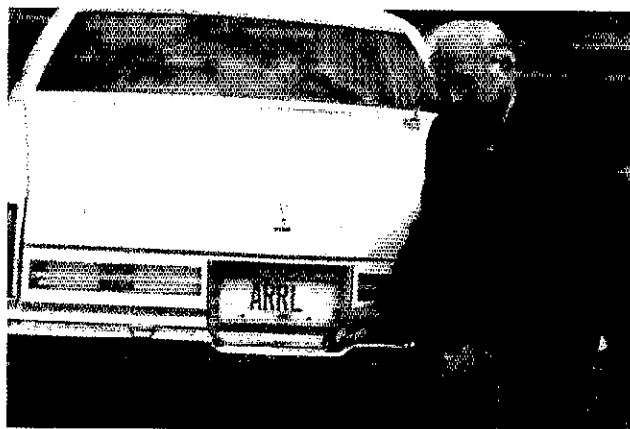


**Billboard on Wheels:** The League gets some free advertising wherever these four members of the "official family" travel. The license plates shown belong to (clockwise from upper left) Southeastern Division Director Frank

Butler Jr, W4RH; Southwestern Division Director Fried Heyn, WA6WZO, and Sandi, W6WZN; Central Division Director Edmond Metzger, W9PRN; and ARRL HQ. The HQ license plate originally

belonged to long-time Communications Manager Francis "Ed" Handy, W1BDI, but a few years ago the Handy family graciously transferred ownership to the League in memory of Ed's 42 years

of service to ARRL and Amateur Radio. Director Metzger had the pleasure of having his license plate presented to him by Illinois Secretary of State (now US Senator) Alan J. Dixon.



### NCS Looking for Tango Partners

Here's a good opportunity for traffic handlers to put their operating skills to the test in behalf of Amateur Radio. The National Communications System is looking for amateurs in several parts of the country to participate in the next Night Tango, a series of exercises designed to evaluate the ability of volunteer communications systems

to support national emergency-preparedness efforts. Amateurs are needed on two dates at the following locations: For August 28 (7 PM EDT)—Gulfport/Biloxi, Mississippi; Portland, Maine; Eau Claire, Wisconsin; and Washington, DC. For August 30 (9 AM EDT)—Monroe, Louisiana; Concord, New Hampshire;

Rochester, Minnesota; and again at Washington, DC. This exercise will also test packet procedures, so amateurs with experience in HF packet radio are needed in addition to regular ARRL HF traffic handlers at the above locations. For more information, contact Keith Young at 703-979-1220, 8 AM-5 PM EDT Monday-Friday.

### Oops!

Those who read about W2DDN's homemade 1-kW mobile rig in this column last month and were expecting to see construction details in Hints and Kinks didn't find them there, and for that we apologize. However, W2DDN's rig is the lead item in this month's Hints and Kinks. We promise.

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# League Lines

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ARRL Executive Committee meets . . . new West Texas ARRL Section . . . EPA proposes to limit public exposure to RF . . . all this and much more news in this month's Happenings, page 50.

**House Passes Electronic Communications Privacy Act.** On June 23, the US House of Representatives, by a voice vote, passed the Electronic Communications Privacy Act bill. On June 10, by a vote of 34-0, the bill had been favorably reported out of the House Judiciary Committee, where the number of the bill was changed from HR 3378 to HR 4952. In the Senate, Patrick Leahy (D-VT) has introduced an identically worded bill, S.2575, for consideration by the Subcommittee on Patents, Copyrights and Trademarks. It is expected that the Subcommittee will act on the bill sometime after mid-July.

ARRL has filed a petition for reconsideration concerning the dismissal of its petition by the FCC Chief Engineer to require the labeling of home electronic equipment relative to its susceptibility to RFI. The Chief Engineer had stated in his dismissal that the Petition was premature as necessitating mandatory RF rejection standards. The League's Petition for Reconsideration disputes this, stating that *the labeling is independent of RF-susceptibility standards, and it would encourage voluntary compliance* by manufacturers without adding any additional work burden on the Commission. The labeling requirement would also serve to educate the consumer by suggesting that the consumer should contact the manufacturer for assistance in case of interference.

The 1986 *Conference of Volunteer Examiner Coordinators* (VECs) will be held in Washington, DC on August 8. FCC's Ray Kowalski, Chief of the Special Services Division, which oversees the Personal Radio Branch, of which the Amateur Radio Service is a part, will be the official host. Both ARRL VEC Department Manager Jim Clary, WB9IHH, and Assistant Manager Don McGrath, KZ1A, will attend. The ARRL VEC now has over 7800 accredited VEs in its program.

*The 1985 ARRL Annual Report is now available* to members for \$1 postpaid. It consists of reports from the Officers, Board of Directors and HQ staff, and financial statements.

The Boy Scout Amateur Radio Merit Badge pamphlet has been rewritten by Mike Brown, WB2JWD. The new edition replaces one that was written by HQ staff member Perry Williams, WIUED, nearly 25 years ago! The Boy Scouts of America national headquarters reports that *the pamphlet should be available in September*.

**Do you want to help bring newcomers into Amateur Radio?** If you are a part of the ARRL Field Organization or an officer of an ARRL-affiliated club, check the July 1986 issue of *Field Forum* for an article entitled Clubs: The Future of Amateur Radio. In it we explore some of the leaks in the system where we lose people interested in joining our hobby—and what to do about plugging them.

**Canadian and US reciprocal operating:** A few years ago, the FCC, and its Canadian counterpart, the Department of Communications (DOC), agreed to automatic reciprocity. Thus, Canadian radio amateurs visiting the US and US amateurs visiting Canada no longer need reciprocal-operating permits from the country they are visiting.

Visiting amateurs must confine themselves to both the host country's restrictions and their home restrictions. When you travel across the US/Canadian border, it's always a good idea to have your original license with you.

A typo appears in the July Happenings column regarding elections for Directors and Vice Directors. The 300-word statement setting forth the candidates' qualifications must be received at HQ *no later than August 20*, not August 30 as stated.



# Electromagnetic Pulse and the Radio Amateur

*Part 1: Will your station survive the effects of lightning strikes or electromagnetic pulse (EMP) generated by nuclear explosions? The information in this series will help you harden your radio system.*

By Dennis Bodson, W4PWF

Acting Assistant Manager, Technology and Standards  
National Communications System  
Washington, DC 20305-2010

Radio amateurs have long been concerned with protecting their radio installations against lightning. Many have applied lightning protection where required by local electrical codes. Traditionally, the installed protection is designed to combat "slow" lightning strikes (having rise times on the order of tens of microseconds) with protection from direct overhead strokes obtained by sheltering important conductors with a grounding system.

To address the transient threat, including lightning-voltage surges and electromagnetic pulse (EMP), it is necessary to protect installations against electromagnetic fields rising to a peak intensity of 50 kV/m in several nanoseconds. While some modern lightning-protection devices are effective against a lightning transient threat, the majority of them will not act in time to prevent the faster EMP from entering the radio equipment.

Protection of Amateur Radio installations is becoming more difficult as circuit components become more sensitive to transients. ICs are susceptible to damage at transient levels smaller than those of discrete transistors, which are more susceptible than vacuum tubes. New protection devices such as metal-oxide varistors (MOVs) offer protection within one nanosecond of the arrival of a transient pulse such. When properly selected and installed, such devices show promise of providing protection against the universal transient threat.

## Background

One of the primary reasons for the existence of Amateur Radio is to provide a public service. Over many years, this service has proven to be most valuable during emergencies. At first, the amateur public emergency service existed spontaneously on an individual basis. Today, it has evolved into a well-established system that includes the Amateur Radio Emergency Service

(ARES), the National Traffic System (NTS), the Radio Amateur Civil Emergency Service (RACES) and the Military Affiliate Radio System (MARS).<sup>1</sup>

Radio amateurs have provided communications during natural disasters such as tornadoes, hurricanes, floods and blizzards when other forms of communication have been inadequate. The amateur uses portable, mobile and fixed-station radio equipment that is not necessarily dependent on commercial power. In almost every community large and small, there is a cadre of experienced radio amateurs willing to respond to the need for emergency communications.

In addition to the role amateurs fill during natural disasters, the National Communications System (NCS) has long recognized that the Amateur Radio community provides a great national resource. It is of value not only to the public, but also to augment civil and military agencies. To enhance the nationwide posture of telecommunications readiness for national emergencies, the NCS and the ARRL have a written memorandum of understanding. Its purpose is to establish a broad framework of cooperation and a close working relationship with volunteer radio amateurs for national emergency-communications functions. Therefore, it is in the national interest to find ways to enhance the survivability of the Amateur Radio system in a nuclear environment.

## EMP Defined

Electromagnetic Pulse (EMP) is defined as a large, impulsive type of electromagnetic wave generated by a nuclear explosion. EMP commonly refers to a nuclear electromagnetic pulse (NEMP). In this usage, it is a plane-wave, line-of-sight electromagnetic phenomenon that occurs

as a result of an above-ground nuclear detonation. NEMP has an electric field strength of 50 kV/m horizontally and 20 kV/m vertically, with a pulse rise time to peak of 5 to 10 nanoseconds.

There are several different types of EMP resulting from a nuclear explosion. One of the more significant types is the High-altitude EMP (HEMP) that results from a nuclear explosion above 30 miles in altitude. The HEMP is created by the interaction of high-energy photons (gamma rays) with atmospheric molecules, producing Compton electrons. These electrons decay in the Earth's magnetic fields, emitting photons in the process.

System-Generated EMP (SGEMP) is produced by the direct interaction of high-energy photons with systems (equipment), rather than through their interaction with atmospheric molecules. SGEMP is important because of its effects on satellite systems and in-flight missiles.

The third type, Magnetohydrodynamic EMP (MHD-EMP) is different because of its distinct physical generation mechanism, later occurrence, smaller amplitude and longer duration. It is sometimes referred to as late-time EMP. MHD-EMP poses a threat for very long landlines (including telephone cables and power-distribution lines) or submarine cables.

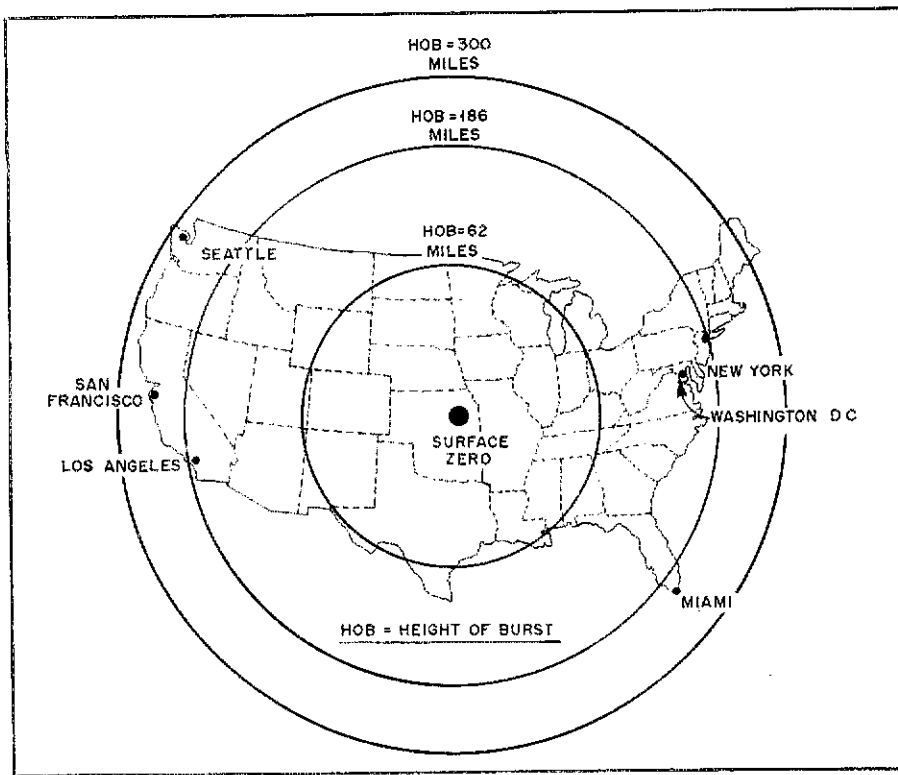
## EMP Description

Of the three types of EMP, HEMP poses the greatest threat to the Amateur Radio operator's equipment. Therefore, this report deals primarily with HEMP and lightning.

## Generation Process

A major threat exists to every Amateur Radio installation in the US from the possibility of high-altitude nuclear explosions over the central part of the country. One such detonation at a height of 250 to 300 miles could produce an EMP/transient effect over the contiguous US. Significant

<sup>1</sup>Notes appear on page 36.



electrons are deflected from their original path by the Earth's magnetic field and spiral around the geomagnetic field lines. They complete about one-third of a revolution before they decay and are reabsorbed by the atmosphere. The current generated by this magnetic deflection is a major component of the deposition region in a high-altitude nuclear blast.

#### Deposition Region

In a high-altitude nuclear blast (30 miles or more above the Earth's atmosphere) the gamma rays radiated in a downward direction travel through the near vacuum of space until encountering a region where the atmospheric density is sufficient to produce the Compton Effect and the resulting deposition region. The deposition region is generally circular and is approximately 50 miles thick in the center and tapers toward the outer edge, with a mean altitude of 25 to 30 miles (Fig 2). The radius of the deposition region is determined by the height of the burst, the yield of the nuclear device, and is limited by the curvature of the earth. The deposition region is formed quickly since the gamma rays and the Compton electrons both travel at nearly the speed of light (186,000 mi/s) in a vacuum. The rapid generation of the deposition

Fig 1—EMP ground coverage for high-altitude, 10-megaton nuclear explosions at altitudes of 62, 186 and 300 miles.

EMP levels can occur on the Earth's surface at all points within line-of-sight from the explosion. If high-yield weapons are used, the EMP field strength felt on the earth will not vary significantly with the height of the explosion. Therefore, a high-altitude explosion, which can cover a large geographic area, will produce essentially the same peak field strength as a low-altitude explosion, which covers a small geographic area. Fig 1 illustrates the areas that EMP would affect based on height of burst (HOB) above the US.

#### The Compton Effect

During a nuclear explosion, gamma rays (high-energy photons) are radiated in all directions from the source. These gamma rays react with the atmosphere to produce large electrical charges and currents, which are the sources of the electric and magnetic fields that comprise the EMP. The basic physical process that converts the gamma-ray energy into EMP energy is known as the Compton Effect.

When a gamma ray strikes an atom in the atmosphere, it knocks an electron free and drives it outward from the detonation. Since the electrons (Compton electrons) are smaller, they are moved outward more rapidly than the remaining large positively charged portion of the atom. The results are a charge separation in the atmosphere, and creation of a huge electric current. This charged region in the atmosphere is called the "deposition region." An additional current is generated when the Compton

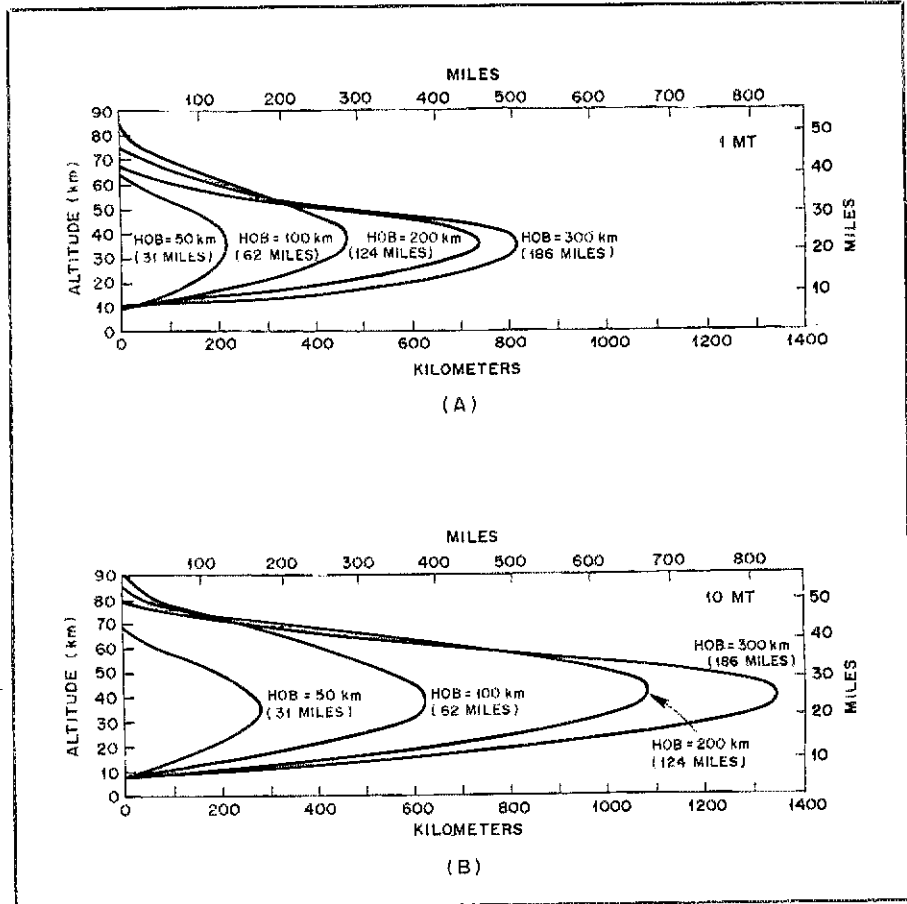


Fig 2—At A, deposition regions for a 1-megaton nuclear explosion at altitudes of 31, 62, 124 and 186 miles. Deposition regions for a 10-megaton nuclear explosion at the same heights are shown at B.

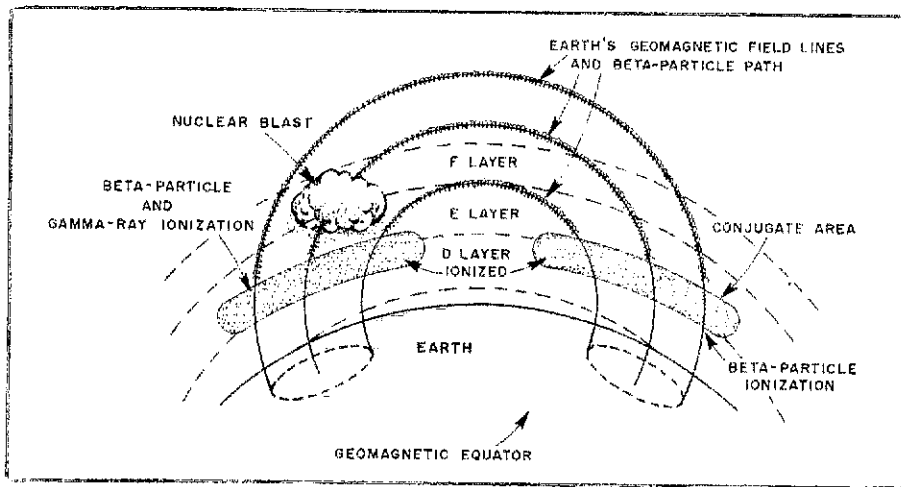


Fig 3—Depiction of the magnetic conjugate.

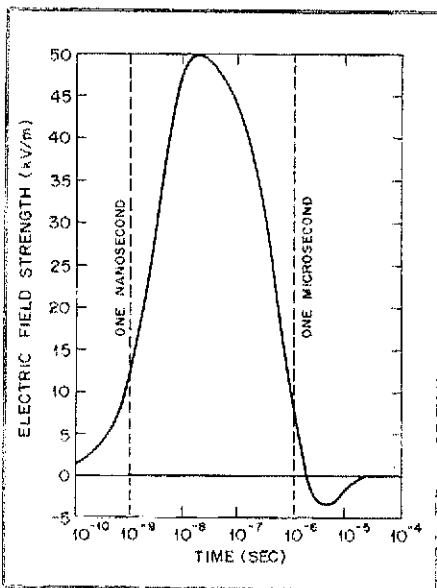


Fig 4—Electric field strength of a typical EMP wave.

since the pulse is of such short duration, the total energy received on the ground is only about 0.6 J/m<sup>2</sup>.

### Radio Frequencies

The energy of a high-altitude EMP is spread over a major part of the RF spectrum. Since the pulse has such a fast rise time and short duration, it covers a broad frequency range extending from 10 kilohertz to 100 megahertz. The electric field strength remains fairly constant in the 10-kHz to 1-MHz band; it decreases by a factor of 100 in the 1- to 100-MHz band and continues to decrease at a faster rate for frequencies greater than 100 MHz. Most high-altitude EMP energy is at frequencies between 100 kHz and 10 MHz, and 99% lies in the frequency spectrum below 100 MHz (Fig 5).

### Coupling

Electromagnetic energy is radiated downward from the deposition region to the earth. Any conductor beneath or near the deposition region will act as an antenna and pick up the electromagnetic energy. Long power-transmission lines are effective in picking up the low-frequency components of the EMP. Short metallic conductors, including internal parts of electronic equipment, pick up the high-frequency components of the EMP. A list of collectors is shown in Fig 6. The energy on the conductor is in the form of a strong current and voltage surge that is transmitted to the attached electronic equipment. Table 1 illustrates EMP-induced surges on conductors.

Equipment does not have to be attached directly to a collector (conductor) to be damaged; EMP/transient-pulse energy can be coupled to the equipment in other ways. For example, an electric current can be induced, or a spark can jump, from a primary conductor that collects the EMP energy to a nearby secondary conductor

surges. A high-altitude EMP rises to peak voltage in approximately 10 nanoseconds (ten billionths of a second) and has a duration of approximately 1 microsecond (1 millionth of a second); see Fig 4. A lightning stroke, on the other hand, rises to peak voltage in about 2 microseconds and lasts 100 times longer (1 thousandth of a second) than an EMP.

A significant difference between EMP and lightning is that EMP effects are felt over a much larger area simultaneously, not just locally. Any conductor within the area of an EMP will act as an antenna and could pick up the electromagnetic energy. The voltages and currents induced in these conductors are comparable to those produced by the largest lightning bolts. However, the total energy of the EMP current is not as large as a nearby lightning-current pulse because of the short duration of the EMP.

Lightning can be viewed almost as a steady current when compared with EMP. The instantaneous peak-power density for an EMP is typically 6 MW/m<sup>2</sup>. However,

region results in a pulse with a very fast rise time, covering a broad frequency range.

### Magnetic Conjugate

A high-altitude detonation also generates beta particles, or free electrons, that spiral along the Earth's magnetic field lines. This creates an increase in the ionization of the D layer of the atmosphere not only at the local area, but also in the area known as the magnetic conjugate—in the opposite hemisphere! Fig 3 graphically depicts the immensity of EMP's widespread effects. Amateurs in both the local and opposite hemisphere may find a sudden loss in their ability to communicate.

### Electromagnetic Spectrum Effects

#### Amplitude (Waveform)

An EMP has a fast rise time and a short duration when compared to lightning

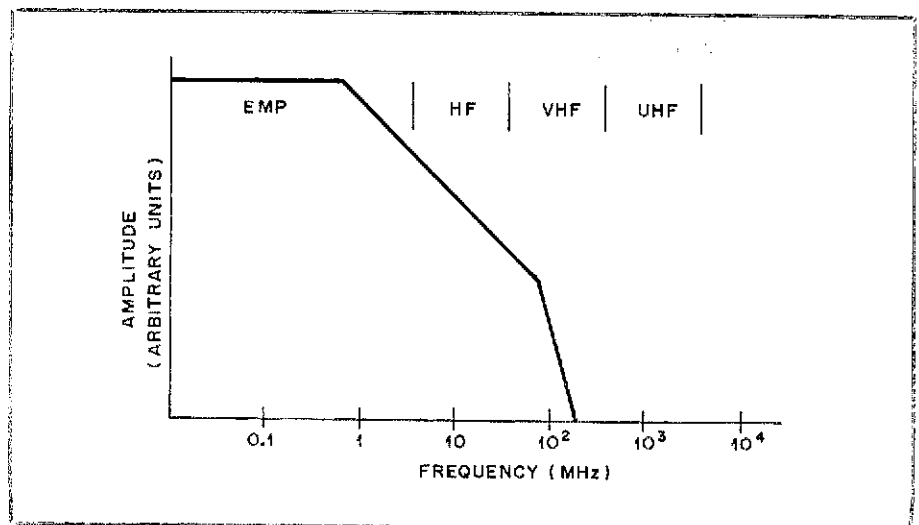


Fig 5—The frequency spectrum of EMP.

### Typical Collectors of EMP Energy

Long runs of cable, piping or conduit  
 Large antennas, antenna feed lines, guy wires, antenna supports (towers)  
 Overhead power and telephone lines and supporting towers  
 Long runs of electrical wiring, conduit, and so forth in buildings  
 Metallic structural components, girders, reinforcing bars, corrugated roofs, expanded metal lath, metal fences  
 Railroad tracks  
 Aluminum aircraft bodies

Fig 6

**Table 1**  
**EMP-Induced Surges on Conductors**

Conductor Type	EMP Rise Time (Microseconds)	Peak Voltage (Volts)	Peak Current (Amperes)
Long, unshielded wires (power lines, large antennas)	0.01-0.1	100 k-5 M	1 k-10 k
Unshielded telephone wires at wall outlet	0.01-1	100-10 k	1-100
Ac power lines at wall outlet	0.1-10	1 k-50 k	10-100
HF antennas	0.01-0.1	10 k-1 M	500-100 k
VHF antennas	0.001-0.01	1 k-100 k	100-1 k
UHF antennas	0.001-0.01	100-10 k	10-100
Shielded cable	1-100	1-100	0.1-50

**Table 2**  
**Effects of Nuclear Detonations on Radio Systems**

Frequency Range	Degradation Mechanism	Spatial Extent and Duration of Effects	Comments
VLF	Phase and amplitude changes	Hundreds to thousands of miles; minutes to hours.	Ground wave not affected, lowering of sky-wave reflection height causes rapid phase change with slow recovery. Significant amplitude degradation of sky-wave modes possible.
LF	Absorption of sky waves, defocusing.	Hundreds to thousands of miles; minutes to hours.	Ground wave not affected; effects sensitive to relative geometry of burst and propagation path
MF	Absorption of sky waves.	Hundreds to thousands of miles; minutes to hours.	Ground wave not affected
HF	Absorption of sky waves, loss of support for F-region reflection and/or multipath interference.	Hundreds to thousands of miles, burst region and conjugate; minutes to hours.	Daytime absorption greater than night-time. F-region disturbances may result in new modes, multipath interference
VHF	Absorption, multipath interference, or false targets resulting from resolved multipath radar signals.	A few miles to hundreds of miles; minutes to tens of minutes.	Fireball and D-region absorption, circuits may experience attenuation or multipath interference
UHF	Absorption.	A few miles to tens of miles; seconds to a few minutes.	Only important for line-of-sight propagation through highly ionized regions

that is connected to the equipment, but not to the primary conductor.

There are three basic ways to couple the EMP energy from a high-altitude nuclear explosion to a conductor on the earth: electric induction, magnetic induction and resistive coupling (direct-charge deposition). Electric induction occurs when a current is induced in a conducting element by the electric-field component that is in the same direction as the conductor's length. Magnetic induction takes place in conductors that are in the form of a closed loop. The magnetic-field component moving perpendicular to the plane of the closed loop causes a current to flow in the conducting loop. Resistive coupling occurs when a conductor is located in another conducting medium, ie, the earth, water or the air. When a current is flowing in the conducting medium, the conductor provides an alternative current path and shares the current with the medium. Resistive coupling can be generated as a by-product of electric or magnetic induction.

### Nuclear Weapons Effects on Radio Signals

Nuclear weapons can degrade and black out radio signals far from the immediate blast zone. Degradation of radio signals by nuclear weapons varies with the explosion yield, distance and altitude. Signal degradation may include high noise levels, absorption, attenuation, ionization and partial or complete blackout. The effects may extend hundreds to thousands of miles and last from minutes to hours. Normal HF ionospheric propagation paths (below the Maximum Usable Frequency—MUF) may be disrupted at the same time that new paths that were not previously available are created in the upper HF or low VHF bands. It is by no means certain, however, that HF communications will be completely disrupted under all circumstances (Table 2).

### Lightning

Lightning and EMP have similar characteristics. Both take the form of a fast-rising electromagnetic pulse that can generate large currents in conductors. Earlier studies generally stated that the effects of EMP exceeded those of lightning, but more recent

reports indicate that lightning effects can be equal to or exceed those of EMP in the lower-frequency spectrum, while EMP effects are more severe in the higher-frequency spectrum.

### Lightning Description

Lightning is a natural, transient, high-current electrical discharge occurring in the atmosphere. Lightning occurs when a region of the atmosphere attains a huge electric charge with the associated electric fields large enough to cause electrical breakdown of the air, creating a discharge path for the charge.

The most common lightning path is the intracloud discharge path. From an electrical equipment standpoint, however, the cloud-to-ground lightning discharge path has the highest potential for causing pow-

er disruption and equipment damage. Typically, the upper portion of the thunder cloud carries a greater positive charge while the lower part of the cloud carries a large negative charge. In a cloud-to-ground lightning discharge, the negative charge in the cloud is lowered by the dissipation of the electrons into the earth. A typical cloud-to-ground lightning discharge can last from 1/5 to 1/2 of a second and is composed of several discharge components. The total discharge occurrence is called a *flash*. The typical lightning flash is composed of three to four high-current pulses called *strokes*. Each stroke lasts about 1 millisecond with a delay between strokes of 40 to 80 ms. The first stroke is initiated by a preliminary breakdown in the cloud, which channels a negative charge toward the ground in a series of short luminous steps called the *step*

*leader*. As the step-leader tip approaches the ground, the electric field beneath it becomes large and causes one or more upward-moving discharges to be initiated from the ground. When the downward-moving leader contacts one of the upward-moving discharges, the leader tip is connected to ground potential. The leader path ionizes the air making it a conductive plasma that is luminous. The return stroke, a ground potential wave, propagates up the ionized leader path discharging the leader channel. The return stroke produces a peak current of typically 30 kA in its lower portion, with a rise time of from zero to peak in about 2  $\mu$ s. The return-stroke energy heats the leader channel to temperatures approaching 60,000 °F and produces a high-pressure channel that expands to generate a shock wave that is heard as thunder. If a residual charge is available at the top of the channel, a charge called a *dart leader* may propagate down the first stroke channel. The dart leader initiates the second, third and fourth return strokes, if any.

### Lightning Energy

The normal peak current in a single return stroke will range from 10 to 40 kA with 175 kA for a severe stroke and with a charge transfer of 2.5 C (coulombs).<sup>2</sup> The total lightning discharge, when composed of several strokes, can transfer a charge of 25 C. The energy associated with a typical lightning stroke will vary depending on the dynamic resistance of the conducting channel, with values estimated to range from 250 J to 10 MJ.

### Lightning and EMP Compared

A direct or nearby lightning strike can equal or exceed the electromagnetic field strength of EMP. To compare a direct lightning strike with EMP, 35 kA will be used as an average value of the peak current of the first return stroke and 175 kA as the value of the peak current of a severe first return stroke. At 1 meter from a direct lightning ground strike, the magnetic-field energy for the average return stroke is equal to the EMP at a frequency near 10 MHz and exceeds the EMP at frequencies below 10 MHz. At 1 meter from a direct lightning ground hit, the energy of a severe lightning return stroke exceeds the EMP to frequencies above 10 MHz. At 50 meters from a severe lightning stroke, the energy of the total electric field exceeds that of EMP at frequencies below about 1 MHz; and for the average first return stroke, the total lightning electric-field energy exceeds that of EMP below about 300 kHz.

The major difference between lightning and EMP is the area affected. EMP can affect an area of thousands of square miles, while lightning can affect an area of only a few square miles, with severe effects normally within a few hundred feet from the lightning discharge path. EMP can damage small electronic components and transmission lines, while a direct lightning strike can

cause major structural damage to antennas and towers, as well as electronic equipment.

### Physical Effects on Equipment

The primary effects of EMP that are of interest to the Radio Amateur are those that would produce direct damage to the sensitive electronic components of the station. The amateur is also interested in the temporary blackout caused by disruption to the ionosphere. A nuclear detonation causes intense changes in the ionosphere that increase or decrease the amount of ionization within a particular layer of the atmosphere. This change can result in the absorption of the radio signal or change the signal path (refraction) to the extent that communication is not possible. The fireball itself can disrupt communications because it generates an opaque area that radio signals cannot penetrate.

More widely known disturbances such as blackout (the complete disruption of electromagnetic signals for a short period) and scintillation (the scattering of signal energy caused by fast-changing ionization irregularity) should not be confused with EMP. Neither of the foregoing can damage equipment like EMP can. Radio propagation degradation, through refraction and absorption, usually lasts for a few minutes to a few hours, depending on the frequency. It is important only where continuous communications are of vital importance, because blackout and scintillation are only temporary and produce no permanent damage to primary or ancillary radio equipment. EMP, however, produces almost instantaneous and possibly permanent damage to sensitive electronic components. Fig 7 shows how signal propagation may be affected.

The components of the amateur's radio system that can be most affected are those directly attached to a primary collector (conductor) of EMP energy. The amateur's transceiver is most sensitive where it is connected to the commercial power lines and the antenna transmission line. Other sensitive connection points include the microphone, telephone lines and any remote-control lines.

There is a large number of electronic and electrical components that can be permanently damaged by the voltage and current surges induced by EMP/transients. As a general rule, smaller components are more susceptible to damage than larger ones. The most susceptible components are ICs, then discrete transistors. Somewhat less susceptible components are capacitors, resistors and inductors. Least susceptible are the large components such as solenoids, relays, circuit breakers, motors and transformers.

### Transceivers

The typical amateur transceiver is subject to EMP/transient damage and temporary effects from a number of sources. The primary sources are EMP energy collected by antennas, transmission lines and

electrical-power lines; to a lesser extent by remote-control, telephone, microphone and speaker lines, and so on. The transceiver would be damaged primarily where these lines enter it at the antenna matching network, internal power supply, telephone-patching equipment, microphone and speaker connections, and so on. If the transceiver case is metallic, it may provide enough shielding to prevent damage from EMP energy collected directly by the transceiver's internal wiring and circuits.

Where EMP energy does enter the transceiver, it may burn out ICs and FETs. More hardy components, when not destroyed completely, may have degraded performance because of changes in their electrical properties. All solid-state components may experience a change in state that causes temporary signal errors or that requires resetting. Vacuum tube equipment has shown little vulnerability to EMP.

Small VHF radios contained in metal cases are not vulnerable if the external microphone and antenna are disconnected. Also, the radio must be physically removed from other external conductors such as power cords and telephone lines.

### Antennas

Antennas are designed to be efficient collectors of electromagnetic energy at their design frequency. An antenna designed to operate in that part of the RF spectrum where EMP energy is high will exhibit a high coupling efficiency for EMP. It is possible for high voltages and currents to be coupled into these efficient EMP antennas. Equipment attached to these antennas will likely be damaged by the resulting energy. Antennas designed to operate at frequencies outside the EMP energy spectrum will be less likely to act as efficient couplers and may not collect high voltages and currents.

Since most high-altitude EMP energy is concentrated between 100 kHz and 10 MHz, antennas in this frequency range will be subject to the strongest EMP-induced voltages and currents. All antennas designed to operate between 10 and 100 MHz will also be subject to high EMP-induced voltages and currents; however, the EMP energy decreases steadily as the frequencies increase. In general, all antennas designed to operate at frequencies below 100 MHz will be subject to strong EMP coupling, since 99% of the EMP energy is found below 100 MHz. Unfortunately for the radio amateur, the HF bands fall within that part of the spectrum that contains a great amount of EMP energy and a high coupling efficiency. On the other hand, amateur VHF antennas are less efficient collectors of EMP energy since they operate above 100 MHz.

When exposed to a high-altitude EMP event, the amateur's HF antenna could collect a potential of several thousand volts. These high voltages could physically damage the antenna line, balun and any at-

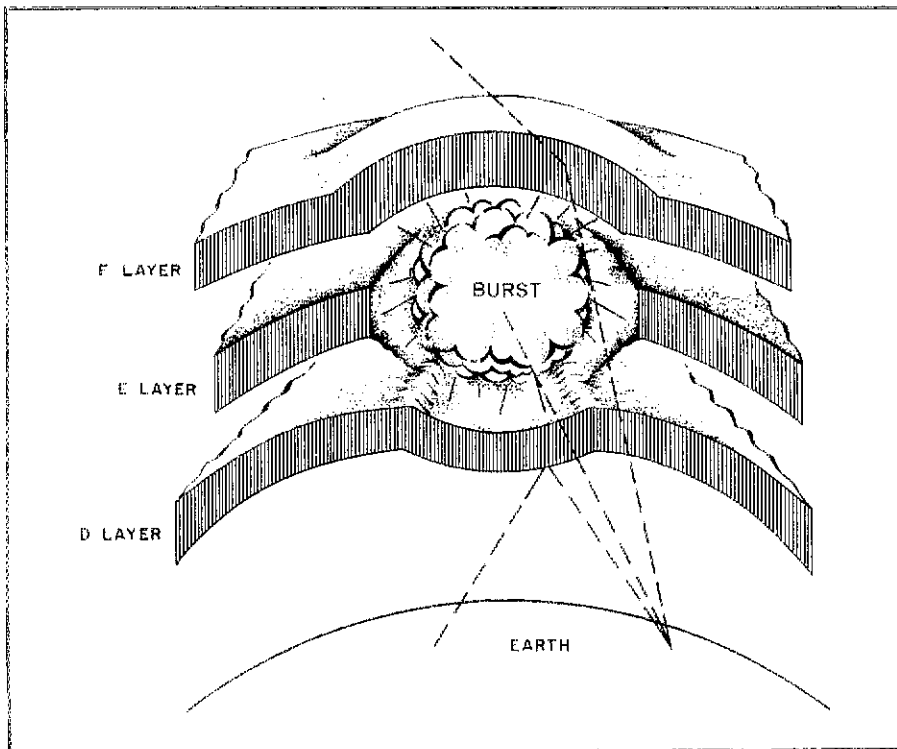


Fig 7—Atmospheric disruption and warping of the Earth's atmosphere caused by a nuclear explosion. Dashed lines show hypothetical signal propagation

tached electronic equipment. Other conductors associated with the antenna system can act as collectors of EMP energy. They are the control cables to the antenna rotator, the antenna mast, guy wires and even the ground system. These all can collect high levels of energy and conduct it directly or indirectly to sensitive electronic equipment. These unintentional collectors are, in many instances, more efficient EMP antennas than the RF antenna they support. Their coupling efficiency is determined primarily by their length, which may be long enough to allow them to operate as an EMP antenna in the strongest part of the EMP energy spectrum. Energy from these collectors, when not directly connected to sensitive radio equipment, can jump or arc to conductors (even short ones) that are connected to radio equipment.

### Commercial Power Equipment

#### Transmission Lines

Power-transmission lines are extremely efficient collectors of EMP energy. The long runs of open, exposed wire can couple large voltage and current transients. Long, unshielded power lines can experience peak EMP-induced surge voltages of between 100 kV and 5 MV, and peak currents of between 1 kA and 10 kA.

Power-transmission lines act as long current conductors with the earth acting as a return conductor. The EMP-induced current flows down the line through the load (equipment) to ground. The amount of

energy dissipated in the load depends on the impedance of the load path to ground. Equipment that presents a large impedance will experience larger peak voltages than equipment exhibiting a smaller impedance and therefore may experience more damage.

#### Power-Line Transformers

Normal power-line transformers will pass a part of EMP-generated currents through capacitive coupling across the windings. Commercial power transformers reduce the severity of the EMP by decreasing the peak voltage and extending the rise time of the pulse. In addition, the internal inductive and capacitive reactances of the transformer make the transformer act like a band-pass filter that attenuates frequencies below 1 and above 10 MHz.

#### Power-Phase Differences

EMP currents that are generated in the three phases of a power line are similar, and voltages in all three phases are nearly equal with respect to ground. The greatest danger exists to equipment connected from one phase to neutral or ground. Less danger exists to equipment connected between phases. The typical household wall outlet supplies 117 V, single phase. Therefore, amateur equipment using this 117-V power source is susceptible to receiving damage from EMP.

#### Household Circuit Breakers

Household circuit breakers will not offer

EMP protection to the amateur's radio equipment because the damaging pulse will pass through the circuit breaker before it has time to react. However, internal arcing in the breaker box and in normal household wiring may limit the peak pulse to about 6 kV.

The amateur should expect the local commercial power system to be damaged and experience outages from the EMP transient. These outages could last for several hours to several days. The power-line EMP transients can cause component damage.

#### Telephone Equipment

The commercial telephone system consists, in large part, of unshielded telephone switches and cable systems. Although a considerable amount of lightning protection has been built in, there is little protection provided for EMP voltage and current surges. An unshielded telephone line may experience a peak voltage between 100 and 10 kV and a peak current of between 1 and 100 A. In recent years, the telephone companies have started using solid-state switching systems that could be highly sensitive to EMP. The older, existing transient over-voltage protection for telephone circuits is robust and can withstand repeated EMP transients without damage. Even the typical telephone handset is likely to withstand EMP without damage. Amateur telephone-patching equipment, however, is subject to EMP damage and should be protected.

#### Computers

One price that modern users pay for the convenience of microelectronics is a greater susceptibility to electrical transients. In computers, particularly when used with Amateur Radio equipment, the same kinds of vulnerability exist as with regular ham gear, only more so. In a typical amateur setup, the program and data are input through a keyboard, cassette recorder or disk drive, and a video display terminal (VDT), printer, cassette recorder and disk drive serve as output devices.

Microprocessors are especially susceptible to EMP and transient-voltage surges. Damage to an amateur's computer can run from simple logic upset or temporary memory loss to fused components and permanent memory loss. Increased voltage may destroy the cathode-ray tube (CRT) and disrupt or otherwise impair disk drives and other ancillary equipment.

#### Repeaters

Microcomputers are having a large impact on FM repeater design and on an increasing number of automated systems under program control. Repeaters are subject to the same threats as any amateur

(continued on page 36)

# Construct a Wire Log-Periodic Dipole Array for 80 or 40 Meters

These log-periodic dipole arrays are simple and easy to build. They are also lightweight, strong and inexpensive. The design parameters can be used to construct antennas for the other ham bands.

By John J. Uhl, KV5E  
245 Fairfield Ave  
Gretna, LA 70053

My desire to work DX and obtain DXCC certification caused me to build my first antenna in the early 1960s. I needed a directional antenna that had reasonable gain, was inexpensive, lightweight and rotatable, and could be assembled with stock items found in large hardware stores. My choice of antennas then was the cubical quad. I had much success DXing with different quads, and I quickly earned DXCC certification. Quads are excellent antennas, but the ones I built lacked the mechanical stability needed in southern Louisiana. I soon learned this when they were ruined by hurricanes.

After my fourth quad was destroyed some years' later, I purchased a triband Yagi and forgot about building antennas ... until the day I had a QSO with Ansyl Eckols, YV5DLT. What started as a normal QSO that day in the late 1970s led to a full-fledged experiment with the design, construction, erection and use of log-periodic dipole arrays made of wire. At that time, YV5DLT was using a triband log-periodic dipole array (LPDA) for 20, 15 and 10 meters. What immediately piqued my interest was that his beam was made of wire, and that his signal had outstanding quality and strength.

During the QSO, I asked Ansyl for construction details of his antenna. His response was generous. He mailed me diagrams, schematics and photographs of the LPDA that he had named Telerana. (He subsequently published his design in *QST*.) After reading and studying all of his data, I was convinced that his design

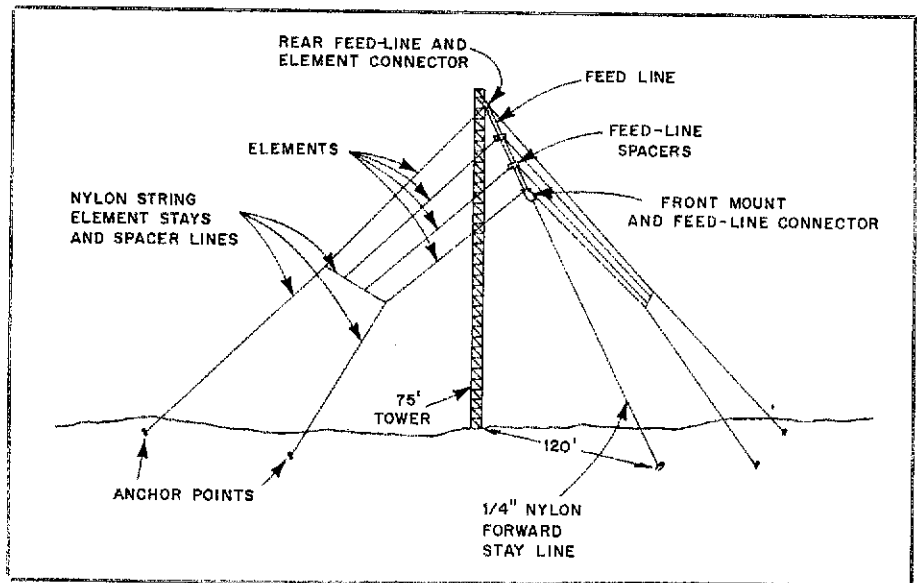


Fig 1—Typical 4-element log-periodic dipole array erected on a tower.

had the mechanical stability to withstand hurricanes, and I began plans in my mind to build a copy of Telerana.

I began a search of the literature, reading all of the LPDA articles that I could find.<sup>2,8</sup> By the time I gathered and read several references, three years had passed. Sunspot activity had diminished and band conditions weren't as good. Openings on 10 and 15 meters were few and of short duration, and future conditions would be worse. I did not duplicate the Telerana for these reasons, but decided instead to apply the LPDA theory to the design of wire LPDAs for use on the 160, 80 and 40-meter bands. By making some preliminary calculations I found that an LPDA for 160 meters would be too large to fit my lot size, but LPDAs for 80 and 40 would fit. However, it would not be possible for me

to rotate these LPDAs.

## LPDAs for 80 and 40 Meters

I placed the same criteria on the LPDAs that I had placed on the quads—that they have reasonable gain, be inexpensive and lightweight, and that they could be assembled with stock items found in large hardware stores. This article is written to detail the design, construction, erection and use of wire LPDAs for the lower frequency bands. Fig 1 shows one method of installation. You can use the information presented here as a guide and point of reference for building similar LPDAs.

If space is available, the antennas can be "rotated" or repositioned in azimuth after they are completed. A 75-ft tower and a clear turning radius of 120 ft around the base of the tower are needed. The task is

<sup>1</sup>Notes appear on p 24.

simplified if only three anchor points are used, instead of the five shown in Fig 1. Omit the two anchor points on the forward element, and extend the two nylon strings used for element stays all the way to the forward stay line.

For the design procedure, refer to *The ARRL Antenna Book*.<sup>9</sup> By using the formulas given there and other data in the text, all of the dimensions can be obtained and the LPDAs will take shape on paper. The design results are summarized in the concluding section of this article. The next step is to fabricate the fittings; see Fig 2 for details. Cut the wire elements and feed lines to the proper sizes and mark them for identification. After the wires are cut and placed aside, it will be difficult to remember which is which unless they are marked. When you have finished fabricating the connectors and cutting all of the wires, the antenna can be assembled. Use your ingenuity when building one of these antennas; it isn't necessary to duplicate my LPDAs exactly.

The elements are made of standard no. 14 stranded copper wire. The two parallel feed lines are made of no. 12 solid copper-coated steel wire, such as Copperweld<sup>®</sup>. This will not stretch when placed under tension. The front and rear connectors are cut from 1/2-in-thick Lexan<sup>®</sup> sheeting, and the feed-line spacers from 1/4-in Plexiglas<sup>®</sup> sheeting.

Study the plans carefully and be familiar with the way the wire elements are connected to the two feed lines, through the front, rear and spacer connectors. Details are sketched in Fig 4. Connections made this way prevent the wire from breaking. All of the rope, string and connectors must be made of materials that can withstand the effects of tension and weathering. Use nylon rope and strings, the type that yachtsmen use. Fig 1 shows the front stay rope coming down to ground level at a point 120 ft from the base of a 75-ft tower. It may not be possible to do this in all cases. In my installation I put a pulley 40 ft up in a tree and ran the front stay rope through the pulley and down to ground level at the base of the tree. The front stay rope will have to be tightened with a block and tackle at ground level.

Putting an LPDA together is not difficult if it is assembled in an orderly manner. It is easier to connect the elements to the feeder lines when the feed-line assembly is stretched between two points. Use the tower and a block and tackle. Attaching the rear connector to the tower and assembling the LPDA at the base of the tower makes raising the antenna into place a much simpler task. Tie the rear connector securely to the base of the tower and attach the two feeder lines to it. Then thread the two feed-line spacers onto the feed line. The spacers will be loose at this time, but will be positioned properly when the elements are connected. Now connect the front connector to the feed lines. A word

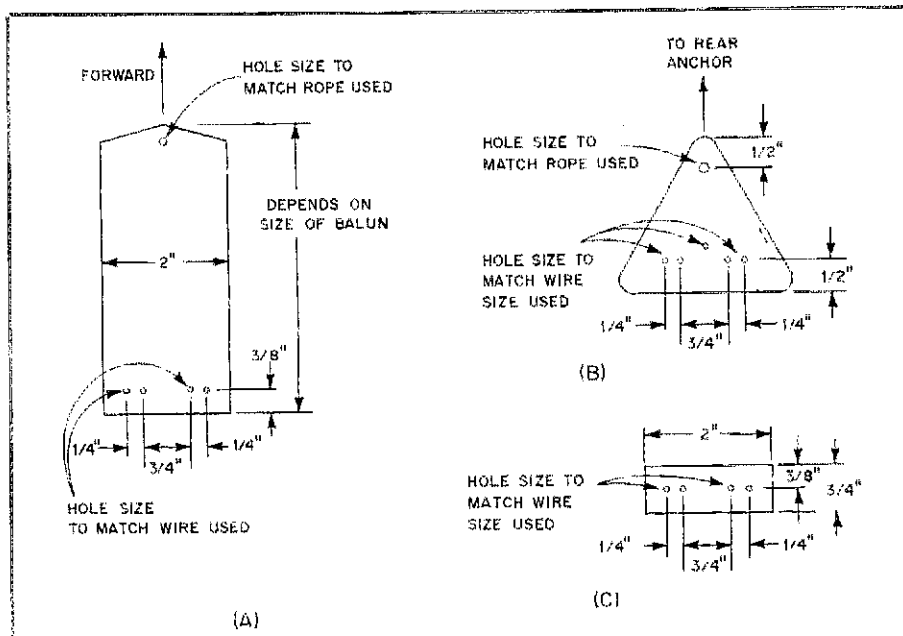


Fig 2—Pieces to be fabricated for the LPDA. At A, the forward connector, made from 1/2-in Lexan<sup>®</sup>. At B, the rear connector, also made from 1/2-in Lexan. At C is the pattern for the feed-line spacers, made from 1/4-in Plexiglas<sup>®</sup>. Two of these spacers are required.

of caution: Measure accurately and carefully! Double-check all measurements before you make permanent connections.

Connect the elements to the feeder lines through their respective plastic connectors, beginning with element 1, then element 2, and so on. Keep all of the element wires securely coiled. If they unravel, you will have a tangled mess of kinked wire. Check that the element-to-feeder connections have been made properly. (See Fig 4.) Once you have completed all of the element connections, attach the 4:1 balun to the underside of the front connector. Connect the feeder lines and the coaxial cable to the balun.

You will need a separate piece of rope and a pulley to raise the completed LPDA into position. First secure the eight element ends with nylon string, referring to Figs 1 and 3. The string must be long enough to reach the tie-down points. Connect the front stay rope to the front connector, and the completed LPDA is now ready to be raised into position. While raising the antenna, uncoil the element wires to prevent their getting away and balling up into a mess. Use care! Raise the rear connector to the proper height and attach it securely to the tower, then pull the front stay rope tight and secure it. Move the elements so that they form a 60-degree angle with the feed lines, in the direction of the front, and space them properly relative to one another. By adjusting the end positions of the elements as you walk back and forth, you will be able to align all the elements properly. Now it is time to hook your rig to the system and make some QSOs.

### Performance

The reports I received using the LPDAs

were compared with an inverted-V dipole. All of the antennas are fixed; the LPDAs radiate to the northeast, and the dipole to the northeast and southwest. The apex of the dipole is at 70 feet, and the 40- and 80-meter LPDAs are at 60 and 50 feet, respectively. The gain of the LPDAs is in the range of 7 to 9 dB over the dipole. This was apparent from some of the reports received: "The quality of the audio on the log is superior to the inverted V." "The signal on the log is much stronger and steadier than the V, about 10 dB." "The LPDA does not fade, but fading conditions are present on the inverted V." During pileups, I was able to break in with a few tries on the LPDAs, yet it was impossible to break in the same pileups using the dipole.

During the CQ WW DX Contest I was able to break into some *big* pileups after a few calls with the LPDAs. Switching to the dipole, I found it impossible to break in after many, many calls. Then, after I switched back to the LPDA, it was easy to break into the same pileup and make the QSO.

Think of the possibilities that these wire LPDA systems offer hams worldwide. They are easy to design and to construct, real advantages in countries where commercially built antennas and parts are not available at reasonable cost. The wire needed can be obtained in all parts of the world, and cost of construction is low! If damaged, the LPDAs can be repaired easily with pliers and solder. For those who travel on DXpeditions where space and weight are large considerations, LPDAs are lightweight but sturdy, and they perform well. They'll even withstand a hurricane!



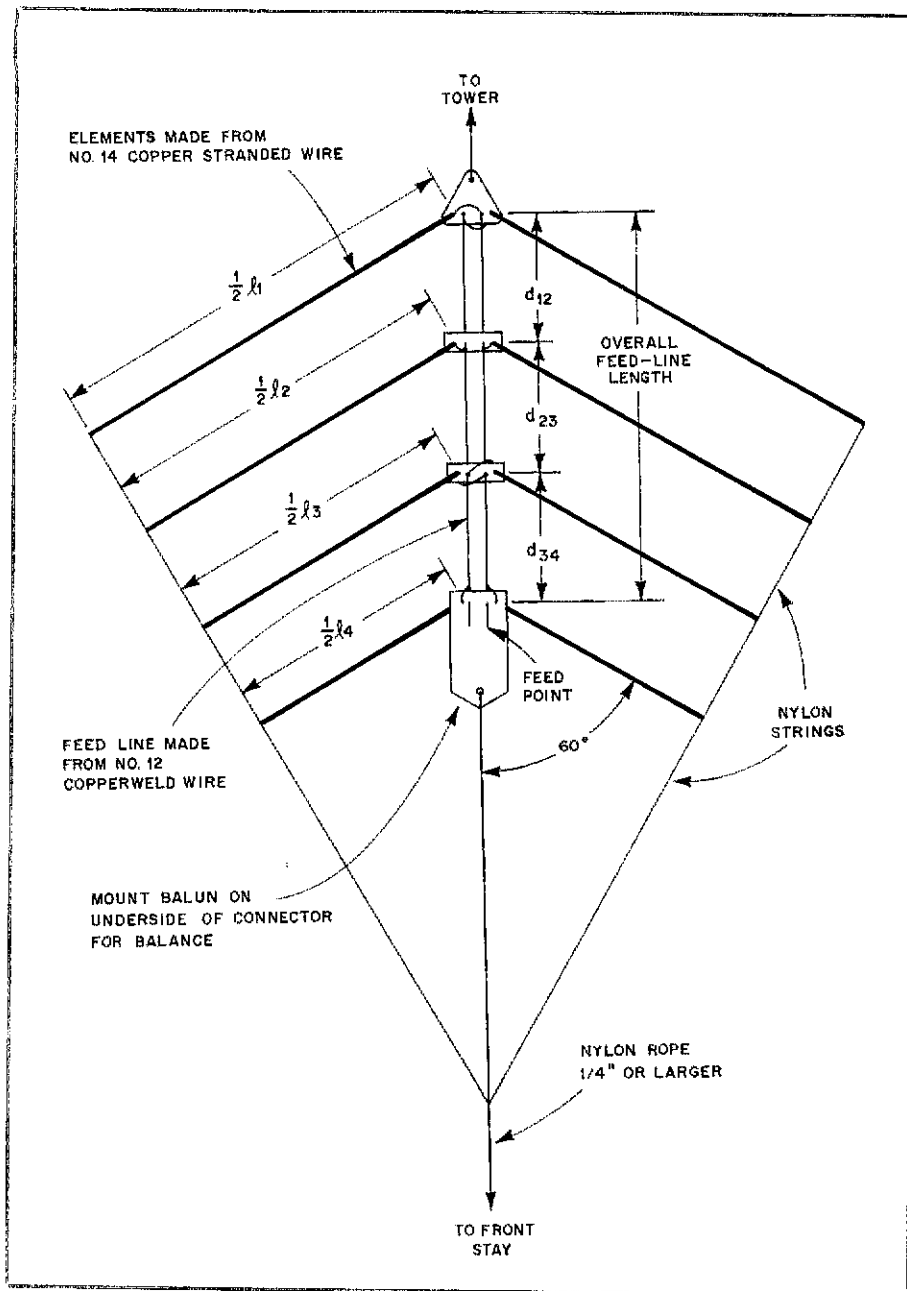


Fig 3—Typical layout for the LPDA. Use a 4:1 balun at the point indicated. See Table 1 for dimensions.

**Table 1**  
**Calculated Array Dimensions**

Element Length	Half Length	Element Spacing
<b>80-Meter Array</b>		
$l_1 = 149.09$ ft	$\frac{1}{2} l_1 = 74.55$ ft	$d_{12} = 17.89$ ft
$l_2 = 125.98$ ft	$\frac{1}{2} l_2 = 62.99$ ft	$d_{23} = 15.12$ ft
$l_3 = 106.45$ ft	$\frac{1}{2} l_3 = 53.23$ ft	$d_{34} = 12.77$ ft
$l_4 = 89.95$ ft	$\frac{1}{2} l_4 = 44.98$ ft	
<b>40-Meter Array</b>		
$l_1 = 71.30$ ft	$\frac{1}{2} l_1 = 35.65$ ft	$d_{12} = 8.56$ ft
$l_2 = 60.25$ ft	$\frac{1}{2} l_2 = 30.13$ ft	$d_{23} = 7.23$ ft
$l_3 = 50.91$ ft	$\frac{1}{2} l_3 = 25.46$ ft	$d_{34} = 6.11$ ft
$l_4 = 43.02$ ft	$\frac{1}{2} l_4 = 21.51$ ft	

### Calculations for Log-Periodic Dipole Arrays

Design constants and the results of design procedures follow. (Terms are defined at the end of this section.)

$$\begin{aligned} r &= 0.845 \\ \sigma &= 0.06 \\ \sigma_{opt} &= 0.152 \\ \cot \alpha &= 1.548 \\ \alpha &= 32.86^\circ \\ \text{Gain} &= 7.5 \text{ dBi (5.35 dBd). [By sloping the} \\ &\text{elements forward, the gain may} \\ &\text{be increased 3 to 5 dB over this} \\ &\text{figure.—Ed.]} \\ \sigma' &= 0.065 \\ B_{ar} &= 1.39; \text{ see note 10.} \\ R_0 &= 70 \end{aligned}$$

Fed with 50-ohm coaxial cable and a 4:1 balun

For the 80-meter antenna,

$$\begin{aligned} f_n &= 4.1 \\ f_l &= 3.3 \\ B &= 1.24 \\ B_s &= 1.72 \\ \lambda_{max} &= 298.18 \text{ ft} \\ L &= 48.42 \text{ ft} \\ N &= 4.23 \text{ (rounded to 4)} \\ l_1 &= 149.09 \text{ ft} \\ R_0 &= 70 \text{ ohms} \\ h &= 62.4 \\ a &= 2.667 \times 10^{-3} \\ h/a &= 23400 \\ Z_{av} &= 937.26 \text{ ohms} \\ Z_0 &= 80.72 \text{ ohms} \\ d_{12} &= 17.89 \text{ ft} \end{aligned}$$

See Table 1 for calculated array dimensions.

For the 40-meter antenna,

$$\begin{aligned} f_n &= 7.5 \\ f_l &= 6.9 \\ B &= 1.09 \\ B_s &= 1.51 \\ \lambda_{max} &= 142.61 \text{ ft} \\ L &= 18.57 \text{ ft} \\ N &= 3.44 \text{ (rounded to 4)} \\ l_1 &= 71.30 \text{ ft} \\ R_0 &= 70 \text{ ohms} \\ h &= 32.727 \\ a &= 2.667 \times 10^{-3} \\ h/a &= 12273 \\ Z_{av} &= 859.82 \text{ ohms} \\ Z_0 &= 81.76 \text{ ohms} \\ d_{12} &= 8.56 \text{ ft} \end{aligned}$$

See Table 1 for calculated array dimensions.

#### Definitions of Terms

B	= operating bandwidth = $f_n/f_l$
$f_n$	= highest frequency, MHz
$f_l$	= lowest frequency, MHz
r	= design constant
$\sigma$	= relative spacing constant
$\sigma_{opt}$	= value of $\sigma$ for optimum gain
$\sigma'$	= mean spacing factor
a	= apex half-angle
$B_{ar}$	= bandwidth of the active group. See note 10.
$B_s$	= structure (array) bandwidth
L	= boom length for N elements
N	= number of elements
$l_1$	= longest element = $492/f_l$
$\lambda_{max}$	= longest free-space wavelength = $984/f_l$
$Z_0$	= characteristic impedance of feeder
$R_0$	= mean radiation resistance level of required input impedance of active region
$Z_{av}$	= average characteristic impedance of a dipole
	= $120 \left( \ln \frac{h}{a} - 2.25 \right)$

[Note: An error exists in *The Antenna Book* for this equation.—Ed.]

# New Products

## TELEDYNE SEMICONDUCTOR CMOS CHOPPER OP AMP

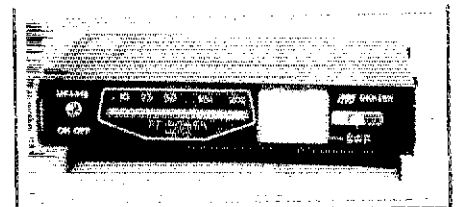
Teledyne Semiconductor has announced a new proprietary high-voltage CMOS chopper-stabilized op amp—the TSC915. This device extends the supply voltage operation of CMOS chopper-stabilized op amps to  $\pm 15$  V, while maintaining the exceptional dc specifications which have made these op amps popular in lower voltage applications. Previous chopper-stabilized op amps were limited to operation from  $\pm 7.5$ -V supplies.

Compared with the industry standard OP-07E precision bipolar op amp, the TSC915 reduces several key sources of error: lower input offset voltage error, offset voltage drift, input bias current, input offset current and higher open loop gain. Instead of offset-nulling trimpots, the TSC915 needs only two inexpensive 0.1- $\mu$ F film capacitors to store the offset voltages. All chopper circuitry is included on the chip, and the nulling process is transparent to the user.

The TSC915 is available in both plastic and cerDIP 8- and 14-pin DIP packages from Teledyne Semiconductor, 1300 Terra Bella Ave, PO Box 7267, Mountain View, CA 94039-7267, tel 415-968-9241.—Bruce O. Williams, WA6IVC

## MFJ ENTERPRISES DIGITAL SWR/WATTMETER

The MFJ-818 is an automatic, digital SWR/Wattmeter with easy-to-read,  $\frac{1}{2}$ -in-high, bright-orange digits on the SWR display, and a 0-200 W 12-bar LED RF output display. An additional three-color indicator tells the antenna matching condition—green for "good," yellow for "not very good" and red for a mismatch condition.



Because the unit is automatic, it indicates SWR from 1.1 to 9.9 directly and instantaneously without the usual switching to FWD, adjusting the meter and then switching to SWR to read. Dimensions are  $5\frac{1}{2} \times 4\frac{1}{4} \times 1$  inch. The unit is covered by an unconditional one-year warranty. Priced at \$89.95 each. If you order directly from MFJ, you get a 30-day, money-back guarantee. Available from MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762, tel 601-323-5869.—Bruce O. Williams, WA6IVC

### NOTES:

- ① MOUNT BALUN ON BOTTOM OF FRONT CONNECTOR FOR BALANCE
- ② FEED WITH 50 $\Omega$  COAXIAL CABLE AND 4:1 BALUN
- ③ PAY CLOSE ATTENTION TO DETAIL OF ELEMENT CONNECTION TO FEED LINES

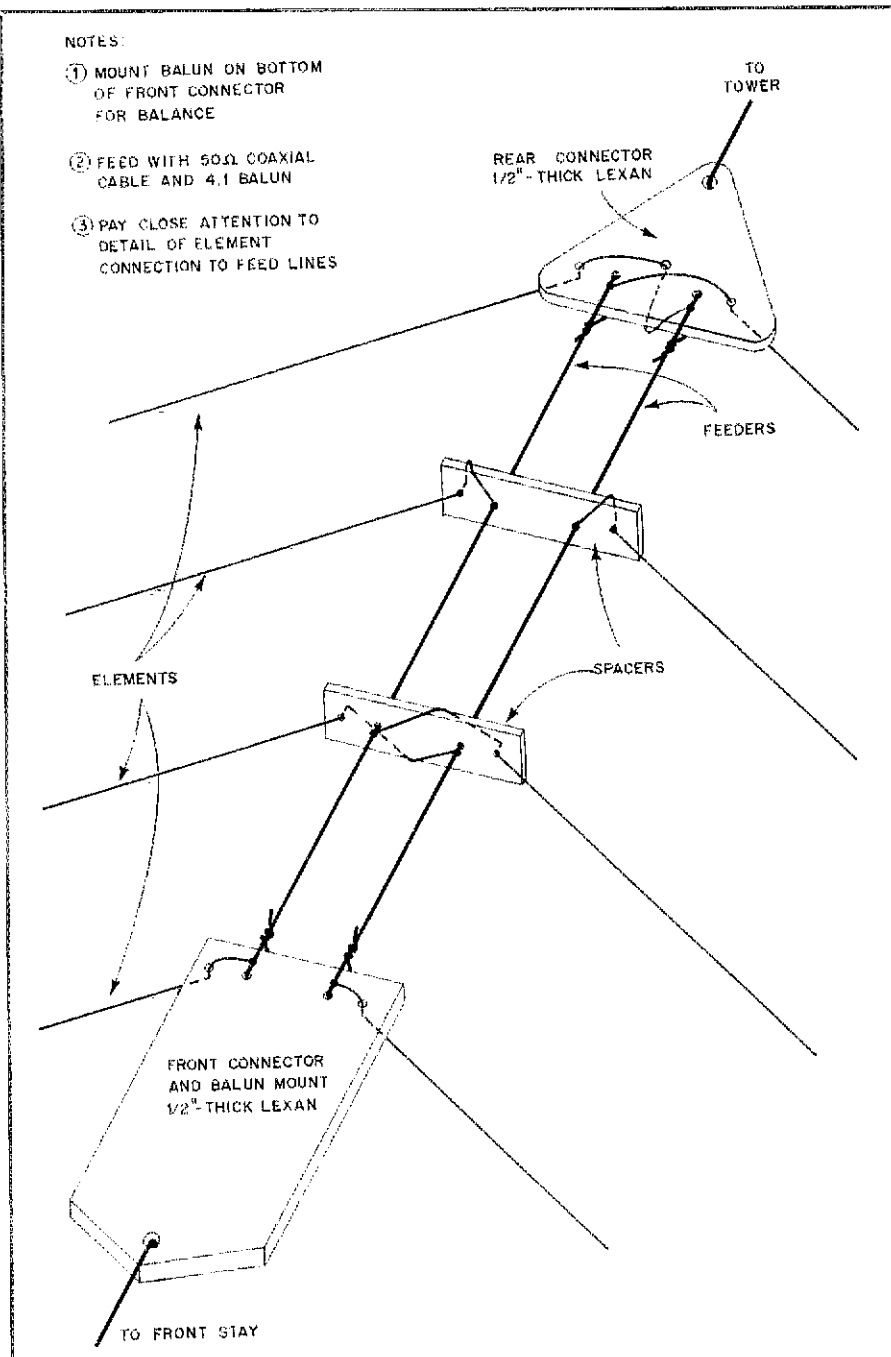


Fig 4—Details of electrical and mechanical connections of the elements to the feed line. Knots in the nylon stay lines are not shown.

- h = element half length  
 a = radius of element  
 l = length of elements  
 d = spacing between elements

### Notes

- <sup>1</sup>A. Eckols, "The Telerana—A Broadband 13- to 30-MHz Directional Antenna," *QST*, Jul 1981, pp 24-27.
- <sup>2</sup>C. T. Milner, "Log Periodic Antennas," *QST*, Nov 1959, p 11.
- <sup>3</sup>D. E. Isbell, "Log-Periodic Dipole Arrays," *IRE Transactions on Antennas and Propagation*, Vol AP-8, No. 3, May 1960, pp 260-267.

<sup>4</sup>P. D. Rhodes, "The Log-Periodic Dipole Array," *QST*, Nov 1973, pp 19-22.

<sup>5</sup>*The GIANT Book of Amateur Radio Antennas* (Blue Ridge Summit, PA: Tab Books, 1979), pp 55-85.

<sup>6</sup>C. A. Balanis, *Antenna Theory, Analysis and Design* (New York: Harper and Row, 1982), pp 427-439.

<sup>7</sup>G. L. Hall, ed., *The ARRL Antenna Book* (Newington, CT: The American Radio Relay League, Inc, 1982), pp 6-24 to 6-26, 9-12 to 9-14.

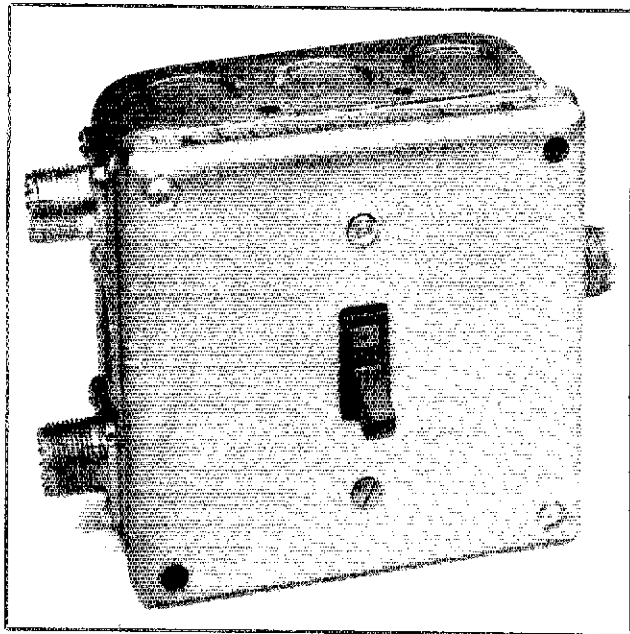
<sup>8</sup>D. A. Mack, "A Second-Generation Spiderweb Antenna," *The ARRL Antenna Compendium Vol 1* (Newington, CT: The American Radio Relay League, Inc, 1985), pp 55-59.

<sup>9</sup>See note 7.

<sup>10</sup>See Ref 6, p 435.  $B_{ar}$  is found from the following equation:  

$$B_{ar} = 1.1 + 7.7(1 - \gamma)^2 \cot \alpha$$

# Inexpensive RF Switches for the Ham Shack



Save a few bucks in the shack—use wall-toggle switches as RF switches!

By Paul Follini, VE1CZX  
RR 4  
Amherst, NS B4H 3Y2  
Canada

Standard toggle wall switches, such as those used in home electrical systems, work well in RF switching applications. Although it might appear unorthodox to use 60-Hz devices at RF, there is nothing in the design of these switches that makes them unsuitable for use in transmission lines for frequencies up to at least 30 MHz. Indeed, they have heavier contacts and greater contact spacing than the rotary-wafer type of switch commonly used for RF switching.

Toggle wall switches and their enclosures are available at any electrical supply house and at most hardware stores. The price of a switch is about \$1.25, and an enclosure costs about a dollar. The most useful type of switch is what electricians call a "three-way switch." It has a single-pole, double-throw configuration.

These switches have a number of advantages over the rotary type, in addition to low cost. They are rugged—a wall switch is rated at 15 A, which is a hefty load. They are easy to work with and to mount. No chassis work is required since their standard enclosures accept them without the requirement for drilling holes. The enclosures have removable walls, so that there is easy access to the switch terminals, and they are designed for side-to-side ganging to facilitate multi-pole switch configurations.

## Electrical Characteristics

To evaluate the suitability of these switches for RF applications, capacitance between contacts, and between contacts and ground were measured. In each case, the to-

tal capacitance was less than 5 pF. SWR measurements show no increase when the switch is inserted between the transmitter and the antenna. Return-loss measurements were made in the ARRL Lab using the pro-

TOTYPE shown in Fig 1. Fig 2 is a plot of return loss as a function of frequency. Table 1 shows the correlation of return loss and SWR. At 21 MHz, the return loss is approximately 20 dB, equating to an SWR of

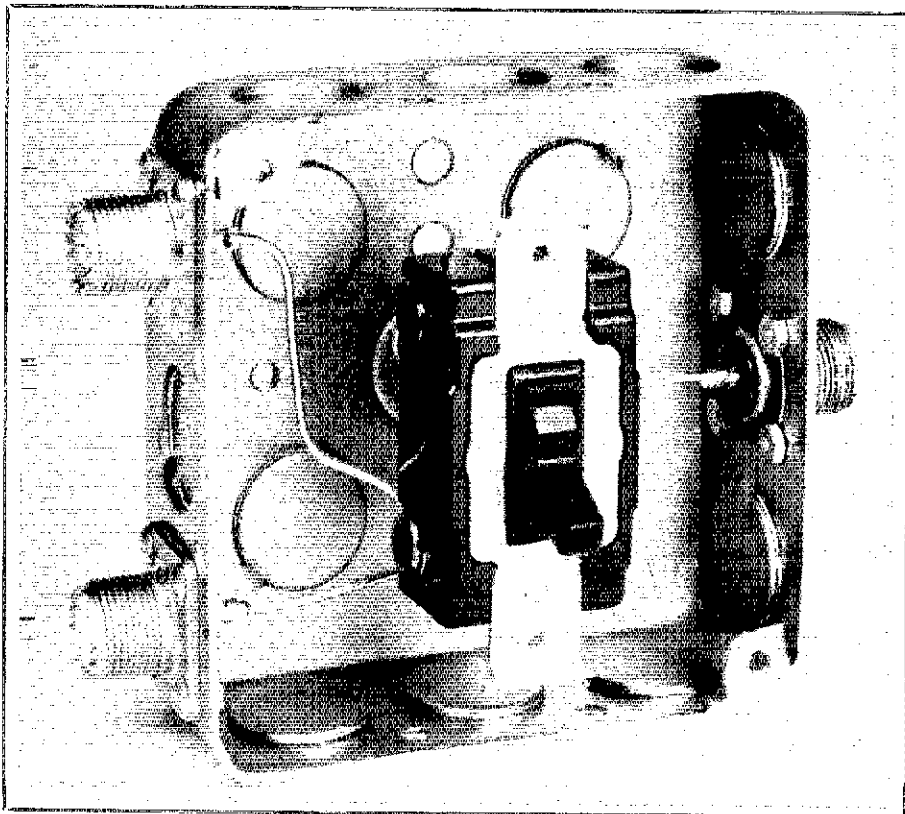


Fig 1—Prototype switch assembly using S0-239 receptacles.

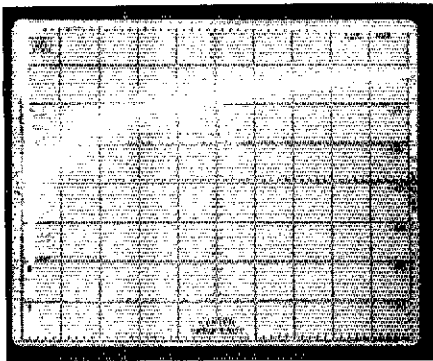


Fig 2—Return loss plotted as a function of frequency using the prototype of Fig 1. Each horizontal division is 5 MHz. Vertical divisions are each 10 dB. Return loss is plotted for frequencies between 1.5 and 50 MHz. The top line is a reference showing 0-dB return loss. The two lower traces are almost coincident and are the measurements at the two output ports.

**Table 1**  
Reflection Coefficient and SWR vs Return Loss

Return Loss (dB)	Reflection Coefficient	SWR	Return Loss (dB)	Reflection Coefficient	SWR
1	0.8913	17.3910	31	0.0282	1.0580
2	0.7943	8.7242	32	0.0251	1.0515
3	0.7079	5.8480	33	0.0224	1.0458
4	0.6310	4.4194	34	0.0200	1.0407
5	0.5623	3.5698	35	0.0178	1.0362
6	0.5012	3.0095	36	0.0158	1.0322
7	0.4467	2.8146	37	0.0141	1.0287
8	0.3981	2.3229	38	0.0126	1.0255
9	0.3548	2.0999	39	0.0112	1.0227
10	0.3162	1.9250	40	0.0100	1.0202
11	0.2818	1.7849	41	0.0089	1.0180
12	0.2512	1.6709	42	0.0079	1.0160
13	0.2239	1.5769	43	0.0071	1.0143
14	0.1995	1.4985	44	0.0063	1.0127
15	0.1778	1.4326	45	0.0056	1.0113
16	0.1585	1.3767	46	0.0050	1.0101
17	0.1413	1.3290	47	0.0045	1.0090
18	0.1259	1.2880	48	0.0040	1.0080
19	0.1122	1.2528	49	0.0035	1.0071
20	0.1000	1.2222	50	0.0032	1.0063
21	0.0891	1.1957	51	0.0028	1.0057
22	0.0794	1.1726	52	0.0025	1.0050
23	0.0708	1.1524	53	0.0022	1.0045
24	0.0631	1.1347	54	0.0020	1.0040
25	0.0562	1.1192	55	0.0018	1.0036
26	0.0501	1.1055	56	0.0016	1.0032
27	0.0447	1.0935	57	0.0014	1.0028
28	0.0398	1.0829	58	0.0013	1.0025
29	0.0355	1.0736	59	0.0011	1.0022
30	0.0316	1.0653	60	0.0010	1.0020

1.22:1. At lower frequencies, SWR is less. The prototype switch was tested on 15 meters with 1000 W forward and 600 W returned (SWR of 8.5:1) with no evidence of arcing. This design should handle the RF levels encountered in amateur HF radio use.

### Applications

If you are using SO-239, or other standard-type receptacles, any enclosure configuration is acceptable. If you wire the

coaxial transmission line directly into the switches, the best enclosures to use are those with built-in cable clamps. These clamps are about the right size for most

standard coaxial cables. Arrange the cables so they enter and leave the box in as straight a line as possible. Strip the outer insulation off the cable and screw the clamps down snugly to make a good grounding contact, but not tight enough to crush the cable. If you use small-diameter cable, wrap the braid with bare hookup wire to give the clamps a good bite on the braid. Strip about 1/2 inch of insulation from the center conductor of the coaxial cable. Form the conductor into a hook and secure it under the terminals of the switch. Bond all sections of the enclosure with bare wire,

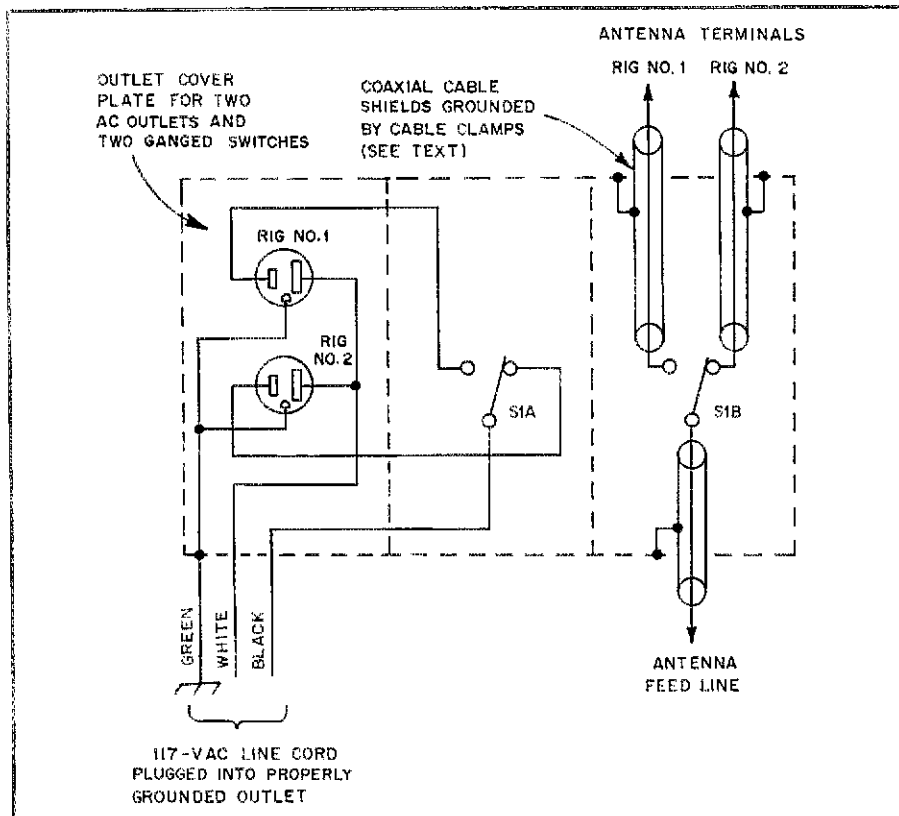


Fig 3—Power and antenna switching for two rigs.

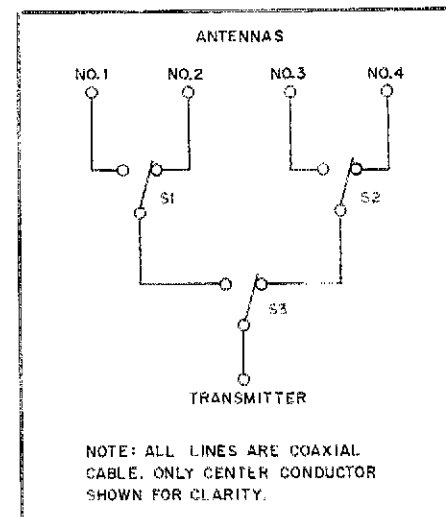


Fig 4—Three toggle wall switches used to select one of four antennas.

# New Products

## REGENCY MX7000 SCANNER MONITOR

□ The Regency MX7000 is one of the few scanners capable of covering frequencies as high as 1.3 GHz. In addition to covering all frequencies between 25 MHz and 550 MHz, it provides continuous coverage of all frequencies between 800 MHz and 1.3 GHz.

In addition to scanning as many as 20 preprogrammed channels, the scanner can also search through an entire band for an active frequency. When an in-use frequency is found, the frequency will appear on the digital display. The user then has the option of continuing to search or to store the new frequency in one of 20 channels. Search increments of 5, 12.5 and 25 kHz are available.

The multifunction, lighted LCD display shows channel numbers during the scan mode, channel and frequency when a call is received, loss of power, delay function status, channel lockout and search mode selection. Other sophisticated features include a 24-hour digital clock, priority channel, dual scan speeds and a scan or search delay that provides a pause when "calls" and "answers" are on the same frequency. The MX7000 is designed for home or mobile use, and comes with a telescoping whip antenna, ac power supply, dc power cord and a mobile mounting bracket.

The MX7000 is available through Regency scanner suppliers or by contacting Regency Electronics, Inc, 7707 Records St, Indianapolis, IN 46446, tel 312-372-7090. Suggested retail price: \$699.95.—Bruce O. Williams, WA6IVC



## Strays

I would like to get in touch with...

□ anyone with a manual/schematic for a Sears 412-3573 2-m transceiver. Don Norman, AF8B, 41991 Emerson Ct, Elyria, OH 44035.

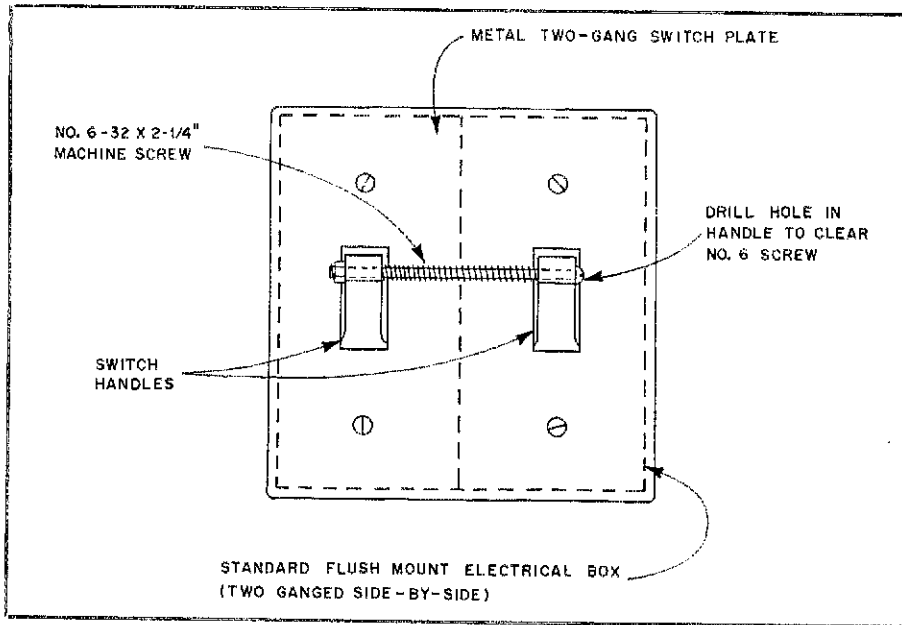


Fig 5—Two switches may be ganged together mechanically to form a double-pole double-throw (DPDT) configuration.

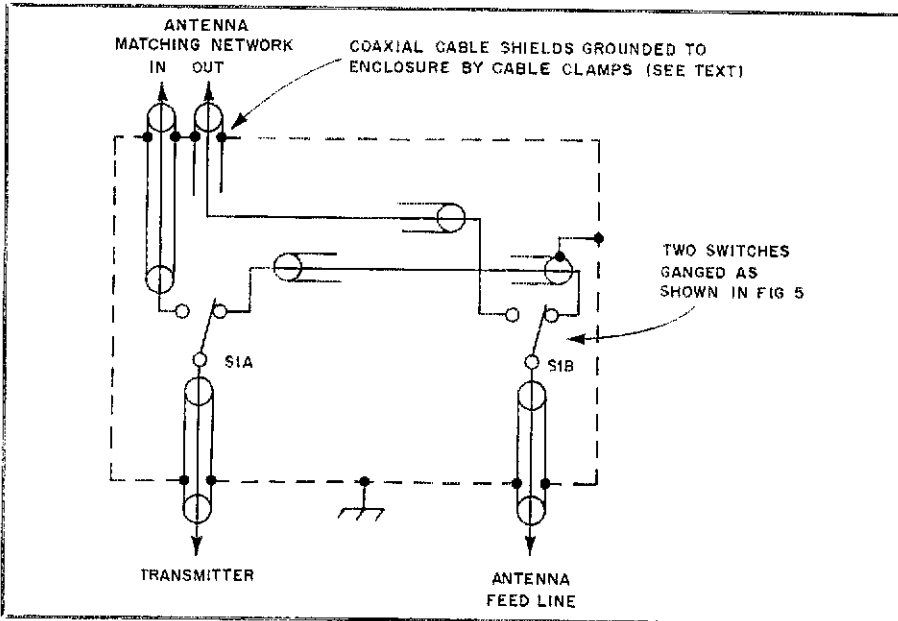


Fig 6—Two ganged (DPDT) switches used for switching an antenna matching network in and out of the feed line.

using the binding screws provided. Use metal switch-cover plates to ensure adequate shielding.

To illustrate the flexibility possible with these switches, some applications are shown in Figs 3 through 6. In Fig 3, two transmitters are switched on or off simultaneously with their antenna connections. This ensures that a transmitter will not inadvertently be operated into an open transmission line. Fig 4 shows how three switches can be used to select one of four antennas. Fig 5 shows how two switches can be ganged together mechanically to form a DPDT switch. Fig 6 shows two ganged switches used to switch an antenna

matching network in or out of the transmission line, as needed.

### Conclusions

The installations shown in Figs 3-6 are in use in my radio shack and have been giving good service. A couple of words of advice—do not switch antennas when they are powered! Live switching is inadvisable in this application, just as it is in any switching application because most switches can't withstand the high voltage transients that are generated. Also, always use metal enclosures with the switches—they provide RF shielding and shock protection.

# An Alternative Method of Mounting Large-Size Antennas

Looking for an inexpensive method of supporting your antenna? Try a used telephone pole and this homemade rotator mount assembly.

By Peter D. Meyer, N0AFW

Dept of Physics and Astronomy  
University of Montana  
Missoula, MT 59812

A few years ago, I relocated to central Minnesota from New York. Since receiving my Novice license in 1969, I had experimented with various types of antennas. After thinking over my experiences, I purchased a Wilson SY-36 tribander. Without much difficulty, the antenna was soon constructed, but one problem remained: What would I use for an adequate support system for the antenna?

## The Search Is On

Literature suggested that if the tribander is to perform its best, it should be higher than 30 feet above the ground. I placed telephone calls to local tower distributors and outlets. To my dismay, I discovered that the towers that would support the antenna at a height greater than 30 feet were beyond my finances.

I consulted with other hams and with my father, a licensed professional engineer and prospective ham. He suggested that a wooden utility pole be used for the main tower frame. He pointed out that a pole is quite sturdy and that ice loading during the harsh Minnesota winters would put a severe strain on any structure. The Minnesota summers, with their strong winds, reinforced the need for strength. Perhaps the cost would be at a level that a young student could afford, and the idea of not having guy wires strung around the yard was appealing. All in all, for a solidly built alternative to a conventional tower, a simple utility pole seemed to fit the bill. It also lent itself to a bit of the "homemade" aspect of Amateur Radio.

Again, I went to the telephone, but this time to place calls to several local lumber yards. I soon discovered that a new, treated utility pole was far too expensive. The next best thing was to try and locate a utility company that might have a *used* pole available. Luckily, I found that the local electric company could provide me with a pole. They would also deliver it and assist

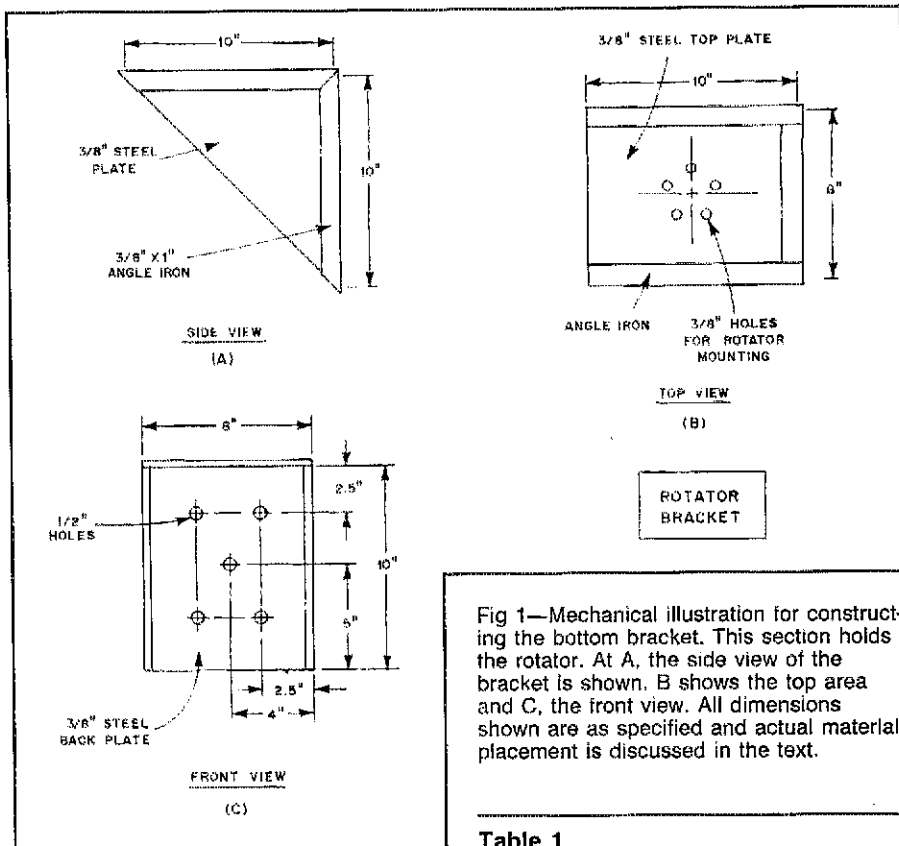


Fig 1—Mechanical illustration for constructing the bottom bracket. This section holds the rotator. At A, the side view of the bracket is shown. B shows the top area and C, the front view. All dimensions shown are as specified and actual material placement is discussed in the text.

with its installation, all for only \$50 (see Table 1).

[Editor's Note: I approached the local utilities company to learn the procedure of how to obtain a used telephone pole in Connecticut. First, the individual's name is added to a waiting list. When a pole is available, a cost of \$.50 per foot is charged. This procedure will vary from state to state. Before hoisting any structure, it is wise to check your town's ordinance relating to raised towers. Once this is cleared, contact your utility company!]

## Mounting the Antenna

A site for the eventual placement of the tower and antenna was suitably located close to the radio shack on our farm. The site was clear of brush and trees and was away from overhead power lines. Remember that any antenna should be as far from power lines as possible to avoid serious electrical shock. Safety always comes first!

My next problem involved mounting the rotator assembly and the entire antenna array to the pole. Two triangularly braced brackets were designed to house the rotator

Table 1  
Materials List

Qty	Item	Approx Cost
2	6 × 8 × 3/8-in steel plate	\$1.00
2	8 × 10 × 3/8-in steel plate	1.25
1	60 × 3/4-in steel angle iron	1.00
10	1/2 × 10-in hardened steel bolts	3.00
1	Wooden utility pole	50.00
1	Bearing	1.00
1	Cover	0.50
1	Welding rod	1.00
Total		\$58.75

using 3/8-inch steel plate and 3/8-inch steel angle iron. The bottom bracket holds the rotator. This assembly was constructed by welding together two pieces of 8 × 10-inch steel plate along their short sides and at right angles to each other. Bracing was done by welding two pieces of angle iron along the edges as shown in Fig 1A. Fig 1B shows the top face of this support. The rotator sits here. Five 3/8-inch holes were drilled to

pass the rotator mounting bolts. Through the other face (Fig 1C) were drilled five 1/2-inch holes for the 1/2 x 10-inch hardened steel bolts that would mount the rotator bracket to the pole.

The bearing bracket assembly was constructed in much the same way as the rotator bracket (see Fig 2A). Here, the steel plates may be of a smaller size since the bearing bracket needn't support the weight of the antenna, mast and rotator as the rotator bracket must. I made mine 6 x 8 x 3/8 inches. Fig 2B shows the top face of the bearing bracket. A 2 1/4-inch hole was drilled to seat a 2-inch self-aligning bearing. The 2-inch-diameter solid steel pipe I used as an antenna mast passes through this bearing. I had to be sure the mast was smooth enough to fit through the bearing. The bearing bracket is mounted to the pole with 1/2 x 10-inch hardened steel bolts passed through five 1/2-inch holes (Fig 2C). It is important that the bolts be hardened. High winds, ice and snow loading could put too much stress on unhardened bolts, causing them to shear. This could mean disaster for that nice antenna! The bearing bracket is mounted to the utility pole one to two feet above the rotator bracket. A small piece of an old inner tube will keep moisture from directly hitting the bearing and prolong its life. Bearing and rotator brackets mount to

the pole as shown in Fig 3.

### Raising the Tower

An electric company crew arrived to raise the structure the morning after I finished construction of the bearing and rotator brackets. First, a 6-foot-deep hole was drilled with an auger. The delivered pole was 40 feet long; with 6 feet of the pole underground, my antenna would be at least 35 feet high because the steel-pipe mast between rotator and antenna would protrude beyond the bearing bracket by about 1 foot. After the hole was dug, I mounted the steel brackets to the pole using the 1/2 x 10-inch hardened steel bolts. Next, the rotator and mast were mounted. Up to this point, all work was performed on the ground without much difficulty. Using a level, I checked for straightness of the assembly and mast with respect to the hole in the upper support. All calculations were correct so far!

The next major step required the crew's help. They placed the pole by the hole and partially raised it, using their crane. Now the beam was brought into place and attached to the mast. All nuts were checked for tightness. Next, the rotator cable and feed line for the beam were connected. The entire assembly was checked twice for levelness. All was okay!

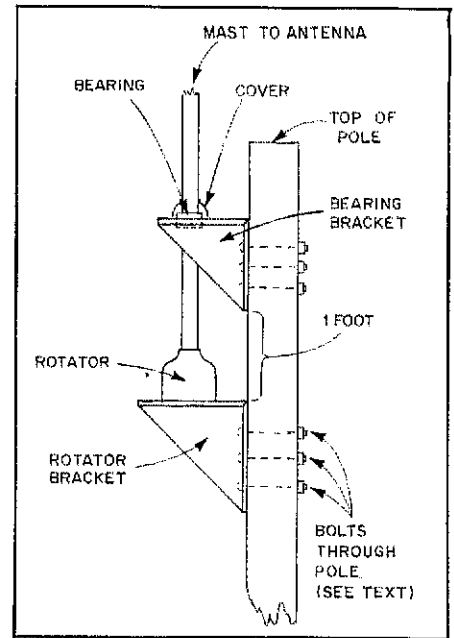


Fig 3—This mechanical drawing shows a side view of the complete installation attached to the wooden utility pole.

The crane lifted the pole into the hole and the rotator was run until its indicator pointed due north. Next, the crew rotated the entire pole antenna assembly so that the beam was pointed in a northerly direction, using a compass as a guide. The antenna was now up and the entire process took about one hour to complete!

### Maintenance

It is not difficult to work on the beam and rotator or to add antennas to the existing structure. A pair of lineman's pole climbers and associated safety equipment are all that is necessary. I always wear a safety belt. Remember, it is a long way to the bottom from *any* height! Climbing pegs, such as those implanted into the sides of telephone poles by utility workers, are another alternative. For those who are not agile, a cherry picker might be considered.

### Conclusion

I have used this system for over seven years without a problem. Its performance is adequate, and its appearance is not unsightly. So, those who like a little adventure combined with a construction project might give this system a try. At least you don't have to dig a large hole, fill it with concrete and carry large sections of tower! For me, the money I spent on this project to increase my signal strength was one of the best investments I could have made for my station.

### Acknowledgments

I would like to thank Mr and Mrs David Meyer for their assistance. Todd-Wadena Electric Cooperative provided the pole and crew, and Kepper's Machine Shop helped with welding expertise. Finally, my thanks to the local hams whose ideas were helpful in this project.

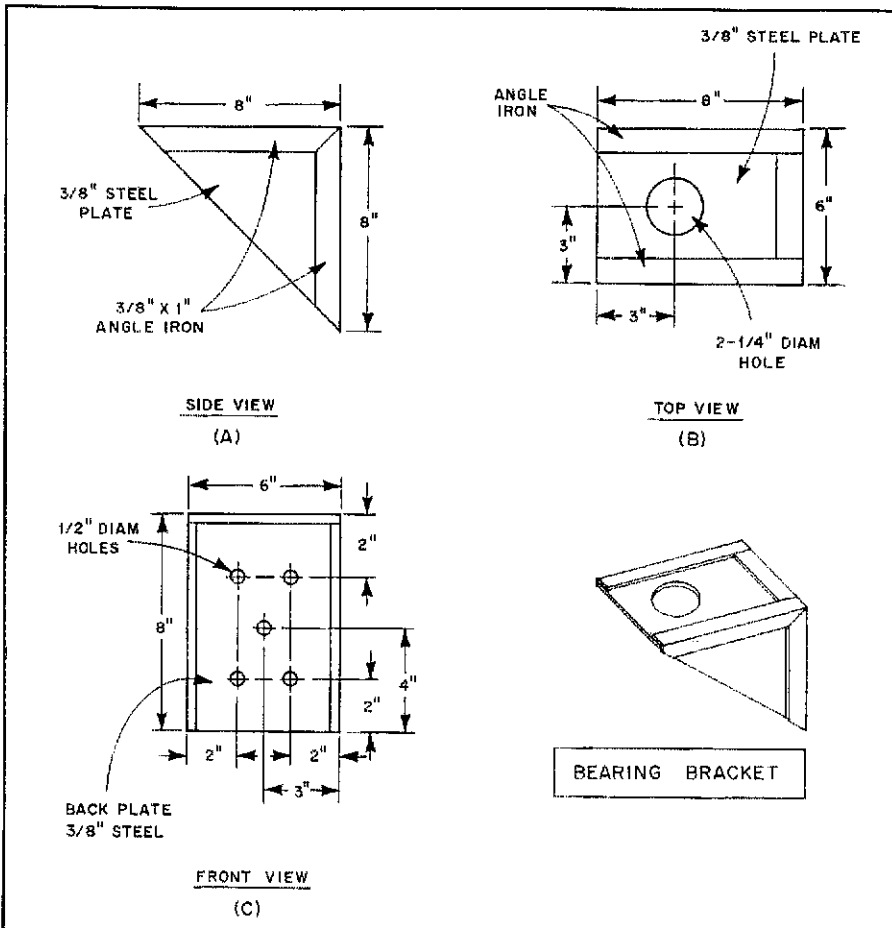


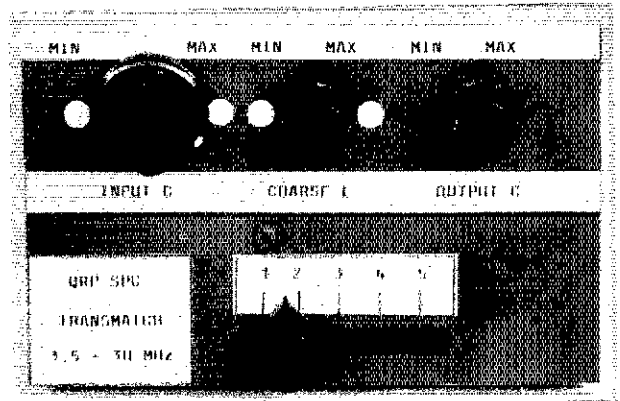
Fig 2—Mechanical illustration for constructing the top bracket. This section holds only the mast up to the antenna. Dimensions for the side view are shown at A, B shows the top view and C allows a view of the front. Construction information is given in the text.

• Under Construction

# The QRP Transmatch— A Novel Approach

**Part 10:** Innovation is a vital part of Amateur Radio. These design hints can aid you in future QRP or QRO projects—especially when variable inductors are needed.

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



Miniature variable inductors are obtrusive by their absence! How often have you searched for QRP-size roller inductors or some equivalent device to use in a Transmatch (transmitter-to-feed-line matcher)? Transmatches are sometimes called “antenna tuners” or “antenna matchers,” just to clarify matters. Whatever the name, some type of continuously variable coil is desirable in order to meet the range of load conditions we may encounter with antennas.

Some Transmatches contain only tapped coils and a switch. This is fine for some applications, but there are times when the needed value of inductance exists *between* the available coil taps. When this happens, we may be unable to obtain a 1:1 match (SWR of 1) and must accept, say, a 1.8:1 SWR. Chances are that the overall system will work just fine without a perfect match, but from a psychological viewpoint, some amateurs are troubled by anything higher than a 1:1 SWR.

This month we will consider a simple homemade variable coil, along with some other ideas that can be applied to home-constructed Transmatches and other ham gear. There is no reason why we can't apply the general concepts described here to QRO (high power) matching networks as well. All that is necessary for scaling the components to high-power operation is the use of heavier conductors and larger core materials.

## Some Elements of a Transmatch

Fig 1A shows the basic circuit of an SPC (series-parallel capacitance) Transmatch. This is a variation I developed some years

ago, based upon the standard T network (Fig 1E) and Ultimate Transmatch that was popularized in *QST* by Lew McCoy, W1ICP.<sup>1</sup> C2B of Fig 1A was added in order to provide greater frequency range and to aid the suppression of harmonic currents. C2B (one half of a dual-section capacitor) is in shunt with L1, which places more parallel capacitance in the circuit than

is characteristic of the T network. This requires less inductance at L1 for a given matched condition. It has an advantage for QRO operation: The added parallel capacitance (C2B) lowers the parallel resistance of L1, which reduces the level of RF voltage applied to C1 and C2 of Fig 1A. The plate spacing of C1 and C2 can therefore be somewhat less than that for a T network or Ultimate Transmatch. In other words, for a given power level, there could be arcing between the plates of C1

<sup>1</sup>Notes appear on page 33.

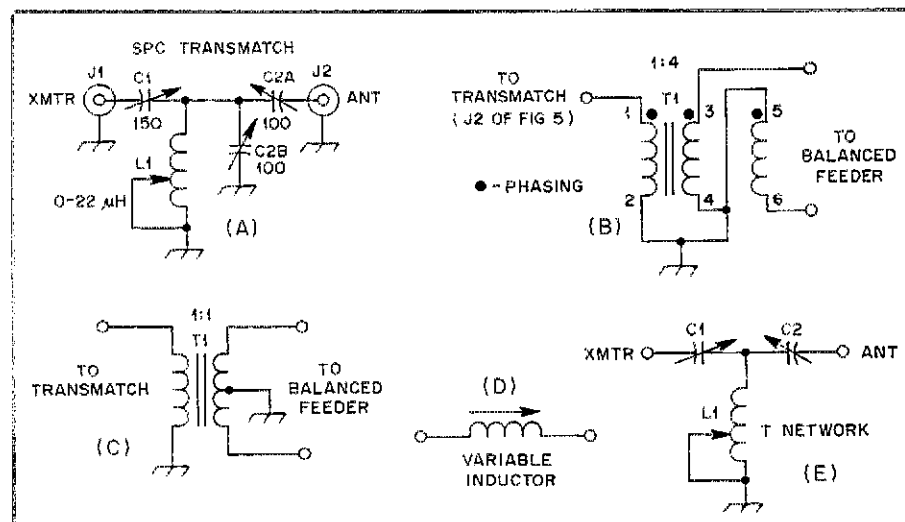


Fig 1—Basic circuit of an SPC Transmatch (A). A 4:1 balun transformer is shown at B. It consists of 15 trifilar turns of no. 24 enam wire on an Amidon FT50-43 toroid core. A conventional balun transformer is shown at C (see text). The primary has 15 turns of no. 26 enamel wire, and the secondary has 30 turns, center tapped, of no. 26 wire. Illustration D shows the symbol for a slug-tuned coil. A standard T network is shown at E.



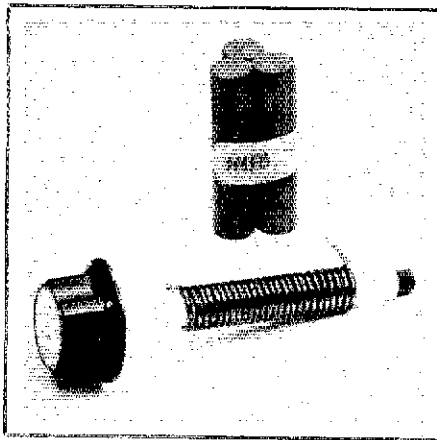


Fig 2—A 1-20  $\mu\text{H}$  homemade variable inductor (see text) and three 0.5-inch-diameter ferrite rods tied in a bundle for QRO use.

and C2 (Fig 1E), whereas there would be no voltage breakdown between the plates of the SPC Transmatch for the same power level. Apart from the differences in performance we have just considered, all three networks have the same matching range (wet noodle to long wire). Therefore, for the sake of simplicity, you may prefer the circuit of Fig 1E, especially for compact QRP equipment.

### Matching to Balanced Feeders

Most commercial Transmatches contain a balun (balanced-to-unbalanced) transformer. This is used with antennas that are fed with 300-ohm TV ribbon, or open-wire 450- or 600-ohm line. Practically, the transformation ratio is unimportant, especially when using a multiband center- or end-fed Zepp antenna. The impedance presented at the transmitter end of the feed line will vary from band to band. It may be less than 100 ohms, or it might be as high as 2000 ohms. The main idea is that we convert the unbalanced transmitter output to a balanced feed for the transmission line. Fig 1B shows a 4:1 ratio balun transformer that can be inserted between the Transmatch output and balanced feed line. This hookup (consisting of three identical wires wound simultaneously on a toroid core) provides a *transmission-line transformer*. We can refer to the winding as "trifilar."

A *conventional transformer* is seen in Fig 1C. It serves as a balun device also, inasmuch as the secondary winding is center tapped. It is drawn as a 1:1 transformer, but it can be changed for step-up transformations by placing more turns on the secondary winding.

Broadband transformers of the type in Fig 1 are not suitable for matching impedance values from 50 ohms to greater than approximately 600 ohms. At high-power levels, the developed RF voltage at high impedance values will cause core saturation or damage, along with voltage breakdown between the windings and the core material. These problems will

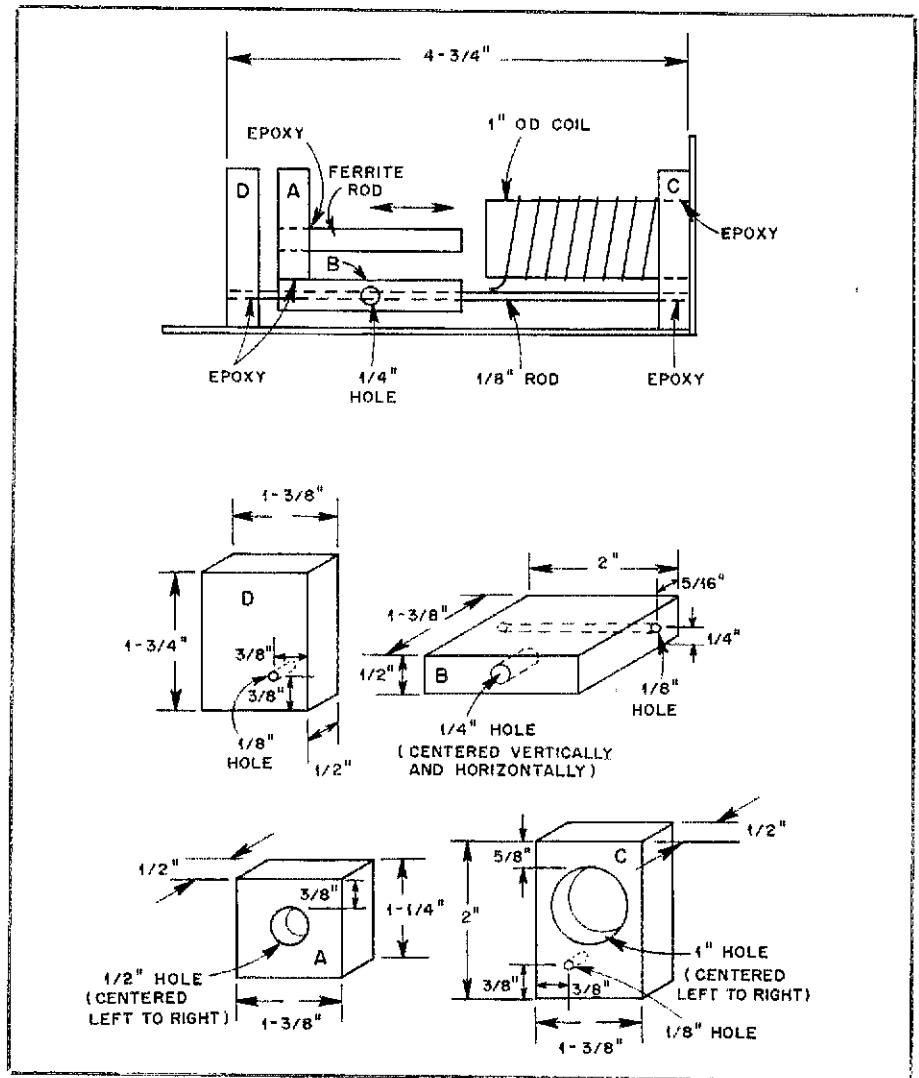


Fig 3—Construction details for the homemade variable inductor of Fig 5.

not affect us during QRP (10 W maximum) operation.

### Homemade Variable Coils

The symbol for a slug-tuned variable inductor is shown at D of Fig 1. We can construct these coils from ordinary materials. This will provide small variable inductors for QRP work, and in the case of QRO coils we can save many dollars by not buying commercially made roller coils. For example, a 1/4-by 4-inch ferrite rod (Amidon Assoc) of 125 permeability (no. 61 material) can be used inside a 1/4-inch ID coil to provide an inductance range of 1.0 to 20  $\mu\text{H}$ . Such a device is shown in Fig 2. I used a ballpoint-pen body for the coil form. The coil Q varies from 50 to 150, depending on the amount of rod inserted into the coil. The coil consists of 26 turns of no. 14 enameled wire. An inductor of this kind could be used in a mini Transmatch by placing a knob on one end of the ferrite rod (as shown), then inserting or extracting the rod into or from the coil via the front panel of the tuner—plunger

fashion. If you are good at mechanical design, you may want to use a lead-screw mechanism for adjusting the rod position. The shortcoming of any variable coil with a large inductance range is that adjustment can become very critical under difficult matching conditions: The slightest movement of the rod causes large changes in inductance.

### A Practical Inductor

Fig 3 contains a pictorial representation of my limited range variable coil. A photographic view is offered in Fig 4. My framework is a bit crude, since I made it from pieces of wood. This resulted in a somewhat bulky unit. Metal end plates and other mechanical refinements would result in a smaller assembly.

Platform B moves left and right by means of a 1/4-inch-diameter rod that projects through a slot in the front panel of the Transmatch.

Vertical support A contains a 0.50-inch-diameter, 2-inch-long ferrite rod of 125 permeability (no. 61 material), also avail-

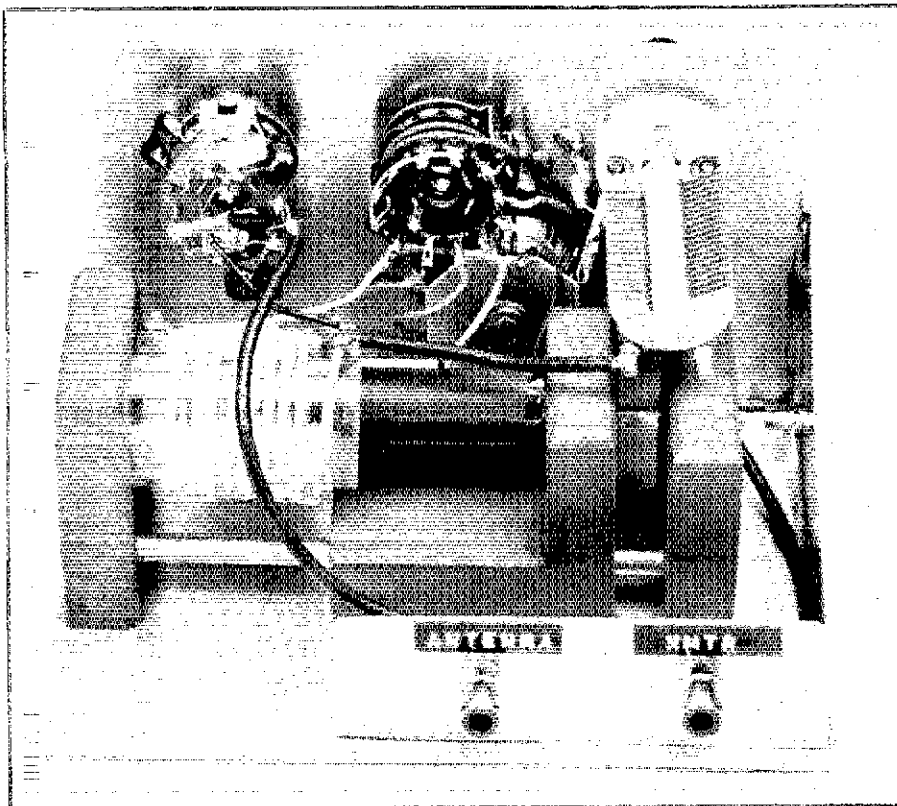


Fig 4—Rear view of the QRP Transmatch, showing the layout of the components and the details of the variable-coil assembly.

able from Amidon Associates. The rod is held in place by a drop of epoxy glue. Parts A and B are also cemented together. End plate C has a 1-inch hole to accommodate the coil, which is wound on 1-inch plastic tubing. I used an electric hobby saw to cut the 1-inch hole. You may use a coping saw or wood bit and drill for this operation.

A small-diameter steel rod is used as a track for platform B of Fig 3. It is glued into end plates C and D, and passes through platform B, as shown by dashed lines. The slot in the front panel, plus the tuning rod, serve as the remaining track for the movable assembly. I used a long, iron nail for my 1/8-inch-diameter track rod. I cut off the nail head and a part of the pointed end to obtain the rail for my tuner. Parts C and D may be screwed to the chassis of the tuner by means of wood screws. The inductance range of this coil is 1.5 to 3.7  $\mu\text{H}$ . The coil Q ranges from 150 (slug out) to 250 (slug in) at 7.9 MHz. QRO versions of this variable inductor can be made by using three or four ferrite rods (see Fig 2) in a bundle, along with a larger coil with heavier wire. End plate A of Fig 3 could contain three holes (or more) to accommodate the additional rods. These larger variable coils are useful also for remote-control antenna-matching networks.

#### A Practical Transmatch

Fig 5 shows the circuit for our 3.5-14.350 MHz Transmatch. L1 has too

much inductance to cover 10 through 15 meters. The upper HF range can be reached by adding a switch and a 1.0- $\mu\text{H}$  coil. This coil would be switched in parallel with L1 to lower its minimum inductance. Also, by adding 100 pF of capacitance in parallel with C1, you can cover the 160-meter band. L1 is the assembly of Fig 3.

Tapped-coil L2 provides added inductance in 2- $\mu\text{H}$  increments for covering the low end of the HF spectrum. Each S2 range allows 2.2  $\mu\text{H}$  of variable inductance. The overall spread of inductance is 1.5 to 21.5  $\mu\text{H}$  (ample for 1.8 MHz with added capacitance at C1).

Three output-capacitance values are provided by S1. They are ample for most matching jobs. S1A and S1B and the associated fixed-value capacitors take the place of the dual-section capacitor (C2) of Fig 1A. Most of the tuning is done by way of C1, L1 and S2. You may replace S1 and the fixed-value capacitors with another 140-pF variable (like C1) for greater tuning range, to derive a T network (Fig 1E).

This Transmatch can accommodate power levels of up to 50 watts. C1 may arc over at higher amounts of power. The inset drawing shows how to wire the balun transformer of Fig 1B. T1 will be required should you wish to employ balanced feed lines.

#### Transmatch Construction

I used pieces of PC board for the panel and chassis of my QRP Transmatch. This

model has no cabinet, since it is essentially a test fixture for the circuit of Fig 5. You may house the circuit in a homemade box or one of the commercial metal cabinets that are available at Radio Shack and other stores. The dimensions of my unit are (HWD) 3-1/2  $\times$  5-1/2  $\times$  3-3/8 inches. PC-board side brackets (one large and one small) are soldered to the panel and chassis to provide support for the panel. A strip of PC board is used at the rear of the chassis to contain the input and output jacks. No balun transformer is used in my model.

L2 of Fig 5 is bolted to the inside of the front panel. If you use double-sided PC board, grind off the copper where L2 is mounted. I removed a 1/2 inch circular section of copper by using a hobby motor and abrasive bit. A sheet of insulating material is used as a washer to hold the toroid in place on the panel.

The coil (L1) has 9 turns of no. 20 insulated hookup wire, but enamel wire may be substituted. I used RTV<sup>®</sup> sealant to hold the coil turns in place (four strips of glue). Epoxy cement will work as a substitute binder.

The wooden blocks for the variable inductor, along with the front panel, are painted with grey automotive undercoating paint. Panel labeling consists of strips of buff-color paper on which I typed the control functions. A computer printer, set for bold face or overstrike, can be used for making attractive labels. Before affixing the labels on the panel with rubber cement, I sprayed them with clear acrylic. If you don't have a can of this material, use some hair spray.

In order to prevent the coil-adjustment shaft from slipping about, I cut a rubber grommet in half and inserted it firmly between the slider knob and the front panel. A thin coating of silicone grease may be added between the mating surfaces to ease adjustment.

Taps may be added to L2 by grinding away the enamel coating of the wire with a hobby motor and cone-shaped abrasive bit. Be careful to avoid shorting adjacent turns on L2. A shorted turn will spoil the performance of the Transmatch.

#### Adjustment and Use

An SWR indicator will be needed between the transmitter and the Transmatch for observing the effects of tuning the network. With the antenna or a dummy load attached to J2 of Fig 5, set C1, L1 and L2 at midrange. S1 may be set for maximum capacitance (120 pF). Apply transmitter power and observe the SWR reading. Adjust S2 for the lowest reading in reflected power. Next, adjust C1 for the lowest reading. Alternate between C1 and L1 until no further reduction in reflected power is noted. If an SWR remains, try a new tap at S2 and repeat the process. Finally, experiment with the settings of S1 to obtain an SWR of 1.

Fig 5—Schematic diagram of the QRP Transmatch. The fixed-value capacitors are silver mica or polystyrene types. Voltage rating should be 100 or greater. Capacitance is in picofarads. Inset drawing shows how to wire the toroidal balun transformer of Fig 1B.

C1—Miniature 140- or 250-pF air variable (see text).

J1, J2—Single-hole mount phono jack or connector of your choice.

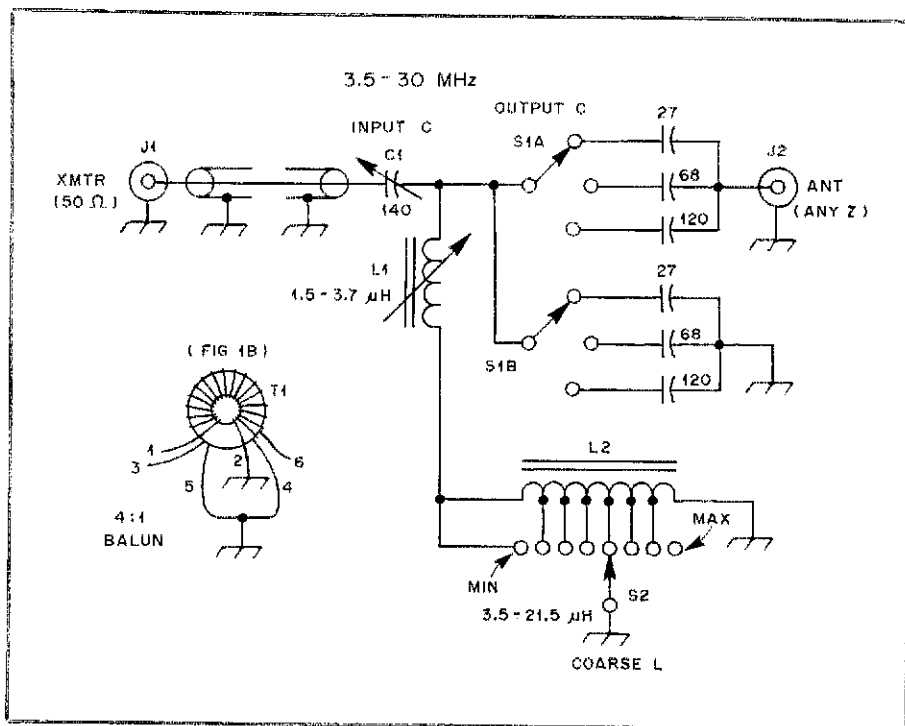
L1—9 turns of no. 20 insulated hookup or enamel wire, 1¼ inch winding length, on a 1-inch-OD coil form. Ferrite rod is 0.5 diam by 2 inches long, Amidon 125- $\mu$ , no. 61 material. Round AM-radio loop rod may be used with smaller-diameter coil.

L2—Tapped toroidal inductor. 34 turns of no. 20 enam wire on an Amidon T106-6 powdered-iron core. Tap at 9 ts (2  $\mu$ H), 14 ts, 18 ts, 23 ts, 27 ts, and 29 ts (14  $\mu$ H).

S1—Small rotary wafer switch, 3 pole, 3 positions. One section used only as tie points for capacitors.

S2—Single-pole, 12-position miniature rotary wafer switch. Several contacts not used. May be used to add more inductance for 1.8-MHz operation.

T1—See caption for Fig 1.



You may find that different taps will be needed on your toroidal coil, L2. It will depend on the stray inductance resulting from your particular layout. Too great an inductance per coil tap will result in some "skips" of the matching range. It is better to have slightly less than 2  $\mu$ H per tap than to have too much!

#### Final Notes

The smaller the coil form diameter, respective to the ferrite-rod diameter, the greater the inductance. You may wish to experiment along these lines. PVC tubing can be used for the L1 coil form, but don't

use PVC at power levels in excess of 50 watts! It will heat and melt under some matching conditions. I used a piece of polystyrene tubing that I obtained as scrap from a plastics dealer. Phenolic tubing is also suitable for L1.

C1 is a surplus variable capacitor I took from a BC-610 tuning unit (available from Fair Radio Sales).<sup>3</sup> A plastic 365-pF BC radio variable capacitor may be substituted. Another scheme would be to solder a ¼-inch brass shaft to the screw head of a large mica compression trimmer for use at C1.

I hope I have provided some useful and innovative ideas for homebuilt amateur projects. I would be interested in seeing a photograph of a miniature, improved unit of your design.

#### Notes

<sup>1</sup>L. McCoy, "The Ultimate Transmatch," *QST*, Jul 1970, p 24.

<sup>2</sup>Amidon Associates, Inc, 12033 Otsego St, N Hollywood, CA 91607.

<sup>3</sup>Fair Radio Sales, PO Box 1105, 1016 E Eureka St, Lima, OH 45802.

## Strays

I would like to get in touch with...

anyone with a manual for a Measurements Standard signal generator, Model 65-B. Keith Petersen, WA9YWK, 817 Minnesota Ave, South Milwaukee, WI 53172.

anyone who needs a schematic manual (circa 1952) for ARC, BC, R, SCR and T equipment from WW II. John Mumma, W6YUV, 23760 Kivik St, Woodland Hills, CA 91367.

anyone with a manual or modifications for a Yaesu FR/FL-101. Vladimir Radev, LZ1OT, PO Box 18, 1504 Sofia 4, Bulgaria.

anyone with a manual for a Regency HR-6 transceiver. Dan Hancock, N8DJP, 34513 Annapolis, Wayne, MI 48184.

## Next Month in *QST*

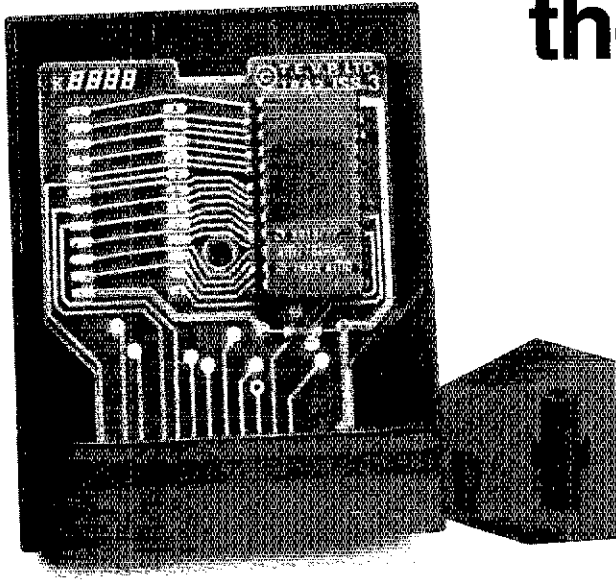
FDR was in his first term of presidency, and Hiram Percy Maxim continued as ARRL President. Step back in time to 1935 in the September issue and enjoy a re-creation of an O-V-2 regenerative receiver. Also, speak up and be heard—with an 8877 linear amplifier. Next month we present the first part of a two-part article on a full-legal-limit amp for the 160- to 10-meter HF bands.

This autumn, QSOs will "fall" into your shack, with the SIMPLEceiver—a high-performance, easy-to-build rig for the 30- and 40-m bands. Leaf through September *QST* for construction hints, a circuit description and a PC pattern for this project. Are your towers secure from summer storms and icy blasts of winter? If not, Hints and Kinks includes a tower anchor you need.

"Shine on harvest moon"—with the 10th International EME Competition. Remember, each station successfully completing at least one EME contact during the contest period receives a commemorative certificate. Complete rules appear in the September issue.

Please note: Although we try our best to include in the next issue all the items we've advertised, from time to time we have to postpone publication for a month or two. If the item you're particularly interested in doesn't appear "next month," it most likely will be in the following month's issue.

# A CW-Program Cartridge for the Atari Computer



Computer + cartridge = CW fun!  
Now you can make your own "plug and play" CW-program cartridge!

By Stephen Stuntz, NØBF  
1656 South California St  
Loveland, CO 80537

Have you ever wondered what kind of magic is contained in those program cartridges that make a computer come to life? We'll solve that mystery and build a CW-program cartridge that will turn your Atari® 400, 800, 600XL, 800XL, 1200XL or 130XE computer into a sophisticated Morse-code terminal.

This article describes how to modify an existing Atari program cartridge to contain a CW send/receive program. The conversion will work on any cartridge that is made for the Atari computers, and can be accomplished easily in one evening. Atari program cartridges can be found for less than \$10 if you're willing to do some bargain hunting.

The "magic" in the little plug-in cartridge is all contained in one or two ROM (read-only memory) ICs. To modify the cartridge to make it do what we want it to, we simply remove the existing ROMs and replace them with EPROM (erasable programmable read-only memory) ICs that contain our desired program.

The CW-program cartridge is produced as easily as 1-2-3: (1) Burn (program) a 2732A EPROM or purchase a programmed EPROM;<sup>1</sup> (2) modify the existing program-cartridge circuit board to accept the EPROM; and (3) install the EPROM in the modified cartridge.

I have used the CW-program cartridge described here for about two years now. With the cartridge, my Atari 800 is immediately available to send and receive CW. Fumbling around with disks or tape cassettes is eliminated. In fact, you can eliminate the disk drive and cassette

recorder altogether. There is no need to prepare the computer for a possible QSO when "reading the mail." You can answer a friend or a rare DX station in a couple of seconds by simply inserting the cartridge and pressing the computer's power switch. With the immediate response of this cartridge, the computer is truly more effective than an electronic keyer. I even sold my keyer because it collected dust after I began using this program and cartridge system! Some Atari computer models are so inexpensive that one could be dedicated for use as a CW terminal. The key-line interface could be built into the computer resulting in a one-piece package.

## The EPROM

For this project, you should use an EPROM with a 250-ns access time. Specify this at the time of purchase. To program the EPROM, you'll need an EPROM burner. If you don't already own an EPROM burner, perhaps you can borrow one. A local user's group or member of the group may own or have access to a burner. EPROM burners are available from many sources with price tags ranging from \$50 to \$500, depending on the features offered.<sup>2</sup>

I use an EPROM burner (no longer manufactured) that connects to my Atari 800 computer. The software that is supplied with the burner allows me to enter the assembly-language source code instead of entering machine-language code. To burn an EPROM, I perform the following steps:

- Compile the assembly-language program using the Atari Editor/Assembler cartridge.

- Save the resulting machine code to disk.

- Load the EPROM burner program.
- Read the machine code from disk.
- Connect the EPROM burner to the computer.

- Insert a blank EPROM.
- Burn the code into the EPROM.

The program that must be burned into the EPROM is too long to be presented here. However, the program that appeared in my November 1985 article will produce the required code.<sup>3</sup> Don't let the article title mislead you; that program is designed to transmit as well as receive CW although the article itself only described how to use the receive capabilities of the program.

To create the machine-language version of the program you'll need for your EPROM burner, modify the assembly-language version of the program by performing the following steps:

- Change line 270 to: PST=\$B000
- Change line 5815 to: \*=\$1000
- Assemble the program and save the object code to disk.
- Change the last seven bytes to \$60, \$16, \$B0, \$00, \$04, \$F9 and \$BF before burning the EPROM.

## Modifying the Cartridge

The circuit board of the cartridge you've chosen must be modified. This is because most game cartridges use masked ROMs that are not entirely pin compatible with the EPROM that will replace it. First, remove the screw or screws that hold the two cartridge halves together. (Usually, it's necessary only to remove a single screw in the middle of the cartridge.) Next, pry the cartridge halves apart and lift the circuit board off the supporting post(s) by prying gently from beneath the board.

On the circuit board you'll see two

<sup>1</sup>Notes appear on page 36.

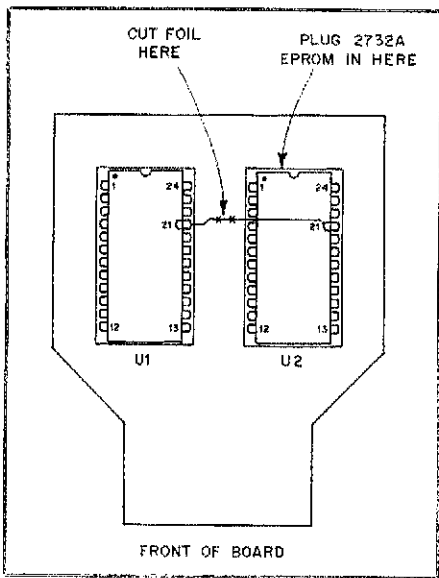


Fig 1—Front or top side of the game-cartridge circuit board. A single foil trace must be cut; see text.

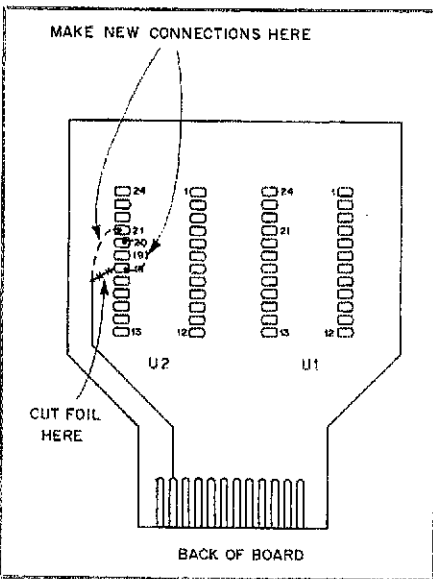


Fig 2—On the back or bottom side of the circuit board one foil trace must be cut and two jumpers added; see text.

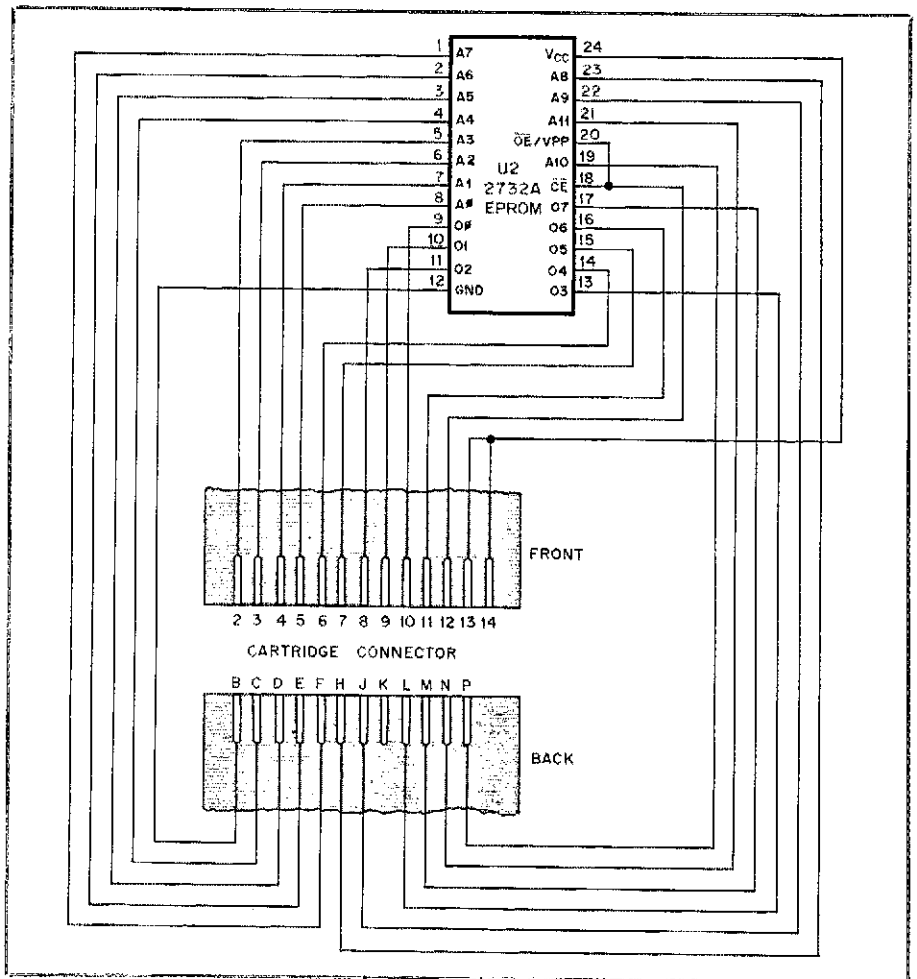


Fig 3—Overall wiring diagram for the modified game-cartridge circuit board.

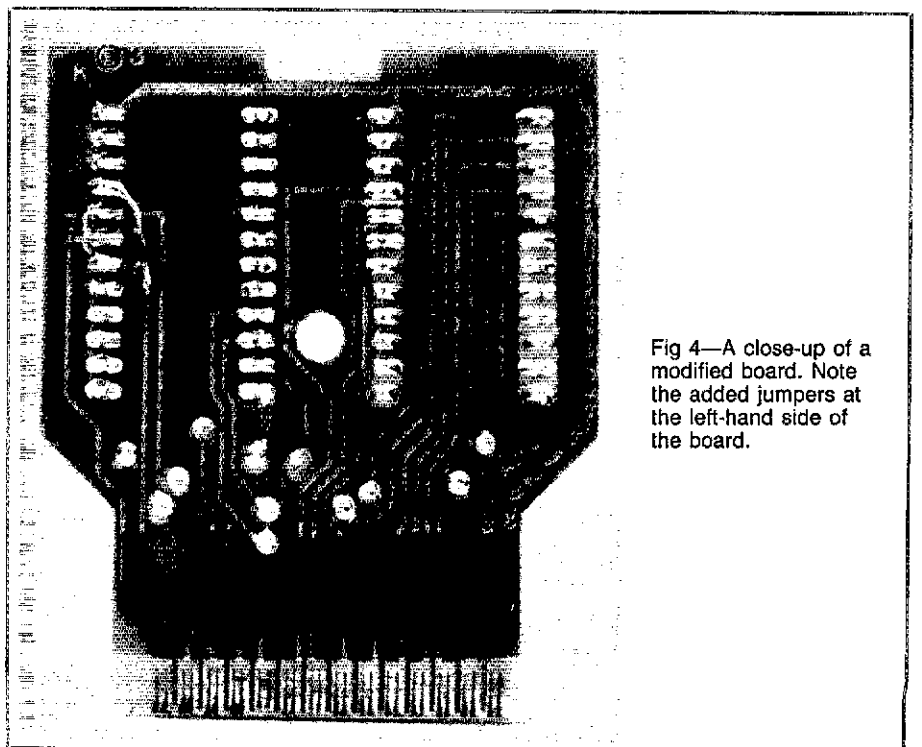


Fig 4—A close-up of a modified board. Note the added jumpers at the left-hand side of the board.

ROMs that may or may not be in sockets. (Note the orientation of the notched end of the IC.) These ROMs contain the program for the game and may be discarded if the cartridge conversion is to be permanent. You can't reprogram these ROMs anyway. If the ROMs are socketed, simply pry them from their sockets. If there are no sockets and you wish to save the ROMs, carefully unsolder each IC leg. If you're going to discard the ROMs, it's easier to clip each leg of each ROM close

to the body of the IC, then unsolder each leg and remove it from the circuit board. Next, solder a 24-pin socket in the U2 position (see Fig 1) on the board. Make sure the notched end of the socket is facing in the same direction you noted earlier. Use of a socket is recommended so that the EPROM can be removed easily, if necessary.

Some circuit board changes are necessary—see Figs 1-4. On the top side of the board, cut the foil connecting pin 21 of U1 and U2. Now, on the bottom of the board cut the foil strip connecting pin N of the card-edge connector to pin 18 of U2. Make this cut close to pin 18. Connect a wire between pin 21 of U2 to the foil strip that was disconnected from pin 18 of U2. Scrape the foil strip to ensure a good solder connection will be made. Finally, connect a wire between pin 20 and pin 18 of U2.

Any Atari program cartridge can be modified using the foregoing procedure,

but different cartridges may require different circuit-board changes. Fig 3 shows the required connections between the cartridge circuit-board edge connector and the 2732A EPROM. Simply make sure the circuit board is modified to connect the EPROM as shown in Fig 3.

Insert the EPROM into the U2 socket (Fig 1). Replace the circuit board in the cartridge and secure the cover. The CW-program cartridge is now ready for use. Simply plug the cartridge into your favorite Atari and you'll be sending and receiving CW with ease!

Give this simple project a try. The end product is something you can enjoy for hours and hours—and probably is more fun than the game that originally came in the cartridge!

#### Notes

<sup>1</sup>Programmed 2732A EPROMs are available from the author for \$10.

<sup>2</sup>You're not limited to using EPROM burners that attach to the Atari computer. Owners of other computers (an Apple IIe or C64, for instance) who have EPROM burners and can enter the program into the computer's memory, can burn the EPROM for you, too.—Ed.]

<sup>3</sup>S. Stuntz, "A CW Receive Program for Atari Computers," QST, Nov 1985, p 51. The program listing is available from the ARRL Technical Department. Send a business-size SASE to ARRL-TD 225 Main St, Newington, CT 06111. Identify your request as "Atari CW."

*Steve Stuntz is the Director of the System Planning and Analysis Division for the Western Area Power Administration. He is responsible for planning improvements to the high-voltage transmission system in Colorado and Wyoming to accommodate future load growth. Steve holds a BSc in Electrical Engineering and is licensed as a professional engineer in the state of Colorado.*

*A licensed ham for 25 years, Steve received his Novice ticket when he was 13 years old. He is interested in QRP CW operating and computer applications in Amateur Radio. His other nonamateur interests include biking, hiking and skiing. ☐*

## Electromagnetic Pulse

(continued from page 20)

piece of equipment. Often, repeaters are collocated with other communications equipment on a joint-use antenna tower. This makes them quite susceptible to receiving an EMP.

### Antenna Rotators

Heavy-duty motors are less susceptible to EMP than smaller, less-rugged electronic components. Antenna rotators, although fairly immune to EMP effects because of their normally heavy metal cases and large components, may be rendered useless if there is a line-voltage surge to the rotator remote-control box. The line surge need not be caused by an electromagnetic pulse.

### Satellite Transceivers and Antennas

Because of the sophisticated nature of satellite transmitters and receivers, and especially of their antenna systems, EMP and line-voltage transients remain serious problems. As noted earlier, the satellite itself is susceptible to SGEMP.

Satellite antenna systems require azimuth and elevation rotators. These rotators are fairly resistant to EMP. However, the antenna tower or mast and the remote-control lines are very likely to pick up large surge

currents from EMP and lightning. The ac power supply for the rotators may fail, leaving the antenna array useless or extremely difficult to aim. Marrying a computer and satellite transceiver increases the station vulnerability. Virtually all stations, regardless of the type of equipment used, will be hostage to the commercial power supply unless, served by a separate, emergency back-up power source.

Part 2 will discuss the testing of EMP/transient protection devices.

[Editors Note: This series of articles is condensed from the National Communications System report (NCS TIB 85-10) "Electromagnetic Pulse/Transient Threat Testing of Protection Devices for Amateur/Military Affiliate Radio System Equipment." A copy of the unabridged report is available from the NCS. Write (no SASE required) to Dennis Bodson, Acting Assistant Manager, Office of Technology and Standards, National Communications System, Washington, DC 20305-2010, or call 202-692-2124 between 8:30 AM and 5 PM Eastern Time.]

#### Notes

<sup>1</sup>When the term "radio amateur" is used in this report, it includes the MARS amateur volunteer.

<sup>2</sup>One joule (J) is the energy expended during one second by an electric current of 1 ampere flowing through a 1-ohm resistance. One joule is equal to 1 watt-second. A 60-W light bulb burning for 1 second expends 60 J of energy.

<sup>3</sup>The coulomb is defined as the ampere-second. One ampere is the current intensity when 1 coulomb flows in a circuit for 1 second. ☐



## QEX: THE EXPERIMENTERS' EXCHANGE

☐ Calling all experimenters! Wonder what you've been missing by not subscribing to QEX, the ARRL newsletter for experimenters? Among the features in the July issue were:

- "Surface Mount Technology" by Ray Miles, KC0BR
- "A High-Resolution Potentiometer" by Albert Weller, WD8KBW
- "The Xerox 820-1 Compendium, Part 1" by Andre Kesteloot, N4ICK
- "Additional Sweep-Frequency Impedance Measuring Techniques" by Ken Simons, W3UB

Other features include: information on selecting the proper silicon and germanium device for your VHF/UHF amplifier project, and suggested circuits for a grounded-grid triode bias amplifier.

QEX is edited by Paul Rinaldo, W4RI, and Maureen Thompson, KA1DYZ, and is published monthly. The special subscription rate for ARRL members is \$6 for 12 issues; for nonmembers, \$12. There are additional postage surcharges for mailing outside the US; write to Headquarters for details.

## THREE-PHASE, HIGH-VOLTAGE POWER SUPPLY FOR MOBILE AMPLIFIERS

[A photo of W2DDN's single-band, mobile linear amplifier appears in the July Up Front in QST column (p 12). Credit for the photo goes to Bob Wilgus, KZ2A, not K2BLA. Of particular interest is the high-voltage power supply for the amplifier, which uses three-phase power supplied by the automobile alternator.—Ed.]

□ Back in the early days of SSB, during the 1950s, mobile operation on the 20-meter band was quite popular. Most hams built their own transmitters and receivers for long-distance mobile QSOs. High voltage was usually supplied by dynamotors. Leece Neville three-phase alternators were a little too expensive for use then, and I limited myself to a popular SSB phasing exciter built by Anthony C. Vitale, W2EWL, a neighbor of mine. I enjoyed many QSOs with that system over a 10-year period.

I recently read some 1950 *GE Ham Tips*, and the old magazines renewed my interest in mobile SSB operation. Several articles written by Al Prescott, W8DLD, and Bill Loudon, W8WFH, inspired me to build a three-phase mobile power supply, now that alternators are standard equipment on automobiles. So, when I ordered my new pickup truck, I included a 120-A alternator.

My first amplifier used a pair of EIMAC<sup>®</sup> 4-65s, in a grounded-grid circuit, driven by a Swan HF700. This system worked very well. I then replaced the 4-65s with a pair of 813s. My first three-phase power supply was built after some conversation with Bill Loudon. It produced about 2500 V, and the 813s performed well. I decided that the 813s could use some more voltage, and a second supply produced 3600 V at 500 mA. This yielded over 1 kW with the 813s. I have worked VKs, ZLs, and many European and South American stations with this setup and a shortened Hustler<sup>®</sup> antenna. My latest mobile station uses a 3CX800A7 amplifier driven by a Yaesu FT-77 transceiver.<sup>1</sup>

The three-phase high-voltage power supply is simple to construct. (A schematic appears in Fig 1.) My supply is enclosed in a standard chassis with dimensions of 10 × 14 × 3 inches. It is located under the hood of my pickup truck. Three-phase power is taken from the alternator (with no. 10 wire) at the input of the diode junction for each phase. The transformer uses the delta-wye ( $\Delta$ -Y) configuration, and was custom built with a 12-V primary and an 800-V, 500-mA secondary.<sup>2</sup> The frequency-response limits are from 100 to 1000 Hz. Relay K1 and another relay in the amplifier are both controlled by the exciter PTT line.

I hope that this project generates some interest in high-power mobile operation. It is a wonderful project and simple to build. Again, thanks to EIMAC for producing a wonderful tube; Jerry Pittenger, K8RA; Bob

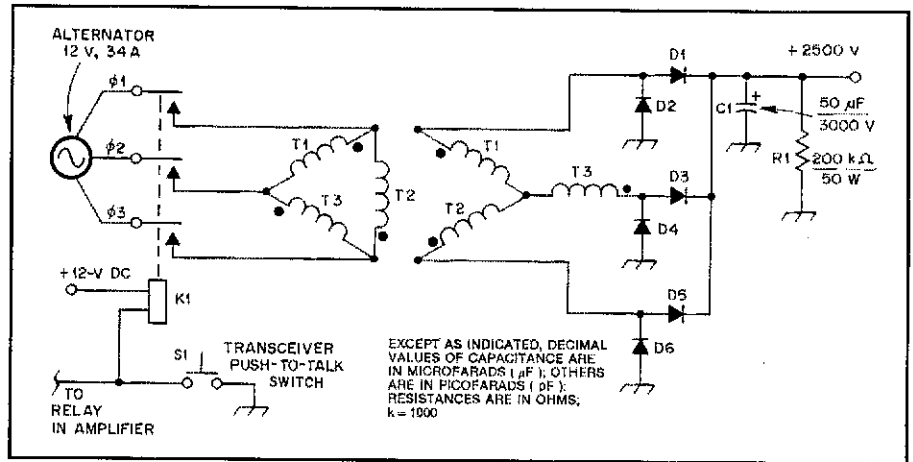


Fig 1—A schematic of W2DDN's mobile high-voltage supply. Use 1-A, 14-kV diodes. The relay has a 12-V coil and 30-A contacts. [The relay contacts are slightly underrated, but the author has experienced no problems.—Ed.] T1 through T3 each have a 12-V primary and a 800-V, 500-mA secondary.

Wilgus, KZ2X; Al Helfrick, K2BLA. Many thanks also to Al Prescott, W8DLD, and Bill Loudon, W8WFH, who stirred me up.—S. Pavone, W2DDN, Boonton, New Jersey

## QSK AMPLIFIER KEYING

□ ETO amplifiers, such as the Alpha 78, are exceptional when operated QSK with a transceiver like the Ten-Tec Omni D. Normally, the electronic keyer triggers the amplifier directly, while the exciter is keyed via a separate line from the amplifier keying relay. This is often necessary because RF output may precede TR switching by milliseconds in many solid-state exciters. Protective circuitry in the amplifier senses RF from the exciter and prevents the amplifier TR relay from changing state when RF is present.

When the exciter is connected to a QSK amplifier via the normal TR scheme, a noticeable pause in amplifier keying results.

This pause may omit the first portion of each CW character or delete whole words during VOX operation. My simple method allows all amplifier switching to be done from the exciter without pauses or lost code elements.

Solid-state transceivers generally have some transmit-control voltage available, immediately, whenever the transmitter is keyed. Furthermore, this voltage is often conveniently available externally. In the Omni D, this "T" voltage is present at the output of the multi-pin connector labeled LINEAR. After installing the common-emitter circuit shown in Fig 2, the Omni switches the amplifier QSK relays with no noticeable delay. Similar techniques can be employed with any exciter/amplifier combination.—David J. Rodman, MD, KN2M, Buffalo, New York

## TIPS FOR THE HEATH SB-220 AMPLIFIER

□ After purchasing a used SB-220 amplifier, I was upset to find a rash of problems with my new purchase. There was arcing across the main tuning capacitor whenever the amplifier was keyed in either the low-power/tune or high-power modes. Also, the high-voltage reading seemed low.

First, I replaced all of the high-voltage metering resistors (old resistors of 100 k $\Omega$  or greater tend to drift in value as high voltage/current is passed through them). Even though a resistance measurement may show adequate resistance, the value varies under loaded conditions. With the new resistors in place, the displayed high voltage is acceptable.

Second, I replaced the main tuning capacitor with a Heath replacement having a slightly wider plate spacing. The arcing persisted, however. I cleaned the relay, and that seemed to help, but only for a short while. Next, I removed the antenna relay and examined the contacts. They were severely pitted, probably because RF was applied to the amplifier with no antenna connected. The relays were apparently switching the exciter RF to the amplifier before the antenna-relay transition was complete. A spike of power was arriving

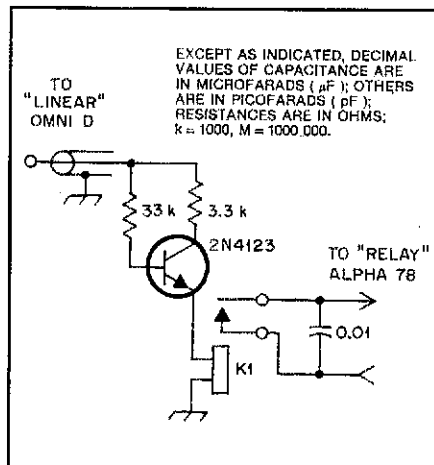


Fig 2—KN2M's QSK keying circuit that uses the transceiver transmit-control line to key an external amplifier. K1 is a 5-V dc reed relay. Parts shown are for the Ten-Tec Omni-D transceiver.

<sup>1</sup>The amplifier design is very straightforward. Anyone wanting details should contact the author directly at RD 4, Box 105A, Boonton, NJ 07005.

<sup>2</sup>The transformer was made by Transformers Inc, 1920 Murrell Rd, Rockledge, FL 32955, tel 305-632-7370.





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

## dB AND GUSTAV FECHNER

□ The readers of QST might be interested to know that the origins of the decibel predate those discussed by H. Paul Shuch and are associated with the German physicist-philosopher Gustav Fechner (1801-1887).<sup>1</sup> Fechner was an unusual man who, while trained in the exact sciences of mathematics and physics, was preoccupied with the metaphysical question of the relationship of the mind and body. In 1850, he thought he had found the solution to this problem in the observation that geometric increases in stimulus intensities are accompanied by arithmetic increases in psychological sensation. Fechner expressed this relationship between the psychological and physical worlds in an equation well known to students of experimental psychology:  $S = K \log_{10} R$ . S and R represent sensation and stimulus, respectively; K is an empirically determined constant.

While Fechner's belief that he had solved the mind problem turned out to be false, he must be given credit for having founded the field of psychophysics. The decibel was one of the first practical offsprings of Fechner's work.—*Alfred Kornfeld, PhD, KMIU, Associate Professor, Psychology Department, Eastern Connecticut State University, Willimantic, Connecticut*

## PESTY RFI

□ A local repeater system occasionally experienced interference on its input frequency. The interfering signal took the form of a pulsing sound similar to that produced by a hand-held transceiver with a weak battery. The signal was a fairly strong and broadband one, and would keep the repeater keyed after a legitimate signal cycled the COR circuit.

A few members of the local repeater group did some quick DFing after one of the regular net sessions and found the source of the interference to be in a private residence some 1000 feet from the repeater. The homeowner was cooperative and helped us to search for the emitter. The offender was discovered to be an insect-repelling device known as a Pestrepeller<sup>®</sup> and was removed from service. This device uses an ultrasonic pulse in the 30-60 kHz range to repel insects and has an adjustable pulse rate.

The FCC Monitoring Station in Livermore, California was notified of our findings. They have apparently received other reports regarding the device. The signal emitted by the Pestrepeller is strong and broad enough that other radio services may also be subject to interference. Our thanks to Donald McDougall, W6OA, Leonard Ivarson, WA6SDA, and

Richard Whipkey, AD6X, for their efforts in correcting the problem.—*Ron Kane, WA6TGF, 3679 Canelli Ct, Pleasanton, CA 94566*

## LOG = LN

□ I received a couple of inquiries regarding my article on Short Loaded Dipoles in the *ARRL Antenna Compendium*. Both queries related to the expression "LN" in program lines 1240 and 1260 of the published Timex-Sinclair computer program (see Fig 1).

The Timex-Sinclair 1000, based on a British design, uses the "Queen's English" for a number of functions. "LN" is identical to the American English function "LOG." Both are, however, natural logarithms to the base e, not base 10.—*Herbert L. Ley, Jr, MD, 1160 Rockville Pike, Suite 208, PO Box 2047, Rockville, MD 20852*

1240 LET S2 = 1/X \* (LN (24 \* X/D) - 1)  
1260 LET S4 = 1/Y \* (LN (24 \* Y/D) - 1)

Fig 1—Program lines reflecting the use of the LN function of the English Timex-Sinclair 1000. This function equates to the LOG function used in "American" BASIC.

## BALUN TRANSFORMERS IN TRANSMATCHES

□ Antenna-matching networks almost without exception are of the unbalanced variety nowadays. That applies to commercial "tuners" and "homebrewed" designs. Those tuners are obviously meant for use with coaxial-cable feeders. Sometimes provision is made to handle open-wire lines. This is done by adding a balun transformer, wound on a toroidal ferrite core, to the unbalanced tuner. I consider this bad practice.

In a properly designed transformer or balun wound on a ferrite core, care is taken that the magnetic flux never reaches the saturation region of the ferrite. This means that the maximum voltage that will be developed in the windings has to be known. When the transformer or balun operates between known impedances, this maximum voltage can be computed easily knowing the impedance involved and the power that flows through the balun. When the balun operates at the input of open-wire feeders, those conditions do not apply. The input impedance of the feeder depends on its characteristic impedance and the standing-wave ratio on the feeder. This impedance can be anything between, say, 10 ohms and several kilohms. The low value does not present a particular problem, but the high impedance certainly does. Unless very low power is used, the chance that the magnetic

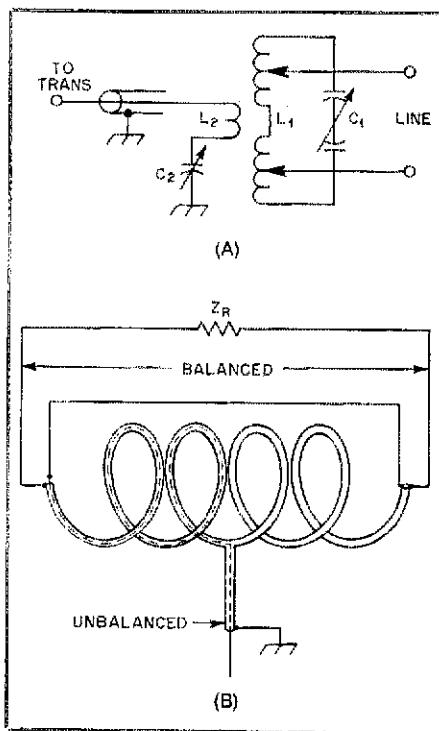


Fig. 2—Antenna-matching networks recommended by PA0SE for use with balanced feeders.

flux will run deep into the saturation region (in order to develop the necessary high voltage at the input of the line) is far from remote. The results are heating of the core and—possibly the worst effect—production of harmonics and intermodulation products, that were carefully suppressed at the transmitter!

The remedy is to use an inherently balanced antenna-matching network such as the one in Fig 2A. If you insist on using an unbalanced network followed by a balun, then an air-wound type without a core (eg, the "Collins" balun of Fig 2B) should be used. The balancing action of this balun is, in principle, independent of frequency, so that a single balun can serve for the whole range from 160-10 meters. The balun almost certainly introduces an inductive or capacitive reactance, but this does no harm. The reactance is absorbed by the tuner as part of the normal matching action.—*Dick W. Rollema, PA0SE, Marckstraat 5, 2352 RA Leiderdorp, The Netherlands*

## MORE ON 900-MHZ

□ Mr. Campbell's letter might lead a reader to conclude that line-of-sight conditions are necessary for communications at or around 900 MHz.<sup>2</sup> This is not the case. In fact, the

<sup>2</sup>R. L. Campbell, "900-MHz Propagation," Technical Correspondence, QST, Mar 1986, p 46.

<sup>1</sup>H. Shuch, "Gaining on the Decibel—Part 1," QST, Feb 1986, p 20.

current generation of cellular mobile telephone systems in the field today, as well as new mobile and portable radio systems on the drawing boards are designed with the assumption that no direct components of the signal to or from the mobile or portable may exist, ie, all the radiation has been "scattered." (An important design assumption if these systems are to work reliably.) This leads to multipath propagation, which results in *Rayleigh fading*.

Rayleigh fading comes from the superposition of radio energy from several directions and with different carrier phases, causing severe (20-30 dB) and frequent (about every half-wavelength) fades. A number of diversity-reception techniques that can lessen the ill effects of Rayleigh fading have been published in the literature.<sup>3</sup>

In addition to Rayleigh fading from multipath propagation, signal fading caused by terrain variations and building blockages cause what is commonly referred to as *shadow fading*. Shadow fading is accounted for in the design of mobile and portable radio systems at UHF by the correct selection of antenna gain, antenna height, transmitter power and by the use of multiple base stations (space diversity).

So, even though hams often think of UHF operation in terms of there being a line-of-sight component to the signal with a minimum of signal fading, this is not the case in many forms of mobile and portable radio systems. By the way, I'm a member of the Technical Staff at Bell Communications Research in the Radio and Satellite Systems Research Division, and have worked in the research and design of cellular radio systems at UHF.—*Rich Bernhardt, NJ2H, 974 Princewood Ave, Lakewood, NJ 08701*

## BETTER SORT

□ I was intrigued by all of the sort-routine variations for The Super Duper.<sup>4,5</sup> It seemed a natural challenge to test the sort routine that I use against all of those presented in *QST*. The tests were made using my Texas Instruments 99/4A computer. This machine is not noted for its speed; that's why I wanted a different way of sorting. The test results shown in Table 1 show that a significant reduction in sort time can be had with my routine shown in Table 2. These results are based on sorting 100 computer-generated random calls.

I first generated a random list of 100 calls using the random-number generator in the computer. In order to be as consistent as possible, the calls were arranged based on what I believe to be the call format for the array P\$ in the original program. The time indicated in Table 1 is an approximation of the elapsed time from when the last bit of data was entered from the disk to the time the first call was printed. The same list of calls was used in testing each routine.

My routine gains its speed by reducing the

**Table 1**  
**Sort Routine Comparisons**

Sort Routine	Sort Time (Min:Sec)
George Allison, K5LJ	5:05
Robert Keller, K3PCS	3:10
Glenn Schulz, WB9NDM	4:50
Tom Karnauskas, N9BWW	1:00

**Table 2**  
**N9BWW Sort Routine**

```

1000 REM LOAD DATA FILE
1100 DIM P$(100)
1200 C = 100
1300 OPEN #1:"DSK.TESTCALL"
1400 FOR A = 1 TO C
1500 INPUT #1:P$(A)
1600 NEXT A
1700 CLOSE #1
:
:
:
4000 REM SORT ROUTINE BY N9BWW
4010 FOR I = 1 TO C
4020 SM$ = P$(I)
4030 K = I
4040 FOR J = I TO C
4050 IF P$(J) > SM$ THEN 4080
4060 SM$ = P$(J)
4070 K = J
4080 NEXT J
4090 REM SWAP
4091 P$(K) = P$(I)
4092 P$(I) = SM$
4093 REM
4100 NEXT I
5000 REM PRINT ROUTINE
5010 OPEN #2:"PIO"
5020 FOR A = 1 TO C
5030 PRINT #2:P$(A)
5040 NEXT A
5050 CLOSE #2
5060 END

```

number of swaps to a minimum. All of the previously mentioned routines continually compare one call to another. This routine swaps only when the "lowest" call is found.

The efficiency of the sort could be demonstrated by bringing the very last item to the top of the list. The other sort routines would require 99 comparisons and 99 swaps; my routine requires 99 comparisons and only 1 swap.

My TI computer BASIC is not blessed with the SWAP statement available in IBM BASIC. However, the SWAP statement may have a minimum effect on speed in comparison to the three-step swap routine I am forced to use. Users of other computers, such as the C64, must employ their own swap routines.

I agree with Schulz about using one string array as opposed to the 7 × 500 array. The single string array would further reduce the number of swaps required. I use long string arrays and separate the fields with a slash mark (/). This key is just above the ENTER key on the TI-99/4A and is convenient to use. For example, the information contained in the

arrays Q\$(1,1) through Q\$(1,7) might be:

```

Q$(1,1) = KA0ABC
Q$(1,2) = 86
Q$(1,3) = 1622
Q$(1,4) = 599
Q$(1,5) = 599
Q$(1,6) = MN ELMER HAM
Q$(1,7) = 40

```

This information can be condensed into a single string such as:

```

P$(1) = KA0ABC/86/1622/599/599/MN
ELMER HAM/40

```

A routine can be written to detect the slash marks during output to the printer. The fields can be separated concurrently with the printing operation. I won't present a routine here since TI BASIC has a statement (POS) to determine the starting location of a string within a string. IBM BASIC also has a POS statement, but it serves a different purpose.—*Tom Karnauskas, N9BWW, RR 5, Box 326, South Fulton, TN 38257*

## Feedback

□ Please refer to Fig 1 of "A Tester for Coil Inductance," *QST*, Apr 1986, p 21. Delete the words "per section" adjacent to C6A/C6B. The maximum total capacitance of C6 should be 400 pF. (A dual-section variable capacitor was used in the prototype.)

□ There is an error in Fig 1 of "The UNKEMO (UNiversal KEyer MOdule)," Feb 1986 *QST*, p 27. No connection should be shown between the common point of K1A/D2 and the collector of Q3. Remove the connecting line and place a ground symbol at the common point of K1A and the anode of D2. The circuit board template has the proper connection.

□ The coil winding data for "Beyond the Dipper," May 1986 *QST*, p 14, was omitted. T1 consists of a 1-turn primary and a 15-turn secondary, tapped at 4 turns from the ground end, wound on a T50-6 core. T2 has a 3-turn primary, a 49-turn secondary, tapped at 8 turns from the ground end; it is wound on a T50-2 core. T3 and T4 each have 10 bifilar turns on FT-37-43 cores. No. 28 enameled wire is used. The RIP probe data is given in Fig 5. The return-loss bridge transformer of Fig 9 consists of 10 bifilar turns of no. 30 wire on an FT-23-43 core.

□ In "A Mode-L Parabolic Antenna and Feedhorn for OSCAR 10," May 1986 *QST*, p 24, an error has been discovered in Table 2. The second entry in the dimensions for the 5-foot dish should read 0.093 in, instead of 0.039 in. The value is an X value, not a Y value. The corresponding Y value is 3 inches. Author Ruperto advises us that the error is not significant, however, amounting to about 1/20 of an inch. Few people, if any, can build a dish to such close dimensions.

□ In the article "Ham Radio in China" (July *QST*, page 48), the person in the photo should have been identified as Tong Xiao-Yong, station manager of BY1PK. The photo was taken by Leonard Cernuch, WD5CAY.

<sup>3</sup>W. C. Jakes, *Microwave Mobile Communications*, (New York: McGraw-Hill, 1982).

<sup>4</sup>G. Allison, "The Super Duper," *QST*, Nov 1985, pp 44-50.

<sup>5</sup>R. Keller, "Super-Duper Bubble," Technical Correspondence, *QST*, Dec 1985, pp 52-53.

<sup>6</sup>G. Schulz, "Super Duper Poop," Technical Correspondence, *QST*, Mar 1986, p 46.

## Dick Smith Electronics K-6345 Radio Direction Finder

Designed to provide an easy method of tracking down illegal transmitters, RFI sources and antisocial radio operators, the Dick Smith Electronics Radio Direction Finder (RDF) operates on any frequency within the range of 50-500 MHz. It will work with just about any FM receiver, such as hand-held transceivers, pocket scanners or fixed stations. It is provided in kit form and requires a middle-level construction ability—that is, it is *not* a project for the first-time kit builder.

### Who Is Dick Smith?

Dick Smith Electronics, Inc. is an American subsidiary of an Australian company. The Dick Smith product line is well known in "downunda" land (Australia and New Zealand), but perhaps not so well known in the US. They have, however, in a very short time established several outlets, primarily in the San Francisco Bay area and Southern California. They stock a very complete line of electronic items, ranging from components to major assemblies, and market much of their product line through mail orders. Because the company emphasizes kit projects for the Amateur Radio operator, as well as the electronics enthusiast, *QST* has looked at some of their projects in the past.<sup>1</sup> This is the first time that we have reviewed one of their more-advanced electronics projects.

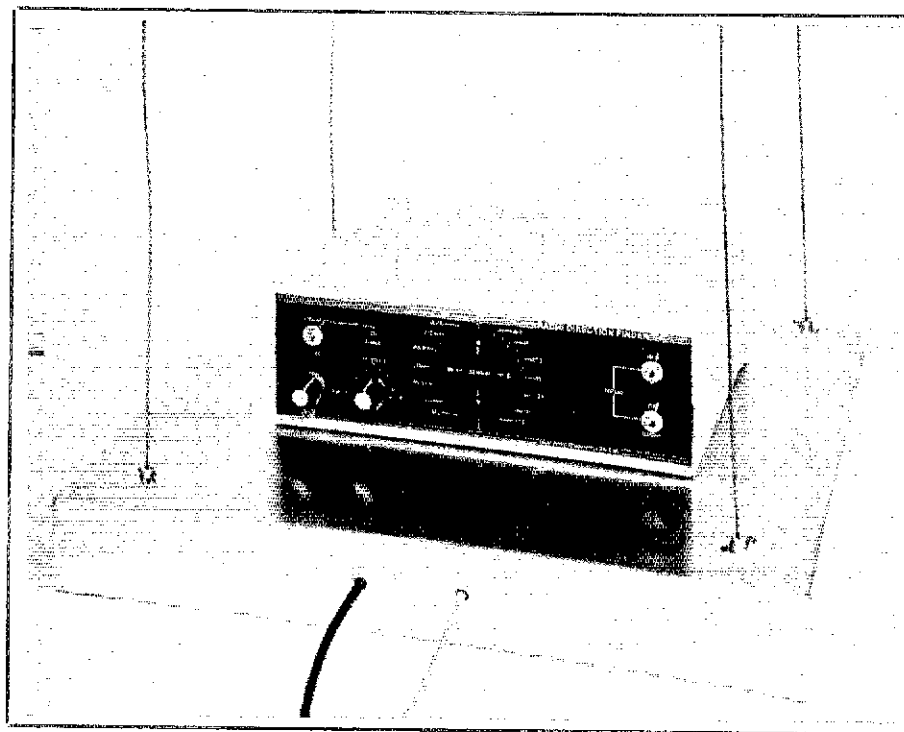
### RDF Description

Physically the RDF consists of two separate units. The major unit contains the control and display electronics, and will be located adjacent to an FM receiver or transceiver. The second unit, the antenna switching unit, is connected to the control unit through a 4-conductor cable and 2-conductor audio line, and to the receiver antenna terminal through a coaxial cable.

An electronic "compass" display consisting of 32 LED indicators in a circular pattern on the front panel indicates the relative bearing from the RDF to the transmitter being tracked. When a signal is received, its relative bearing to the RDF antenna system is indicated by whichever of the 32 LEDs illuminates. In fixed installations, this allows the compass bearing of the signal to be directly indicated to within  $\pm 5.6^\circ$ . When installed in a vehicle, successive readings allow you to pinpoint the exact location of the transmitter.

### How It Works

The theory of operation is relatively simple. Radio signals transmitted from a moving location and received on a stationary antenna, or transmitted from a stationary point and received on a rapidly moving antenna, undergo a frequency shift due to the Doppler effect. This effect is similar to that observed when



a moving car blows its horn or a moving train whistles at a crossing.

Consider a single antenna mounted on the edge of a rapidly spinning disk. As the antenna moves toward the source of the RF signal, the apparent frequency will increase due to the Doppler effect. Conversely, as the antenna moves away from the RF source, the apparent frequency decreases. Thus, the rotating antenna causes frequency modulation of the received carrier. When the antenna is connected to an FM receiver, a tone will be heard corresponding to the modulation induced by the rotation. By analyzing the phase of this tone, the direction to the transmitter can be determined.

To avoid the obvious drawbacks associated with a mechanically rotated antenna system, the Dick Smith RDF simulates a rotating antenna electronically. Four vertical whip antennas are arranged around a circle with a diameter of 0.07-0.4 wavelength. The antennas are electronically switched on and off in a clockwise direction such that all four antennas are scanned once every 1/1250th of a second. Only one antenna is active at any point in time. This situation is equivalent to one vertical antenna mounted on the perimeter of a disk spinning at 1250 revolutions per second. For a diameter of 800 mm (31 1/2 inches), which is 0.4 wavelength at 144 MHz, this results in a tangential velocity of 10,300 feet per second, or 3140 meters per second (m/s).

The deviation of the received carrier is determined as follows. For  $V \ll C$ , we will

neglect relativistic effects and use

$$Fr/Ft = 1 - V/C \quad (\text{Eq 1})$$

also,

$$dF = |Fr - Ft| \quad (\text{Eq 2})$$

therefore,

$$dF = Ft \times V/C \quad (\text{Eq 3})$$

where

Fr is the received frequency

Ft is the transmitted frequency

dF is the frequency shift

C is the velocity of light ( $3 \times 10^8$  m/s)

V is the antenna velocity

For  $V = 3140$  m/s and  $Ft = 144$  MHz, the carrier will deviate 1.5 kHz at a rate of 1250-Hz. For lower carrier frequencies, the deviation will be proportionately lower. Note, however, that the 1250-Hz modulating tone remains constant as it is a function of the antenna switching rate only.

The audio output from the FM receiver is fed to the signal input of the RDF and compared with an internal reference phase. The resultant phase angle appears as a 5-bit binary code that is decoded to a 1-of-32 output to drive the appropriate indicator LED. In addition, the detected audio tone is fed to an internal speaker to allow monitoring of receiver tuning.

### Construction

The RDF control unit includes two PC boards, a main circuit board and a display-

<sup>1</sup>Bruce O. Williams, "Build a UHF Wattmeter," *QST*, Oct 1985, pp 35-37.

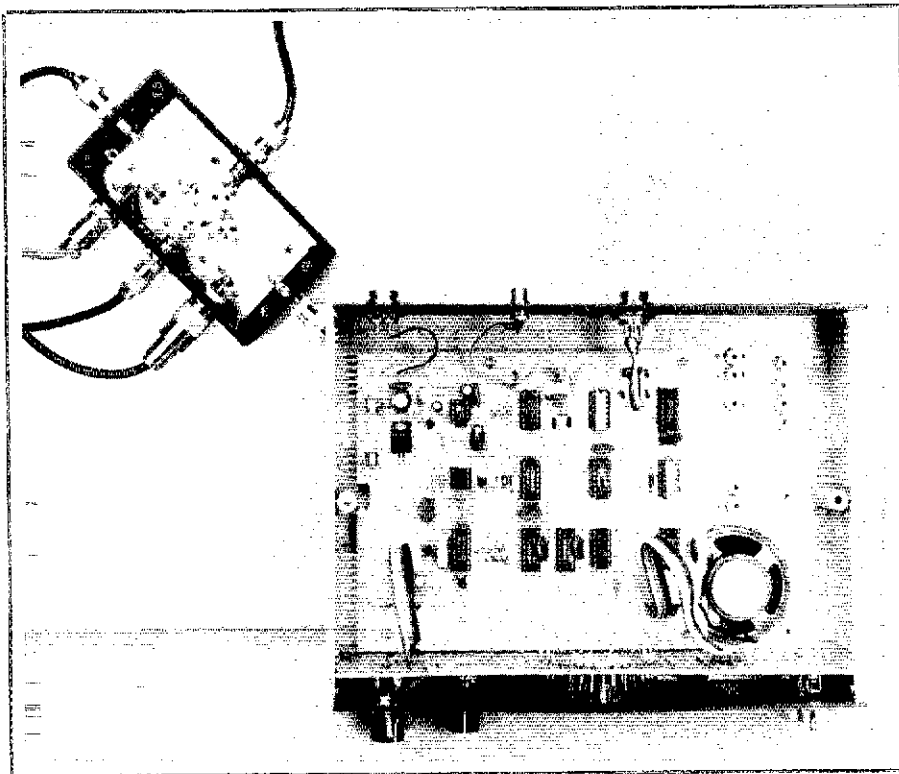


Fig 1—View of the Dick Smith RDF with the top cover removed. The homebuilt antenna system, at top left, includes the Antenna Switching Unit. Note the clean and uncluttered circuit boards in both units. At the bottom right, the 32-LED compass display can be seen. The LEDs must be soldered in to match the spacing between the front panel and the display panel PC board.

panel board. Fig 1 shows the control unit with the cover removed and a bottom view of the antenna system that I built in accordance with the assembly instructions. On the main circuit board, there are 13 ICs, a 5-V regulator and miscellaneous discrete components—resistors, capacitors, transistors and the like. The display-panel circuit board includes the 32 LEDs mounted in a circle, the two control potentiometers, two decoder ICs, the POWER ON LED and two switches, HOLD and DIM. This circuit board is mounted directly behind the silk-screened clear-plastic front panel. The controls mounted on the PC board must align with the holes and markings on the front panel, so it is important to follow the assembly instructions explicitly. The hardest job in the whole assembly process is the mounting and soldering of the 32 LEDs that make up the directional display. The LEDs must be soldered in so that they protrude just the right amount to fit snugly against the front panel and match the clear spots in the panel screening. One thing that bugged me was the mounting of the ON-OFF switch—it is mounted so that you activate the switch *down* for ON. This is just opposite to the US convention where up is on, down is off. Well, the RDF was designed and built downunda and I guess that's the way they do things. Because the switch is mounted on the display-panel circuit board, there is no way to change the arrangement. There is a POWER-ON LED in the front panel, so you don't have to remember which way is ON, however.

The Antenna Switching Unit (ASU) consists of a small PC board mounted in a small plastic box. This unit incorporates the anten-

na control diodes and connections to the transceiver, control unit and the four antennas. I made an antenna system by mounting four 18-inch vertical antennas on a square box and mounting the ASU on the inside bottom of the box. Although this is a very rough-looking unit, it serves its purpose. It gives some protection to the ASU and allows use of short coaxial cables from the ASU to the antennas.

The assembly instructions for the ASU are complete—the only problem I had was with the four coaxial connectors used to connect from the ASU to the antennas. A coaxial connector is provided for each cable—the problem is that I had never seen a connector like this. It took me a while to figure out how to connect the coaxial cable using it, but eventually it worked out. The four antennas are mounted in the corners of the box, with a spacing of about 20 inches on the diagonal. This meets the specified 0.07 to 0.4 wavelength spacing for 2 m and above, and allowed me to use the RDF for the FM broadcast band.

The assembly instructions are adequate for the experienced builder. There were a few problems during the process, mostly occasioned by a few strange components that I encountered and the different level of capability that Dick Smith expects in Australia. I contacted the manufacturer, and they agreed to do several things to make the kit easier for US constructors. There were no IC sockets provided in my kit. I feel that any IC should be socket-mounted, particularly in a kit. Trying to replace a soldered-in IC is not an easy task. I had a problem with both the VOLUME control potentiometer and the

CALIBRATION potentiometer. Both were intermittent and caused some performance problems. It was difficult to find suitable replacements at the specified values (25 ohms and 500 kilohms). In addition to the problem with the unfamiliar coaxial-cable connector, there were no instructions for connecting the shield provided with the 4-conductor cable used for interconnections between the ASU and the main unit. I discussed all of these problems with the manufacturer, and they agreed to furnish IC sockets with all future kits, as well as replace the potentiometers with higher reliability types. The assembly manual will be changed to add the instructions for use of the coaxial connectors and shield. They are also providing silk-screened PC boards to make assembly easier.

I spent about 10 hours assembling the kit and constructing the antenna system. I had no insurmountable problems, just annoying little things. I'm sure that the changes promised by the manufacturer will do much to make construction easier.

### Operation

I operated the RDF in several different ways. First, I used it with my Alinco hand-held transceiver to locate the various 2-m repeaters around the Newington, Connecticut area. Because of the severe reflections in the ARRL Lab, I was able to get only general directions on these transmitters, and maybe these weren't too accurate. I then tried operating from a 12-V battery in my truck. I was a few miles away from the Lab environment, and I was able to pinpoint fairly well the locations of the various repeaters. Attempts to locate FM broadcast stations from my QTH were apparently successful—I got directions for them, and they coincided with where I think the transmitters are. Remember, the resolution of this RDF is only about 11.5°. Repetitive readings will be necessary to locate the transmitters exactly. I was also able to locate an FM paging system transmitter operating on about 155 MHz, near my home.

### Conclusion

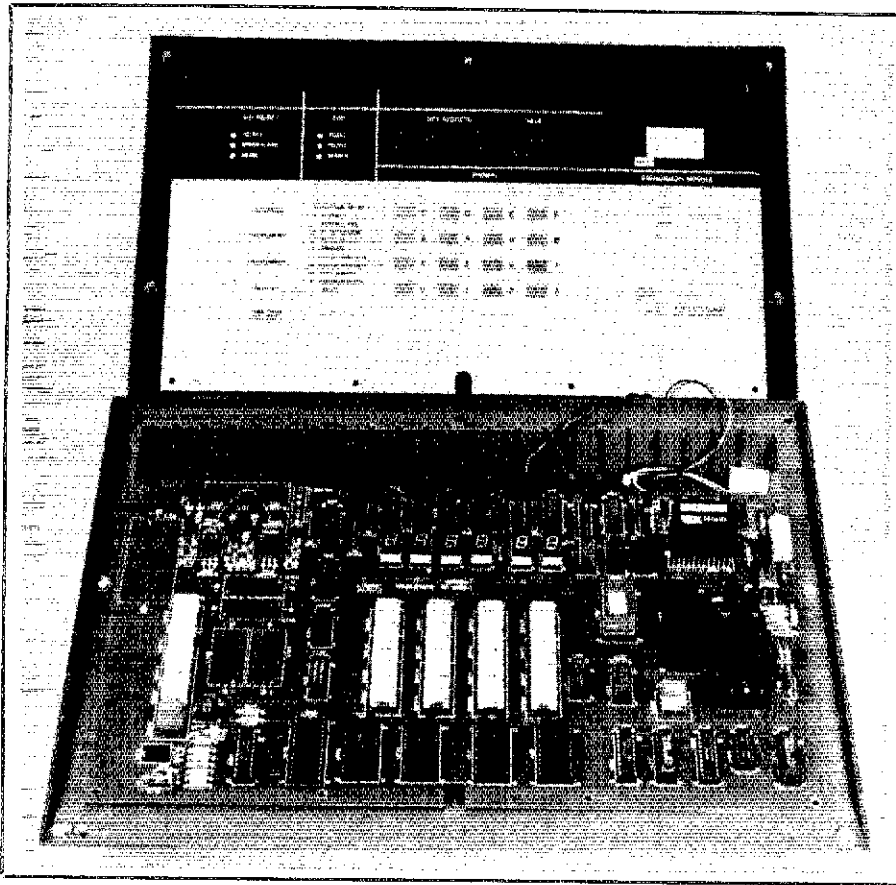
After spending considerable time playing with the RDF, I have a lot of confidence in it. It is a useful piece of equipment for the ham operating in the FM bands, particularly if there are malicious interference problems in the area. It is ideal for transmitter hunts, but I'm sure the local rule makers will outlaw it for competitive use in T hunting. I intend to make a new antenna system, mounted in a large, round pie pan with some sort of magnetic mount, to satisfy the esthetic demands of the XYL and my wishes for a semi-permanent mobile installation.

If you are considering an FM DFing application, the Dick Smith RDF is certainly worth looking at. When you consider that similar commercial items may cost as much as \$500-600, it seems to be a good value at \$100.

It is available from Dick Smith Electronics, Inc, PO Box 8021, Redwood City, CA 94063, tel 415-368-8844.—Bruce O. Williams, WA6IVC

### HEATH MODEL ID-4801 EPROM PROGRAMMER

The Heath Model ID-4801 EPROM (Erasable Programmable Read Only Memory) programmer allows you to program the con-



tents of 5-V, 2500- and 2700-series devices. The microcomputer-based design of this unit allows a great deal of flexibility in entering data into, and retrieving data from, an EPROM.

The programmer is housed in a sloping-front cabinet that provides easy tabletop access to the controls. Push-button switches are used to select functions and for data entry, and seven-segment LED displays and status indicators provide visual indication of all operations of the unit. All data entry and display is done in hexadecimal values. Two IC sockets are located on the front panel. One socket is a zero-insertion-force (ZIF) type for the EPROM to be programmed; the other is for a "personality module" that configures the programmer for the particular type of EPROM being used. A separate personality module is required for each type of EPROM used.

### Functions

Internally, the programmer has read/write memory (RAM) into which data is placed. These data can come from any of several sources, depending on the operation being performed. The RAM can be loaded using the control-panel keypad to enter memory addresses and data; data can be read from an EPROM in the ZIF socket; and data in the form of Intel hex object records can be loaded into RAM through a rear-panel RS-232-C serial port. Once data is in RAM, it can be (1) displayed—location by location—on the control panel display, (2) programmed into an EPROM, (3) altered from the keypad or (4) sent as Intel hex object records through the serial port to a computer.

Entering data into RAM from the keypad

is easy. You simply punch in the first memory address you want to enter data into, then key in the two hex data bytes. The programmer then automatically increments the address to the next memory location. The address can be incremented or decremented without entering data, as well.

The editing functions provided from the front panel are flexible and easy to use. In addition to changing the data in any memory location, you can insert and delete data. Inserting a byte into memory at a particular address causes the data in all of the higher-address locations to move up one location in memory. Deleting a byte causes all higher-address bytes to move down one location. This feature is particularly useful if you have keyed in data and left out a byte, or entered a byte twice.

### Operation

Before reading or programming an EPROM, you must first configure the programmer for the type of EPROM in use by plugging in a personality module. These are constructed on 24-pin plugs and Heathkit supplies two with the unit. Additional personality modules can be purchased as an accessory. A personality module for a particular EPROM is configured by soldering jumper wires between pins of the plug. Some modules require an internal resistor and/or a diode as well. Instructions for configuring modules for several presently available EPROMs are included in the operating manual. The programmer can only handle EPROMs—the programming voltages and currents required for fusible-link PROMs are not available in the ID-4801.

The ID-4801 comes with 2 kbytes of inter-

nal RAM. If you intend to program EPROMs larger than 2 kbytes, it is best to have more memory. Heath sells 8-kbyte and 16-kbyte memory expansion kits.

Once you have loaded the programmer's RAM with data, programming that data into an EPROM is simple. You merely place an erased EPROM into the ZIF socket and enter the starting and ending addresses using the control-panel keypad. The programmer then applies the address and data bits and the control signals to the EPROM to store the data. One minor annoyance is that the programmer requires that all of the EPROM locations to be programmed are *fully* erased (all bits are set to 1). This is annoying because there are occasions when you may want to change a single bit in a programmed EPROM. Although an EPROM cannot change a bit that is programmed to a 0 back to a 1 short of complete erasure, a 1 can be changed to a 0. It's good that the programmer checks to make sure the EPROM is erased, but it would be better if the check function could be overridden to allow an EPROM location to be reprogrammed. Of course, you *can* read the EPROM contents into RAM, alter the data in RAM, remove and erase the EPROM, and reprogram the entire EPROM.

The ID-4801 does a good job of handling 2500- and 2700-series EPROMs; nearly every operation you might need to perform on the data in an EPROM is possible. If you want to work with microprocessor-based equipment, an EPROM programmer is a practical necessity, and the Heath ID-4801 is a good candidate.

Manufacturer: Heath/Zenith, PO Box 167, St Joseph, MI 49085. Price class: ID-4801 kit, \$370; SD-4801 wired and tested, \$525; IDA-4801-1 Personality Module kit, \$20; IDA-4801-2 8K RAM expansion kit, \$20; IDA-4801-3 16K RAM expansion kit, \$40.  
—Jon Bloom, KE3Z

## Strays



### CALL FOR ARTICLES

□ With the miniaturization of circuit boards and components, standard soldering techniques are no longer sufficient. Many manufacturers have turned to a process called surface mounting.

If you work in a field related to surface-mounting techniques, why not share the technology with other readers through the pages of *QST*? Prepare an article of the methods involved, and what the advantages or disadvantages of the system are. Submit your material to Paul K. Pagel, N1FB, Senior Assistant Technical Editor, 225 Main St, Newington, CT 06111.

### I would like to get in touch with...

□ anyone having tube charts for a Superior Tube Tester, Model TW-11, made after 1956. Ronald Blocker, K9JON, 40 N Pine La, Glenwood, IL 60425.

□ anyone with a manual for a Hy-Gain linear, Model 640. Art Southard, WB2CUQ, Rte 2, Box 668, Yaphank Rd, Middle Island, NY 11953.

# 1986 ARRL National Convention, San Diego

Enjoy the warmth and friendliness with ham radio by the bay the weekend of September 5-7.

By Walt Hicks, W6UZZ

General Chairman  
1986 ARRL National Convention  
2671 Elyssee St  
San Diego, CA 92123

For the first time in eight years, the American Radio Relay League will hold its annual convention in the Southwest. The San Diego County Amateur Radio Council, SANDARC, will host the ARRL for three days in the spacious, comfortable surroundings of the Town and Country Hotel and Convention Center, in the city that "feels good all over."

The convention theme is "Amateur Radio in Public Service." In addition to public-service aspects of the exciting hobby of ham radio, the program will encompass a series of technical sessions, forums and social affairs, highlighted by a blue-ribbon panel led by NASA Astronaut Dr Anthony "Tony" England, W0ORE, discussing "high tech" ham radio in a Youth Forum. Tony will also be the banquet speaker, along with Master of Ceremonies NBC News Correspondent Roy Neal, K6DUE, who was named Ham of the Year at the Dayton HamVention® last April.

The convention is expected to draw record crowds, not only because of the outstanding program that will be offered, but the ideal location. San Diego is especially appealing to the visitor. It is bordered on the south by Mexico, on the west by the Pacific Ocean and on the east by mountains and Anza Borrego Desert State Park—largest park in the US. Ninety miles north is Disneyland and the beginning of the Los Angeles metropolitan area.

Here is what the San Diego ConVis Bureau has to say: "Sunny, warm, friendly, beautiful and full of fun. That's what San Diego feels like, and that's why people come here from all over the world—to share the feeling and take it home with them. If this is your first visit to San Diego, you'll be amazed at all there is to see and do. Famous attractions like the San Diego Zoo, Sea World and the Wild Animal Park, San Diego harbor, La Jolla shores, historic Old Town, Spanish missions, miles of Pacific beach, golf, tennis and scenic trails are just the beginning of other attractions that the vacationer experiences here." Many con-



vention attendees have scheduled extra days to enjoy this ideal vacationland.

## Schedule

The convention registration desks will open 1 PM Friday, September 5. Sybil Allbright, W6GIC, says "I will do all I can to keep the lines short. The best way is to get an advance registration. Your packet will be at the door—no wait. And save a few bucks. Copy the registration form in the advertisement for the convention that appears on page 97, this issue, and get it on its way." Exhibits open at 3 PM and close at 9, allowing plenty of time for a first look at the latest from all the major manufacturers and dealers. No forums or tech sessions on Friday to conflict.

Saturday—International Breakfast at 7:30, with ARRL President Larry Price, W4RA, greeting attendees, with special recognition of those who came from outside our borders. Forums and technical sessions and exhibits fill the day from 9 AM to 5 PM. After a social hour at 6:30, the banquet starts at 7:30 PM. The day ends with the Wouff Hong ceremony at midnight.

Sunday—Exhibits and speakers 9 AM until closing ceremonies. The "World Class" T-hunt commences at 1 PM. Ladies Luncheon, scheduled for 11:30 Saturday, quickly sold out after early convention publicity, and therefore does not appear on later registration forms. Dee Crumpton, N6ELP, Alternative Events Chairman, reports that a new, closer facility with more room has been located. Call the convention hotline,

and you may be able to get a seat (\$10).

## Facilities

All convention-sponsored events will be on the grounds of the Town and Country Hotel and Convention Center, with the exception of the Harbor Cruise on Friday evening, the Ladies Luncheon and DX Breakfast (right next door), and the T-hunt. There are 1000 rooms and suites in the hotel, which is minutes from the airport, Sea World and the San Diego Zoo. Next to the hotel is Fashion Valley, San Diego's premier shopping mall. Parking for the convention is free. Spacious exhibit hall, meeting rooms and banquet facilities (banquet will be set up to seat 1100) will be popular places for attendees to gather. Over half the banquet seats were sold as of May 31, so it looks like advance registration is going to be a "must" here! Hotel and discount airline reservations can be made toll free: California 800-542-6082, USA 800-854-2608. Ask for ARRL Convention rates.

## Forum and Technical Sessions

N6NR, Tech Sessions chairman, reports at press time that forums firmly scheduled are: ARRL, AMSAT, Packet Radio, Joint MARS, DX, Youth Forum, Public Information, Ten Ten International, and Ham Radio and the Law. General-interest sessions include: Antenna Modeling, ATV, DF Techniques, Direct Numeric Synthesis, Frequency and Deviation Clinic, The Great Armadillo Run, HF Antenna Design, HF Propagation, Hilltopping, Human Exposure to RF, Packet Radio, Quads, Yagis and

## Highlights

- ARRL, MARS, DX Forums
- Technical Sessions
- International Breakfast
- Special Youth Activity
- Public Service Sessions
- VEC License Exams
- Banquet—WØORE and K6DUE
- Ladies Luncheon—WA6OHB
- Alternative Activities
- Old Town and Tijuana Tours
- New Products and Exhibits
- Frequency and Deviation Clinic
- World Class "T" Hunt
- Spark-Gap Radio Demo
- Free Parking
- 1000 Hotel Rooms Onsite
- Hospitality Suites
- Nearby Ham Swap Meet
- Discount Airline Fares
- Gigantic Ham Shack

Quagis, RFI/EMI, RTTY is Fun, Seminar for New Hams, Slow-Scan TV, The Monster Antenna, What is Cellular Radio, and Wayne Green, W2NSD. Something for everyone! And more in the works!

## WØORE Youth Forum

The Youth Forum will provide an opportunity for young folks to hear about the exciting hobby of ham radio from a blue-ribbon panel of experts, with an "over the shoulder" and "hands on" session with Amateur Radio gear incorporating the latest high-tech features. The panel will be headed by Tony England, WØORE, whose operation of two-way slow-scan television from the orbiting Space Shuttle *Challenger* last year provided thrills in many classrooms. Joining Tony are Julian Macassey, N6ARE, telecommunications consultant and writer; Jerry Boyd, KG6LF, Chief of Police, City of Coronado, member of the ARRL Emergency Communications Advisory Committee; Gordon West, WB6NOA, ARRL Instructor of the Year; and packet radio "guru" Harold Price, NK6K, computer communications consultant.

The Forum will begin at 1 PM Saturday, September 6, and continue for three hours: one hour of formal discussion, one hour for visiting the convention "ham shack," and one hour for questions and answers.

Bob Zakowski, WA6MTF, high school science teacher in Encinitas, California, is handling the arrangements for the forum. Bob says, "We are seeking youngsters of junior high and high school age who have scientific curiosity to attend this forum. There will be no attendance fee, but participants must preregister. Individual and group registrations can be made through Bob, PO Box 3026, Olivenhain, CA 92024, hotline 619-292-7918.

## Amateur Radio License Exams

Volunteer Examiner tests will be conducted at the convention site. Convention

registration is not required to take an exam, and there will be no fee; however, applicants must sign up before August 20. Preregister by sending a completed Form 610, a copy of your ham license (if you have one), Code Credit certificate (if applicable), SASE and request for "Convention Session" to: SANDARC VEC, PO Box 5023, La Mesa, CA 92041. Exams will be conducted Friday evening, Saturday morning and afternoon, and possibly Sunday morning. For more info on exams, tel 619-465-EXAM. Note: Visiting examiner participation is invited. Contact Harley Gabrielson, K6DS, tel 619-463-3287.

## Swap Meet

While the convention is not sponsoring a flea market, the popular San Diego "Electronics Swap Meet" will be starting at 7 AM Saturday at nearby San Diego Jack Murphy Stadium. The stadium will be busy over the weekend for ham football fans as well, with a San Diego State University Aztec game Saturday night and the Chargers vs Miami on Sunday afternoon.

## Alternative Activities

Lots to do besides ham radio. Friday evening: Romantic "showboat" cruise of San Diego Bay, open bar, dinner, dancing. Saturday and Sunday: bridge games; fashion shows; Old Town, Tijuana tours; San Diego Zoo; Sea World Tours; and more. Like the horses? They are running at both Del Mar and Tijuana that week.

## Convention Ham Shack

Radios will be on the air, all bands, all modes, in the Tiki Hut on the convention grounds. Bring and post your QSL card. Talk-in repeater frequencies—147.15 MHz, 146.67 MHz, 146.64 MHz. Call sign—K6NC (K6 "National Convention").

## Recommended Clothing for San Diego


The mild year-round climate lends itself to light- and medium-weight clothing. Casual dress is acceptable everywhere except in a few of the more exclusive restaurants, which require a jacket and tie for men. Evenings along the coast can get chilly, so a light wrap is in order all year. The average daily temperatures in San Diego for September are: 76.5 (high) and 63.2 (low). Average rainfall is 0.13 inch.

## Make This Your 1986 Vacation

A few tips on things vacationers can do in San Diego: Take a harbor cruise; spend a day at the Zoo; take a safari through the Wild Animal Park; visit Sea World; run up to Disneyland; see the museums, Space Theatre at Balboa Park and Mt Palomar Observatory; fish on the beach; the Maritime Museum; dawn balloon flights; Scripps Aquarium; the Gaslight Quarter; 52-mile scenic drive; waterski at Mission Bay; scuba dive at La Jolla; horse/dog races in Baja; Old Town; Spanish

## For More Information

1986 ARRL National Convention  
PO Box 82642, San Diego, CA 92138  
Convention Hotline: 619-292-7918

missions; sail in the bay; Aero-Space Museum, Hotel Del Coronado; tennis; jog around the bay, Balboa Park; great restaurants and shops; pitch a tent at the beach, mountains or desert; enjoy the warmth and sunshine and relax! 

## Strays

### QST congratulates...

ARRL Technical Advisor Al Markwardt, W5PXH, of Richardson, Texas, on receiving the Outstanding Achievement Award of the Dallas Section of the IEEE.

Philip Eisenberg, W6TBH, of Downey, California, on being elected president of the Components, Hybrids and Manufacturing Technology Society, an affiliate of the IEEE.

Principal Appellate Law Assistant Robert Naparty, WA2JKZ, of Brooklyn, New York, on being given a Special Merit Performance Award by the New York State Unified Court System.

### I would like to get in touch with...

anyone with information on the application, connections and supplies for a Star Set Classic/Star Band 8010 chip formerly manufactured by Plantronics, Inc, Santa Cruz, CA. R. K. Mildren, G3FVD, Kenberry, 13 Queens Crescent, Bodmin, Cornwall PL31 1QP, UK.

anyone who knows where an Atronix Ham-I watch can be repaired. R. F. Moore, 26 Auburn Rd, West Hartford, CT 06119.

US Navy radiomen who served on any of the ships in Destroyer Division 3, Squadron 2. Woody Fugate, W4JDU, 3435 Tufts Dr, Catlettsburg, KY 41129.

veterans of Camp Forrest in Tullahoma, Tennessee, willing to help operate the First National Reunion commemorative station. George Stone, WD4CYV, 712 First Ave, Tullahoma, TN 37388.

anyone with a copy of the latest issue setup chart/book for a B&K tube tester, Model 700. D. J. Christel, 219 Shady Lane Ct, La Crosse, WI 54601.

# Robbing the Cradle: Aggressive Recruitment of Young Hams

An Ohio teacher has a plan of action to get more young people involved in Amateur Radio.

By David P. Koch, PhD, W8LNUJ  
3576 Donegal Dr, NE  
No Canton, OH 44721

As a high school teacher, I have had experience with trying to interest teenagers in Amateur Radio. The results have been disappointing. Regardless of whether I have made a lot or a little effort, only a couple of pupils get the Novice license each year, although several faithfully attend the weekly meetings. Competition from other clubs, band, sports, jobs, computers, school work and friends seems to take its toll of prospective hams.

Two years ago, I received a grant from the American Association of Physics Teachers to set up an OSCAR 10 station. The Canton Amateur Radio Club donated some of the proceeds of its annual hamfest to our project, several pupils helped to build antennas and a tripod, and to sell raffle tickets. Yet, only one girl passed the Novice test. I decided that this spring I would try my hand with the younger group. This article is intended to share with others my experience and perhaps motivate other hams to recruit some of the youngsters before other interests take over.

"Would you guys like to study for your Novice licenses this summer?" "Yeaaaaah!" So began what, in another type of journal, could have been titled "How I Spent My Summer Vacation."

In early May, my oldest son, Charles, celebrated his birthday with a party for a few of his friends from school and Cub Scouts. One of the activities included a demonstration of Amateur Radio. The results were several pairs of wide eyes.

Near the end of the school year, I conducted the above conversation with my sons, Charles, 11, and Evan, 9. I asked them if they would like to have some of their friends study with them. Receiving a strong affirmative, I duplicated a letter explaining to their friends' parents that I would teach a study class for the Novice license, and explained a little about Amateur Radio. The ARRL brochure *Amateur Radio: The World At Your Fingertips* was attached to the letter, and the package was distributed by Charles and Evan to five of their friends at school. All of the parents responded favorably, and the



The Novice class of seven 9- and 11-year-olds really got into the building spirit, with Dick, KC8OU, supervising the soldering. Five of the boys went on to get their Novice licenses.

class began on the Monday morning following the end of the school year.

The class was scheduled Monday through Thursday, from 9 to 10 AM, for three weeks to see if there was any progress and interest. As it turned out, we continued for a total of five weeks. The parents did an excellent job of delivering the boys to my home promptly, and of helping them study each day. And the results were gratifying: five of the seven boys passed the Novice test by the end of the five-week period.

The cost to the parents was \$20, which covered expenses for the *Tune In The World* package and parts to build an audio oscillator with a key for code practice.<sup>1</sup>

## The First Two Days

Richard Dager, KC8OU, came out to help on the second day as we completed construction of the code-practice oscillators begun the first day. Dick and I each furnished two soldering irons, and could keep a watchful eye on the boys as they learned to solder. The oscillator uses a 555 IC. For reasons of simplicity, cost and size, no volume or tone adjustments were included. To facilitate the first soldering

attempts of 9- and 11-year-olds, I soldered 2-inch lengths of wire to each of the 555 IC socket terminals that would be used. The boys were then able to solder the components to the wires. The finished circuits were wrapped with electrical tape and stuffed into an empty 35-mm plastic film canister. A hole the size of the bottom of a 2-inch loudspeaker was cut in the top of the film canister, and lead wires were brought out through the hole. After wrapping the bottom of the speaker with electrical tape, the speaker was put into the hole with a friction fit. The canister/oscillator was taped, along with a battery, to a board to which a key had been fastened. Voila!—a code-practice oscillator for \$10.42 plus tax, and not much larger than a can of 35-mm film. Functional, if not elegant.

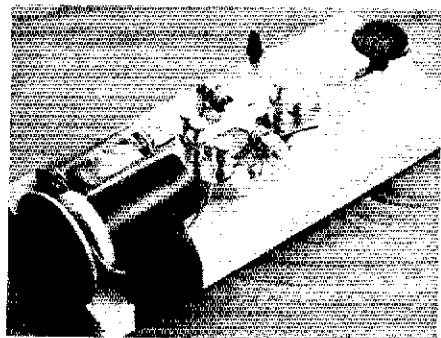
The reasons for having the kids build the practice oscillator were to provide an opportunity to learn to (1) solder; (2) recognize some schematic symbols; (3) practice code; and (4) develop a good "fist." From experiences with teenagers learning code from a computer program I wrote, I found that they learn to receive, but cannot send clearly. These youngsters seemed to like oscillators; they brought them every day.

## Code Practice

Each hour consisted of two 15-minute

<sup>1</sup>Schematic diagram and parts list appear on page 64.





The completed code-practice oscillator in a 35-mm film container with key was an important element in the class. By helping build it, the boys became familiar with many construction techniques and created a means to practice code.

code-practice sessions interspersed with two sessions devoted to discussing 10 of the multiple-choice questions on rules and theory. I asked the boys to learn the first letter group (AEIMNT) from the package they had purchased. After the oscillators were built, we began practice using randomly sent letters from a computer program. The code was copied from the computer onto cassette tape for ease of handling on the patio, where the class was held. At first I sent only one five-letter "word" at a time, gradually building up to 1 minute of random code (5 words). The difficulty seemed to come when we reached the third letter group. After they passed that point, the remainder of the letters, numbers and punctuation were learned quickly. By the fourth week I began sending text from the newspaper and sample QSOs using another computer program I wrote that allows me to type in what I want sent. At this point, I sent 5-6 minutes at a time, and had the boys take turns sending the material back to me with their oscillators as we went over what had been sent. Since the class began at nine, and WIAW practice also began at that time Monday, Wednesday and Friday, the boys tried copying code using the radio I brought to the patio.

### Theory

At this young age, electrical theory—not code—is definitely the hurdle. Also, the vocabulary used, even in "plain" English, was sometimes a problem. Perhaps those who write test questions and practice material for the Novice tests may, in the future, want to take a close look at the vocabulary. Often the same thing could be said more simply. If we want to recruit younger hams we should eschew obfuscation!

We discussed 20 of the 200 multiple-choice questions each day, 10 at a time. I studied the text and located nearly every answer in the *Tune In The World* text, and noted the page numbers. As we discussed each question, I gave the boys the page

number so they could read more about it at home. I explained the material as best I could for each question, and tried to demonstrate with equipment, etc, where it was available.

It became apparent to me that these kids were going to do as I did: Memorize the material now, understanding it gradually as they progressed through the amateur ranks. The boys had no trouble with the approximately eight groups that dealt with rules. They had some difficulty with understanding frequency and wavelength, but the breakthrough there was a chart I had them make. Along a line, they marked off intervals and labeled them 0 to 30 MHz. Next, they marked the AM broadcast and citizens bands, and each of the amateur bands through 10 meters. They also indicated the WWV locations, and I had them listen to WWV so they knew what I was talking about. Above each amateur band they wrote the frequencies, and above the four bands containing Novice privileges they wrote the Novice band edges in megahertz. It then was easy for them to replace the decimal point with a comma to change to kilohertz. Below each band they wrote the approximate wavelength in meters, and below that the length, in feet, of a half-wave antenna for the Novice segment. That chart contains answers to several of the questions on the Novice exam, and one of the boys remarked that the relationships were finally clear to him.

After we had finished the 200 questions during the third week, I picked out one question from each group of 10 (using the random-number generator on a computer) and had a sample test each day for the remainder of the five weeks.

### Conclusions

This group of youngsters was hand-picked. All had a brief exposure to ham radio through a demonstration that sparked their interest. All had parents who were interested in their children and helped them study. Two were my own children, who had a greater exposure to Amateur Radio, but who had not studied it before. One boy proved exceptionally motivated and bright. In addition, he was leaving on vacation at the end of the fourth week and wanted to take his test early. He passed the test four days before his 11th birthday, and that proved

a tremendous motivator for the other youngsters in the class. A second passed his code test two days later, and all of them learned the numbers and punctuation the next weekend. Dick, KC8OU, came and gave my boys their tests the day before the end of the class, and two others passed on the last day. Membership applications for the ARRL were given to each new Novice, along with the four-digit code for the Canton Amateur Radio Club.

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## *The most important ingredient is desire.*

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Youngsters can pass the Novice test. If you want to run a class, I suggest you choose your recruits carefully. I think 11 is a good starting age for bright kids, perhaps a little older for average kids. Even bright 9-year-olds can do it. The most important ingredient is desire; they must want to get that license. To that end, one or more demonstrations of Amateur Radio are in order to kindle the flame. Classes should be ready to start within a short time after those demonstrations. I recommend that the chart described above be included in the Novice study material, or be constructed by the pupils. If you have, in any age group, a pupil who is ready for the test early, let him or her take it. Success here can provide a great motivator for the others.



Evan and Charles, clearly pleased with their success in the Novice class, mail their completed Form 610s as younger brother Matthew looks on.

# The K7DBV Guide to Easy CW QSOs

By Gene A. Williamson, K7DBV

2160 Fairway Loop  
Eugene, OR 97401

Probably the bumper sticker says it best: DAH-DI-DAH-DIT DAH-DAH-DI-DAH. Of course, it's easier when heard on the air. As in NNGT, perhaps. Or allfruntogether in one big slur. Either way—any way—it has always meant "Someone, somewhere, out there . . . give me a call and we'll talk."

We'll talk about the weather, the rig (our "working conditions," if you're an old-timer), how the band's been, what our antennas are, where we're located, what our names are. And if anyone else finds what we're talking about to be of interest, he'll join right in.

So let's begin:

GM OM TNX CL BT UR 579 EUGENE  
ORE ES OP GENE BT HW? BK

Or, you might hear it this way:

WELL HELLO OM AND THANKS FOR  
THE CALL BT UR SIGS RST 57N 57N,  
QTH IS EUGENE, OREGON EUGENE,  
OREGON BT NAME IS GENE GENE  
GENE BT SO NOW BACK IT COMES  
BT W6xxx DE K7xxx K

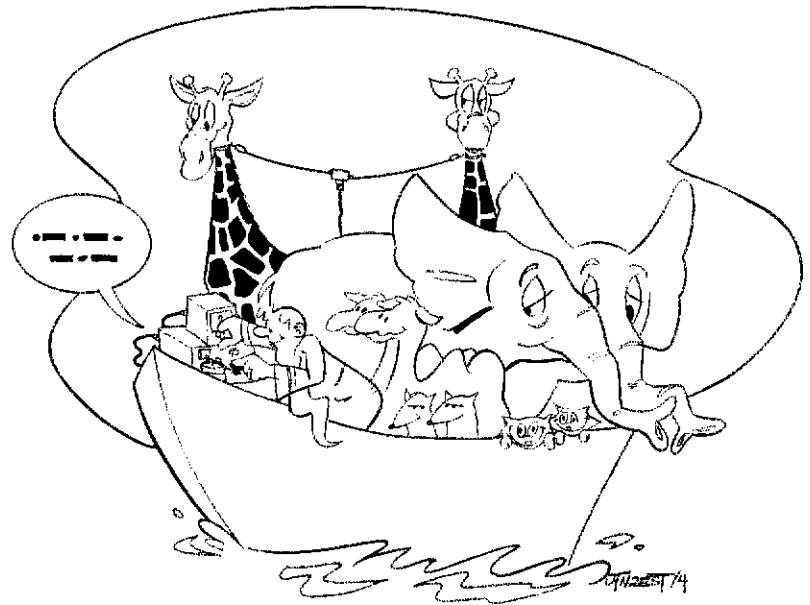
Both say the same thing. Both get the point across. But they take two entirely different lengths of time to send and receive. The first example marks you as an operator with savvy, as an operator who loves the skill and art of communicating with Morse code.

Wait a minute—what is this? Haven't we read enough recently about code and no code and computer code and keyboard code and all that stuff? Enough to last a lifetime? And who really cares, anyway?

We all should care. Because—like it or not—Morse is what makes the Amateur Radio Service what it is today.

A whole lot of folks who hang around the low end of the bands care as well. So for those who only venture down there once in a long while with trembling fingers, here's a little refresher on what to send and how to send it. How to begin—and how to end.

Besides, a lot of us who *do* hang around the low end all the time have slipped into some bad habits and could use a little rethinking of our procedures.



Back in The Old Days we heard it from The Old Man, with his "uggerumph" and "rettysnitch" and "Wouff Hong." You'll still hear those words from time to time. And TOM surely got the point across.

In the '50s, the ARRL used to send reprints of a dandy little article called "Your Novice Accent" to all newly licensed ops. And, in the '60s, we had "Ol' Joe" asking if you were a #\$\$%&\*\* on the air—and telling you how not to be. But since then no one has stepped forward to refresh people's thinking on the right, and wrong, ways to act when you operate CW.

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## *Morse is what makes the Amateur Radio Service what it is today.*

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So here goes. Not because I am such a hotshot CW op, for many are better than I. But because there's nothing in the world of ham radio to match the joy and skill and art of smoothly sent, precisely punctuated Morse. Nothing. And because a few simple rules haven't really changed since we were trying to get three dots across the Atlantic.

Let's start with calling CQ, because that's the easiest advice to give—and to

take. Just don't. That's right—*don't* call CQ.

But how will anyone get a conversation started if no one calls CQ and everyone listens? Easy. Not everyone, first of all, will ever do that, no matter what they see or hear or read. But if even one of three hams who blithely turn on the rig with one hand and start banging out NNGT would listen first and answer someone else, well, our bands would suddenly seem a lot less crowded.

Think about it. If CQ means "I'll talk to whoever answers," then listening first means "I'll call anyone who CQs." And we all know how much CQ calling is going on.

So just try it. Twice. Maybe you'll like it.

Big side benefit: You can pick a signal that's QRK to answer, rather than risk being called by someone down in the mud. Result: less frustration for both caller and callee.

(Here's a hint: Take a peek inside the *ARRL Logbook* or *Operating Manual* and refresh yourself on Q signals, such as QRK. Used correctly, Q signals are a big boon to good CW, and they're a must for *great* CW.)

Okay, so maybe you don't hear anyone calling, and you want to CQ. How should you do it? Quickly, please.

Unless you're very rare DX, you'll only be answered by someone who can hear you plainly enough to copy your call sign easily. And since they're tuning for a contact, they're especially alert to the letters CQ or C or Q, or even DE. So keep it short.

Try a 3 × 1, 2 × 1, 1 × 1. That's

CQ CQ CQ DE K7DBV CQ CQ DE K7DBV CQ DE K7DBV K.

This takes about 30 seconds at 20 WPM. Long enough that someone can zero you and write down your call, but not so long that they get tired and move on.

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*There's nothing in the world of ham radio to match the joy and skill and art of smoothly sent, precisely punctuated Morse.*

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Oh, yes, procedure signs. That's probably the item more people totally confuse each other with than any other. Let's polish up each one in turn right now.

After your CQ, send a K. That means "go ahead any station," which is what you're implicitly saying in your CQ anyway, right?

Then when you're in the QSO and want only your partner and no one else to answer, you'll end with  $\overline{KN}$ . Go ahead ( $\overline{K}$ ) nobody ( $\overline{N}$ ) but the one I'm already talking to or *only* the one I'm talking to.

(The dash over the prosign  $\overline{KN}$  means send it as one signal—dah-di-dah-dah-di—rather than two distinct letters. On purpose, send it all as one signal!)

And what of our old, tired, misunderstood friend,  $\overline{AR}$ ? Boy, is he battered unmercifully, but, perhaps, understandably. First, a little story to get you in the mood.

Once upon a time, when it was raining night and day, an OM set to sea on a big boat with two each of all the animals he could round up, plus his trusty, rusty spark set for human companionship. Now, to QSO this OM was no easy chore. What with all the animals crowding around, and the boat rocking and pitching, and all the bad weather, his fist was often a real mess. In fact, most times when he'd send his location he'd run two letters together, then leave a big gap before the third. So it came out OP NOAH ES QTH  $\overline{AR}$  K.

Remember this, please: If, and only if, your name is Noah . . . If, and only if, it's been raining 40 days and 40 nights . . . If, and only if, you're located maritime mobile on an ark . . . Only under those exact circumstances can you ever, ever send together the procedure signs  $\overline{AR}$  K.

Just when do we use  $\overline{AR}$ ? Well, here's probably where some of the confusion comes in: Use  $\overline{AR}$  when you're calling someone before they have acknowledged you: BY4AA DE K7DBV  $\overline{AR}$ . Remember it as Answer Requested, maybe. Awfully Rare, certainly. But only  $\overline{AR}$ —not  $\overline{R}$ , not  $\overline{KN}$ , never  $\overline{AR}$  K.

Note: Once the QSO is established, you

don't have to send the other station's call sign—a recent FCC rule change. So I don't. Remember, the whole idea here is to be as efficient and precise as you can. This CW stuff is beautiful music when it's working right!

Would I ever want to use the other op's call? Well, how about this—remember the BY4AA I was trying to land with DE K7DBV Awfully Rare? Should I actually work him, you might very well hear me ending with HW? BY4AA BY4AA DE K7DBV  $\overline{KN}$ .

Why? Well, I'm pretty darned proud to be working a BY. And just maybe by throwing his call around a little—correctly—I'll get a few more people hanging around *this* frequency, panting, so when I get done there'll be less competition on some other DX I might need!

Certain other conventions have become standard over the last 60 or 70 years, but not so standard that you can't hear them mangled each and every day of the week.

Like R. Sent *once* at the very beginning of your transmission, R is used instead of ROGER OLD MAN SOLID COPY OK ON UR QTH OK ON UR NAME OK ON UR WX OK ON UR RIG OK ON UR ANT, etc.

Just that simple. R. Once.

See how much time we're saving? And how sneaky we're being chasing DX? And aren't we having fun?

Then there's punctuation.

Until recently, a lady or gentlemen never sent di-dah-di-dah-di-dah [period] or dah-dah-di-di-dah-dah [comma]. Certainly you didn't send a period between two sentences—the BT sign says that. And never a comma to separate the name of your town and state. A space does that quite well, thank you.

With the advent of keyboards, that distinction is changing. Let's face it, when you're typing at high speed (or even down at 15 WPM), it's just plain typing habit that fully spells out words and uses punctuation marks. So I can understand it. It's just that if we could keep the art of carefully abbreviated, prosigned CW while we marry it to the precision of computer-generated characters and spacing . . . wouldn't that be an ultimate world-beater?

My personal nomination for 1986's most terribly misused prosign is BK. These days you can hear QSO after QSO containing SO BK TO U OM. Wrong, wrong, wrong. If you want to say "back to you," the correct abbreviation is BCK. But don't even say that. Say HW? Or HW CPY? It means the same thing, it's universally understood, and it takes a lot less time and effort to say.

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*This CW stuff is beautiful music when it's working right!*

---

On that subject, how about ending this QSO now that we've dragged out all the wrong-things-to-do and kicked them around:

WELL OM GUESS THE BAND IS CHANGING AND BETTER WIND IT UP BEFORE WE LOSE EACH OTHER. SO BEST 73 73 AND SURE HOPE CU DOWN THE LOG. 73.

Nope.

The band—any band—is always changing. And we're forever about to lose each other to QRM, QSB, QRN or even QSD (here's another to look up; it's an alternate to QLF—are you sending with your left foot?).

So why not just be up front: QRU HR TNX QSO 73  $\overline{SK}$  DE K7DBV K.

There, wasn't that much easier? To save you having to look this one up, QRU means "I have nothing further for you." If you were talking on the telephone, you'd say "Well, Joe, that's all I have to talk about. See you next week." So do it on the air, too. (Besides, it saves thinking up all those excuses about why you've suddenly got to run.)

Last but not least— $\overline{SK}$ . End of work or clear. We in the US differ from our overseas friends on where to position this one prosign. But even so, why can't we "WANKs" be consistent?

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*If you don't tell people that learning the code is hard, it won't be.*

---

$\overline{SK}$  is sent just before the exchange of calls on the last transmission *you yourself* are making in the QSO. Like this: 73 BCNU  $\overline{SK}$  DE K7DBV K (give me your last hurrah, but I'm all done). Or 73 BCNU  $\overline{SK}$  DE K7DBV (it was my last hurrah, you were already all done, and now so am I). And, really, I am done now.

These guidelines are relatively easy to learn. And if followed, they smooth things a whole lot over the air. Again, one of the beauties of CW is it hasn't changed a whit since the Ancients blasted the ether with their spark machines.

Just take your time, remember these few rules, and—most important—when you have a chance to introduce someone to ham radio, don't let on that there's anything difficult about CW. Because there's not. Here's that secret: If you don't tell people that learning the code is hard, it won't be.

So when that starry-eyed visitor in your shack finishes exchanging hellos with JY1 and tremulously asks, drooling all over your logbook, "How can I get to do this?" . . . Just smile, turn on your code oscillator, and say "It's easy—first you learn the Morse code." DEF

## ARRL Executive Committee Meeting

The ARRL Executive Committee met in Portland, Oregon June 13-14, and among the topics discussed were a number of FCC related matters. The ARRL Counsel was directed to:

- File a Petition for Reconsideration of the denial by the FCC Chief Engineer of the ARRL petition for rule making to require the labelling of home-entertainment equipment with respect to its immunity from radio frequency interference.
- File comments in opposition to RM 5434, a petition from the Association of Radio

Reading Services that proposes the use of 500 kHz in the 220-MHz band for reading services for the blind.

- File comments in PR Docket 86-163, in which the FCC proposes to establish certain technical parameters for private land mobile operation in the 421-430 MHz band within a 50-mile radius of Detroit, Cleveland and Buffalo (Line A), with the objective of reducing the possibility of interference between land mobile and amateur stations.

- File comments in support of PR Docket

86-161, enhancing Novice operating privileges. The comments will argue that Novice privileges in the 220-MHz band are an intraservice matter and not affected by the moratorium on allocations in the band. The comments would also urge the Commission that Novice examinations be supervised by two volunteer examiners rather than one, as stated in the original ARRL petition for rule making.

See Moved And Seconded, this issue, for the complete minutes of the committee meeting.

### SECOND NOTICE—ARRL DIRECTOR AND VICE DIRECTOR ELECTIONS

Attention members! Nominations are now open for candidates for ARRL Director and Vice Director in each of the following Divisions: Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern and West Gulf.

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. 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.

For a candidate to be eligible for the office of Directors 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, 1986. Each candidate must also provide information (on a form provided by HQ) that will allow the Executive Committee 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, and a statement of not more than 300 words setting forth the candidate's qualifications, which will be included with the ballot mailed to members. The EC will meet August 23 for this purpose, so candidates should make sure their information

form arrives at Headquarters no later than August 20. The candidate's 300-word statement will be reprinted without content editing; if the statement as submitted exceeds 300 words, the first 300 words will be used. The statement must not contain any derogatory reference to any person or entity. The candidate must also submit an accompanying signed statement certifying that the information is true to the best of the candidate's knowledge and belief. Any willful violation of the statement will be grounds for disqualification by the Executive Committee.

The nominee must reside in the ARRL Division he or she seeks to represent. He or she must also be the holder of 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 at the time of 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 improper exploitation of his or her office for the furtherance of his or her own aims or those of his or her employer. The primary test for eligibility is the candidate's freedom from commercial or governmental connections of such nature that his or her influence in the affairs of the League could be used for his or her 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 the ARRL and (3) are free from conflicts of interest.

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

Executive Committee  
The American Radio Relay League  
Newington, CT 06111

We, the undersigned Full members of the 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 1987-88 term (Signature... Call... City... ZIP... Date...)

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 on September 10. The ballots will be mailed no later than October 1, and, to be valid, must be returned to Headquarters by noon, Tuesday, November 20. A group of nominators can name a candidate for Director, for Vice Director, or for both, but there are no "slates" as such. Each candidate appears on the ballot in alphabetical order.

All ARRL members who are licensed by the FCC but temporarily residing outside the US are eligible for full membership. These 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.

Even within the US, Full members temporarily residing outside the ARRL Division they consider home may now notify the Secretary of the League prior to September 10, giving their current QST address and the reason why another Division is being considered home. So if your home Division is Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern or West Gulf, but your QST goes elsewhere, please let the ARRL Secretary know as soon as possible but no later than September 10, so you will receive a ballot for your home Division.

If a person is nominated for both Director and Vice Director, the nomination for Director will stand and that for Vice Director will be void. A person nominated for both offices does have the option, however, of declining the higher nomination and running

for Vice Director if he or she wishes.

Since all the powers of the Director are transferred to the Vice Director in the event of the Director's death, resignation, removal outside the Division or inability to serve, careful selection of candidates for Vice Director is just as important as for Director.

These persons presently hold the offices of Director and Vice Director, respectively, in the divisions conducting elections this year: Central—Edmond A. Metzger, W9PRN, and Howard S. Huntington, K9KM; Hudson—Linda S. Ferdinand, N2YL, and Stephen A. Mendelsohn, WA2DHF; New England—Tom Frenaye, K1K1, and Richard P. Beebe, K1PAD; Northwestern—Mary E. Lewis, W7QGP, and Rush S. Drake, W7RM; Roanoke—Gay E. Milius Jr, W4UG, and John C. Kanode, N4MM; Rocky Mountain—Lys J. Carey, K0PGM, and Marshall Quait, AG0X; Southwestern—Fried Heyn, WA6WZO, and Wayne Overbeck, N6NB; West Gulf Division—Raymond B. Wangler, W5EDZ, and Thomas W. Comstock, N5TC.

Petitions need 10 or more signatures of Full members and are due at League 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 Tuesday, November 20. The new term will begin at noon January 1, 1987.

Nominees or, indeed, any member, may obtain a copy of the ARRL Articles of Association and By-Laws, along with a pamphlet outlining the duties and responsibilities of elected League officials. Interested persons should write to or call ARRL Headquarters, 225 Main St, Newington, CT 06111, tel 203-666-1541.

For the Board of Directors:  
June 16, 1986  
Perry Williams, WIUED  
Secretary

## EPA PROPOSES TO LIMIT PUBLIC EXPOSURE TO RF

At press time, HQ received news from the Environmental Protection Agency that the agency had proposed to limit public exposure to RF radiation from communications. The agency noted that presently there are no federal standards limiting public exposure to RF radiation, and biological effects have been observed in laboratory animals exposed to RF radiation in experiments.

The EPA proposes four alternatives for controlling public exposure to radio-frequency energy. What will eventually emerge from the process will be guidelines for the other federal agencies. The Federal Communications Commission, at its discretion, may apply the guidance to its licensees.

Two of the EPA alternatives are much stricter than the ANSI standard C.95.1-1982 (which sets limits of energy at 100 milliwatts per square centimeter at 0.3 to 3 MHz, dropping to 1 milliwatt per square centimeter at 30-300 MHz, then rising slightly to 5 milliwatts per square centimeter at frequencies above 1.5 GHz). The EPA makes the matter more confusing for laymen by using different references. It talks of "whole-body average specific absorption rates" or SARs,

expressed in watts per kilogram of body mass (W/kg) for frequencies above 3 MHz! For frequencies below that, a different kind of standard is used, placing separate limits on the electric field and magnetic field intensities. The tightest guideline would have an SAR of 0.04 W/kg above 3 MHz, with the electric field intensity at 87 volts per meter (V/m) and magnetic field intensity at 0.23 ampere per meter (A/m). This guideline is said to be similar to that imposed in Portland, Oregon. It would cost the broadcast industry about \$34,000,000 to comply with this guideline, EPA says.

The next level would have SARs of 0.08 W/kg, electric field of 275 V/m and magnetic field of 0.73 A/m. The cost to the industry would be \$22,700,000. The third level would have SARs of 0.4 W/kg, electric field at 614 V/m and magnetic field of 1.63 A/m. Broadcasters' compliance costs would drop to \$12,400,000. This level is said to be equivalent to the ANSI standard.

The fourth option is nonregulatory: public awareness programs to distribute information on health effects and environmental measurements, and providing technical assistance to states and federal agencies.

Since the actual proposal was not available at press time, it's unknown whether the proposal will affect radio amateurs. Even the Docket number for filing comments isn't known. The ARRL will lean heavily on its volunteer panel of experts, the Committee on the Biological Effects of RF Energy, for advice on what our position should be. Stay tuned for further information.

## THREE AMATEUR RADIO OPERATORS FINED BY FCC

During the course of a special investigative project conducted by the FCC's Philadelphia office, a group of radio operators allegedly was observed operating on 26.165 to 26.770 MHz, which is allocated for use only by the US Government and the Auxiliary Broadcasting Service.

Three of the stations were located and the operators were identified as being licensed amateurs. Notices of Apparent Liability to a Monetary Forfeiture in the amount of \$1000 each have been issued to the following: Joseph W. Bosak (Advanced), N3DFD; Adrian J. Post (Technician), KA2YIN; and Walter Leddick Sr (Technician), N3DXP.

## FCC ENFORCEMENT

Officers from the Douglas, Arizona FCC office recently investigated a report of illegal use of Amateur Radio frequencies by the operators of hot-air balloon ride businesses in the Phoenix area. One group allegedly was operating on 221.0 MHz and another on 221.15 MHz, using hand-held radios for communications between the balloons and their chase cars. They were found in violation of Section 301 of the Communications Act, and each group was fined \$750 for unlicensed operation.

## "AMATEUR ADMINISTRATION" COURSE TOPIC

For a second year, ARRL and the

International Amateur Radio Union (IARU) presented a course entitled "Amateur Radio Administration" for middle-level managers of telecommunications entities in developing countries, under the sponsorship of the US Telecommunications Training Institute. The course was conducted June 9-13 at HQ, with IARU President Richard L. Baldwin, W1RU, as chief instructor. Students from Dominica, Ghana, Jamaica, the Philippines and Tonga attended.

## COMMISSION DELETES REFERENCE TO "WR" CALL SIGNS

The Commission has issued an Order deleting the parenthetical reference in Section 97.84(d)(1) to amateur repeater stations having call signs prefixed by "WR." The Commission noted that since no repeater licenses had been renewed since 1978, and by now they have all expired, it was deleting this reference in the rules.

## FReD: ARRL'S FIELD RESOURCES DIRECTORY

The new *Amateur Radio Field Resources Directory* will be available shortly. With over 500 pages, this \$10 book has the answer or the name of the person who can answer almost any Amateur Radio-related question. The book is divided into three sections: the White Pages, which lists members of the ARRL Field Organization; the Blue Pages, an invaluable resource that includes a 10-year QST index; and the Yellow Pages, the advertising section. To order, see page 143.

## W4FRU NEW DXAC CHAIRMAN

DX Advisory Committee Chairman Bob Thompson, K6SSJ, has submitted his resignation to ARRL President Price. John Parrott, W4FRU, has been appointed as his replacement.

## FCC CAUTIONS MODELERS AND DEALERS ON PROPER USE OF R/C CHANNELS

Frequencies in the 72-76 MHz band are authorized in Section 95.207 of the Commission's Rules as radio control (R/C) channels for use in remotely controlling model craft. Certain channels are designated for model R/C aircraft only, while others are designated for model R/C surface craft only.

Some R/C systems for surface craft use have been sold equipped for operation on channels specified for model aircraft use. The unfortunate result is that such improperly channeled systems transmitting in model-flying areas interfere with the remote control of model aircraft. An out-of-control flying model can be a serious safety hazard.

Dealers selling an R/C system with a model craft for which is intended to be used, or with knowledge of its intended use, are responsible for ensuring that the R/C system is equipped with proper transmitting frequencies. Similarly, each operator of an R/C transmit-



Hazard E. Reeves, K2GL, once again a major contributor to the fund for the ARRL Scholarship Honoring Barry Goldwater. Mr. Reeves has continued his generous support of the scholarship each year since its inception.

ter is responsible for determining that it transmits on a channel authorized for the type of model craft being remotely controlled.

#### DARA NAMES SCHOLARSHIP WINNERS

Dayton Amateur Radio Association President Ray Smith, KR8B, has announced the winners of the 1986 DARA Scholarship Awards. The winners are: Tracy LaFleur, N5FKG, Morgan City, Louisiana; Angela Fox, KA6JPD, Vallejo, California; Christine Hammer, WD9PWV, Bellbrook, Ohio; and Brian Bourque, KA11PP, Fairfield, Maine.

The Awards provide \$1000 for each young person to further his/her education.

#### DOUBLE TROUBLE

FCC has assessed monetary forfeitures against a father and son, Albert and Eugene Kuklin, of Tucson, Arizona. Albert was fined \$750 for operating an unlicensed station under a now-unassigned call sign, K9LUX, through a repeater. Eugene, who is K7KCA, was fined \$300 for aiding and abetting the violation, transmission of a false call sign and communication with an unauthorized station.

#### W0LCT REELECTED CCIR DIRECTOR

At the recently concluded Plenary meeting of the International Radio Consultative Committee (known by its initials in French as CCIR), Richard Kirby, W0LCT/HB9BOA, was reelected as CCIR Director for a three-year term.

#### FCC SAN DIEGO FIELD OFFICE MOVES

The new address for the FCC San Diego office is 4542 Ruffner St, Room 370, San Diego, CA 92111-2216, tel 619-293-5478.

#### Goldwater Scholarship Fund

The following have contributed \$25 or more to the Senator Goldwater Scholarship Fund: Hazard E. Reeves, K2GL; in memory of Gabe Romero, K7SAE, from the Arizona Repeater Assn; Roy Schlegel, N7BH; in memory of A. E. Martin, Jr, W4THV, by the Southern Coffee Club; Kenneth M. Scheibel, N3CJW; with thanks to Monroe Penick, W9KF; David A. Gentry, KA0NTS and Eugene B. Affolter, WB0SEN from M. K. Snook, KA0VTH; in memory of Opal Hale by Lee Augustus, W8DKA; Timothy A. Kearns, NN6A; in memory of George E. Keith, W9QLZ, by Rose Keith; in memory of Lynsie Lewis, WB7BYK, by the Arizona Repeater Assn; in memory of Henry Warren, K7ORF, by the Arizona Repeater Assn; James P. Hayward, W2PVF; Edson B. Snow, W2UN; in memory of Gordon Leavitt, WA7LMA, by Florence W. Leavitt, WB7AVT; Jeffrey F. Peters, W2DXE; Herbert C. Hornischer; and Dick L. Eilers, W0YZV.

#### ARRL HQ OPEN HOUSE

The June 8 HQ Open House saw nearly 300 visitors stop by. Regular announcements were made at a nearby hamfest with van transportation provided. Local radio station WTIC aired information on the open house, and even the *New York Times* Connecticut section featured an article about the open house that alerted many visitors.

#### NEW ARRL EMPLOYEES

HQ welcomes Zachary "Zack" Lau, KH6CP, of Honolulu, Hawaii, who has joined the Technical Department staff as a lab engineer. He received a BSEE from the University of Pennsylvania and did some graduate study at the University of Hawaii. Zack is an active contester and holds many QRP awards, plus DXCC. He will be working primarily on RF and analog projects. Another new member of the Technical Department is James "Rus" Healy, NJ2L, who recently graduated with highest honors from the Electrical Engineering Technology program at the State University of New York Agricultural and Technical College in Canton. Rus is an Assistant Technical Editor, and is an avid contester and DXer.

#### SECTION MANAGER ELECTION NOTICE

To all ARRL members in the Missouri, Southern New Jersey, South Carolina, Western Pennsylvania, Eastern Massachusetts, Nebraska and New York City-Long Island Sections: You are hereby solicited for nominating petitions pursuant to an election for Section Manager. Incumbents are listed on page 8 of this issue.

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

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

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.

Petition must be received at Headquarters on or before 4 PM Eastern Local Time September 5, 1986. Whenever more than one member is nominated in a single Section, ballots will be mailed from Headquarters on or before October 1, 1986. Returns will be counted November 18, 1986. SMs elected as a result of the above procedure will take office January 1, 1987.

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, 1987.

If no petitions are received from a Section by the specified closing date, such Section will be resolicited in January 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 Service Manager.

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

Richard K. Palm, K1CE  
Field Services Manager

#### SECTION MANAGER ELECTION RESULTS

The following Section Managers will begin a two-year term of office on October 1, 1986:

##### Uncontested

Eastern Pennsylvania	Kay C. Craigie, KC3LM
Idaho	Don Clower, KA7T
Minnesota	George Frederickson, KC0T
Ohio	Jeffrey A. Maass, K8ND
Southern Florida	Richard D. Hill, WA4PFK
West Indies	Alberto L. Valdejuli, WP4CSG
Western New York	William W. Thompson, W2MTA

In the Connecticut section, Robert J. Koczur, KIWGO, has requested his nomination be withdrawn. Thus, John T. Ronan, K3ZJJ, being the only other candidate, has been duly elected Section Manager. His term of office will begin October 1, 1986.

# Moved and Seconded . . .

**MINUTES OF EXECUTIVE COMMITTEE**  
**Meeting No. 423**  
**Portland, Oregon**  
**June 13-14, 1986**

## AGENDA

1. Approval of Minutes of March 22, 1986 meeting.
2. FCC Matters:

2.1 Consideration of ARRL action in response to denial by the FCC Chief Engineer of its petition for rules requiring the labelling of home entertainment equipment with respect to its immunity from radio frequency interference.

2.2 Consideration of ARRL position in respect to RM-5434, a petition from the Association of Radio Reading Services for the use of 500 kHz in the 220 MHz band for reading services for the blind.

2.3 Consideration of ARRL response in PR Docket 86-163 to provide for private land mobile operations in 421-430 MHz in Detroit, Cleveland and Buffalo.

2.4 Consideration of ARRL response in General Docket 83-806, proposed regulations regarding radio-frequency lighting devices.

2.5 Consideration of ARRL response in PR Docket 86-161, Enhancement of Novice Privileges, as requested in ARRL's petition, RM-5038 and other RMs.

2.6 Consideration of ARRL position re the National Association of Broadcasters' request for Federal preemption of regulations regarding the biological effects of radio frequency energy.

2.7 Consideration of ARRL response in PR Docket 86-207, proposed authorization for F8E multiplex emission on all amateur frequencies above 1240 MHz.

3. Local antenna/RFI matters.

4. Review of progress on Board directives:

4.1 By the vice presidents and/or chairmen for the committees.

4.2 By the President, reporting on meetings on May 29 with Federal Communications Commission personnel on various amateur matters.

4.3 By the Executive Vice President, on Board directives affecting Headquarters.

5. Studies requested of the Executive Committee by the Board at its 1986 Annual Meeting:

5.1. From Minute 80, review of the terms and conditions governing the availability of mailing lists from Headquarters.

5.2. From Minute 57, the question of whether statements similar to the "Guidelines for Ethical Conduct of Officers and Directors" and the "Policy Governing Contacts with Federal Government Officials" by Board members should also be applicable to Section Managers.

6. Consideration of creating a new West Texas Section of the West Gulf Division, from portions of the Northern and Southern Texas Sections.

7. Recognition of new Life Members.

8. Affiliation of clubs.

9. Convention matters:

9.1. Approval of division, state and section conventions.

9.2. National Convention matters.

10. Authorization of a wire funds-transfer arrangement requested by the Treasurer to facilitate ARRL money management.

11. Date and place of next meeting.

12. Other business.

Pursuant to due notice, the Executive Committee of the American Radio Relay League met at 8:35 A.M., Pacific Daylight Time, Friday, June 13, 1986, at the Portland Marriott Hotel, Portland, Oregon. Present were President Larry E. Price, W4RA, in the Chair; First Vice President Jay A. Holladay, W6EJJ; Executive Vice President David Sumner, K1ZZ; and Directors Frank M. Butler, Jr., W4RH, Paul Grauer, W0FIR, Hugh A. Turnbull, W3ABC, and George S. Wilson III, W4OYI. Also present were Vice President William J. Stevens, W6ZM, Secretary Perry Williams, W1UED, Directors Mary E. Lewis, W7QGP and Edmond A. Metzger, W9PRN, Vice Director Rush S. Drake, W7RM and Counsel Christopher D. Imlay, N3AKD.

1. On motion of Mr. Turnbull, the Minutes of the March 22, 1986 meeting were accepted as printed.

## 2. FCC Matters:

2.1. On motion of Mr. Wilson, Counsel was directed to file with the Federal Communications Commission a Petition for Reconsideration of the denial, by the FCC Chief Engineer, of the ARRL petition for rulemaking to require the labelling of home entertainment equipment with respect to its immunity from radio frequency interference.

2.2. On motion of Mr. Butler, Counsel was directed to file comments in opposition to RM-5434, a petition from the Association of Radio Reading Services for the use of 500 kHz in the 220 MHz band for broadcasting reading services to the blind.

2.3. On motion of Mr. Wilson, Counsel was directed to file comments in PR Docket 86-163 in which FCC proposes to establish technical parameters for private land mobile operation in the 421-430 MHz band within 50 miles radius of Detroit, Cleveland and Buffalo. The comments would ask the Commission to require that satellite receivers as well as base stations be located within 30 miles of the city center and to require that CTCSS (e.g. "Private Line," "PL," or similar) systems be utilized so as to minimize inadvertent interference from amateur radio stations.

2.4. On motion of Mr. Grauer, Counsel was directed to file comments in General Docket 83-806 which proposes amending the regulations regarding radio-frequency lighting devices, in opposition to any radiation limitations less restrictive than those permitted for consumer devices under other provisions of Part 15, Rules Governing Incidental and Restricted Radiation Devices.

2.5. On motion of Mr. Butler, Counsel was directed to file comments in support of PR Docket 86-161, enhancement of Novice operating privileges, once again urging that Novice examinations be supervised by two volunteer examiners rather than one, each meeting present standards for such examiners, and restating firmly its view that Novice privileges in the 220-225 MHz band are an intraservice matter not affected by the moratorium on new allocations in the band.

2.6. The Executive Committee considered the invitation of the FCC for comments on the request of the National Association of Broadcasters for federal preemption of regulations regarding the biological effects of radio frequency energy. Without objection, the matter was referred to the ARRL Ad Hoc Committee on Biological Effects of RF Energy for a recommendation.

2.7. Without objection, the matter of PR Docket 86-207, proposed authorization for F8E multiplex emission on all amateur frequencies above 1240 MHz, was deferred to the July meeting of the Board. The Executive Committee meeting was in recess from 10:17 to 10:27 A.M.

## 3. Local antenna/RFI matters:

3.1. The President reported on the Ravenscroft case in Canada, conveying information gathered at the Annual Meeting of the Canadian Radio Relay League. Briefly, Mr. Ravenscroft was ordered by a judge to cease causing interference to a neighbor's household appliances and home entertainment devices under the tort of nuisance. An appeal will be taken. A fund is being raised in support of Mr. Ravenscroft under proper auditing procedures; any surplus remaining will create a Legal Defence Fund in Canada.

3.2. Counsel Imlay reported briefly on the Love's Park, Illinois, RFI ordinance, a Honolulu RFI case, and the Pacific Gas & Electric electrical interference problem in certain parts of Northern California.

## 4. Review of progress on Board directives:

4.1. Vice President Stevens reported on the meeting at Seaside, Oregon, of the Volunteer Resources Committee, and progress of the Committee on tasks assigned it by the Board. On request of Mrs. Lewis, as chairman, it was agreed that the staff would delay implementation of a program to encourage local memoranda of understanding until the July meeting of the Board. First Vice President Holladay reported briefly for the Committee on Committees, urging that directors and advisory committee chairmen, past and present, communicate their views to him promptly. Mr. Metzger, as chairman, reported briefly for the Administration and Finance Committee.

4.2. The President reported on meetings in Washington with FCC staff on May 29, 1986, including the proposed Section 333 of the Communications Act to make the causing of malicious interference a statutory offense; the idea of assisting FCC with

issuance of call signs under some conditions; and matters regarding the ARRL Interference Reporting System (AIRS). It was moved by Mr. Wilson that a draft letter to FCC presented to the Executive Committee, expressing interest in an exclusive role as supplier of secondary call signs for FCC amateur licensees, not be sent and that the matter be deferred for discussion at the July Board meeting, but the motion failed. During the course of the above, the Committee was in recess for lunch from 12:10 to 1:06 P.M.

4.3. The Executive Vice President presented a report in chart form on various assignments to the Headquarters and Board Committees from the Board. Specific discussion centered on liability insurance coverage for clubs, and QST single-copy retail sales (up 24% in the past year). Mr. Sumner distributed copies of the 1985 Annual Report, the 1986-1987 edition of the Advanced Class License Manual reflecting new question pools effective July 1, and a recruitment letter just mailed to ex- and non-member amateurs. In answer to an earlier question, materials for the guidance of section managers in the proper handling of League section expenses were distributed for the information of the Committee.

5. Studies requested of the Executive Committee by the Board at its 1986 Annual Meeting:

5.1. As requested by Minute 80, the committee reviewed the terms and conditions governing the availability of mailing lists from Headquarters. On motion of Mr. Wilson, the Executive Committee recommends to the Board that it amend the Rules governing the availability of mailing lists by adding to Category 1 the list of members in an affiliated club's territory which is available once per year for recruiting purposes only, and making it clear that lists from the FCC data base and lists of affiliated clubs are also available, generally under the same terms as apply to lists of members.

5.2. Minute 57 referred to the Executive Committee for action the question of whether statements similar to the "Guidelines for Ethical Conduct of Officers and Directors" and the "Policy Governing Contacts with Federal Government Officials" by Board members should also be applicable to Section Managers. On motion of Mr. Butler, the Executive Committee adopted a version of these ethics policies tailored specifically to Section Managers.

6. On motion of Mr. Butler, the Executive Committee approved the creation by the Executive Vice President of a new West Texas Section comprising the western 40% of the State and some 950 ARRL members, effective January 1, 1987. The remaining sections are restyled North Texas and South Texas Sections respectively.

7. On motion of Mr. Butler, the names of 72 newly elected Life Members were recognized, and the Executive Vice President was directed to list their names in QST.

8. On motion of Mr. Wilson, the following clubs were affiliated with the ARRL, all in category 1: Arlington Communications League, Wood Dale, IL; Charleston Area Hamfest & Computer Show, Inc., South Charleston, WV; Chicora Amateur Radio Group, Dunn, NC; D-CAT, A Disaster & Communications Action Team, Houston, TX; Holmes County Ham Club, Bonifay, FL; Inland Empire DX Association, Spokane, WA; Kankakee Valley ARC, DeMotte, IN; Kent Amateur Radio Society, Chestertown, MD; Lea County Repeater Association, Hobbs, NM; Lumberton Repeater Association, Lumberton, NC; Maple Valley Wireless Society, Maple Valley, WA; Mountain Repeater Association, Studio City, CA; North Texas Microwave Society, Sanger, TX; Rochester Radio Repeater Assn., Inc., Rochester, NY; Sonora Pass Amateur Radio Klub, Twain Harte, CA; Southern Humboldt ARC, Redway, CA; Springhill Amateur Radio Club, Springhill, LA; Stark DX Association, Louisville, OH; Sub Club ARA, La Habra, CA; Trinity County ARS, Weaverville, CA; Umpqua Valley ARC, Umpqua, OR; Union County ARS, Waxhaw, NC; Wadena Area ARC, Wadena, MN; Wheatstraw Amateur Radio Club, Calumet, OK.

With this action the League has the following number of active affiliated clubs: Category 1, 1797; Category 2, 12; Category 3, 161.

(continued on page 63)

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

## NOVICE ENHANCEMENT

□ In response to the ARRL/FCC proposal to expand the privileges of the Novice licensees, I could not agree more on every aspect of this proposal. I am very active in the amateur field and have seen numerous bright and intelligent Novice prospects cast by the wayside because the current Novice privileges are vastly lacking any real user appeal.

As we all know, for most practical purposes the 15- and 10-meter CW Novice bands are practically dead, propagation is extremely poor, and Novices have to fight one another on 40 and 80 meters just for a casual QSO. The conditions on 40 and 80 meters are especially discouraging because of the Canadian phone traffic on 80 meters and the international broadcast activities on 40 meters. What is left for the Novice?

Upgrading to Technician eases the problem somewhat, but does virtually nothing to attract the Novice into the amateurs' hobby. There must be an incentive to bring these potential amateurs into our fold at a ground floor level no matter what the next level of license may bring. How can we entice potential amateurs to upgrade when the present Novice privileges aren't bringing them to us in the first place!

The much respected "Old Timers" complain that the newcomers don't know a resistor from a capacitor, but the same sentiment can be reversed by our young people when it comes to computer technology and other such means of communications. We can't look to the past and expect to bring in new blood at the thought of wire-wound oatmeal boxes (no disrespect meant), but it's the future we have to concern ourselves with. We have already lost thousands of Novices! How many thousands more do we have to lose before we wake up!

I, for one, would rather see a Novice get HF phone privileges than to lose that dedicated ham altogether. All potential ham talents and future contributions to the Amateur Service are being put "on the line."

It is said, "If you snooze, you lose," and the loser, now, and in the future, is the Amateur Radio Service.

One last thought: Some say that we would be getting a new group of undisciplined individuals from another band of our radio services. I totally disagree! As a matter of fact, the majority of present day "Notice of Violations" cases are General, Advanced and Extra Class license holders, so the above speculation doesn't hold a drop of water. —Robert A. Leary, KA5UWR, Akron, Ohio

□ I endorse the current FCC structure of passing a 5-WPM code test along with theory and regulation exam. We both seek to change for the better, however, the "entry" license.

My experiences have led me to believe that our kids are much more interested in computing than ham radio. Moreover, the FCC, ARRL and the business community have taken the correct course in changing a system that produces nearly 10,000 fewer hams in

recent years.—Joseph G. Vella, KA2MAT, Hazlet, New Jersey

□ I think that the proposed extension of voice privileges to Novices is ill-conceived. If adopted, the change will discourage Novices from advancing and drive one more nail in the coffin of incentive licensing.

Under the present rules, the Novice must not only pass a code test, he must use code to operate on the air. At the earliest stage, the Novice builds communications skills. The constant on-the-air code practice helps him build code speed for the General.

Under the new proposal most Novices may never make that first, scary on-the-air CW contact. Their only upgrade will be to Technician. We will gain a few more licensees but lose input into the General, Advanced and Extra classes.

If any change is to be made, I propose that the Novice license be made nonrenewable once again. A limited-term Novice license will encourage upgrades and put more new hams on a lifetime path of learning and self-improvement.—John R. Culleton, Jr., KC3FK, Sykesville, Maryland

## THE RAVENSCROFT CASE: HAMS RESPOND

□ I just finished reading the story of Jack Ravenscroft, and after having sent my donation to the JRSD Fund in Ottawa, I feel that this needs to be written.

I am a ham radio operator and have been quite active since 1966. During the course of my twenty years of operating, I have had to operate in crowded city conditions, with neighbors who, for the most part, tolerated my efforts to resolve the interference problems. But Jack Ravenscroft was not so fortunate, and now faces what I perceive as a very bad dream, but indeed for him is very real! I am writing this letter to ask all Amateur Radio operators to put themselves in Jack's shoes for an instant and consider why they need to respond to his needs. Jack Ravenscroft does not just represent Jack Ravenscroft, but rather, every single ham. I could understand the complacency of some hams who live thirty miles from their nearest neighbor, but this is not the case of most of us. Most of us live with the constant probability of new and contrary neighbors moving in next door.

Let us stand together and support Jack, because in reality, by supporting Jack, we support ourselves. If any member of the body is in pain, the whole body suffers! "United we stand, divided we fall!"—John N. Hogan, NK2J, Union, New Jersey

□ I would encourage all amateurs to rally behind Jack Ravenscroft, VE3SR, and provide the needed financial support for his appeal case as well as for his expenses to date. This case can well affect each and every amateur for we are all living next door to a hodgepodge of unshielded and haphazardly constructed electronic gimmicks placed on the market at the lowest possible cost.

Whether Jack gets back on the air may be of small consequence to you or me, but the amateur fraternity should be greatly concerned with a frightening court ruling that jeopardizes the very existence of Amateur Radio as we know it.—John McKinney, W0AP, Grand Island, Nebraska

## GRAVITY GRADIENT MODULATION—PSEUDOSCIENCE REIGNS

□ Thank you so much for all the letters regarding my April Fool's article in *QST* on Gravity Gradient Modulation!

I was totally unprepared for the quantity and type of replies that have been pouring in here. You have shared your thoughts on GGM with me, so I would like to share a very important discovery with you! I received two types of letters. The first group gives hilarious responses from people who took the article for an April Fool's Day joke, sometimes with some very funny replies (for instance, I have received all types of "anti-matter," including some crushed Cap'n Crunch pieces), for which I am deeply grateful, as they made me laugh for hours on end.

The second group asks very serious questions about GGM as a mode of communications, from people who read right past all jokes. These were obviously explorers who are searching for answers to a great many questions of the universe, to whom no idea is too crazy if it has a ring of logic to it.

I would like to say to both groups that I appreciate sincerely your letters and comments. To those of you (there are, unfortunately, too many of you to send personal replies to) who sent me articles, books and other useful information, I am especially appreciative, since I realize you spent an extra amount of effort to scrutinize the article and investigate that area of pseudoscience.—Dave Morris, NSSD, Garland, Texas

## RST

□ W0YBV thinks we should drop the "1" in RST. Let's keep the "T" till everyone owns a new rig, no one experiments anymore, and we can all be sure our osc/mod circuits will run trouble-free forever.

It does my heart good to read the occasional letter like the one from N7ESJ, "Clutter, Clunk vs CW." I find packet radio very interesting, but not so interesting that we need to lose sight of the fun and relaxation that comes with our hobby, namely CW. —R. Gleason, N5CMD, Livingston, Texas

□ A solid S9 "Amen" to Charles Ellis, W0YBV, for his letter in May *QST* regarding the outmoded and meaningless use of the last digit in our CW RST reporting system. Out of curiosity, I checked back in my logs for the past 3½ years, covering more than 1000 QSOs, and find nothing recorded other than T9. Isn't it about time for the intelligent CW operators to drop the last digit from the current signal reports?—Coleman Murphy, W3BBL, Pittsburgh, Pennsylvania

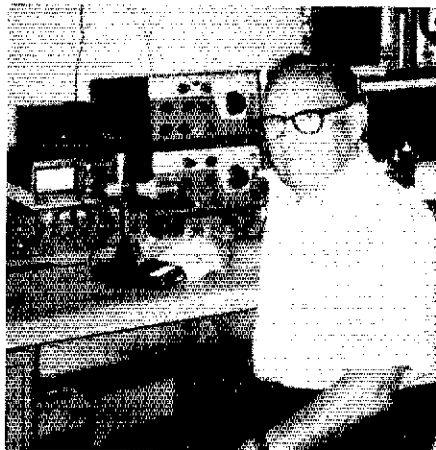


## W5KC—The Gentle DXer

Fewer and fewer hams remain who can boast of knowing of the world of Amateur Radio from coherers and spark transmitters to packet and satellites. W5OVV movingly reminds us of active DXer and contester Vince Rosso, W5KC, one of those early pioneers who joined the ranks of Silent Keys this past February 6. W5OVV had the opportunity to talk with Vince last January. The following are extracts from his account of a talk with Vince on how W5KC became attracted to Amateur Radio.

Every year the big Mississippi River would flood the lower stretches of Louisiana, before there were levees. W5KC was born in Plaquemine, Louisiana on Christmas Eve of 1901. (Plaquemine is on the western banks of the river, just a few miles downstream from Baton Rouge.) In 1916 Vince's father moved the family to relatives in Centerville, Mississippi to safely wait out the high water time. It was in Centerville that 15-year-old Vince came across copies of Hugo Gernsback's magazine, *The Electrical Experimenter*. This is what got him interested in radio, he said. "I read all about coherers and spark transmitters, and started building some of those things from the magazines." Vince never threw away a single thing, and in January was able to show me a piece of an old helical coil and the original key he used to interrupt the spark of his first transmitter. He bought a lot of parts from Sears Roebuck, but many things had to be built from scratch.

Vince was in high school at the time that World War I interrupted his activities. In 1919, with hostilities over, Vince became 5KC, using a rotary gap running 1 kW and a 10-wire cage aerial 60 feet long. His receiver was a regenerative Grebe Type Cr 1. DX at



W5KC

that time was his first out-of-state contact, Texas. But he began working on WAS and WAC as the years passed.

There was hardly a function relating to ham radio that Vince missed. He was active in several nets, in QCWA, OOTC and various

DX associations, and went to every hamfest he could possibly make. A strong supporter of ARRL, W5KC made ham radio his life and loved every aspect of it dearly. He was a genuine person, gentle and kind, and still young at heart at the age of 85.

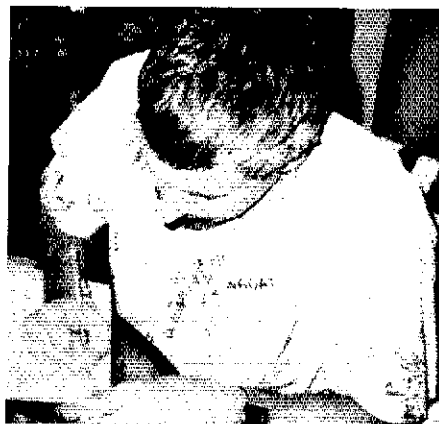
Vince earned a great many awards, certificates and QSLs. He achieved 5BDXCC in 1973 (no. 239), and proudly recalled his 1970 contact with JY1. He continued to receive recognition right up to the end of last year, when the Quarter Century Wireless Association presented him an award for 65 years in ham radio. Some of the awards so proudly displayed by Vince included the ARRL 50 Year Member Award and his treasured DXCC.

His rich and full life within our hobby of Amateur Radio is an example for all of us to emulate. From spark to solid state, Vince bridged the wide gap with a continuing list of accomplishments. This gentle and special person touched many of our lives, and he is missed by his many friends. His remarkable enthusiasm and love for this satisfying hobby will continue to inspire us all. W5KC is silent, but his spirit continues within those of us who knew him. RIP, Vince.



Scenes at the International DX Convention, Visalia California, last April (l-r): the peripatetic G6ZY/EA6 with wife Jan; W6OAT

starting his Clipperton Diary (to appear in a future issue); and KH6IJ receiving the first lifetime achievement award from the Northern and Southern California DX Clubs. Nose's career was documented in this column in February 1983. (W1YL photos)



### ANNIVERSARY CONGRATULATIONS

This year marks the 10th anniversary of the IARU Society in Gibraltar, the 20th for Morocco, the 40th for Iceland and Yugoslavia, the 50th for Romania, and the 60th for Austria, the Dominican Republic, Japan and New

Zealand. RCD, the headquarters station for the Dominican Republic, will be signing HI6RCD through year end. New Zealand celebrated its 60th anniversary at the Annual Conference in New Plymouth, May 31-June 2.

JARL is planning a number of events to

commemorate its 60th anniversary. Five types of awards will be issued for contacts with JA stations in the second half of the year. June saw much JA activity for their internal celebration. JAS-1, Japan's first amateur satellite, is scheduled for launch this month

aboard a National Space Development Agency of Japan rocket. Year-long celebrations will culminate at the ceremony and banquet in Tokyo November 8.

### 6K86AG/6K88SOG

A special event station operated by the Korean Amateur Radio League (KARL) will be signing 6K86AG August/September this year, on the occasion of the 1986 Asian Games. Looking ahead to 1988, KARL will commemorate the Olympic Games to be held in Seoul, with the use of 6K88SOG. Both stations are authorized to conduct international third-party traffic on behalf of athletes. Athletes who are licensed in their home countries may operate the special-event station. Individual Korean amateurs will be using the special prefix HL86 this year, and HL88 at the time of the Olympics.

### BAFFIN EXPEDITION

KC3PT/VE8 is one to look for August 4-25. Earl will be doing solo-technical rock and ice climbing, carrying 1-watt QRP gear for 20, 30 and 40 meters. The anticipated "times out" for hamming include 2300-0200Z and 1000-1300Z. Check 14.010, 14.057, 10.104, 7.010 and 7.030.

### WORKED EI COUNTIES AWARD

The Irish Radio Transmitters Society (IRTS) has announced its first operating award, for working (or heard, for SWLs) at least 20 of the following counties on or after January 1, 1982: Carlow Cavan Clare Cork Donegal Dublin Galway Kerry Kildare Kilkenny Laois Leitrim Limerick Longford Louth Mayo Meath Monaghan Offaly Roscommon Sligo Tipperary Waterford Westmeath Wexford Wicklow. A verified list (IARU member-society/affiliated

## Troster's Tips for Easy Listening

### What Do You Say?

You are the DX operator, and there is a goodly sized pileup calling you. What do you say? If you are on vacation and you are only at a semirare location, you might casually exchange pleasantries now and then—your name, location description, weather, quality of the beach or mountain, food, whatever. Answer questions.

Now this will disturb a lot of fellows who want to work you, so hold it down, perhaps, to fellows you know. Such responses also invite long responses. If you do chitchat now and then, please don't repeat the whole story every QSO. Most of the callers have been monitoring and already know the details. And even though you think you are only semirare, there is always someone out there who needs you for a "new one" of some kind! So, keep things moving along.

If you are at a rare DX location, your exchange should consist of the report only (and, once in a while, QSL information). There may be hundreds of fellows trying to work you, and they don't appreciate (or much care) about what a nice beach you're on. They just want their call in your log. So, go fast! Send the report only, and move on. This is called "contest style" operating, and is the method used by top DXpedition operators at rare spots. [If you listened to the fellows from Clipperton a couple of months back, you already know what we mean—Ed.]

More next month from W6ISQ.

(club) and 10 IRCs go to IRTS Award Manager, Box 462, Dublin 9, Ireland.

### THE CIRCUIT

□ **HC8:** NE8Z will be signing HC1MD/HC8 August 1-21, using a TS-430 on all bands/modes, plus 50.110. Rick will try to get in a little fishing time, too! QSL via John Kroll, K8LJG, 3528 Craig Dr, Flint, MI 48506.

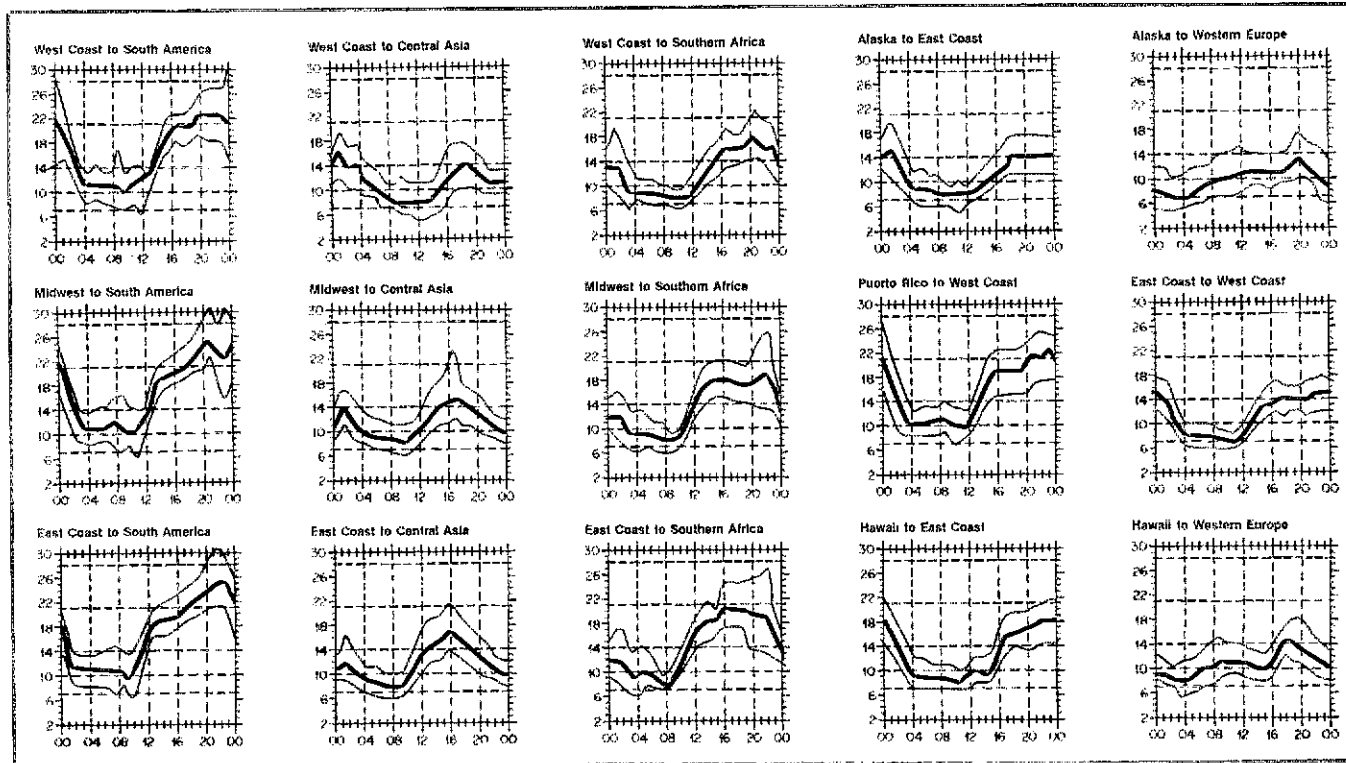
□ **W1BB:** W1PL notes that OT Stew Perry of top band fame is in failing health and needs help in dismantling his antenna farm.

□ **XX9CW:** Rudi, DK7PE, operated from Macau to the tune of 1700 contacts, including 65 Europeans on 160.

□ **AZ1ARU/1-12:** In commemoration of this fall's IARU Region 2 conference, to be held in Buenos Aires (Oct 2-25), 12 local LU clubs are operating special-event stations through October 31. AZ1ARU/5 gets confirmed via LU6FAZ. Other information will appear as available.

□ **HK3/:** David Edens (WB4AKC/HK3) is operating 80-10 and OSCAR 10 Mode B, from Bogota, Colombia. Cards may go via the WB4 bureau, his stateside home QTH or direct to David Edens, WB4AKC/HK3, US Embassy, APO Miami, FL 34038.

□ **XE1IKG:** WB5INB's May operation gets confirmed via 7800 Bissonnet, No. 215, Houston, TX 77074. Dave puts in a special



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

gracias for help from XEIs SR NJ GGU SSG TU.

□ **XEFJTW:** AA5B was issued this strange one for use till mid-year. Bruce operated from El Sauz during WPX phone. He notes that the call was *doubted* by 450 of his 520 contactees!

□ **C39:** This prefix was used during the early May International Congress of the Catalan Language. If you worked this Andorra station, QSL via Unio de Radioaficionats Andorrans, PO Box 150, Andorra la Vella, Principality of Andorra, Europe.

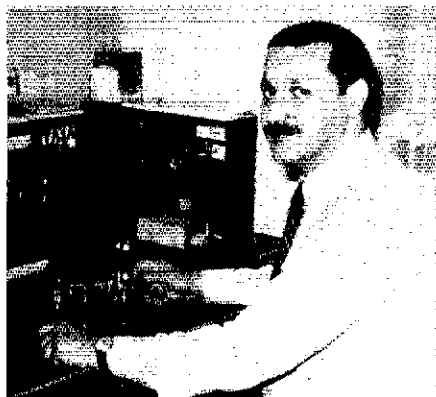
□ **PA2CJH/a:** Information on the Dutch Naturalist Amateur Radio Club, celebrating its 25th anniversary this year, can be obtained from Box 1056, 5602 BB Eindhoven, The Netherlands. (Please remember to enclose return IRCs.)

□ **JA Northern Territories:** *The DX Family News Letter* (JH1KRC, editor) makes note of the interesting situation between UA and JA claims concerning the islands offshore of Hokkaido (JA8)—Kunashiri, Etorofu, Shikotan, Shibotsu, Yuri and Akiyuri. Something to watch.

□ **NARS at 25 Award:** KB4EPK/5N0, with the US Embassy in Nigeria, would like to make note of the Nigerian Amateur Radio Society (NARS) Award: Work only 5 Nigerian ham stations during 1986, with club stations counting for 2 contacts. To obtain the award, send contact proof with \$5 to cover costs to NARS at 25, Box 2873, Lagos, Nigeria, West Africa.

□ **ZS6:** The Town of Pietersburg is celebrating its 100th birthday and is offering an award for those working 4 or more of the following stations: ZS6s AAS AFD ALE AGS AHD AIQ BGX BYT CDO EX LN NQ OJ PU W WA WE and ZR6s KB SZ. Check with SARL, Wolkberg Branch, Box 294, Pietersburg, South Africa 0700.

□ **TF3XUU/8:** Martin reports his call is being bootlegged—in particular for early March, when



TA1A, the first official TA station. QSL Unal Akbal, direct only, via Box 787, Istanbul 34435, Turkey.

he was out of the country. He'd appreciate notes on the bogus operator: type of fist, speed, details, etc.

NZART, PO Box 36-118, Moera, Lower Hutt, New Zealand.

□ QSLs for HK71MB should go to Allison Bergsneider, PO Box 864, Bucaramanga, Colombia.

□ QSLs for EL2GA should go to Jim DeLoach, American Embassy, APO New York 09155.

□ JH1HWN's 1986-1987 63-page *QSL Manager's Guide* is now available by air for 12 IRCs (no checks).

□ K2QEY is retired with a lot of free time (and a computer on his hands). Jerry is ready, willing and able to help out a needy DX station by handling the QSLs. KA6SAR of Santa Ana is also similarly interested.

□ 5U7AD: W4WMQ is looking for a QSL route for this one for Jun 1, 1962: 21 MHz at about 1430Z.

□ BV0YR: K6ARE makes it plan that he is *not* the manager for this station.

□ VP5Y: Cards via Bob Fabry, N6EK, 1175 Colusa Ave, Berkeley, CA 94707.

□ VP2M: KAINTM/VP2M, K1CLN/VP2M (Feb 24-Mar 3, 1986) and VP2MU (Mar 1-2, 1986) go via Bill Welch, K1CLN, Box 866, Truro, MA 02666

□ The American Radio Club of Korea is holding a significant number of QSL cards for ex-HL9 call-sign holders. Any past member wishing to claim their cards should write to the American Amateur Radio Club of Korea, Dependent Mail Section, APO San Francisco, CA 96301.

□ QSL Corner, June 1986, page 57, contains information and addresses for ARRL Incoming Bureaus. March 1986 *QST*, page 71, contains information on the operation 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.

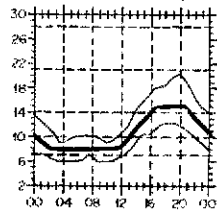
## QSL Corner

Administered By Joanna Hushin, KA1IFO

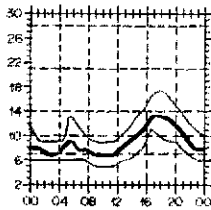
### Special Notes

□ The new address for the ZL QSL bureau:

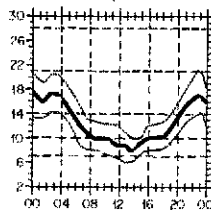
West Coast to Western Europe



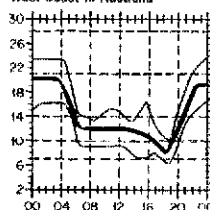
West Coast to Eastern Europe



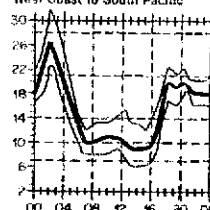
West Coast to Japan



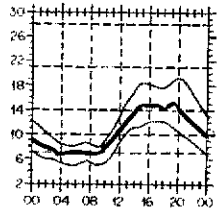
West Coast to Australia



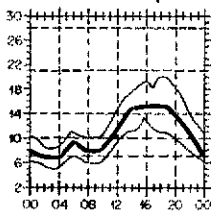
West Coast to South Pacific



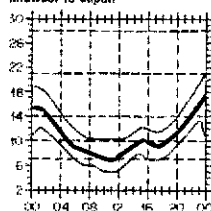
Midwest to Western Europe



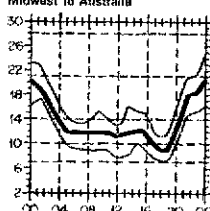
Midwest to Eastern Europe



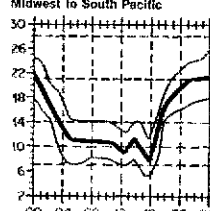
Midwest to Japan



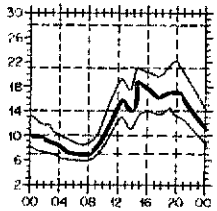
Midwest to Australia



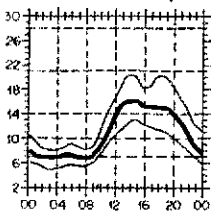
Midwest to South Pacific



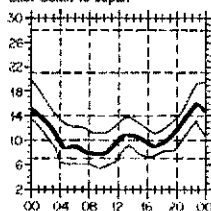
East Coast to Western Europe



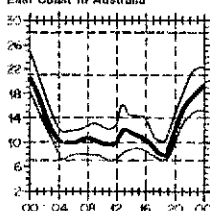
East Coast to Eastern Europe



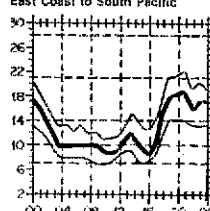
East Coast to Japan



East Coast to Australia



East Coast to South Pacific



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 *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, 1986, assume a sunspot number of 10, which corresponds to a 2800-MHz solar flux of 72.

# DX Century Club Awards

Administered By Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 25-country increments through 250, 10-country increments through 300 and 5-country increments above 300. The totals shown below are exact credits given to DXCC members from April 1 through April 30, 1986. An SASE will bring you the rules and application forms for participation in the DXCC program.

## New Members

<b>Mixed</b>									
DF8NX/229 DK7WCY/103 DL4MCF/105 DL7ALM/108 F6FFA/290 F6HIM/186	G4UZO/110 G5ACLA/100 HL2SF/116 IT9GXE/105 JE2MDE/130 JF2ECJ/185	JR2BZA/293 JA3VZD/234 JA5BEN/270 JA7AER/137 JA9FT/110 JA9JFO/292	OK1MJL/102 ON4AJZ/109 ON8DG/189 OZ4XU/112 PA3AXU/278 PA3CJS/106	PA3DKX/163 SM0GDB/130 VE5ZN/127 XE2NNZ/105 Y22YJ/105 5N8ALH/110	9Q5HF/183 KA1LR/113 KO1R/192 K2VSP/108 KA2UFA/124 WA2WIP/100	WB2KQC/109 WA9BNH/100 KA4JNB/106 KC4IL/104 KA5TQF/159 WA5VGI/107	WB5OSD/103 K6EBK/101 N8ITY/106 WA7GVB/131 K8BTH/305 K8RC/103	K9QYA/100 K8ACDN/258 N0CB/117 W0JUR/260 W0KU/297	
<b>Radiotelephone</b>									
C38AAH/158 G4VBT/102 G4VZQ/110 HK3HMA/102	IK1ARA/204 IK4DSM/109 JF2ECJ/182 JR2BZA/272	JA3VZD/167 JA4CZM/151 JA5BEN/258 JA7AER/137	JA9JFO/279 VE5ZN/123 XE2NNZ/100 XE3ABC/136	YB8QD/102 Z98AXC/102 K1YR/231 KA1LR/113	KO1R/155 K2ZPW/105 N2DNO/100 W3RLR/100	KA5TQF/100 KA6QHI/110 KG6OU/105 N6ITY/101	W6YLJ/104 W7UFM/127 WA7FJR/106 WA7GVB/131	K9HEK/108 W9HHS/105 W9RXJ/523	
<b>CW</b>									
DJ2XP/183 DJ3SU/112 F6HMJ/130 I1WNB/125	I2XIP/270 IT9GXE/100 JE2MDE/105	JR2BZA/251 JA3VZD/183 JA9FT/110	JA9JFO/204 OK1DAU/103 OK1QH/101	ON7FK/204 PA3AXU/108 PA3DKX/161	SM0GDB/114 K1YR/144 W1AX/219	K2KPG/101 AJ3K/102 WA3IMY/106	WA5VGI/102 AJ6F/107 NA7R/100	NC7B/101 KD8VM/239 W8LY/152	
<b>RTTY</b>									
I1JQJ/105	WA4WIP/102	W0RWC/100							
<b>160 Meters</b>									
JA3ONB/102	W1AX/101	W5AQ/100							
<b>5BDXCC</b>									
JA2BL K0QC NW5K RB5X	RL8PY UA4PO EA3NA UW1AE	K9RJ YU2ZZ W9KE K2YI	WA2UXC W6OUL W4EVP/9 W2ELH	AA4AM JA1QOQ W6ZH	A18V AE5H XE1MOX	K5BDX W6BX A92P	ZS6BCR N4OM JA7IL NJ8N	F6EXV DJ8NK OK3CAQ	

## Endorsements

<b>Mixed</b>									
CE3GN/306 DF4RD/305 DJ1ND/288 DJ2XP/247 DJ6GK/293 DK2UA/306 DL1EY/305 DL8VN/295 DL9EY/251 F6BLP/286 F6EXV/311 F6HIM/199 G3KMA/345 G4BWP/277 G4CP/362 G4GIR/290 HB9BIN/150 I1RBJ/335	I2MOP/310 I8YRK/337 I0TIC/216 IK0CAJ/192 JA2AIR/333 JA2DJH/318 JA3KWJ/313 JA4CZM/191 JA4GXS/302 KH6J/355 KH6GS/310 P29JS/308 SK7AX/263 P29JS/308 SM5AZU/339 SM5FC/333 SM6DHU/335 SM6NKJ/149	SM7AIQ/217 SM7DMN/325 SM7HCW/303 SM0DJZ/314 TA2BK/200 VE3DR/311 VE3KOY/260 VE3MV/304 XE2FL/228 XE3ABC/149 YU1BEF/163 YU1NFT/X/284 YU2JG/249 YU2QB/317 ZSTOU/327 4Z4OZ/226 5R8AL/154 AA1KJ/313	AD1V/224 KB1ER/177 NA1N/150 W1YK/155 W1ZT/260 WA1COA/221 WB1ATZ/187 WB1CRI/125 K2EK/265 K2MFY/318 KA2CFH/229 KB2QN/280 KG2T/265 N2BJ/300 W2FR/316 W2HTX/174 W2MT/304 W2NUS/150	W2QL/316 W2TA/318 W2VP/252 AJ3K/202 K3HPG/332 K3PA/183 KB3J/155 K3CQ/251 KJ3L/298 KJ3L/301 W3YF/153 WA3CGE/301 WA3IMY/138 AA4DO/155 K4II/335 KF4ZP/150 KR4F/301	NA4M/322 W4NKJ/339 W4OMQ/330 K5KT/243 KA5MJJ/151 KC5MO/195 KR5D/282 W5RO/332 W5YM/176 WB5PLD/276 WC5E/155 K6ANP/316 KG6AM/226 KZ6Z/199 N6HR/329 N6VF/301 N6WK/289	W6GYM/280 W6UZ/273 W6YFW/223 WB6OTB/234 WK6V/239 K7OXB/325 K7OZ/174 KX7J/282 W7EKM/327 W7LYO/287 WA7GOA/202 WB7EEI/302 A18D/283 K8DB/306 K8MR/225 K8BMR/304 KD8V/290	KD8VM/359 KT8P/287 N8ATR/285 N8DE/312 N8FGH/195 N8FU/292 N8FZ/177 NN8Y/181 WB8KS/141 WB8KJ/305 WB8A/332 WB8KFG/280 WB8LFQ/278 WB8TRW/300 AB8Q/254 A19F/293 K9EC/153	K9IW/310 KB9L/151 KD9FB/187 KR9O/307 N9CPW/273 NA9O/308 NC9N/124 NE9K/293 W9MP/293 W9LXJ/249 W9TA/302 WA9YTO/294 KU0A/125 NCAT/170 NIDF/310 NJ0M/226 W0HZ/341	
<b>Radiotelephone</b>									
CE3GN/306 CT1AHU/136 CT1RM/323 CX2CB/203 DK2EZ/287 DL1EY/304 DL4FV/202 DL8QS/307 DL9EY/204 EA18DB/265 F6CYV/297 F6EXV/309 F6FFA/286 G3KMA/331 G3UAS/251	G4BWP/266 G4GIR/268 G4MBT/125 G4MTC/128 I1RBJ/335 I1XA/292 I2ADN/225 I2MQP/310 I2YBC/324 I2YKV/299 I8KNT/314 I8YRK/337 I8XU/209 I0TIC/206 IK0EPS/176	JA1PNA/318 JF2AXT/190 JA3KWJ/304 JA4GXS/275 JEBVVU/177 P29JS/306 PA3AAN/165 PY3CM/235 SM3BIZ/357 SM5AZU/336 SM5FC/333 SM6DHU/308 SM7HCW/295 SM0DJZ/303 VE1JL/245	VE3MV/304 XE1L/298 XE2FL/227 Y08BLO/131 ZP5CE/314 KA1SK/134 W1CRL/277 W1FZ/353 W1ZT/187 WA1COA/191 K2EK/213 K2MFY/289 KG2T/256 W2GHV/293 W2QL/308	W2VP/249 WA2ZGO/152 WB2EZU/280 AJ3K/177 K3FNW/152 K3VY/162 KA3HXO/252 KF3C/261 KJ3L/288 KJ3L/295 W3CQ/307 W3JZP/203 WA3CGE/291 AA4M/293 K4II/292	KD4NZ/270 KE4VU/244 KW4V/239 NA4M/318 NF4A/298 W4NKJ/339 W4TDW/311 WK6V/200 KA5MJJ/151 KC5MO/195 W5LLU/286 W5RO/332 WC5E/153 AA6BB/277 KA6JDI/205	KA6V/275 KB6HW/185 KZ6Z/190 N6GBM/165 W6GYM/280 W6YFW/221 WA6CTX/271 WK6V/200 K7OXB/318 NK7Y/175 W7EKM/325 WA7GQA/157 K8BTH/302 K8DB/306 K8ZZO/305	K8BMR/304 KD8V/284 KD8VM/358 N8ATR/285 N8DE/275 W8TA/255 WB8KS/140 WB8KFG/280 WA8SXM/125 WB8KFG/280 WB8LFQ/278 WA8YTM/252 AB8Q/254 A19F/264	K9IW/307 K9PSN/282 KR9O/307 KR9R/261 N9CPW/266 NE9K/290 W9TA/296 WB9JBH/280 WB9FOE/280 K0PCK/177 KB0BH/150 KJ0A/125 N0AT/310 W0KU/297	
<b>CW</b>									
DJ1ND/207 DK2UA/211 DL1P/307 DL5YBU/145 DL9EY/149 G4BWP/227	G4GIR/241 I8YRK/180 JA1PNA/269 JA3KWJ/199 JA4GXS/232 OZ1VY/305	SM6NKJ/133 SM7HCW/255 SM0DJZ/289 ZS2WV/138 AK1E/149 KA1CB/255	KA1X/154 KO1R/159 N1CYA/152 W1ZT/190 K2MFY/252	W2QL/267 WA2ASQ/125 KB3J/145 KJ3L/264 W3EVP/301	AA4M/286 K4CEB/305 K4II/269 K4PR/176 KR4F/270	KV4F/274 W4MPY/270 WB4WRM/125 KR5D/265 W6TVP/200	K7DOR/152 NR7F/250 K8MR/160 KD8V/270 N8DE/252	W8PR/250 WA8YTM/202 K9IW/300 KR9RM/203 KB0S/175	
<b>160 Meters</b>									
AA1K/177									

The totals below are exact credits given to DXCC members from May 1 through May 31 1986.

## New Members

### Mixed

DF8EM/101 DF8TX/110 DJ7QB/288 DL8KBT/109 F6FJ/125 G4DJJ/111	G4WIA/108 HA8XX/187 HB9COD/132 I2JR/314 I5OQV/132	IS0URA/110 JA1KWC/104 JE1RXJ/105 JFHNN/165 JE3NWQ/109	JA4UQY/234 JR7BT/148 JA8AAJ/278 JA8IAB/314 LU8DWR/109	OK1ANS/103 OK1JLC/100 SM7CRW/311 YU3RW/124 YU4JLM/102	5N8ZHN/108 K1VSC/103 AK2H/206 KA2VYW/166 WA2TMP/108	W2BMW/105 WB2LNR/110 N3COB/102 K4DSX/110 KB4JRS/126	N5FYJ/124 WE5Y/107 NB6T/114 WG6P/201 WN6J/103	KD9WB/104 WB9LDD/109 WB9SAU/104 N8COP/109 NB9H/105
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### Radiotelephone

EA2SN/107 EA3BMT/110 EA5FCP/214 FD1HWB/108 G4WIA/108	HC2KW/114 I2WNO/287 IK2DZN/111 JE1RXJ/105	J11HNJ/165 JA4UQY/234 JA8IAB/276 LU1DKH/103	LU2CC/273 LU8DWR/104 OE7XMH/100 PY4BA/143	SM7CRW/310 T12ANL/103 Y08PZ/109 YV5BHW/140	4X6GS/147 KA2VYW/156 KB4JRS/126 K5RSI/102	KD5ZD/102 KE5ZW/104 N6FYJ/122 WN6J/103	K7OZ/108 KD7UN/103 W7TLK/129 WA8HFS/123	K9EC/151 NB9C/117 WB9SAU/104 W8LYM/205
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### CW

DL4SBD/115 F6HBJ/206 G3VQG/104	HA7RB/109 HA8XX/105 I5OQV/130	JR7BT/124 JA9AAJ/249 LA1SV/106	LA2GV/101 LZ1XK/109 OK2PO/171	OK3CEI/105 OK3YDM/105 VE3JFH/110	AA4AM/133 AA4L/111	N4IBF/103 WB4VKW/191	KA5DYB/110 N5GNE/102	KA6A/159 W9DE/218
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### RTTY

I2JR/123      WNZ/106

### 160 Meters

G4OBK/103 GM3ZSP/100	LA2GV/101 OK1DTN/102	VE2FYR/102 YU2TW/101	K1IK/104	KM1H/101	K2CL/101	K2EK/101	W2XN/102	N4WJ/111
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### 5BDXCC

GM3YOR YU3HAM I2WNO	N8HL JH0LFE	W7BG I2FUG	K6JAD DL7JY	KR4F ZS2MY	F6HBI K4RIG	KN3P JA1QXY	WB9EEE HB9CSA	YS1RRD G3ZPF
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## Endorsements

### Mixed

CX2CS/272 DL1SD/233 DJ8AJ/154 DK3BS/259 DK5J/280 DK6UR/238 DK6ZR/272 DL2AW/318 DL2FAG/199 DL7NB/326 EL2AY/136 G2HKW/179 G3CWW/150 G3SJH/322 G3UKH/126 HA8KUN/132	HA9RE/223 HA9RT/175 HB9CJX/186 I4EAT/309 J11EEA/179 JR1TNE/315 JA2BHG/332 JA2GSQ/208 JA2IG/297 JE2RDO/129 JA5IU/319 JA7HMZ/304 JA8AWH/309 KL7AF/273 KV4FZ/334 OE2SNL/176	OH2FS/318 OH2KI/321 OK1ABP/299 OK1DKR/226 OK2PO/244 ON4LD/174 PY5CA/298 SM7BIP/329 T10RC/133 VE2GHZ/161 VE2HN/151 VE5KX/289 VE6CB/152 VE7BCU/134 VE7BD/327 YU10XW/162	YU2JG/250 YU3HAM/257 ZS5MY/247 N1CNC/174 W1ODY/325 WA1AYS/251 K2BT/334 K2PK/275 KB2RA/269 K12P/228 KS2O/229 W2OB/306 WA2HZT/153 WA2LMW/282 K3BEQ/304	K3NL/332 KA3RI/297 W3AC/341 WA3LJP/308 K4ELV/242 K41R/330 K41TO/130 KC4ZH/262 KF4ZR/176 KJ4MD/230 N4DRG/288 N4KE/326 W4DTC/202 W4UKA/333 WB4CSK/271	WB4FLB/251 WB4MAI/300 WB4NFO/298 WB4QNP/324 WC4B/225 K5JUC/308 K5VNU/316 K5VT/324 K05P/229 KF5AL/155 N5EPA/129 W5EDX/332 W5BOS/286 W5JG/297 W5QK/353	WD5BIV/144 AA6G/316 K6RQ/353 K6SIK/201 K6TMB/286 KD6EU/200 N6ADI/301 W6NLG/306 WN6CND/253 WK6E/250 K7OZ/182 KC7V/264 KE7CR/151 KY7M/252 W7CUS/251	W7KSA/323 W7MCU/272 K8EFS/289 KJ8G/318 NK8Q/125 W8CT/339 W8MFV/301 AB9Q/262 K9BJ/309 K9DDO/281 K9RHY/292 KD9BG/250 KG9Z/252 KQ9Q/201 NB9C/176	NC9N/125 W9JOP/157 W9POC/199 W9TGN/224 W9TY/312 WA9BXB/225 WD9IIC/305 KW9WX/326 KC0F/J200 K9DS/175 N0EL/323 W0JS/300 W0NCY/230 W0PFG/245 WD0GML/293
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### Radiotelephone

CX2CS/265 DK6UR/175 DL2AW/313 DL2FAG/195 DJ4PT/331 DL7NB/316 DL7QB/271 DK4KL/318 DK6ZR/224 EABOZ/311 EL2AY/136	G3SJH/322 HA8XX/166 HB9CJX/177 I2JR/314 HB9AST/229 I4LCK/332 I7KBI/313 I8ACB/317 JA1RWE/312 JA2GSQ/200 JA2IG/287	JA5IU/314 JA7HMZ/282 JA8AWH/289 KL7AF/255 KP4CZ/153 KV4FZ/330 LU9DBK/201 QE1PPC/176 OH2FS/231 OX3KM/250 PY5CA/297	PY5PS/302 VE1OC/205 VE2GHZ/160 ZL2AFT/303 4X4AT/205 KA1ERN/179 KA2CYN/233 KB2RA/268 KG2U/304 KI2P/182 KS2O/207	N2AC/240 N2ERN/156 W2OB/263 WB2TKU/227 K3BEQ/304 W3AC/338 W3FDP/316 W3GG/329 AA4AM/249 KB4CWO/225 KC4ZH/262	KJ4MD/225 N4DRG/288 W4AVY/331 W4WVB/152 WA4MMO/324 WA4TJW/147 WB4QNP/317 K5VNU/313 K05P/227 W5DLQ/170 W5EDX/329	K6OCY/175 K6SIK/200 K6TMB/280 KB6CLL/155 KF6TE/126 N6ADI/291 W6NLG/301 W6NTX/321 W6XH/309 WB6ALC/155 WG6P/201	K7ABV/311 KC7V/235 CX7J/251 N7GM/152 W7JFO/335 W7LZG/198 W7YEM/305 W8NTX/321 K8EFS/289 K8REG/230 KC8KE/253	KB8DB/308 WB8CA/316 WB8XMM/142 AB9Q/282 K9BJ/309 W9KB/310 WB9LDD/307 KW9WX/320 K9NNF/270 WB9QO/270
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### CW

DK6UR/181 DK6ZR/229 DL2AW/234 DL3HAH/205 DL7NB/261 F6CZL/203	G3CWW/125 I4EAT/235 IK6CQO/179 JR1TNE/273 JA3CMD/272	JA4TF/207 JA7HMZ/271 JA8RII/176 KL7AF/225 OE2SNL/137	OH2FS/227 SM6CVX/253 VE1VX/125 VE3S/250 XE1OX/168	AK2H/202 AK2O/201 K2PK/266 K2UFM/276 KI2P/155	W2ZZ/226 KA3R/282 AA4DO/127 N4JF/299 K5VT/313	K6CBL/303 K6TMB/182 N6ADI/200 W6ENZ/211 KC7V/201	KJ8G/250 N8CQA/127 WA8SXQ/286 W9KB/260 W9LNQ/282	W9NNK/125 W9TY/300 WD9IIC/291 W0MTC/226 WB0TL/225
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### RTTY

OE2SNL/127      WB2CJL/154      WA6PJR/127

### 160 Meters

DL9KR/152      W4DR/185

# Strays



QST congratulates...

□ JARL President Shozo Hara, JA1AN, on being decorated with a Blue Ribbon Medal in

recognition of his outstanding contribution to restoring, promoting and developing Amateur Radio in Japan.

□ Kenneth Spittler, NØJP, of Winona, Minnesota, on achieving General Motors Master Technician Status and becoming a member of the GM Master Technician Advisory Council.

□ Berthold Sheffield, W2ANA, of Belle Mead, New Jersey, on receiving the Distinguished Adjunct Professor Award from Trenton State College.

□ Gerald Silverman, WB2GYS, of Tinton Falls, New Jersey, on receiving the Elmer of the Year Award from the Central New Jersey Chapter of the QCWA.

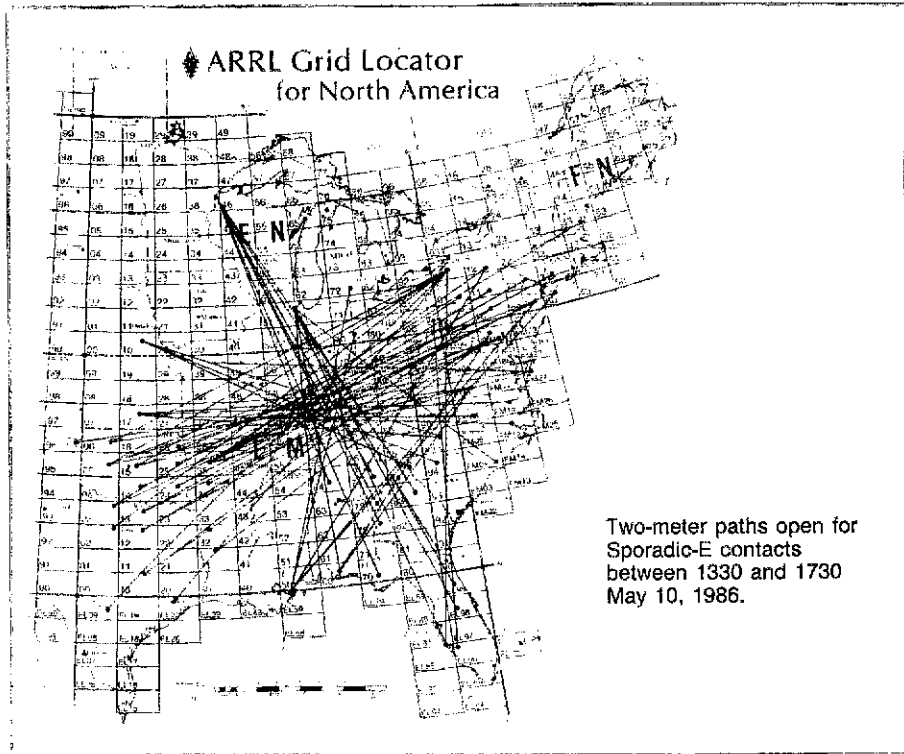
## E Season up to Expectations—So Far

Based on conditions in the Australia/New Zealand area between early November and mid-January, the June column speculated that we may be in for a very good E<sub>s</sub> season. As of the first days of June (when this must be written to meet the new QST mailing deadline), this pre-season prognostication seems to be coming true. It is true that the last week of May and the first few days of June saw a pronounced decline in the number and coverage of 6-meter openings, and a complete absence of 2-meter occurrences. But it's far too soon to conclude that the 1986 season was confined to early May. The first two weeks of May were indeed much more productive of both 6- and 2-meter Sporadic-E openings than usual, with Saturday the 10th being the hottest day. It would have been considered an outstanding day for June or July, but, coming as it did in early May, it was truly fantastic. This month's column will be devoted principally to a review of the 2-meter E<sub>s</sub> openings of early May, with particular emphasis on the 10th.

Perhaps the best illustration of the extent of the May 10 2-meter E<sub>s</sub> opening can be gleaned from the accompanying grid map. It was produced by K5YY and WA2FXB, and reprinted from the May issue of WBØDGF's *Midwest VHF Report*. In addition to the contacts displayed by K5YY and WA2FXB, I have added a few traces based on reports I have received. It is apparent that the opening affected most of the eastern half of the country. Both its extent and duration are very unusual for so early in the season. From some locations, it reportedly lasted for about two hours, and the overall time span was considerably longer than that. From the intersection of the traces, it is apparent that the E clouds were located approximately over Tennessee. This is borne out by a report from N4VC Nashville who worked KB3QM Delaware at 1335Z and WIDGA/3 Maryland at 1345 and then had no luck until 1625, when he worked WA1OUB New Hampshire. Al concludes that he was too close to the E cloud to be able to work much in the intervening 1 hour 40 minutes. The remainder of the reports show conclusively that the opening was certainly in progress during that time.

The earliest 2-meter contact that day I have heard about was one between WB5ROR Paris, TX and KB3QM at 1315Z; the latest seems to be at 1710Z between NOØY Wichita and N4BG southwestern Virginia. NOØY says that the latest E<sub>s</sub> signals faded at his location at 1725Z. Jon also notes that his friend KFØM was able to hear WA4SBC Virginia quite well on a hand-held and rubber duck. He also comments that the same two made an attempt to work on 1½ meters, but with negative results. Keep trying, fellows. Some day it will happen, and the participants will write another chapter in the annals of VHF.

Nor was May 10 the only day that 2 meters was open for E<sub>s</sub>. According to WA6BIL Westchester, California, May 18 was the productive day for his part of the country. It was a great day on 6 meters as well, with



Two-meter paths open for Sporadic-E contacts between 1330 and 1730 May 10, 1986.

short skip, lots of QRM and double hop across the country. On 2 meters, Jeff was able to work WB5POK Amarillo, TX at 1834Z with S9 plus 20-dB signals.

Of course, 6 meters was absolutely wild May 10, with many very short skip contacts taking place here in the East. Remember that, although short skip on 6 meters is a good barometer of what might be happening on 2 meters, it is not infallible. Often, it may indicate an opening, but not one necessarily that will affect your QTH. For example, if you hear 6-meter stations with very strong signals only a few hundred miles away, chances are you are too close to the cloud for it to provide you with 2-meter QSOs. Of course, it may be furnishing an area several hundred miles beyond you with 2-meter propagation. However, E clouds do move around, often quite rapidly, so hang in there; your time could come before very long. If,

on the other hand, you hear 6-meter stations several hundred miles from you working other stations a few hundred miles beyond that, 2 meters is likely to be open for you already.

Nor was 2-meter E<sub>s</sub> limited to this country. Europeans saw an even earlier opening than we did. It occurred April 25, when stations in the Manchester/Lancaster area were able to work into Italy. Also, May 16 brought 2-meter E<sub>s</sub> to London-area station G8LFB and permitted him to work a UQ2. Only a few minutes later, GW4CQT worked Polish station SP5EF, and G4XEN hooked up with two Polish stations, SP4DGN and SP2LU. The 1986 Sporadic-E season seems to be off to an auspicious beginning on both sides of the Atlantic.

Additional reports of 2-meter contacts made May 10 and other days during the month are chronicled in the On the Bands section.

### ON THE BANDS

**6 Meters**—Of course, with 2-meter E<sub>s</sub> behaving as it did during early and mid-May, 6 meters was putting on an excellent show of its own. In addition to a number of transcontinental double-hop openings, several intriguing beacon reception reports were turned in. Unfortunately, however, up through early June, no exotic DX contacts had materialized, at least on this side of the Atlantic. Reception of the GB3SIX beacon was reported by both Maine and Florida stations, namely KITOL at 0030Z May 13 and N4EJW around 1130Z May 10. At the same time that KITOL was hearing the British beacon, he was

also getting the OX3VHF Greenland beacon (50.045). Both were about S6. Also heard on a number of occasions has been the FY7THF French Guiana beacon. In addition, reception of 6Y5RS was reported by several Northeast stations. It's nice to know that the Jamaica beacon is still on. Judging from my own observation and reports received, it is seldom heard.

In both cases of reception of GB3SIX, efforts to stir up live 6-meter operators on the other end went unrewarded. There is activity there, however, according to G4ASR, who edits the monthly *VHF/UHF Newsletter*, published by the RSGB. In the June issue, David says that

# 1 1/4 Meter Standings

For WAS holders, listing is WAS number, call, state, call areas, worked and grid squares worked. For others, call, state, US states worked, call areas worked and grid squares 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 1 1/4 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 grid squares 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 8, 1986. Deadline for next update is December 5, 1986.

WAS Holders				W3XO MD 17 6 20				N6AMG* 3 3 ---							
1	W0VB*	MN	13	---	W3RUE	PA	16	9	12	W4WD7*	UT	37	10	22	
2	W0SD*	SD	---	---	KB3QM	DE	16	---	68	K7NII*	AZ	16	11	---	
2	W08TEM*	IA	---	---	W3UJG	MD	15	8	---	W7JF	MT	17	9	---	
4	K5FF*	NM	14	---	AC3T	DE	15	6	13	W7ICW	NV	4	2	---	
5	W5FF	NM	13	---	W3HMU	PA	14	4	---	WB8BKC	MI	31	9	55	
6	WBSLUA*	TX	---	---	W3IP	MD	13	6	---	W81XT	OH	28	10	---	
7	VE3EMS*	---	14	---	WA3JUF	PA	12	5	---	W81DU	MI	26	8	---	
8	W3GPY*	PA	12	---	K3IUV	PA	12	4	---	WB8PAT	OH	16	8	---	
	W1JR*	MA	44	14	72	WA3FYJ	PA	8	6	14	K8AXU	OH	12	7	---
	W2SZ/1	MA	23	9	55	K43B	PA	7	4	9	W8VO	MI	11	7	---
	K1FO	CT	23	7	---	WA4PCS	KY	32	7	---	K9MRI*	IN	34	9	---
	K1PXE	CT	18	6	---	WD4DGF	TN	31	9	63	K9XY*	WI	28	13	---
	W1GXT	MA	17	9	---	WA4NMA	GA	25	8	---	K9HMB*	IL	23	10	---
	W1QXX	MA	15	5	21	W3IY/4	VA	23	10	---	WB9SNR	IL	22	9	---
	W1YTW	ME	14	8	---	KC4EG	KY	23	7	---	K9KFR	IN	11	6	---
	K1JIX	MA	13	4	---	K4LHB	VA	21	9	---	W8UC9	WI	6	2	7
	K1LPS	VT	12	6	---	WS4F	GA	20	7	28	KB9NM	WI	5	4	---
	WA1JOF	MA	11	5	15	WA4CQG	AL	20	---	---	KA0Y	IA	32	11	---
	K1BFA	MA	10	3	---	WD4IIS	GA	18	7	---	K0DAS	IA	29	10	---
	W1AZK	NH	10	3	---	WA4SBC	VA	17	6	---	K0ALL	ND	23	10	---
	W2CRS	NY	21	---	---	N3AH/4	GA	16	6	---	W0PW*	CO	20	8	---
	W2PGC	NY	20	9	---	K4GL	SC	14	6	---	K0TLM	MO	18	5	35
	K2CBA*	NY	19	7	---	WA4MVI*	SC	12	7	---	W0RT	KS	12	5	---
	K2GK	NY	16	8	41	K4CKS	GA	11	2	---	KC0QR	NE	8	3	8
	K2DNR	NY	15	6	---	KC4P	AL	9	2	---	WA0NOK	MO	6	2	---
	W2DWJ	NJ	15	6	---	WA4LYS*	FL	6	6	6	WB0ZKG	IA	5	2	---
	WB2IEY	NY	14	7	37	K4IXC	FL	5	3	---	WA0QLP	SD	4	2	---
	K2YCO	NY	14	7	---	W5RCI	MS	30	7	---	KC0W	ND	3	1	---
	WA2FGK	NJ	14	6	---	W5HN	TX	22	6	19	VE1UT	NS	7	4	---
	WA2FUZ	NY	14	5	---	K5CM	OK	22	---	---	VE2YU	---	8	3	8
	N2WK	NY	13	8	37	K5UR	AR	18	6	26	VE2DFO	---	7	8	---
	N2BJ	NY	13	5	23	K5SW	OK	16	5	32	VE2HW	---	5	2	---
	W2WW	NY	13	5	19	N4J5/5	MS	13	7	---	VE3DSS	---	13	7	---
	W2SEU	NY	13	5	---	W5NZS	OK	12	---	25	VE3LNX	---	13	5	29
	WA2YWP	NY	6	2	---	N5KW	OK	12	---	---	VE3AIB	---	10	12	---
	K3HZO	MD	22	10	17	WASVJB	TX	11	5	---	XE2BC*	---	2	3	---
	N3CX	PA	18	---	---	K5JL	OK	7	4	---					
						WA5DDBY	TX	3	1	3					
						WB6NMT*	---	10	6	---					
						W6WSQ	---	6	4	---					

\*some contacts via EME  
 ---information not supplied

Sporadic E has been almost a daily occurrence on 6 meters, with the ZB2VHF Gibraltar beacon heard frequently and the 5B4CY Cyprus beacon also in occasionally. He also reports working CT1AWO two-way on May 9, and notes that May 17 brought many crossband QSOs between British 50-MHz stations and Norwegian, Swedish and Finnish operators replying on 28.885. G4UPS, perhaps better known on this side of the Atlantic as ZD8TC, also passes along a list of European 6-meter and crossband QSOs that he has had recently. Ted pleads for a 20-meter frequency to use when there is no propagation on 10 meters. He suggests 14.345. This spot is widely used in Europe for VHF liaison and is also the venue for both the 2-meter and 70-cm EME nets held each Saturday and Sunday beginning at 1600Z.

It's always nice to hear from people new to VHF or those returning after an absence of many years. One recent such convert is NA6J Catheys Valley, CA. Mike says that he used to be W2LCP in New Jersey and worked 5 meters in those days. He says that his 6-meter station is quite modest, but that he is having a good time with openings beginning May 18 to Washington, Colorado, Kansas and Texas. Another Golden State resident, WA6BIL Westchester, CA, is really excited over propagation on both 6 and 2 meters. Jeff also says that his station is modest (70 W to a dipole at 20 feet), but on May 18 was happy to be able to work all corners of the country, including K1TOL Maine, W7DP and KA7ICT Washington, and WB2RJL/4 and N4WW Florida.

N4VA would like to see more information in the column on nets, and passes along news of one begun by a group of North Carolina stations. Larry says they meet on 50.2 at 0800 local-time Sunday mornings and are also trying to drum up sufficient activity for a 2000 local time get-together Monday, Wednesday and Friday evenings.

A reminder: Updates to the 50-MHz DX

Standings must be received at PO Box 117 no later than September 2.

**2 Meters**—Judging from what is written at the beginning of this column, it is apparent that 2 meters was the star performer during the first part of May. What follows are just a few examples of what took place on the 10th and several other exciting E-Skip days.

W0PN Dufuth, MN was one of many active during the huge May 10 opening, and reports the following contacts between 1600 and 1650Z: W5HUQ/4 Florida EM90, W4ISS Georgia EM83, WB2KHD/4 Georgia EM83, KL7JG/4 Florida EM70. Ron notes that the band then shifted to Alabama in the vicinity of EM72, allowing him to work seven stations in that area: KB4NCD, WA4CQG, KB4OOW, W4NT1, WB4GFO, K4QF and W4EQM. W0PN comments that he was hampered by not having his big rig running and having to be satisfied with 100 W to an OSCAR array. From the East Coast, K2OVS reports contacts with W4ODW Florida, NY4T Tennessee, WB4NNY South Carolina and K5YY Arkansas between 1400Z and 1600Z. From Oklahoma City, W5NZS's log shows 16 contacts in the Mid Atlantic states, including KB4BNW FM07, WB2IFC/4 EM27, AA4KP FM07 and K4WOB FM17 Virginia; Maryland stations W1DGA/3, K3NXH, N3FL, W3ZZ, K3TK and N3AM—all in FM19—along with WA3DMF in FM18; New Jersey stations K2TXB FM29, K2SMN and N2AHN both FM20; and western New York station W2DRZ FN02. Larry pleads for stations to give their states as well as their grid squares so people can tell immediately when they have a new one on the line. W3CWG comes up with his own list of 16 contacts. It features Louisiana stations WA5WXD, NW5K and W5VAS—all EM40—in company with NU5F EM32; WJ5U EM50 and W5JTL EM42 Mississippi; N4KMT EM60

Florida; WA4CQG EM72 Alabama; W9BN/5 EM34 and K5YY EM35 Arkansas; K5ACR EM14 Oklahoma; NY4T EM55 Tennessee; and four Texas stations; N5HHS EM10, N5WS and WB5VNI (both EM12) and KESEP EM13. Altogether, Jack added 10 grid squares bringing his total worked to 116.

One of the stations appearing on the worked lists of many from the Mid Atlantic states is NU5F. From his end, NU5F describes signals between 1430 and 1700Z as "real loud," permitting him to bag 17 grid squares in Ohio, Pennsylvania, Maryland, Delaware, New Jersey, New York, West Virginia and Ontario. Bill says that the rig consists of a Hallicrafters transverter with 50-W output to a Junior Boomer at 50 feet. Another with a somewhat modest setup who did well was N5HYV Violet, Louisiana. Paul added five new states and 14 grid squares to his total with contacts in Indiana, Ohio, Michigan, New York and New Jersey as well as one VE3. From his call to the answering machine, it was apparent that he was very pleased and excited by the opening and proud of his accomplishments in it. I would conclude that he, and a number of others, justifiably share similar feelings.

**1 1/4 Meters**—WB2IEY writes that activity on the band is alive and well in the western New York area. Tom has recently put up a new antenna consisting of four homebrew 13-element Yagis, and is anxious for some EME action. His lament is that he missed the February 8 aurora, but has upped his previous state and grid square totals nevertheless. Plans are to go to FN14 for the September QSO Party. You should be popular, Tom.

**The Higher Bands**—As if the wild happenings of May 10 were not enough, the following

(continued on page 63)

## Circular Waveguide for 2304 MHz

Waveguide is frequently used as a transmission line on the microwave bands because of its low loss characteristics. In the mind of many amateurs, the term "waveguide" conjures up a picture of the rectangular brass tubing that often shows up at flea markets—usually designed for X-band (8-12 GHz) use. There is, however, no requirement that waveguide must be rectangular or that it must be made of brass. It could just as well be round aluminum tubing (as will be described later). The reason most of the commercial waveguide is rectangular has to do with the nature of the propagation of electromagnetic energy along the guide. A rectangular cross section of the right dimensions will allow only one principal "mode" of propagation, ie, only one arrangement of electric and magnetic fields within the guide. This being the case, polarization of the signal is maintained (since this corresponds to the direction of the electric field), and it becomes easy to design devices to couple into the fixed patterns of electric and magnetic fields (couplers, circulators, matching devices, etc). In most commercial waveguide, the

dominant mode is designated TE. TE stands for transverse electric and refers to the fact that the electric field is transverse to the guide, extending between the narrow walls of the rectangular guide.

If the waveguide is to be used solely as a transmission line, then the mode of propagation of energy within the guide is less important. As mentioned earlier, round aluminum tubing could easily be used, and this is what Joe Moraski, KY3F, has been experimenting with. Joe has written in with details of some tests he has been conducting using standard aluminum downspout as waveguide for use on 13 cm (2304 MHz). Using an Alfred 6600 sweep oscillator and an HP 8755A swept amplitude analyzer in conjunction with Narda couplers and detectors, Joe has made measurements on waveguide lengths of up to 30 feet, using home-brewed coax to waveguide adapters to couple RF

energy into and out of the waveguide.

The dimensions of these adapters and their mounting position on the waveguide are shown in Fig 1. Some of Joe's results are shown in Fig 2, which shows the loss of a 30-ft length of "spout" waveguide and a 30-ft length of RG-214. As can be seen, the loss is about 2 dB at 2304 MHz. As a comparison, 1/2-inch heliax should show about 1.5 dB at this frequency. To show what can be done with waveguide, commercial WR340 (an aluminum rectangular waveguide 3.4 in x 1.7 in should show about 0.2 dB loss on a 30-ft length! Perhaps with a little tweaking, the performance of "spout" waveguide could be improved and show lower loss than Joe has seen so far. It is certainly in keeping with the amateur spirit of experimentation to see just what can be done. Thanks to Joe for sharing his work with us.

One way in which an improvement might

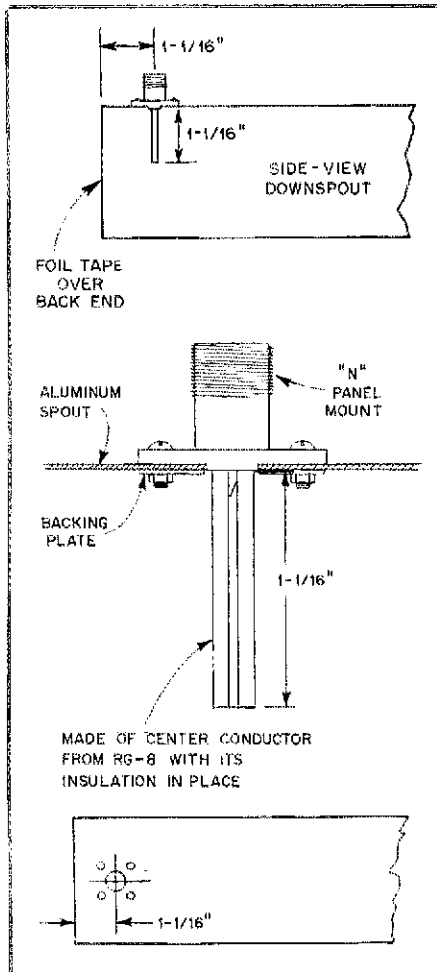


Fig 1—KY3F coax to "spout" waveguide transition.

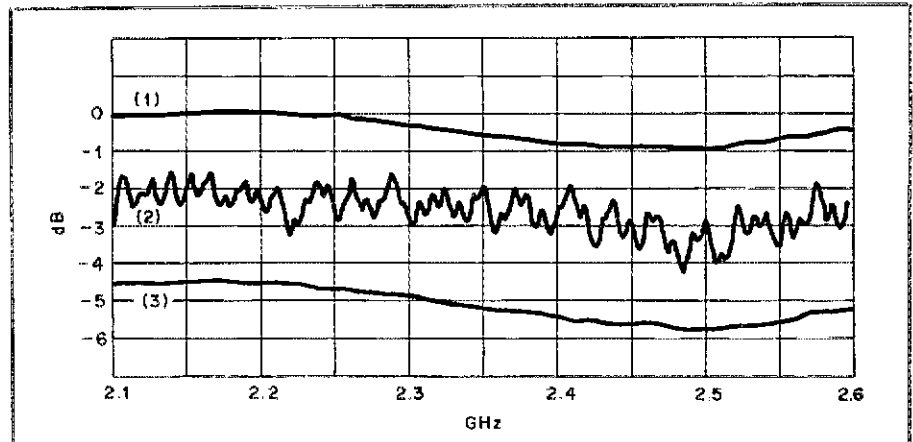


Fig 2—KY3F measurements on spout waveguide and coax: (1) 0-dB line (output of sweep generator); (2) loss of 30 ft of spout waveguide (~2 dB); (3) loss of 30 ft of RG-214 coax (~4.5 dB).

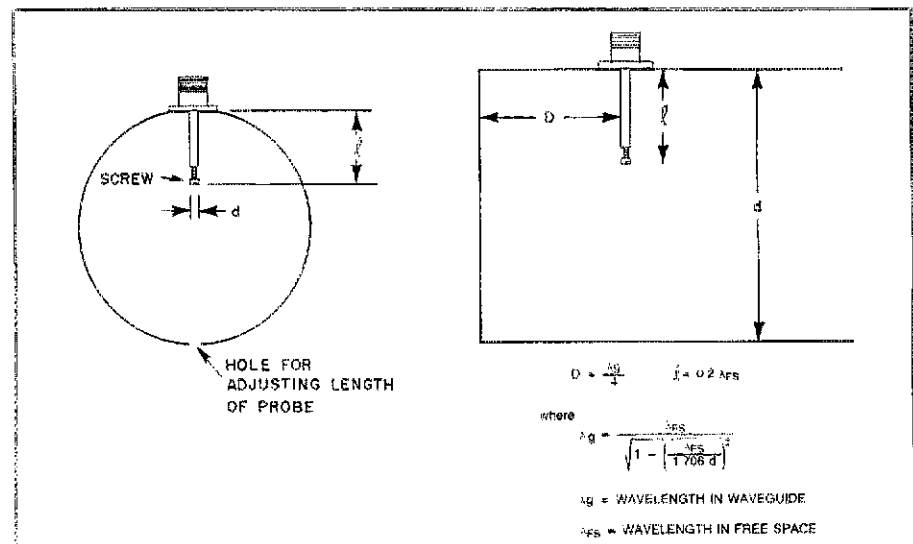


Fig 3—Dimensions for a coax to circular waveguide transition.



be gained is by better matching of the coax to waveguide transition. One set of dimensions that should work well for the transition elements is shown in Fig 3. The probe length is approximately 0.2 free space wavelength long (2.6 cm at 2304 MHz). It may be made adjustable by using a length of 1/8-in or 3/16-in brass or copper rod with a 4-40 tapped hole in the end. A screw may then be inserted into this hole and used to adjust the probe length. The probe itself should be situated approximately 1/4 waveguide wavelength from the shorted (closed off) end of the waveguide. The wavelength in the waveguide is a function of the waveguide diameter as indicated in Fig 3. Fig 4 shows a plot of this function for 2304-MHz radiation. Note that the waveguide rapidly increases as the "cutoff" frequency is approached. For 2304 MHz, the ID of the waveguide should be larger than about 8 cm to avoid approaching cutoff and increasing attenuation. For a 4-in-(10.16-cm-) ID guide, the wavelength in the waveguide is 19.6 cm, and thus the probe would be spaced 4.9 cm from the closed-off end. These numbers are, of course, approximate. In reality, the best approach would be to arrange for this distance to be variable, and to adjust it and the probe length for minimum reflected power.

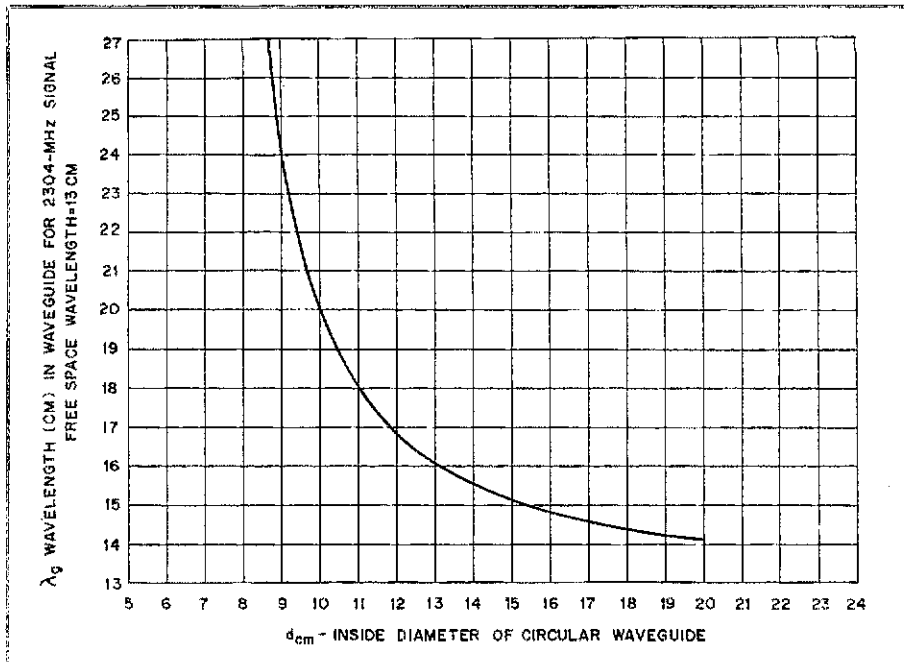


Fig 4—Relationship between free-space wavelength and wavelength in circular waveguide for 13-cm (2304-MHz) radiation.

## Moved and Seconded . . .

(continued from page 53)

### 9. Convention Matters:

9.1. On motion of Mr. Turnbull, the following conventions were approved:

Section	Date	Location
Northern Florida	August 9-10, 1986	Jacksonville, FL
Florida State	February 7-8, 1987	Miami, FL
Southeastern Division	March 13-15, 1987	Orlando, FL
Michigan State	March 20-21, 1987	Muskegon, MI
Nebraska State	March 28-29, 1987	Kearney, NE
Missouri State	April 10-12, 1987	Kansas City, MO

9.2. First Vice President Holladay presented an oral report on the 1988 National Convention, to be held in San Diego September 5-7; a review of the convention program followed.

10. On motion of Mr. Grauer, officers were authorized to sign a document permitting the transfer of funds by wire from Dean, Witter, Reynolds, Inc. to the ARRL account at Shawmut Bank of Boston, N.A.

11. The next meeting of the Executive Committee was scheduled for August 23, 1986 at St. Louis, Missouri.

12. Other matters were discussed briefly, including satisfactory progress of the CRRL toward its five year goals; Hands Across America; and the possibility of a W6AM memorial on the West Coast. The Committee was then in recess at 5 P.M., reconvening at 10:20 A.M., on Saturday, June 14 with all persons hereinbefore mentioned present except Vice Director Drake. Discussion resumed on Agenda Item 9.2, National Convention matters. On motion of Mr. Butler, the following statement was unanimously adopted: The Executive Committee reviewed the plans for the 1988 National Convention and found the progress satisfactory to date.

There being no further business, the Committee adjourned at 11:30 A.M.

Respectfully submitted:  
Perry Williams, WIUED  
Secretary

### Life Members Elected June 13, 1986

Ruth Abrams, KA2ZRP; Elizabeth C. Adams, NG8I; Michael E. Adams, N6GFV; Carole H. Allen, W5NGG; Barbara M. Alm, N6CBN; Ruth M. Armes, KB4KJG; Constance K. Barsky, WD8ODC; Janet A. Bird, KB6KTU; Lois Bird, WA1ZOX; John M. Blinke, K18Y; Kathy Bogart, N3CGH; Helenrose

E. Burke, W5IXS; John R. Burroughs, N6LXC; Kay Lawson Carter, WA5DYC; Marlis Cartwright Norton, KA2TPA; Francis W. Chao, N6ESM; Gregory K. C. Ching, KH6FD; Judy B. Cottage, WA2IFX; April C. Delancy, AL7CV; Donna B. Dillon, N5GWM; Mary E. Dorian, KA3PJZ; Patricia T. Fagan, KB4PEX; David W. Farrington, WB1FCV; Lois A. Fridenstine, N8GTI; Patricia Grandinetti, N2FPM; Jerry Grunden, WR6X; Endora B. Hahn, KA9MPN; Robert B. Harris, N2BZP; Donna L. Hebert, WB7NAW; Robert C. Heiser, Jr., W7IKT; Mildred C. Janssen, KA6STT; Carol G. Jefferies, KF4OF; Robert J. Jones, WB8DRV; Norma Kerwin, KA1NVR; E. M. Lacefield, KA5WZR; Gerald V. Lake, KD4NH; Sheldon R. Levy, WB2GKL; Jeanne McClard, WA6RLZ; Deborah Oliver MacDonald, N4APZ; Dorothea Evergates Mann, KA2OUZ; Catherine A. Marrin, N2FOU; Larry L. Moegenberg, NA2G; Irene Morgan, WB7WQE; James A. Muller, WB2FFY; Frank O. O'Halloran III, WD51GM; Fran Olsen, N4NXJ; Dotty Peterson, N0HAS; William D. Power, K0ARK; Loretta Pozzani, KA3HKT; Cynthia R. Pyeatt, WD5HDU; Jean Reazer, N8AXO; Suellyn S. Rossmann, KA9ACX; Lois Schwab, KA8YOK; Maria E. Semiao, KA2VJF; Mary A. Smith, KA0EJY; Moira E. Skalski; Russell D. Smith, KA2G; Robert Steinhauser, KA9UUH; Teresa I. Stewart, WD9FKH; Jacqueline Mae Tolley, KE4TX; Ruth M. Thompson, KB6KMA; Orland Upton, N7FLE; Joseph T. Vaccaro, WA3YAO; Bobbie Carol Waller, KA4DXU; Charlan K. Walston, KA1THM; Joan M. Wang, KB4FT; Olga H. Watkins, WA4BNW; Robert J. Wiley, N6LDQ; Joseph P. Wilkerson Jr., WA6NZC; A. N. Williams Jr., WB3GPM; Lawrence A. Wise, K5UYH; Joan Zak, WA2YJU.

## World Above 50 MHz

(continued from page 61)

evening saw a terrific north-south tropo in the Midwest. W5NZS Oklahoma City writes that he was able to work KC0QR EN10 Nebraska on both 1 1/4 meters and 23 cm for new states on both bands. Another new state, number 5, was added on 23 cm by virtue of a contact with N0ERT EN21 Iowa. Also worked on 23 cm was K0NG EN10 Nebraska, who was very strong for over an hour, WB0YSG EM28 Kansas and WB0TEM EN12 Iowa, who was also very strong. Larry even added state number 36 on 2 meters by working W0SD EN13 South Dakota. He probably

missed working that station on 23 cm for another new state by going to bed at 0130 local time. W7CNK/5 reportedly completed a 23-cm contact with W0SD a half hour later.

## VHF/UHF Century Club Awards

The ARRL VUCC is awarded to amateurs who submit written confirmations for contacts with the minimum number of Maidenhead grid-square locators indicated in italics for each band listing. Initial qualifiers are shown first, followed by those with endorsements, for April 15, 1986 through June 14, 1986. An SASE will bring you the rules and application forms.

6 m (50 MHz) 100	70 cm (432 MHz) 50
114 WD9FSA	49 KE5EP
115 K13L/5	50 K3YTL
116 N3BBI	51 WA5DBY
117 K4RWP	52 KB3QM
118 N7BUP	53 WB3LJK
119 K9LGR	G6DZH 70
120 WD9FFC	W1JR 130
121 K4CKS	WB5AFY 110
122 N4VA	W0RAP 140
123 WA9FYB	
124 AC3T	
125 K2GK	
2 m (144 MHz) 100	23 cm (1296 MHz) 25
WA1OUB 300	21 WA0TKJ
W1QXX 250	22 KE5EP
KA3B 150	23 WA5DBY
N3BBI 200	WB5AFY 30
K13L/5 125	KE5EP 30
W3WFM 275	WB5LUA 60
K4CKS 150	KD5RO 30
KE5EP 150	
N9FDS 150	
WD9FFC 175	
KY9P 150	
N0LL 275	
2.3 GHz 10	5.7 GHz 5
8 WB5AFY	
9 KD5RO	
10 W7CNK	
11 W5UC	
2 m (144 MHz) 100	5.7 GHz 5
104 N8DEJ	
105 WB0SWD	
106 WA3FYJ	
107 KD4LT	3 WA5ICW
108 W3CWG	4 WD5AGO
109 KB4FO	5 W5UGO
110 N2WIK	
WA4NJP 175	
WB8ART 175	
KABABA 125	

## What Do Coordinators Want to Know About Repeaters?

If you went through the coordination process, your frequency coordinator most likely has all of the necessary information about your repeater in his files. But for grandfathered repeaters and uncoordinated ones, the coordinator's files are incomplete or lacking sufficient details to afford you the protection you need in case of an interference complaint. Primarily, the coordinator wants to know who to contact (complete name, call, address and phone number) when he has to get in touch with repeater owners/operators. In the case of club stations, he needs that information for the trustee. You should also provide: the date your repeater was placed in service, experimental and regular service; whether you were coordinated, when and by whom; details

of the physical location of your repeater (longitude and latitude, for example), the name of the mountain it is on (if this applies) and its relationship to the nearest town that may be found on the map; your coverage area (cities, towns and counties, for both base and mobile users); your type of transmitter/receiver; whether you use a duplexer and, if so, the manufacturer, single- or split-site operation. If your machine is linked, with what other facility? By what means? List your linking and control frequencies (these will be kept confidential). Is your repeater controlled by a microprocessor controller and, if so, which make? Your antenna type? Its height above sea level and height above average terrain. Your output power ERP? Is the

repeater opened or closed (private)? How is it accessed (carrier, whistle, tone, etc)? Does it have autopatch? Is the autopatch opened or closed or restricted to club members? Does your repeater have emergency power? Is the ID by voice or CW? Provide any other information that you feel would make your file more complete. And be sure to notify your coordinator when you change the repeater's call or any of the other repeater parameters. Repeater owners and operators, does your frequency coordinator have all of this information on your repeater? Why take a chance? Provide the necessary information and he will put it in his file. Better safe than sorry. (Ted Wolfe, WD4KHL, from *The CVRA-SERA Repeater Journal*)

### THE ROLE OF THE ARRL

Some individuals and repeater owners have stated that they were coordinated a repeater frequency by a local ARRL appointee. The simple fact is, ARRL is not a frequency coordinator, they have never been a frequency coordinator, they do not plan on taking on the job of frequency coordinator, nor do they want it. Over the years, we have had some mild arguments with some ARRL appointees who felt they were authorized to coordinate, but they were in a minority. Actually, the ARRL publishes a national *Repeater Directory* once a year. They also publish a national *Repeater Coordinators' Newsletter*, which is mailed to all of the frequency coordinators in the country. ARRL is also helping the group form a national data base that will be accessible to all coordinators to provide them with on-line information. The ARRL is

helpful in getting groups of coordinators together and helping them work up policies that parallel other councils. The ARRL has always had a national band plan for repeater frequencies, but this band plan was merely a guide for coordinating councils to follow. But, as for frequency coordination of individual repeaters, the ARRL has no part in that. (from *The CVRA-SERA Repeater Journal*)

will use the 15-kHz "upright" channel spacing band plan that is standard on the East Coast. (from the newsletter of the Western Washington Amateur Relay Assn)

### NORTHERN CALIFORNIA REJECTS 20-kHz CHANNELING

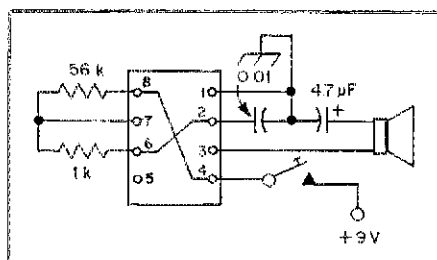
By a 10-vote margin, the Northern Amateur Relay Council April 5 rejected the "Pacific-Northwest" 20-kHz channel spacing band plan for the 146-148 MHz segment of 2 meters. As a result of this 79 to 69 vote, Northern California

### REPEATER LOG

According to April 1986 reports received, repeaters were involved in the following public-service events: 277 vehicle emergencies, 26 drills/alerts, 26 medical emergencies, 16 fire emergencies, 15 public-safety events, 1 criminal activity, 6 weather emergencies, 1 power failure and 1 search and rescue.

The following repeaters were involved (followed by the number of events): WA1DGW 13, WA2ZWP 10, W2UL 31, WD4JWO 3, W6FNO 266, WA6BJY 6, W6NBJ 15, KH6H 3, K8DDG 10, WD81EL 5, W8MVE 6, KD0JE 1.

## A Simple-to-Build Code-Practice Oscillator



Want to build the same one-piece code-practice oscillator that David Koch has his students build? (See his article, pp 46-47, this issue.) Radio Shack parts numbers appear in parentheses.

- 555 IC (276-1723)
- Socket (276-1995)
- 56-kΩ resistor (271-43)
- 1-kΩ resistor (271-023)
- 0.010-µF capacitor (272-131)
- 4.7-µF capacitor (272-1024)
- 9-V battery clip (270-325)
- 8-Ω 2-in spkr (40-245)
- Key (20-1084)

## Strays



### HAMBIT '86—THE FIRST INTERNATIONAL CONGRESS ON AMATEUR RADIO AND COMPUTERS

□ Ham radio and computers will meld at a symposium sponsored by the Italian Amateur Radio Association (ARI) in Florence, Italy on November 23. The goal of HAMBIT '86 is to provide a general view of the experiences, perspectives and advances in the communications and computer fields. For more information, contact Organization Committee Chairman Carlo Ciapetti, ISCLC, Via Trieste 36, 50139 Florence, Italy.

### QST congratulates...

□ Harold Schearer, W3MB, for his 70 years in Amateur Radio. Edward Gurtowski, W3BHS (right), presents Harold with a Distinguished Member certificate from the Quarter Century Wireless Association.

First licensed in 1916, Harold recalls that the radio inspector came to his home in a new Cadillac with an antenna on it. The inspector asked to see Harold's equipment, sent code to

him and asked a few questions. Harold sent back some code, and that was it. Harold was told he passed and was issued the call 3MB, which he has held for 70 years.



## Packet Radio POPCORN

Unless you have been in deep hibernation for the last 12 months, you know that packet radio is the hottest mode of Amateur Radio operation today. More and more hams are joining the packet radio ranks everyday, and the resulting overcrowding is causing the operation of the packet-radio network to become very rank. Hams who have not been properly initiated in proper procedures are making operating errors that are causing the network to get bogged down.

Things have become so bad that Tucson Amateur Packet Radio's Lyle Johnson, WA7GXD, and Pete Eaton, WB9FLW, have put together a presentation that they have given at conventions on how to eliminate poor operating on packet. In this column, I would like to share with you some of the ideas that Lyle, Pete, and others have offered—to share with you some packet radio POPCORN; that is, Proper Operating Procedures that Can Only Revive the Network.

Monitor 145.010 MHz and take note of the number of repeated packets ("retries"). Often, the retries are caused by one packet colliding with one (or more) other packets that are being transmitted on the same frequency. Collisions result in the erroneous reception and rejection of the packet at its intended destination station, and thus the packet is sent again ("retried"). As more stations get on the same frequency, retries increase and data throughput deteriorates dramatically.

### Move It!

One way to alleviate this congestion is to move off a busy frequency. If you are conducting a VHF/UHF direct (sans digital repeater) contact, move your contact to an unused frequency. It is very inefficient to try to exchange packets on a frequency where digital repeater stations are also exchanging packets. You should use a frequency occupied by a digital repeater only when you are using that digital repeater.

The same rule of thumb also applies to HF operation. Move to an unused frequency if there is other packet-radio activity on the frequency you are presently using. Often one frequency is used as a calling frequency, where stations transmit packets to attract the attention of other stations who may wish to contact them. Once a contact/connection is established, the stations move to another frequency where there is less activity, thus clearing the calling frequency and increasing their own station's throughput.

### I Hate Beacons!

If you've seen one beacon, you've seen them all! The only good beacon is a dead beacon! Such epithets are heard throughout the packet-radio community and for good reason.

All terminal node controllers (TNCs) have a beacon function, which allows a station to send an unconnected packet at regular intervals. These unconnected packets usually contain a message to the effect that the station originating the beacon is on the air and is

ready, willing and able to carry on a packet-radio contact.

The purpose of the beacon function is to generate activity when there is none. This purpose was legitimate when there was little packet radio activity. Back in the early days of packet radio, it was a rare occurrence when a new packet-radio station appeared on the air. Without beacons, that new station might think that he was the only packet-radio station in his town. Similarly, packet-radio stations already on the air would not be aware of that new station's existence. It was very discouraging to build a TNC, get on the air and find no one to contact. The beacon function was the solution to the problem; it made stations aware of each other's existence.

Today, beacons are usually unnecessary. There is absolutely no need to resort to beaconing in order to make your existence known. On HF and 2 meters, there is plenty of activity. If you are getting on the air for the first time, monitor 14.103-plus or 145.010 MHz for a few minutes and you will quickly have a list of the other stations that are on the air. When one of these stations disconnects, send a connect request to that station.

After a few connections, your existence on the air will be known.

Over a year ago, Hank Oredson, WØRLI, the father of the message-forwarding packet-radio bulletin board system (PBBS), conducted a contest as to who could come up with the most odious beacon. I tied for first place with the following:

WA1LOU IS NOT AT HOME, SO PLEASE DO NOT CONNECT WITH HIS STATION.

Such a beacon is not only useless, it is illegal, too. Yet, each day, beacons as bad or worse than that winner scroll across my computer screen. As an alternative to beaconing, leave a message on your local PBBS announcing your existence. This is more effective than beaconing; people will be able to read your message even when your station is off the air!

Beacons only add congestion to already congested packet-radio channels, so do the packet-radio community a favor and disable your TNC's beacon function (simply type B E 0 <CR>).

The next installment of On Line will include additional packet-radio POPCORN. In the meantime, QSY and beacons off.

### PX: Apple Harvest

Computer programs for Apple Models II, II+ and III and Macintosh computers are offered in this installment of PX.

Program 127: a CW receive program for the Apple II (with no external hardware) written in BASIC by Andre Bédard, VE2FNF.

Program 128: a resistor-identification program written in BASIC for the Apple II+ by Lannes Johnson, NJ5H.

Program 129: a QSL card-generator program written for the Apple III in Business BASIC by Glenn Goodenow, KC0OJ.

Program 130: MacMUF (MINIMUF for the Macintosh) written in Pascal by Daniel Rosenne, 4X4SK (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 catalog of all 130 programs in the PX library is also available by sending a business-size SASE with 22 cents postage to Dept PX.



A who's who of packet radio were at this year's Orlando Florida State Convention, including (l-r) N2WX, VE3FJB, K8KA, VE3GYQ, WB9FLW, NK6K, K9NG and N0CCZ. Kneeling in front of the group is WA7GXD. Also present, but not visible in this photograph, is the Stealth TNC. (WA2FTC photo)



## CRRL Officers and Directors

**President:** Thomas B. J. Atkins, VE3CDM  
**Vice President and Secretary:** Harry MacLean, VE3GRO  
**Honorary Vice President:** Noel B. Eaton, VE3CJ

**Directors:** G. Andrew McLellan, VE1ASJ  
Albert G. Daemen, VE2IJ  
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William A. Gillespie, VE6ABC  
William Kremer, VE7CSD  
**Counsel:** B. Robert Benson, QC, VE2VW  
Suite 1600, 2020 University Ave  
Montreal, PQ H3A 2A5

**CRRL Headquarters Office:** Box 7009, Station E  
London, ON N5Y 4J9, Tel 519-225-2188  
**General Manager:** Raymond Staines, VE3ZJ  
**CRRL Outgoing QSL Bureau:** Box 113, Rothesay, NB E0G 2W0  
**Bureau Manager:** Donald Welling, VE1WF

## Restructuring: CRRL and CARF Submit Joint Comments

Restructuring the Canadian Amateur Service: The issue was just too important to have Canada's two national Amateur Radio organizations, CRRL and CARF, deal with it separately. It was time to put past differences aside and speak with one voice.

What did the national organizations say? Permit homebuilt transmitting equipment for

all classes of certificate. Use a no-code entry-level certificate to attract newcomers. Offer attractive incentives to encourage those newcomers to learn Morse code and join the mainstream of Amateur Radio. Include at least one incentive that would give newcomers a taste of privileges that come only with the

highest-class certificate so those newcomers would want to work for that certificate. Make each step toward the highest-class certificate part of a logical progression. Make each step attainable. Still, insist on high standards to ensure the ultimate quality of the Canadian Amateur Service.

There's lots more. Read on.

Before the  
DEPARTMENT OF COMMUNICATIONS  
Ottawa, Ontario K1A 0C8

Discussion Paper on a )  
Possible Restructuring of )  
the Amateur Radio Service )  
in Canada )

TO: The Director-General,  
Radio Regulatory Branch

JOINT COMMENTS OF  
THE CANADIAN AMATEUR RADIO  
FEDERATION, INC.  
THE CANADIAN RADIO RELAY  
LEAGUE, INC.

### A. Introduction

The Canadian Radio Relay League, Inc. and the Canadian Amateur Radio Federation, Inc., herein referred to as the "national organizations", principal representatives of over 20,000 radio amateurs licensed by the Department of Communications, respectfully submit these joint comments in response to the Department's Discussion Paper on a Possi-

ble Restructuring of the Amateur Radio Service in Canada.

Over the past six months, the national organizations have been flooded with comments on the Discussion Paper. These comments have come from individual amateurs and from amateur radio clubs and groups. The national organizations found that there was widespread support for the Department's objectives. However, the comments seemed to offer as many ways to reach those objectives as there were comments. For this reason, the national organizations used the comments first to identify the needs of the amateur radio community. Then, mindful of those needs, the needs of the Department, the Department's own proposals, and suggestions from the amateur radio community, the national organizations proceeded to develop a proposed structure that would meet all needs and incorporate the best of the proposals and suggestions.

In a restructured Amateur Service, the needs of the amateur radio community would include the following:

1. More and younger radio amateurs,
2. High standards for all classes of certificate,

3. Strong incentives to upgrade to the highest-class certificate,

4. A continuing role for Morse code,

5. A continuing stress on the experimental side of amateur radio: this would preclude any ban on the use of homebuilt or modified commercial transmitting equipment,

6. Compatibility with structures in jurisdictions with which Canada has reciprocal operating agreements, and

7. Viability in the eyes of the international amateur radio community.

The needs of the Department would include the following:

1. Ease of entry into the Amateur Service,
2. Simplicity, resulting in less administration and lower costs,
3. Recognition of the fact that many amateurs and prospective amateurs are more interested in "communicating" than in the technical aspects of amateur radio, and
4. A structure that will remain viable into the next century.

The national organizations believe that the structure described below will meet these needs.

### B. Proposed Structure

#### Outline:

The entry-level certificate would be called *Certificate B* or the *Basic* certificate.

There would be a written test based on 40 hours of study of basic electronic theory, basic electronic circuits, receiving and transmitting systems, antennas and propagation, station setup and operation, and interference prevention, as well as a regulations test.

Holders of *Certificate B* would be permitted to use all modes on amateur frequencies above 30 MHz.

#### Comments:

Many amateurs suggested reversing the nomenclature used in the Department's Discussion Paper, reserving *Certificate A* for the highest-class certificate. The term *Basic* is psychologically good. It suggests something to build on.

There would be no code test. This would make the certificate attractive to computer buffs and others who may view Morse code as interesting but old-fashioned. 40 hours of study would ensure the high standards that everyone is seeking in an entry-level certificate. The written tests would likely be multiple-choice. They could be administered and marked by accredited amateurs. Receiving and transmitting systems would involve study of block diagrams only. MF-HF equipment, antennas, propagation, regs, etc. would be studied to give holders of *Certificate B* an overview of amateur radio, in the expectation that every holder of *Certificate B* would eventually upgrade. Station setup and operation would head-off problems on the air.

It would be important to give holders of *Certificate B* access to the 144-148 MHz band to ensure that these amateurs come into contact with good operators who would serve as role models. Limiting these amateurs to 220 MHz and above, for instance, would create a "ghetto" where they would likely develop operating procedures at variance with established practice.

Holders of *Certificate B* would be limited to 100 watts to the final stage of the transmitter, and would not be permitted to become licensees of repeater or remote-base stations.

Homebuilt or modified commercial transmitting equipment would be permitted.

A 7 W.P.M. Morse Code Endorsement would be offered for *Certificate B*.

Holders of *Certificate B with a Code Endorsement* would be permitted to use radiotelegraphy and radioteletype on amateur frequencies below 30 MHz, and radiotelephony in the 28-29.7 MHz amateur band.

Holders of *Certificate B with a Code Endorsement* would be permitted 250 watts input to the final stage of the transmitter. Homebuilt or modified commercial transmitting equipment would be permitted.

The highest-class and only other certificate would be called *Certificate A* or the *Advanced* certificate.

There would be a written test based on 20-30 hours of study of advanced electronic theory, receiver and transmitter circuitry, and antenna systems. There would be a Morse code test at 12 W.P.M.

Holders of *Certificate A* would be permitted to operate all modes on all amateur bands using maximum legal power. They would be permitted to become licensees of repeater or remote-base stations.

A candidate for *Certificate A* with no previous accreditation would be permitted to try the written tests for *Certificate B* and the written and Morse code tests for *Certificate A* at a single sitting. Upon passing, the candidate would be granted *Certificate A*. There would be no time limit on the validity of any certificate.

Power might be expressed in terms of "watts output". "Watts output" is more common on VHF-UHF bands. 100 watts input (about 50 watts output) permits the use of most commercially-built VHF-UHF transceivers currently on the market. It is also adequate power for satellite communications.

"Repeater stations" would not include "digipeaters" which do not transmit and receive simultaneously.

Amateur radio publications constantly encourage building and modifying equipment, including transmitting equipment. It is an amateur radio tradition. A rule specifying commercial transmitting equipment, even for holders of *Certificate B*, would violate that tradition. It would suggest to newcomers that knowing how to build or modify equipment was not important. It would downgrade the Canadian Amateur Service in the eyes of the international amateur radio community. Even though few amateurs would take advantage of being able to build or modify transmitting equipment, amateurs feel strongly that they should always have that option.

As described, *Certificate B* would satisfy those who see a need for an attractive no-code entry-level certificate.

This could merit a separate certificate. However, such a certificate would have no value unless used in conjunction with a *Certificate B*. It would simply act as an endorsement on *Certificate B* and confer additional privileges. We propose to present it for what it is—an endorsement. 7 W.P.M. is psychologically good. With 12 W.P.M. for the highest-class certificate, it would preserve the 5 W.P.M. differential between the present *Amateur* and *Advanced* code requirements. It is 2 W.P.M. faster than what is required for the U.S. Novice- and Technician-class licenses. It would justify more generous privileges.

We would not favour special subbands for holders of *Certificate B with a Code Endorsement*. Access to entire bands would ensure that these amateurs come into contact with good operators who would serve as role models. Such contacts would lead to greater proficiency in Morse code and promote further upgrading.

Fourteen jurisdictions around the world give holders of entry-level certificates radiotelephone privileges in the 28-29.7 MHz band. Such privileges are being considered in the U.S. In this structure, such privileges would be a strong incentive for obtaining a *Code Endorsement* and joining the mainstream of amateur radio. They would also give beginning amateurs a sample of privileges available with the highest-class certificate and promote further upgrading.

Another reason to obtain a *Code Endorsement*. 250 watts input permits the use of most commercially built MF-HF transceivers currently on the market. It is more than adequate power for worldwide communications.

*Certificate B with a Code Endorsement* would satisfy those who see a need for a slow-code Novice-type entry-level certificate. Requirements for *Certificate B with a Code Endorsement* would be in excess of requirements for a U.S. Technician-class license. This would permit operation in the U.S. under the Canada-U.S. Convention.

Two certificates: less administration and lower costs. *Advanced* is familiar terminology.

The Department proposed separating the written and code tests, issuing separate certificates. The entry-level written test with the 12 W.P.M. code test would have given full MF-HF radiotelephone privileges. This was one of the most common criticisms of the Department's proposal. First, it seemed illogical to grant full radiotelephone privileges upon demonstrating such proficiency in Morse code. Second, the privileges granted were so generous, there seemed to be no incentive to upgrade to the Department's highest-class certificate, *Certificate C*. To many amateurs, this left the ultimate quality of the Canadian Amateur Service in doubt. For these reasons, we would link the advanced written test and the 12 W.P.M. code test for *Certificate A*.

Here is the incentive to upgrade.

There would be no requirement that a candidate for *Certificate A* have operated for one year, etc.

This would simplify the Department's bookkeeping.

### C. Compatibility with Present Certificates

1. Holders of the present *Amateur* certificate would be deemed to have the same qualifications and be given the same privileges as holders of *Certificate B* with a *Code Endorsement*, except that the right to use maximum legal power and any privileges permitted by an endorsement (such as 160-metre radiotelephone privileges) would continue.

2. Holders of the present Advanced certificate would be deemed to have the same qualifications and be given the same privileges as holders of *Certificate A*.

3. Holders of the present *Digital* certificate would be given the same privileges as holders of *Certificate B*, except that the right to use maximum legal power would continue. Holders of the present *Digital* certificate would be deemed to have all qualifications for *Certificate A* except the code. They could qualify for *Certificate A* upon completion of the 12 W.P.M. code test.

The national organizations realize that some of the above recommendations may be difficult to implement. The Department may have no choice other than to give a *Certificate A* to every holder of the present *Amateur* certificate. The national organizations have a concern that this may cause resentment among amateurs who received their full privileges only after considerable extra study and a second examination. Whatever the



CRRL President Tom Atkins, VE3CDM (left), and CARF President Ron Walsh, VE3IDW, were on hand as representatives of CRRL and CARF met in Campbellville, Ontario on May 10 to work out details of the CRRL-CARF Joint Comments on the DOC Restructuring Paper. (VE3GRO photo)

Department decides, it will be important that no amateur, as a result of restructuring, lose any privilege that he or she previously enjoyed.

### D. Conclusion

The national organizations offer this proposal as a point of departure for future discussions with the Department. There is a strong hope that the Department will involve the national organizations in every aspect of the development of a restructured Amateur Service, including the syllabus for examinations.

The Canadian Radio Relay League, Inc. and the Canadian Amateur Radio Federation, Inc. would like to thank the Department of Communications for its continued interest in the welfare of the Amateur Service, and for this opportunity to help shape its future.

Respectfully submitted,

Ronald Walsh, VE3IDW  
President, The Canadian Amateur Radio Federation, Inc.

Thomas B. J. Atkins, VE3CDM  
President, the Canadian Radio Relay League, Inc.

1986 May 10

## REGIONAL DIRECTOR ELECTION NOTICE

Nominations are open for the office of CRRL Regional Director in all CRRL Regions: Pacific, Midwest, Ontario, Quebec and Atlantic. Nominations will be accepted at the CRRL Headquarters office until 1200 EDT 1986 August 20.

New two-year terms of office will begin on 1987 January 01. Because of space limitations this month, we cannot reproduce the entire election notice here. For full details, please refer to last month's *QST* or contact CRRL Headquarters.

## SECTION MANAGER ELECTION NOTICE

To all CRRL members in the Quebec and Saskatchewan Sections: You are hereby solicited for nominating petitions pursuant to elections for Section Manager. Names of the incumbents appear on page 8 of this *QST*.

A petition, to be valid, must carry the signatures of five or more Full members of the League residing in the Section concerned. It is advisable to have more than five signatures. Photocopied signatures are not acceptable. Signatures must be on the petition.

Petition forms, FSD-129-D, are available from the CRRL Headquarters office in London, Ontario, but are not required. The following form is acceptable:

(Place and date)

CRRL Secretary  
Box 7009, Station E  
London, ON N5Y 4J9

We, the undersigned CRRL Full Members residing in the... hereby nominate... (name and call sign) as Section Manager for this Section for the next two-year term of office.

... (Signatures and call signs)... (Addresses including postal codes)

A Section Manager must be a resident of his or her Section and a licensed radio amateur holding a Canadian Amateur Certificate or higher, and have been a CRRL Full member for a continuous term of two years at the time of nomination. Petitions will be received at the CRRL Headquarters office until 1600 EDT 1986 September 05. If only one valid petition is received from a Section, the person nominated will be declared elected. If more than one valid petition is received from a Section, a balloted election will take place. Ballots will be mailed from CRRL Headquarters on or before 1986 October 01. Returns will be counted after 1986 November 14. Section Managers elected as a result of these procedures will begin their new two-year terms of office on 1987 January 01.

If no valid petition is received from a Section, that Section will be resolicited in 1987 January *QST*.

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

Harry MacLean, VE3GRO  
CRRL Secretary

## NOTES FROM ALL OVER

[L] Amateurs in Westmount, Quebec, assisted by CRRL Counsel Bob Benson, QC, VE2VW, were successful in having Amateur Radio exempted from the provisions of a bylaw that governs the size and placement of radio and television antennas. The important clause reads: "This bylaw shall not apply to any antenna forming part of a federally-licensed installation." An attempt to have a similar clause worked into a bylaw being developed in Rosland, British Columbia, is moving ahead. If your municipality is developing a bylaw that will govern the size and placement of antennas, this is definitely the way to go. Help is available; just contact CRRL Counsel Bob Benson.

[L] If you spoke English, lived in Ontario and wrote a DOC Amateur Radio examination on

June 18, you had a choice of questions in the regular format or questions that were multiple-choice. It was all part of a DOC "pilot-project."

[ ] DOC has announced dates for 1987 Amateur Radio examinations. They are February 11, April 15, June 17 and October 21. File applications on or before January 14, March 18, May 20 and September 23. Remaining date for 1986 Amateur Radio examinations is October 15. File applications on or before September 17 if you plan to write. [ ]

## Strays

I would like to get in touch with...

[ ] anyone with an Instructograph code-course manual. Robert Stellmaker, W1PAM, 741 N Summit Ave, Lake Helen, FL 32744.

[ ] anyone who served with the 990th Signal Service Co in Vienna, Austria immediately after the end of WW II. Howard Atlas, NE2I, 65 Violet St, Massapequa Park, NY 11762.

[ ] all amateurs interested in the Sherlock Holmes Wireless Society, which meets each month on 14.282 MHz (second Sunday) and 21.440 MHz (last Sunday). The SHWS also publishes the *Log of the Canonical Hams*. For more information, send an SASE to Ron Fish, KX1W, PO Box 262, Merrimack, NH 03054-0262.

[ ] anyone who has converted the Smith Chart in BASIC program (*QST*, Nov 1984) to run on the IBM PC. Paul Travis, W7EI, 19 Rincon Dr, Clarkdale, AZ 86324.

[ ] anyone with a manual for a Regency HR-2A 2-meter transceiver. Ron Hassinger, KA5SVQ, 3427 Loring St, Omaha, NE 68123.



**President:** Richard L. Baldwin, W1RU  
**Vice President:** Carl L. Smith, W8BWJ  
**Secretary:** David Sumner, K1ZZ  
**Assistant to the Secretary:** Naoki Akiyama, N1CIX/JH1VRQ

**Regional Secretaries:**  
 John Allaway, G3FKM  
 Secretary, IARU Region 1  
 10 Knightlow Rd  
 Birmingham B17 8QB  
 England

Alberto Shaio, HK3DEU  
 Secretary, IARU Region 2  
 9 Sidney Lanier La  
 Greenwich, CT 06830  
 USA

Masayoshi Fujjoka, JM1LUXU  
 Secretary, IARU Region 3 Association  
 PO Box 73, Toshima  
 Tokyo 170-91  
 Japan

The International Amateur Radio Union—since 1925 the federation of national Amateur Radio societies representing the interests of two-way Amateur Radio communications.

## Continental News

Somehow, it sticks in my mind that when one speaks of "the continent," one obviously speaks of the continent of Europe. My apologies to the other continents if that's a misconception on my part. Regardless, here are a few tidbits concerning Europe, largely in pictures because of the overwhelming response to last month's presentation.

Some of these photos are associated with Geneva, where, during April, there was an ITU regional conference concerning a new 1605-1705 kHz BC band for the Americas. Others of the pictures were taken in Oslo, where, over the weekend of April 19, the Executive Committee of IARU Region 1 met

to review the status of Amateur Radio in that region and to take any appropriate actions. One of the major topics of discussion was the establishment of an Amateur Radio Stand at Telecom 87, a large telecommunications exhibit sponsored by the ITU to take place in Geneva in October 1987. More on that later (much more, but not much later!).



Many of you have worked 4U1ITU, the amateur station at the headquarters of the International Telecommunication Union in Geneva. Here we see Dr John Allaway, G3FKM (left), Secretary of IARU Region 1, and David Kaplan, CX9AAK, the station engineer for 4U1ITU. 4U1ITU is operated by members of the International Amateur Radio Club (IARC), by ITU delegates who are licensed amateurs and by various visitors to Geneva, all of whom have to get individual authorizations from EA2ADO, President of IARC. With quite a variety of equipment on voice, CW, AMTOR and packet, both HF and VHF, David spends a good many maintenance hours each week at the station.



At the right, Jaap M. den Herder, F6FYI/PA0YJ, who is in charge of the Amateur Radio Stand at Telecom 87, outlines some of his plans for the display. Jaap has organized other exhibitions in Geneva, and the stand he set up for Telecom 79 was the finest Amateur Radio exhibition this writer has ever seen. Looking on during Jaap's presentation are Rosella Strom, H1RYS, member of the IARU Region 1 Executive Committee, and Steve Dunkerley, VP9IM, member of the Region 2 Executive Committee.



Speaking on behalf of Karl Taddey, DL1PE, President of DARC, Hans Berg, DJ6TJ (left), presents the DARC Golden Honor Badge to W1RU, in token of W1RU's work for international Amateur Radio while serving first as ARRL General Manager and then as IARU President. In his prepared remarks, DJ6TJ pointed out that this was the first time the DARC Golden Honor Badge had been presented to someone outside of Germany. □



Three of the four officers of the Region 1 Executive Committee (l-r): Dr John Allaway, G3FKM, Secretary; Lou v.d. Nadort, PA0LOU, Chairman; and Wojciech Nietykza, SP5FM, Vice Chairman. Stein Barlaug, LA4ND, Treasurer, was out of range of the camera at the moment.

### Mini Directory

As a convenience to our readers, here is a list of items of particular interest and when they most recently appeared in QST.

Advisory Committee			
Members	May 1986, p 48	OSCAR 10 Band Plan	Jul 1986, p 27
Club Contest Rules	Jan 1986, p 94	QSL Bureaus	
DX Contest Awards		Incoming	Jun 1986, p 56
Program	Feb 1986, p 83	Outgoing	Mar 1986, p 71
Emergency-Traffic		Reciprocal-Operating	
Committee	Apr 1986, p 69	Agreements	Jun 1986, p 53
Frequency/Mode		Spread-Spectrum Rules	Apr 1986, p 45
Allocations	Jan 1986, p 62	Third-Party-Traffic	
Hamfest Calendar Rules	Feb 1986, p 72	Agreements	Jun 1986, p 63
License-Renewal		1986 ARRL UHF Contest	
Information	Jan 1986, p 62	Rules	Jul 1986, p 86
Major ARRL Operating		10-GHz Cumulative	
Events and		Contest	Jun 1986, p 84
Conventions—1986	Jan 1986, p 61	902-MHz Interim Band	
MARS Information	Jul 1985, p 46	Plan	Jan 1986, p 74
Novice-Enhancement			
NPRM	Jun 1986, p 49		

## Words of Wisdom from KA1OBA

"If you have a good ear for music, you will find it easy to learn code." That personal insight comes from a savvy YL who plays the oboe, piano and recorder, and copies CW so well she has earned the privilege of calling herself KA1OBA. Holly McLeod, 10, learned about Amateur Radio through a friend in her church. Her interest in becoming a licensed amateur resulted in the study of code and theory as a "special project" approved by The Gifted and Talented Program at her school.

"I got an electronics kit that had Morse code on it with a key, and Dad and I studied together." Her mother prepared worksheets on the theory chapters so she could study on her own. "However," Holly admits, "it is helpful to have an adult explain the difficult parts of theory. I found it hard to understand the difference between FM and AM."

Holly used ARRL's *Tune in the World* to learn code, but says, "If you find yourself writing down the words *before* they are tapped out on the cassette, you should go to the code practice on W1AW." Holly is recently licensed, and as yet she and her father (who became KA1OAZ) have not set up their station. But her hopes and anticipations are



Holly McLeod, KA1OBA, is One Bright Angel who can tell all of us a thing or two about learning code and theory.

high. "I enjoy the idea of communicating by code, and I hope to use it to talk to people all over the country and world. Knowing code is like knowing another language. Not only that, it makes me feel more grown-up to be an amateur." Needless to say, her school friends were very impressed by Holly's new status as a licensed Amateur Radio operator. "Studying for my license helped me learn a lot about math and science, especially about electronics."

This unusually talented YL is a straight-A student, a stamp and spoon collector, and a Girl Scout who enjoys biking, swimming and art. With her parents, sister and cat named Tiger, Holly goes on summer camping trips, the favorites being those in the Canadian provinces. "We hope to do some radio operating from campsites some day."

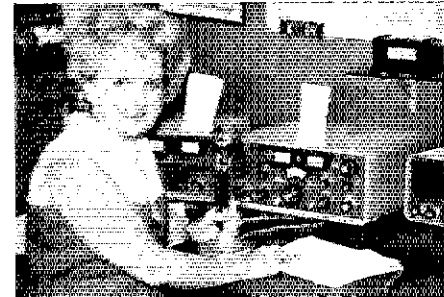
If you happen to be Holly McLeod, just a pinch of hope and a teaspoon of determination are the ingredients for success. "Even though it may be discouraging while you are studying code and theory, you'll be glad once you get your ticket. It is one more nice thing you can do with your parents!"

### LOOKING FOR NEW DX YLs? TRY THE AFRICAN QUEEN NET

If you are looking for new YLs to fill out your DXYL, YLCC and YL DXCC certificates sponsored by the Young Ladies Relay League, give a listen to The African Queen Net. The group meets each Monday, propagation permitting, on 14.235 at 2030 UTC. The Net was started by Diane Meyer, EL2EF, and Mildred Dean, EL2M, with a lot of encouragement from EL2P, who happens to be the Assistant Minister of Post and Telecommunications for Liberia. Diane and Mildred wanted to develop a net that would provide a place for YLs everywhere to meet and work each other. Although this is basically a YL-only net, OMs are invited to stand by until the YLs have made their calls. Once the YLs have finished their QSOs, the OMs are welcome to call stations that are on frequency.

DX YL stations currently participating in the net are TZ6FS, PT2TF, WP2ABG, EL2J, VK3DYL, ZS6RF, AH6GQ, VE3GHJ, 15YBZ, PY2LCL, VE3MNI, VE7YL, G4SDF. Although the Net began in October of 1985, the group is becoming more active with an increased number of check-ins.

Because of poor band conditions during the winter of 1986, Carol McClure, N5GAP, served as stateside NCS and helped YLs to make their contacts when they could not check in with the Liberian YLs. The Net founders are currently in the process of developing a constitution and bylaws, and soon a certificate of membership will be available. Anyone wanting more information about the African Queen Net is encouraged to contact Carol McClure, N5GAP, 3428 Kilrush Dr, Arlington, TX 76014.



Jane Jones, K3ZDN, keeps active as a member of PJYL (Pennsylvania New Jersey YL), the group that is planning the YL Spring Fling. Jane and other PJYLs recently met to work on centerpieces for the next year's miniconvention.



Carol, N5GAP, operates her impressive station as stateside NCS for The African Queen Net.



PJYL members work together on centerpieces for the upcoming April 1987 Miniconvention in Hershey, Pennsylvania. Shown (l-r) are K3ZDN, W3SLF, W3TNP, W3GTC and W3AAU.



W3AAU, W3SLF and K3ZDN (l-r) enjoy an eyeball QSO at a Holmesburg (Pennsylvania) ARC meeting.



## George Wallington, W2DSE: From Jazz Band to Sideband

"Dedicated to the building of friendship among all people through Amateur Radio" states the credo of the International Single Side Banders system and one of their Top Flight Operators—George Wallington, W2DSE, of Cape Coral, Florida. The desire to communicate is not only evidenced in W2DSE's hobby, Amateur Radio, but has been lifelong in his career. George has reached many people worldwide via a very special talent—his music.

George gained fame both as a jazz pianist and composer (with over 200 published works) during the late '40s and early '50s, the "Swing to Cool" era. He played piano in small clubs in New York City's Greenwich Village and around the country. In 1944, he connected with Dizzy Gillespie and Oscar Pettiford to form the first-ever bebop band, a new jazz sound. George also performed with singers Billie Holiday and Sarah Vaughan. Two of his compositions—"Lemon Drop" (recorded by Woody Herman) and "Godchild" (recorded by Miles Davis)—won gold records. "Godchild" was later inducted into the Grammy Hall of Fame of NARAS (National Academy of Recording Arts and Sciences).

In the mid '60s, rock 'n' roll and discos became the new trends in music. Jazz clubs started converting to accommodate this new entertainment. George left music as a profession when The Composer Club, which had been dedicated to piano music and bringing in composers, closed in 1965. For 14 years, George worked in the family's air-conditioning business in New York, then retired to Florida with his wife, Billie, a former director of public relations for CBS and Warner Brothers Records.

During his retirement from the club-and-concert scene, the 30-year member of ASCAP (The American Society of Composers, Artists and Publishers) continued composing. In 1984, his first solo album, "Virtuoso—George Wallington, Christened as Giacinto Figlia," with 10 new compositions, was released. Four more compositions premiered Spring 1985 on National Public Radio's "Marian McPartland's Piano Jazz VI," marking George's first public performance in many years. Later that year, he performed at the Kool Jazz Festival and Carnegie Recital Hall

in New York City. His current activities? A second album—"The Symphony of a Jazz Piano," featuring 12 new piano solos—was released this spring, plus a concert tour in Japan.

Reaching out through music, reaching out through Amateur Radio—both are ways of sharing oneself with a larger world. George describes Amateur Radio as "a medium for communications, first for emergencies and then as a hobby for comradeship, exchanging ideas in radio, culture and



Top Flight Operator and award-winning composer George Wallington, W2DSE, puts out a "big signal" in both Amateur Radio and music circles.

philosophy. Helping on or off the air makes life worthwhile."

*What in particular attracted you to Amateur Radio?*

I was a shortwave listener from an early age, and Amateur Radio seemed like something I could participate in. I studied early in the morning when I finished playing at night clubs, and listened with my old Collins gear and dipole to shortwave and ham stations while learning theory and CW. I gained more and more interest and decided to try for my Novice license, which I got in the early '50s. Later, I upgraded to General and then to my present license class, Advanced. Maybe someday I'll go for Extra.

*What are your current Amateur Radio activities?*

I am very active on the early morning warm-up in the YL International SSBers system, working with such fine hams as Jda Rogers,

KB5YQ. We have shared many interesting moments together. I am also a control station on the International Amateur Radio Society DX net, which is a certificate hunters', DXpeditions and DX information "listening post" founded by Scott Douglas, KB7SB.

I have had many rewarding experiences, most recently being of some help in the crises in Grenada and Mexico, relaying messages of assurance to families. I think we all should offer help to individuals and families who need medical and travel assistance.

I am very proud to have been named a Top Flight Operator, given by the YLSSBers International System based upon "excellence in operating procedure," determined by the entire membership of some 15,000 hams.

*What other Amateur Radio activities interest you?*

High-quality audio and efficient antennas. Recently, I have been experimenting with 160 meters and have tried to work with (in keeping with the space I have) everything available: dipoles, slopers, long wires. I now have a quarter-wave vertical with close to 40 radials in conjunction with it. I'm very satisfied with the hundreds of contacts I've been able to make with it so far.

*Does your music publishing company's name—Big Signal—have any radio connection?*

Big Signal Music was taken from a nickname some friends and family gave me after one ham who heard me on the air remarked, "Boy, he certainly has a big signal." We also have a division, Big Signal Productions, for making recordings.

*Do you take any amateur gear when you go on tour?*

I try to concentrate on my music and the planning of performances and programs, so I don't take any radio equipment along. I give radio the same concentration when I'm on the air. However, I do enjoy meeting the hams I have contacted on the air and try to meet them as I travel. When I go to Japan this year, for instance, I'll see my friend Yuusaku Harada, JA7DY, who translated the concert-tour promotional ads into English so I could know what they were saying about me! □

## Those Mysterious FCC Rules—Part 2

Have you ever wondered what the FCC does in Washington? If so, then you should read this column. Once a person understands the way the FCC makes rules, all these complicated names will make sense.

It is true that our government is used to elaborate, and often terribly slow, procedures. We have these procedures because we live in a free society, and these procedures allow for public participation at the expense of speedy decisions. Our rule-making process may be slow, but everyone has a voice.

As you will recall from the last Washington Mailbox (June *QST*, p 65), we discussed how rule changes were initiated. Remember that a change is usually first proposed by an individual or an organization, such as the ARRL. The FCC may propose a change on its own motion. The Commission may give it a file number (RM-), or it may be dismissed. Should the Commission find merit in the petition, it may issue a Notice of Proposed Rule Making (NPRM) or a Notice of Inquiry (NOI). In this Washington Mailbox we shall discuss the Notice of Inquiry (NOI), Report and Orders (R & O) and alternate methods of rule changes. We shall also discuss current rule makings which are important to the amateur community.

### *Q. What is a Notice of Inquiry (NOI)?*

A. An NOI is an inquiry that is initiated by the Federal Communications Commission. The NOI sets forth the Commission's concern over a particular matter and solicits comments and suggestions as to whether amendment or repeal of the rules may be desirable. A Notice of Inquiry may be combined with a Notice of Proposed Rule Making. Although a Notice of Inquiry is rare in amateur rule makings, it is used occasionally.

### *Q. If I see that the FCC has issued a Notice of Inquiry or a Notice of Proposed Rule Making, may I file comments with the FCC?*

A. Absolutely. This is precisely what the FCC is asking for.

### *Q. What is a comment period?*

A. This is the period during which persons are given the opportunity to file comments "for the record": Decisions will be made based on these comments. Normally, the Commission will not consider comments filed after the comment period has ended.

### *Q. What is a reply comment period?*

A. This is the period of time after the comment period has ended in which an individual or organization can comment on other comments received in the proceeding. A copy of the reply comments must be served upon (mailed to) the original commenter.

*Q. After the Commission issues a Notice of Proposed Rule Making (NPRM) or a Notice of Inquiry (NOI), and the comment periods close, what is the next step?*

A. The Commission evaluates the comments and then either terminates the proceeding with a Report and Order or issues a Notice of Proposed Rule Making (NPRM) proposal to amend the rules on the basis of the comments to the NOI. (See June Washington Mailbox for additional information on NPRMs.)

### *Q. What is a Report and Order?*

A. A Report and Order is just what it sounds like—the Commission issues a detailed report of its findings and issues an order based on the judgment of the commissioners. The Report and Order gives the exact changes to the rules in an appendix.

In amateur rule-making matters, the responsible office in the FCC is usually the Personal Radio Branch in the Private Radio Bureau. A draft Report and Order is prepared by that branch for the Bureau Chief of the PRB, who, after approving it, sends it to the five Commissioners. Sometimes it must also be coordinated with other bureaus or offices, such as the Field Operations Bureau or the Office of Engineering and Technology. The Commission may adopt the NOI or NPRM as drafted or with modifications, or reject it.

### *Q. Is the rule that is adopted in a Report and Order always identical to the original proposal?*

A. No. A Report and Order does not necessarily have to be identical with the original NPRM. The rule finally adopted may satisfy issues raised by the comments.

### *Q. Once a Report and Order is issued, can it be changed?*

A. A Report and Order can be changed. The Communications Act of 1934 states that any "person aggrieved" by an FCC action has the right to petition the Commission for reconsideration. The petition must state the reason why the petitioner thinks the action taken by the Commission should be changed. The Petition for Reconsideration must be filed within 30 days from the date upon which public notice of the Report and Order is published in the *Federal Register*. The first day to be counted is the day after that. Since the 30-day requirement is statutory, it cannot be waived by the FCC.

### *Q. If I disagree with a Report and Order and I file a Petition for Reconsideration, what are the chances that my petition will be acted upon?*

A. From a practical standpoint, unless new facts not available at the time of the original decision are presented, it is unlikely the Commission will change that decision. However, if a petitioner shows good cause, the Commission may grant the Petition for Reconsideration and modify the Order by a Memorandum Opinion and Order.

### *Q. What are the requirements for a Petition for Reconsideration?*

A. The requirements for a Petition for Reconsideration are the same as for general petitions and comments. The petition must be double-spaced and typewritten. All pleadings over 10 pages in length must include a summary and a table of comments. An original and five copies must be filed with the Commission.

### *Q. If all else fails, may I appeal the FCC's decision in Federal Court?*

A. Yes. However, the courts generally are quite deferential to the FCC because of the Commission's broad discretion and recognized expertise in the field of telecommunications. Therefore, it is acknowledged that filing an appeal in Federal Court will be successful only if the FCC acted arbitrarily or capriciously. Your best bet is to file a new petition for rule making after experience has been gained with the new or amended rule.

Now that we are all experts on how rules are made, we shall examine two "hot issues" concerning Amateur Radio and how they apply.

### *Examples:*

*PR Docket 86-161* (Novice Enhancement Proposal). It was apparent to the ARRL Board of Directors that the Novice license needed additional privileges, and accordingly they authorized the filing of the petition with the Commission. This petition was assigned the number of RM-5038 by the Commission. In response to this petition and others, the FCC adopted a Notice of Proposed Rule Making in PR Docket 86-161 on April 18, 1986. The comment period ended July 16, 1986. The reply comments period ends August 20, 1986. Depending on the Commission's schedule, a Report and Order may be issued by the end of the year. See June 1986 *QST*, p 48, for complete details.

*PR Docket 86-63* NPRM (Proposal to provide examination credit for written examination elements). At present, if you pass a code test on your way to qualifying for a higher class of license, but you don't pass the written exam, you are given credit for the code "pass" for up to one year. If you pass the written, however, and you fail the code, you are given no credit. Present FCC rules don't allow credit for having passed the "written" unless it results in a new license. Robert Scupp, WB5YX, petitioned the FCC in RM-4991 to authorize that credit also be given for the written exam elements as it is for the code at the present time. The FCC has responded with a Notice of Proposed Rule Making in PR Docket 86-63, which proposes just that. The ARRL recently filed comments favorable to this proposal.

**Note:** Questions appearing in this column are typical of those frequently asked of the FCC and other agencies. Answers, prepared at ARRL HQ, have been reviewed by the FCC's Personal Radio Branch for agreement with current FCC interpretations and policy. Numbers in parentheses refer to specific sections of the FCC rules. [95]

# Affiliated Clubs in Action

Conducted By Leo D. Kluger, WB2TRN  
Club Program Manager, ARRL

## NEATS (NOVICE EQUIPMENT AND TRAINING SERVICE)

The Montgomery Amateur Radio Club (MARC) of Montgomery County, Maryland, has initiated a program to help beginners and Novice licensees in their quest for licenses and upgrades. The NEATS program consists of many parts: a welcome package, an equipment loan program, a Novice booklet, CW practice tape loan and a book loan. In addition, several MARC committees, such as the Elmer and education committees, are available for assistance.

The welcome package is a collection of materials given to first-time visitors so they have something to take home with them. Included is club membership information, copies of the club newsletter, a club directory and copies of some of the popular ham magazines.

The equipment loan program has equipment for loan to beginners and Novices. Six rigs are currently out on loan. The main purpose is to enable the user to listen to Morse code on the air, both from WIAW and elsewhere on the ham bands. Most of the equipment has been donated by MARC members, although some of it is on extended loan. Club members repair the rigs that are donated in close-to-operable condition. The equipment may not be the prettiest and is certainly not the newest, but it does allow the beginner to listen to the real thing.

MARC has a library of CW practice tapes that have been collected from various sources. A set of tapes using computer-generated code for speeds from 5 through 20 WPM is being produced. QSOs written by club members and random sets of five characters are used on the tapes.

Eight copies of *Tune In The World With Ham Radio* were donated to the club and have been lent out along with other donated books. Members also lend their personal copies of books to newcomers.

Since so many club members are interested in computers, a wealth of information exists within the club for the newcomer on computers, RTTY and packet. Two club members operate open remote bulletin-board systems (RBBSs).

The Novice booklet is a collection of information to help the Novice in selecting clubs and organizations to join, books to buy, local places to buy ham gear and things to think about. The booklet is designed to provide specific local information and specific sources of information without repeating the text from these sources.

NEATS came about mainly through the efforts of Jim Doyle, W3CKU, the newsletter editor for MARC and the club's program chairman. The NEATS program is exactly the sort of comprehensive Elmering program needed to continue to bring new amateurs into the fold. For more information, write to Jeffrey Horlick, KZ3F, MARC Publicity, 18610 Sandpiper Ln, Gaithersburg, MD 20879.

## Volunteer Examiner Information

from the ARRL/VEC, 225 Main St, Newington, CT 06111

**Locating A Test Session:** Sessions are advertised publicly via local Amateur Radio club newsletters and repeaters. A printout of sessions in any state and some overseas locations is available from ARRL HQ for an SASE. We list ARRL/VEC sessions plus those of other VECs who inform us of their testing schedules.

**Registering to Take an ARRL-Coordinated Test:** A completed FCC Form 610 application and a check or money order for the test fee, payable to the "ARRL/VEC," should be sent to the local VE Team where you intend to be tested. "Walk-in" candidates may be allowed at some sessions, but registering in advance helps. If you write to a VE Team, send an SASE to cover postage and handling.

**Test Fee:** For ARRL-coordinated sessions held during calendar 1986, the test fee is \$4.25, payable to "ARRL/VEC." A check or money order is preferred.

**What to Bring to the Session:** Bring the *original* plus a photocopy of your current FCC-issued Amateur Radio license, and the *original* plus a copy of any temporary upgrade certificate issued by a VE Team less than 1 year prior to the test date. (Duplicates of lost licenses are available through the FCC's Gettysburg office.) Also bring two forms of positive identification (including a photo ID, if possible) and at least two pencils and a pen. Scratch paper and answer sheets are provided.

**Calculators:** Nonprogrammable and "scientific" calculators are welcome. Pocket computers that store words are not allowed. Programmable calculators will be allowed only at the discretion of the VE Teams; be prepared to demonstrate that the memories have been cleared.

**Exam Format:** Written element exams are four-choice multiple-answer tests. A score of 74% or more is required to pass a written element exam. Most VECs assemble tests based on the ARRL-issued multiple-choice question pool. Code test transmissions are played from an audio tape prepared by the ARRL/VEC with message contents similar in format to an Amateur Radio QSO. The code test is "fill-in-the-blank" style and may be passed by answering at least 7 out of 10 comprehension questions correctly or by copying on paper at least one continuous minute of perfect copy from the code test transmission. The ARRL/VEC does not require a code sending test, based on the FCC's recommendation. Code tests may be copied on typewriters, but prior arrangement with the VE Team is required so that other candidates are not disturbed.

**Which Question Pool(s) to Use:** FCC revises the four written element question pools on a staggered basis, with one of the four pools revised every three months. The 1986 scheduling calendar that the ARRL/VEC will be using for putting into use the question pools revised by FCC is as follows:

Question Pool	Revised by FCC	ARRL/VEC Tests Will Change	ARRL/VEC Tests Good Through
Element 2 (Novice)	Jul 1985	Jan 1, 1986	Dec 31, 1986
Element 3 (Tech/Gen)	Oct 1985	Apr 1, 1986	Mar 31, 1987
Element 4A (Advanced)	Jan 1986	Jul 1, 1986	Jun 30, 1987
Element 4B (Extra)	Apr 1986	Oct 1, 1986	Sep 30, 1987

**ARRL/VEC Retest Policy:** A candidate who fails a written element and who has exhausted all code test possibilities at a session may not be retested during that same session. If a convention or hamfest test session schedules multiple sittings, a failed candidate may request that the VE Team retest him or her at a subsequent sitting. Retesting is allowed if the VE Team has a *different* test version available and the VE Team determines that it has the time and resources available to accommodate the retest. A candidate for retest is required to pay another test fee, and may be required to complete a fresh application Form 610 at the Team's request.

**Special Tests:** Candidates who require special assistance, materials or equipment because of physical disability must attach to the application a signed and dated physician's statement certifying the nature of the disability, plus a letter explaining what special assistance, materials and/or equipment must be used to conduct the examination. (See Section 97.25(j) of the FCC Rules.) Be sure to notify the VE Team well in advance so that special arrangements can be made. If Braille or tape-recorded written tests or special-pitch code tapes are needed, contact the ARRL/VEC at least one month in advance to ensure materials will be available. Further questions about testing persons with disabilities should be addressed to the ARRL Program for the Disabled at HQ.

**How to Become an ARRL-Accredited Volunteer Examiner:** Qualified Advanced or Extra Class licensees (see Section 97.31 of the FCC Rules) are invited to notify the ARRL/VEC of their interest in becoming an accredited VE. Send us your name, call sign, license class and full mailing address.

**Registering an Upcoming Test Session with the ARRL/VEC:** Complete a Test Session Registration Form and submit it to the ARRL/VEC office at least 30 days in advance of your session. We need four weeks or more advance notice of a session to serve you in the most cost-effective and accurate way.

## New Special Service Clubs

Becoming a Special Service Club (SSC) is not for every Amateur Radio group. It takes commitment, planning and, mostly, a membership that sets the highest standards for itself. A number of your fellow clubs have recently undertaken the commitment and become SSCs. Here's a rundown of these special groups, their city, state and number of members:

Cumberland County ARS, New Kingstown, PA (14)

Tamaqua Transmitting Society, Tamaqua, PA (19)

## Renewing Special Service Clubs

After completing a year of Special Service, SSCs go through a review process with their respective Affiliated Club Coordinators (ACCs). With successful programs behind them, they plan their next 12 months of activities. Recently renewing SSCs are presented here, followed by their city, state and number of members:

Alamance ARC, K4EG, Burlington, NC (57)

Hoodview ARC, Portland, OR (102)

Huntington County ARS, Huntington, IN (17)

Lake County ARC, Gary, IN (170)

Madison County ARC, Inc, Anderson, IN (85)

Muncie Area ARC, Muncie, IN (48)

Pike County ARC, Stendal, IN (37)

South Brevard ARC, Melbourne, FL (77)

It is with deep regret that we record the passing of these amateurs:

WICBD, William Randall, Bridgeport, CT  
 WICTR, Daniel J. Giro, Westbrook, ME  
 WB1ELI, Richard F. Reddy, Jacksonville, FL  
 W1GOV, William A. Meissner, Bridgewater, CT  
 K1HGI, John R. Cain, Waltham, MA  
 W1HWW, Carl Bachner, Norwood, MA  
 W1JIV, Fearing Pratt, Hingham, MA  
 KA1ME, Albert H. Howes, Wilbraham, MA  
 K1MOU, Russell L. Lawson, West Suffield, CT  
 K1NBR, Harold C. Anderson, Brandon, VT  
 W1QOS, Edwin E. Turner, Siasconset, MA  
 W1VYS, Robert W. Little, Weston, MA  
 W2AM, Herbert Berner, Brooklyn, NY  
 W2BCZ, William J. Kuehl, Scottsdale, AZ  
 \*N2CDJ, Walter F. Herold, Staten Island, NY  
 W2CG, Arthur L. Turner, Pleasantville, NJ  
 W2CCOC, Ferdinando Giglio, Astoria, NY  
 WB2DIS, Ernest Hansen, Preston, MD  
 W2DKN, Anthony J. Strefkaskas, Toms River, NJ  
 W2FY, Carl E. Welscher, Vincentown, NJ  
 W2MSH, John Bogner, Yonkers, NY  
 W2QVV, John Ressegio, Woodhaven, NY  
 W2SCP, Charles W. Okie, Jersey City, NJ  
 W2WXX, Edward J. Leaty, Whitesboro, NY  
 W3CBV, Frederic Hamburger, Lutherville, MD  
 W3CRK, Peter Gramba, Pittsburgh, PA  
 WA3HRJ, James C. McCray, Erie, PA  
 WA3BK, Paul R. Dierker, Slippery Rock, PA  
 W3LTL, Max R. Spering, Pittsburgh, PA  
 K3MW, Michael Winsco, Tamaqua, PA  
 W3NWW, J. Fred Burhenn, Greensburg, PA  
 W3OMN, James W. John, Lewes, DE  
 K3SSD, Henry J. Elbert, Reading, PA  
 W3UH, Robert G. Adams, Jr., Kutztown, PA  
 WA4CIE, Sam H. Malone, Decatur, AL  
 WD4CPI, Charles McAllister, Melbourne, FL  
 K4EP, Cecil M. Watkins, Henderson, TN  
 KA4FX, Troy Tatum, Fern Park, FL  
 K4HGQ, Walter W. Schorr, Miramar, FL  
 W4JBB, Walter Sall, Miami Beach, FL  
 KA4JFX, W. V. Powell, Springfield, VA  
 WA4NYH, Alfred E. Pearson, Knoxville, TN  
 W4OPX, Warren V. Woodruff, Ormond Beach, FL

WA4PMP, William M. Pugh, Miami, FL  
 K4TND, Robert H. Blalock, Chattanooga, TN  
 W4UA, James G. Kerr, High Point, NC  
 KA4YWW, Ernest C. Knight, Roanoke, AL  
 K4YY, Theodore "Ted" C. Stern, Fort Lauderdale, FL  
 W5AP, Clyde B. Hillman, Hot Springs, AR  
 \*W5CTM, Paul H. Daniels, Paris, TX  
 K5ECQ, Hillyer A. White, La Mesa, NM  
 KA5GAG, William D. Hatfield, Bartlesville, OK  
 K5GCO, Mike Powers, San Antonio, TX  
 K5IOY, M. H. Rowe, Albuquerque, NM  
 W5KC, Vincent L. Rosso, Plaquemine, LA  
 W5KO, T. T. Earle, Greenville, SC  
 KB5LZ, Wesley A. Armstrong, Fort Worth, TX  
 KA5NAR, John T. Turner, Texarkana, TX  
 KA5TE, Frank S. Himebrook, Albuquerque, NM  
 W5SEK, William F. Bennett, Helotes, TX  
 W6ABD, Marlo G. Abernathy, San Diego, CA  
 W6CU, Harold S. Mumford, Walnut Creek, CA  
 KA6DIH, Art W. Rothe, La Mirada, CA  
 N6DXB, Joe K. Parker, Sr., Stockton, CA  
 AH6EA, Richard Leon Robinson, Pahoa, HI  
 WB6EIG, John M. Schweighardt, Richland, WA  
 W61CR, James A. Payne, Santa Cruz, CA  
 KA6JRH, S. Austin Jones, Los Angeles, CA  
 K6SAM, Charley N. McCoy, Grass Valley, CA  
 KG6TD, Charles Saunders, San Diego, CA  
 W6ZHD, George Schroeder, Anaheim, CA  
 W7AOL, Sidney D. Shaw, Portland, OR  
 K7CDL, Elsie Peel, Milwaukie, OR  
 W7DKR, William H. Whitehead, Spokane, WA  
 N7GPW, Marshall B. Satterlee, Mesa, AZ  
 WA7NCA, Harold L. Houser, Eugene, OR  
 W7PXW, Norma F. Coon, Ashland, MT  
 WB7UIB, Arthur E. Robinson, Cashmere, WA  
 K7VQR, Howard E. Smith, Billings, MT  
 WB8CJA, George H. Stalker, East Tawas, MI  
 W8DJJ, John E. Lambert, Youngstown, OH  
 WA8EFP, Paul F. Kienast, Battle Creek, MI  
 N8GTL, Georgette Welch, Bronson, MI  
 \*W8LUC, Floyd W. Cox, Osseo, MI  
 W8LFP, Harry E. Anderson, Grand Haven, MI

WD8RKT, Robert Welch, Bronson, MI  
 WB8TCH, Lucille M. Chapin, Alma, MI  
 KA9ANA, Bobby J. Brown, Oblong, IL  
 W9BQH, Ralph H. Baer, Elkhart, IN  
 \*N9KY, Meron "Bud" Stanley, Decatur, IL  
 W9DYB, Kenneth W. Robinson, Lake Geneva, WI  
 K9GLG, Merlin A. "Mel" Feltz, Chicago, IL  
 W9IFA, George W. Grauel, Carrollton, IL  
 W9IOG, Evan Woodrow Barton, Ellenton, FL  
 WB9NLR, Lyman E. Dooley, Jr., Flat Rock, IN  
 \*W9QLZ, George E. Keith, Oglesby, IL  
 W9QMG, Charley "Diver" Delps, Granite City, IL  
 KA0ANF, Arden Peterson, Langford, SD  
 KA0BJT, Russell M. Ferns, Fruitland, IA  
 KA0CJL, Robert D. Duff, Cedar Rapids, IA  
 W0JKC, Robert R. Blanchard, Lakewood, CO  
 W0MH, Charles Coultas, St. Louis, MO  
 W0FOC, James F. Hefton, Joplin, MO  
 WB0OGH, Paul L. Dunstan, Willmar, MN  
 WA0PMS, Charles S. Fleckenstein, Onaga, KS  
 WB0TEE, Mike Mankey, Bismarck, ND  
 KC0BY, John McGrane, St. Louis, MO  
 VE1NH, Robert Cox, Aroostook Junction, NB  
 VE7FAP, Arthur Jackson, Victoria, BC  
 VE7GL, Walter H. Bud Graham, Victoria, BC  
 VE7JC, Royal Holbrook, North Vancouver, BC  
 GD6TF, Colin H. Askham, Liverpool, UK  
 Great Britain  
 HB9OP, Theo R. Vogel, Founex, Switzerland  
 OZ7KB, Knud Bjarno, Holback, Denmark

\*Life Member, ARAI

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 1936

- "The biggest parade in the history of American radio occurred in Washington in June, when ... the entire art and industry passed in review before the Federal Communications Commission's informal engineering hearing (on 30-200 Mc. allocations)."
- The League presented much useful testimony on 5-meter achievements by amateurs, which attracted considerable interest among both government and industry participants. We are optimistic that our request for a new 112-120-Mc. band will be granted, but concerned that needs of television broadcasting may impinge on good old 5 meters.
- Progress on 5 meters has required more selective receivers; in turn this means more stability in transmitters. W6HJN and W6WI show us a setup of 6A6 oscillator-doubler using a 7-Mc. crystal, and then an 802 quadrupler to reach 56 Mc. Buffers drive a pair of 50Ts final with 500-watt capability.
- WIEDY's approach is unique: A series of type-53 tube stages put the 80-meter crystal output at 5 meters; then a pair of 802s drive a pair of 800s with resonant-line output "tanks" and interstage couplings.
- The Radio Society of Great Britain has arranged for several members to send c.w. on regular 5-meter schedules hoping to achieve some international DX.
- Staffer W1JPE finds that increasing the bias resistor for a 35T r.f. amplifier stage from a normal 5,000 ohms to 50,000 made the tube perform admirably well as a doubler to 56 Mc., driving a pair of 'em in the output stage.
- Back to the "d.c. bands," an inexpensive four-band low-frequency rig, complete with antenna coupler, is W1JEO's project this month—a straightforward 47-46-210 setup. Keying is in the final grid circuit to avoid chirp.

□ PNOMPENHIXIVIAIEALATEVSTVETIARE is a sample of text transmitted at 22 w.p.m. in the second A.R.R.L. Copying Bee, held last December. There were 159 entries. W2DHI, K4KD, K4RJ, W8BKM and YN1AA made perfect copy. (Your scribe, red-faced, scored only 88%.)

□ A condensometer? W91WV has his 5-meter receiver on the roof of an 18-story building. He remote tunes it with a power-type moving coil galvanometer, controlling the rotor of a butterfly condenser (for receiving tuning) which moves in proportion to a current supplied from the operating position.

□ W6CUH (also featured in "Hamdom" this month as an outstanding DXer) has been researching propagation vagaries for some months now and feels confident he can predict future minimums—which seem to have a 27-day cycle.

□ Largely to conform to A.A.R.S. procedures for ease of interchange of traffic with basic amateur nets, the Communications Department announces a change in our standard message form. The "land-line check" has now become established, as well.

□ George Grammer chides us for abandoning 10 meters every time it has a bad few days. He points out it may take years to find the answers to strange propagation anomalies.

## 25 Years Ago

### August 1961

- The Editor calls for greater cooperation in avoiding use of 14,335-14,350 kc. so we may hear foreign stations without local interference. There are always a few hams with selfish interests sufficient to disrupt a plan that has benefits for all.

□ Use of frequencies above 1000 Mc. requires totally new technology—for example, normal tubes take too long to get electrons from grid to plate! W6CXW explains the innards of the power klystron, one of the tools we may soon be using.

□ Discovery of inexpensive Class-B modulation in the early '30s sounded the death knell for linear amplifier systems then being used by a few voice stations. Single sideband has now caused a rebirth of this technique, with interest largely in grounded-grid hookups. EIMAC staffers W6SA1, W6KEV and W6UOV report on extensive tests of the new animal, with helpful background data for our own use.

□ The 150-watt amplifier WHCP created from television and surplus parts proved so popular that many amateurs requested a modification to cover 6 meters. He obliges.

□ A "grid dip meter" with no grid and no meter to dip? That's W2JIO's transistorized, wide-range, battery-operated test oscillator designed for blind amateurs, producing an auditory output signal.

□ Preampifiers are the way to go for effective v.h.f. reception. WHDQ describes some practical circuits using the 6CW4 Nuvistor tube, with much improvement in results.

□ "Operation Alert" was a surprise test of the effectiveness of the Radio Amateur Civil Emergency Service organization. It was sponsored by the federal Office of Civil Defense Mobilization. National Emergency Coordinator WINJM summarizes participation reports received at HQ.

□ A General Radio Service is being set up in Canada roughly similar to Citizens Band activities in the U.S.

□ The product detector has one problem for sideband use—inability to reject signals on the undesired side of an injected carrier. K2OHF describes a plug-in unit for his NC-125 receiver which uses a phasing system and a double product detector to overcome the difficulty.

□ K21TO has built a duffy power supply that provides voltage requirements, both positive and negative, for most low-power experimental work in our shacks.

# Coming Conventions

## COLORADO STATE CONVENTION

August 10, Denver

The Rocky Mountain Radio League invites you to attend the Colorado State Convention. Plan your summer vacation to include a visit to Colorado and its beautiful scenery, and take in a ham swapfest at the same time. This event will be at the Jefferson County Fairgrounds Auditorium, located at the 6th Ave freeway and Indiana St exit. Talk-in on 146.940, 145.220 and 449.450. There will be regional meetings, new equipment displays, demos and a swapfest held 9 AM-5 PM, with doors open to exhibitors at 7 AM. Each 8-ft table will be \$5. For information or preregistration, contact Fred Brachle, N8FIK, 9185 Lander St, Westminster, CO 80030, tel 303-429-3865.

## NORTHERN FLORIDA SECTION CONVENTION

August 9-10, Jacksonville

The 13th Annual Greater Jacksonville Convention will be held at the Jax Civic Auditorium. Activities include computer show and shortwave exhibits. Walk-in FCC exams on Saturday at 1 PM only. Provide a 610 form, copy of license and \$4 cash/check. No preregistration. Novice license free. Major exhibitors, air-conditioned, huge indoor swap area. Admission \$4, under 16 free. Swap tables (including admission) \$9 each for 1 day, \$15 for 2 days. Talk-in on 16/76. The convention is located on Water St in downtown Jacksonville, on the St Johns River. For commercial booths and swap-table reservations, send inquiries and/or checks to Jacksonville Hamfest Association, PO Box 10623, Jacksonville, FL 32207, or call 904-350-9193.

## ROANOKE DIVISION CONVENTION

August 23-24, Virginia Beach, Virginia

The 1986 ARRL Roanoke Division Convention and 11th Annual Hamfest and Computer Fair will be

August 1-3  
West Gulf Division, Oklahoma City, Oklahoma  
August 9-10  
Northern Florida Section, Jacksonville  
August 9-10  
Delta Division, Shreveport, Louisiana  
August 10  
Colorado State, Denver  
August 23-24  
Roanoke Division, Virginia Beach, Virginia  
September 19-21  
Dakota Division, Fargo, North Dakota  
October 3-5  
Pacific Division, San Jose, California

October 11-12  
Kansas State, Wichita  
October 18-19  
New England Division, Boxboro, Massachusetts  
October 18-19  
Central Division, St Charles, Illinois  
October 18-19  
Southern Florida Section, St Petersburg

## ARRL NATIONAL CONVENTIONS

September 5-7, 1986—San Diego, California  
July 10-12, 1987—Atlanta, Georgia  
1988—Portland, Oregon (date to be announced)

## How to Register for Upcoming Exams

ARRL National Convention (San Diego, California) Sep 5-7: Exams will be given on Friday, Sep 5, 6 PM-9 PM; Saturday, Sep 6, 9 AM-12 PM and 1 PM-4 PM; and Sunday, Sep 7, 9 AM-12 PM. Novice through Extra Class, at the Town & Country Hotel and Convention Center. Convention registration is not required, and there is no fee; however, applicants must sign up by Aug 20. Submit a completed FCC Form 610 and copy of present Amateur Radio license (copy of code credit certificate, if applicable) to SANDARC VEC, PO Box 5023, La Mesa, CA 92041, requesting "convention session." No walk-ins.

presented at the Pavilion. Featured will be many dealers, special displays, radio and computer forums, and a gigantic indoor flea market. This is a great time for a vacation at the beach. If the XYL doesn't like the beach, we have special-interest programs for her. The kids can watch free movies. ARRL VEC exams given Sunday at 9 AM. To register, send completed FCC 610, with photocopy of present license and \$4.25

check, payable to ARRL/VEC, to David House, N4LOW, 4 Aylwin Crescent, Portsmouth, VA 23702. Show time both days is 9 AM-5 PM. Admission for both days is \$5 in advance or \$6 at the door. Flea-market tables are \$5 per day, electricity \$10 extra for both days. For information and tickets, call or write Manny Steiner, K4DOR, 3512 Olympia La, Virginia Beach, VA 23452, tel 804-340-6105.

# Hamfest Calendar

Administered By Bernice Dunn, KA1KXQ  
Convention Program Manager

[Attention: The deadline for receipt of items for this column is the 5th of the second month preceding publication date. Hamfest information is accurate as of our deadline; contact sponsor for possible late changes. For those who send in items for Hamfest Calendar and Coming Conventions: Postal regulations prohibit mention in QST of prizes of any kind and games of chance such as bingo.]

†Alabama (Huntsville)—Aug 16-17: The Huntsville Hamfest, sponsored by the Huntsville ARC, will be held at the Von Braun Civic Center, 700 Moore St, NW, 10 AM-4 PM Sat and 9 AM-2 PM Sun. Free admission. Activities include exhibits, forums, ARRL booth and indoor flea market. FCC exams by CAVEC, Huntsville High School cafeteria; walk-ins 9 AM Sat. Tours of the Alabama Space and Rocket Center are available for the family. Parking \$2. Limited RV hookups are available on a first-come first-served basis. Flea-market tables \$6/day. Talk-in on 34/94. Frank S. Brown, ARRL contact chairman, tel 205-852-6324 (motels); Alen Forney, dealer chairman, tel 205-837-5935; Dave or Gwenn Givens, flea-market chairman, tel 205-883-2760.

Alabama (Opelika)—Sep 5: The Society for the Promotion of Amateur Radio Communications is sponsoring their Auction at the Lee County Fairgrounds on Hwy 431. First in, first sold. Bring your consignment items by the bag or truckload. Consignment donation is 10 percent on all items. Doors open 7 PM. Sale begins at 7:30 PM. For more information,

write to SPARC, PO Box 2423, Opelika, AL 36803-2423, tel 205-745-2838.

†Connecticut (Norwalk)—Sep 7: The Fairfield ARA, Norwalk ARA, Stamford ARA and the West Haven ARA are sponsoring the Fairfield County Hamfest 9 AM-5 PM. There will be a flea market, tailgating, distributors, VE exams, ARRL forum and technical seminars. Refreshments also available. Talk-in on 99/39 and 52. Admission \$3, tailgate \$5, tables \$10, power free. Location is at the Norwalk National Guard Armory, immediately off Merritt Parkway, exit 38. For registration or info, write to PO Box 326, West Haven, CT 06516.

†Delaware (Georgetown)—Aug 17: The Delmarva Hamfest will be held at the Delaware Technical Community College 8 AM-4 PM. The college is located on Delaware 18 1/4 mile from the intersection of US 113 and Delaware 18 just west of Georgetown. Inside tables are \$3 at the gate. Ham exams given. Swimming pool available. Thirty minutes from beaches. Talk-in 147.075 and 52. For information and advanced ticket registration write: Delmarva Hamfest, Rte 2, Box 244G, Georgetown, DE 19947.

†Illinois (Willow Springs)—Aug 10: The Hamfesters Radio Club, Inc, is sponsoring their 52nd annual hamfest at Santa Fe Park, 91st and Wolf Rd. Plenty of free parking. Gates open 6 AM. The Pavilion will have many vendors displaying and selling their goods, and ARRL and FCC tables. Many other dealers and hams will have tables outside the Pavilion. Refreshments available at reasonable prices. Tickets \$3 in advance, \$4 at the gate. For advance tickets, send check and SASE to Hamfesters Radio Club, Inc, PO Box 42792, Chicago, IL 60642. For general information, call 312-598-4802.

Indiana (Argos)—Aug 23: The Marshall County ARC is sponsoring their hamfest at the Marshall County 4-H Fairgrounds located on State Rd 10. Dealers set up at 6 AM. Doors open for public 8 AM-2 PM. Activities

include Amateur Radio tests given for all levels, walk-ins encouraged; 8-ft tables available for \$5, food and drinks, 60- x 120-ft buildings with 26,000 sq ft, numerous electrical outlets. Flea-market area next to buildings. Talk-in on 52. For more information, write to Marshall County ARC, PO Box 151, Plymouth, IN 46563, or call Bob Nellans, KB9DE, 219-892-5224.

Indiana (Indianapolis)—Aug 9: The WA9SNT ARC will hold its annual Swapfest at ITT Technical Institute, 9511 Angola Ct (across from the pyramids) 8 AM-4 PM. Flea-market set up begins at 6 AM. Admission \$2, students \$1. flea-market space \$1 (additional). Activities include a large flea market and electronics equipment auction. Refreshments available. Talk-in on 146.94. ITT Technical Institute will hold an open house during the swapfest. All interested persons are invited to tour the facilities. For additional information, contact Dave Johnston, K9HDQ, c/o ITT Technical Institute, 9511 Angola Ct, Indianapolis, IN 46268, tel 317-875-8640.

Indiana (Lafayette)—Aug 17: The Tippecanoe ARA (W9REG) will hold its 15th annual hamfest at the Tippecanoe County Fairgrounds, Teal Rd and 18th St. Doors open at 7 AM. Tickets are \$3. Features include a large flea market, with dealers and license exams. Refreshments available. Talk-in on 52 or 13/73. For tickets or more information, write Lafayette Hamfest, Rte 1 Box 63, West Point, IN 47992.

Indiana (La Porte)—Sep 7: The La Porte and Michigan City ARC will hold their combined summer hamfest at the La Porte County Fairgrounds located on State Rd 2 on the west side of La Porte. Inside tables \$3 each. Paved selling area outside. Church-sponsored breakfast and food all day. Talk-in on 52. For more info, write to La Porte ARC, Inc, c/o Alan Rutz, WA9GKA, 7102 W 500 S La Porte, IN 46350.

†Indiana (Marion)—Aug 10: The 7th Annual Grant County ARC hamfest will be held at the 4-H Fairgrounds. Doors open at 8 AM. Admission \$2 in

†ARRL Hamfest

advance, \$3 at the gate. Table reservations are \$2 each for 8-ft tables. Free parking, refreshments and license exams are available. For more information/tickets, send SASE to Brooks Clark, WB9EAP, 2202 S Boots St, Marion, IN 46953.

**Iowa (Cedar Rapids)**—Aug 2-3: The Cedar ARC Inc. is sponsoring their "Summerfest 86" at the Cedar Five Seasons Center 6 AM-5 PM. We will have forums, (amateur/computer), FCC exams, a large variety of commercial vendors and a rummaging flea market inside and outdoors. Special hotel rates at Stouffers Five Seasons by calling 319-363-3161 and asking for Summerfest 86. A delicious and tantalizing buffet dinner on Sat night; advance registration please. Alternative activities will include a ladies' hospitality room and flea market. For Sat shoppers, Cedar Rapids has a skyway system linking the arena and downtown department stores. Talk-in on 16/76 and 52. Tables 8 ft/\$8 with air-conditioning; tailgating \$5 per stall, no air-conditioning for tailgaters. Commercial \$20 per booth with air-conditioning, \$15 each thereafter; phone 319-362-3602. Admission 12 and under free; adult \$5, \$8 at door; student admission \$3, \$5 at door. Banquet buffet \$10, \$13 at door if available. For advance registration, write to Summerfest 86, 2825 23rd Ave, Marion, IA 52302, tel 319-377-2761 or 319-393-2663.

**Kentucky (Georgetown)**—Aug 10: The Blue Grass ARS is sponsoring the Central Kentucky ARRL Hamfest at the Scott County High School on Longlick Rd and US 25. Doors open 8 AM-4 PM. Admission \$4 in advance, \$5 at the door. Activities include technical forums, exhibits and license exams. Flea market held outside with free space. Food and drinks available. Talk-in on 16/76. For more info, send SASE to J. Scott Hackney, 629 Craig La, Georgetown, KY 40324 tel 502-863-5828 or 606-232-2507.

**Maine (Windsor)**—Sep 6: The Augusta Emergency Amateur Radio Unit is sponsoring their Windsor Hamfest at the Windsor Fairgrounds. Gate opens at 8 AM. Admission \$1. Activities include flea market, net meetings, commercial displays and entertainment. Camping and light lunches available. Talk-in on 22/82. For more information or reservations, contact Phil, W1JTH, or Dot Young, W1TGY, Longwood Ave, Augusta, ME 04330, tel 207-622-1385.

**Maryland (Gaithersburg)**—Sep 7: The 29th Annual Gaithersburg Hamfest, sponsored by the Foundation for Amateur Radio, will be held at the Montgomery County Fairgrounds. Gate opens 7 AM. Vendors may set up on Sat, Sep 6. Admission \$4, 12 and under free. Talk-in on 146.52 and 146.04/64. Services include FCC exams, women's and children's program, tailgating \$5 per space, flea market with tables \$9 each, commercial exhibits, free parking in designated areas, food and refreshments at several locations. For more information, write to Robert C. Moore, N3DK1, FAR, PO Box 1068, Laurel, MD 20707, tel 301-776-3571 (evenings).

**Michigan (Saginaw)**—Aug 24: The Five County Swap-N-Shop committee is sponsoring their 10th annual swap-n-shop at the Saginaw Civic Center. Advance tickets \$2, \$3 at the door. Table rental \$7.50 for 8-ft tables. There will also be a covered "trunk-sales" area at \$3 per car. Doors open at 8 AM (6 AM for dealers). Talk-in on 84/24 and 52. For more information, call Don, 517-893-3475. For advance tickets and table reservations, write to Five County Swap-N-Shop, PO Box 1783, Saginaw, MI 48605-1783.

**Minnesota (St Cloud)**—Aug 10: The St Cloud ARC hamfest will be held at Lake George, off MN 23 and US 52. Displays include demonstrations and trades. Ticket donation \$3, extra ticket \$2. Snack counter is available. Talk-in: 34/94 primary, 615/015 secondary. For more information, contact SCARC, Box 141, St Cloud, MN 56302.

**Missouri (Harvester)**—Sep 28: The 2nd Annual St Peters ARC Swapfest will be held at the Harvester Lyons Club Park, 6 miles south of St Charles, just off Hwy 94. Admission at gate \$1. Bring your ham gear or any other electronic equipment to sell or swap. Refreshments available. Talk-in on 145.33. For further info, contact Joe Rordan, KG0R, 2760 Hwy 40-61, O'Fallon, MO 63366.

**Missouri (Springfield)**—Aug 17: The Southwest Missouri ARC will hold its annual hamfest on the north side of Lake Springfield at a new site. Area opens at 8 AM. Tailgate swapping starts at 10 AM. A covered fish dinner with smoked ham at 1 PM. Events include a packet-radio demonstration and bunny hunt. Tickets \$3, two for \$5. Talk-in on 04/64. For information, contact Ray Caringer, SMARC, Drawer B, Springfield, MO 65808.

**Missouri (St Charles)**—Aug 24: The St Charles ARC will sponsor Hamfest 86, at Blanchette Park (new site) 7 AM-2:30 PM. Forums and FCC license exams at 10 AM. Free parking and admission. Tailgating, flea market \$2. Dealers welcome in non-air-conditioned hall. Talk-in on 07/67 and 52. For more information, contact Eric Koch, NF0Q, 2805 Westminister, St Charles, MO 63301, tel 314-946-0948.

**New Jersey (Mullica Hill)**—Aug 24: The Gloucester County ARC is sponsoring their Glou County "Hamfest 86" 8 AM-4 PM. Admission \$3.50 in advance, \$4 at the door; sellers \$4 per space. Activities include VEC testing, YLRL, children's activities. Food and refreshments available. Talk-in on 52 and 78/18. For more information, contact John Fisher, K2JF, 609-589-2318; Milt, K3WIL, 609-845 7000 (daytime); or Ginny at 609-694-4442 (evenings).

**New Jersey (Oakland)**—Aug 23: The Ramapo Mountain ARC is holding its 10th annual flea market at the Oakland American Legion Hall, 65 Oak St, Oakland, NJ, just 20 miles from the GW bridge. Talk-in on 147.49/146.49 and 52. Indoor tables \$6.50, tailgating \$3. Admission \$1, non-ham family members free. For information, contact Tom Risseuw, N2AAZ, 63 Page Dr, Oakland, NJ 07436, tel 201-337-8389 (after 6 PM).

**New Mexico (Alamogordo)**—Aug 30-31: The AARC will hold its second annual Hamfest at the Civic Center on First St. Admission \$5 in advance, \$6 at the door. Activities include exhibits, swap tables, seminars and VE testing. Air-conditioning indoors, with food and drinks available. For more information, contact Larry Moore, WA5UNO, 1830 Corte Del Rancho, Alamogordo, NM 88310. Also can be reached by Southwest Traffic Net on 3935.

**New York (Ballston Spa)**—Sep 6: The Saratoga County RACES will sponsor a hamfest at the Saratoga County Fairgrounds 9 AM-5 PM. Amateur Radio exams given; preregistration is recommended. Talk-in on 147.00. For more information, contact Betty Burgess, NB2R, RD 2, Box 269, Corinth, NY 12822.

**New York (Brewster)**—Aug 16: The Putnam Emergency ARL is having their Electronics Extravaganza at the JF Kennedy Elementary School. Doors open 9 AM-4 PM. Admission \$3, under 12 free with adult. Food and refreshments available. Indoor tables (with one admission) \$10. Tailgating \$5. FCC exams with limited number of walk-ins. Talk-in on 144.535/145.135. For advance table registration and information, contact K. Dillon, N2EFA, RFD 7, Noel Ct, Brewster, NY 10509.

**New York (Ithaca)**—Aug 23: The Annual Finger Lakes Hamfest will be held 8 AM-4 PM at the Trumansburg Fairgrounds 12 miles NW of Ithaca on Rt 96. Talk-in on 37/97. Admission \$3, under 14 free. Flea-market space \$1. Boat-anchor auction and other fun events. Reserved indoor space available and overnight parking. Contact David Flinn, W2CFP, 886 Ridge Rd, Lansing, NY 14882, tel 607-533-4297.

**New York (Niagara Falls)**—Sep 6: The ARA of the Tonawandas is sponsoring their hamfest at the Niagara Falls International Convention Center. Doors open 7 AM-5 PM. Advance admission \$3.50, \$5 at the door, under 12 free. Activities include inside flea market; 4-ft table \$5 in advance, \$7 at the door. Tailgaters flea market \$5 advance, \$7 at the door. New equipment, video and computer displays, technical and non-technical programs, equipment test-bench facility, first aid, code proficiency test, FCC/VEC exams starting at 9 AM, ARRL forum, food and drink facilities both inside and outside of the convention center. Famous Rainbow Center Mall only a short walk from the convention center. Talk-in on 31/91 and 52. For more info, contact Nelson Oldfield, WA2ZSJ, 126 Greenway Blvd, Cheektowaga, NY 14225, tel 716-636-6394 after 5 PM, or Harold Freund, KD2V, PO Box 485, Buffalo, NY 14215, tel 716-834-6181.

**North Carolina (Shelby)**—Aug 30-31: The Shelby ARC is sponsoring their 29th Shelby Hamfest at the Cleveland County Fairgrounds. Doors open 8 AM-5 PM Sat, 8 AM-3 PM Sun. Admission \$5, advance \$4. Free shuttle buses to shopping mall and downtown. Sunday School available also. Services include license exams Sat at 9 AM. Reservations required; mail Form 610, copy of license, \$4 check or money order payable to Charlotte VEC, 227 Bennett La, Charlotte, NC 28213. Talk-in on 28/88. For more information, contact John Ledford, N4GOQ, 3410 Oakcrest Dr, Shelby, NC 28150, tel 704-482-4507.

**Ohio (Lancaster)**—Aug 10: The Lancaster and Fairfield County ARC will hold its annual hamfest 8 AM-4 PM at the Fairfield County Fairgrounds. Talk-in on 63/03 or 52. Plenty of parking, refreshments available all day. Limited tables or bring your own. Admission \$3 advance, \$4 at the door. Tables \$4 in advance, \$5 at the door. Table space \$3 advance, \$4 at the door. For more information, contact Lancaster ARC, Box 3, Lancaster, OH 43130.

**Ohio (Louisville)**—Aug 10: The Tusco ARC and Canton ARC is sponsoring their 12th Annual Hall of Fame Hamfest at the Nimishillen Grange, 6461 Easton St. Doors open 9 AM-4:30 PM. Admission \$2.50 in advance, \$3 at the door. Activities include flea market, \$2 per vehicle in addition to admission, AEP communications van, forum, radio-controlled airplanes. Services include large flea market, dealers, distributors, QCWA and Buckeye Belles. Talk-in on

52 and 72/12. For more info, contact Bill MacNealy, W8LRF, RR 1 Box 442, Bolivar OH 44612, tel 216-874-3483.

**Ohio (Marysville)**—Aug 24: The Union County ARC is sponsoring their Marysville Hamfest at the Marysville Fairgrounds. Doors open 6 AM-4 PM. Admission \$4, advance \$3. Activities include flea market. Talk-in on 52 and 99/39. For more info, contact Gene Kirby, W8RBN, 13613 US 36, Marysville, OH 43040, tel 513-644-0468.

**Ohio (Warren)**—Aug 17: The Warren ARA is sponsoring their hamfest at the Kent State University, Trumbull Branch. Flea market opens 6 AM, dealers in main building opens 8 AM. Talk-in on 37/97. Tickets \$3 at gate. Flea-market spaces \$2 per 10-ft space. Dealer spaces inside campus \$6 per 8-ft table. New programs for women's activities. Tests will be given on walk-in basis only; bring your original license and a copy, and a \$4.25 check to VEC. For more information, contact Sandy Melton, KC8RM, 4595 Bonnie Dr, SW Warren, OH 44405, tel 216-399-1422.

**Ontario (Barrie)**—Sep 20: The Hex-9 Group of the Central Pennsylvania Repeater Assn will hold its annual Electronic Exhibit, Ham and Computerfest at the Penn Harris Inn and Convention Center, Rt 11 and 15. Gates open 8 AM. Admission \$4, XYLs and under 12 free. Activities include 15,000-sq ft indoor air-conditioned exhibit area, large outdoor tailgate area, free frequency/modulation checks, packet seminar by AK3P, various other seminars and amateur license examination session (starts 9 AM). Services include food and refreshments, rooms available to attendees at reduced rates. Talk-in on 145.47 and 52. For more information, contact Paul McDonnell, N3BK1, 1207 Apple Dr, Mechanicsburg, PA 17055, tel 717-697-1880 (12 PM-8 PM). For hotel reservations only, contact Penn Harris Inn and Convention Center, tel 717-763-7117; mention CPRA for reduced rates.

**Pennsylvania (Camp Hill)**—Aug 24: The Central Pennsylvania Repeater Assn will hold its annual Electronic Exhibit, Ham and Computerfest at the Penn Harris Inn and Convention Center, Rt 11 and 15. Gates open 8 AM. Admission \$4, XYLs and under 12 free. Activities include 15,000-sq ft indoor air-conditioned exhibit area, large outdoor tailgate area, free frequency/modulation checks, packet seminar by AK3P, various other seminars and amateur license examination session (starts 9 AM). Services include food and refreshments, rooms available to attendees at reduced rates. Talk-in on 145.47 and 52. For more information, contact Paul McDonnell, N3BK1, 1207 Apple Dr, Mechanicsburg, PA 17055, tel 717-697-1880 (12 PM-8 PM). For hotel reservations only, contact Penn Harris Inn and Convention Center, tel 717-763-7117; mention CPRA for reduced rates.

**Pennsylvania (Lancaster)**—Aug 31: The Red Rose Computerfest is sponsoring their hamfest at the Guernsey Pavilion, Rt 30 at Rt 896, about 3 miles east of Lancaster. Doors open 9 AM-3 PM. Donations \$3, under 14 free. For more info, SASE to Computerfest Committee, PO Box 5029, Lancaster, PA 17601.

**Pennsylvania (Uniontown)**—Sep 6: The Uniontown ARC will hold its 37th annual Gabfest at the club grounds located on the Old Pittsburgh Rd, just off Rt 51 and the 119 by-pass, 50 miles south of Pittsburgh. Talk-in on 645/045 and 144.57/5.17. Free parking available, free coffee and free swap and shop set-up with registration. Registration \$3, 2 for \$5. Plenty of food at refreshment stand. For more information, contact UARC, Gabfest Committee, John Cermak, WB3DOD, 36 Steel St, PO Box 433, Republic, PA 15475, tel 412-246-2870.

**Pennsylvania (Warrington)**—Aug 10: The Mid-Atlantic ARC is sponsoring their "Hamfest 86" at the Bucks County Drive-In Theatre, Rt 611. Rain or shine, doors open 8 AM-3 PM. Tailgate setup begins at 7 AM. Talk-in on 66/06 and 52. Refreshments available. Admission \$3, \$2 for each tailgating space. For more information, write to MARC, Box 352, Villanova, PA 19085, or call Bob Josuwiet, WA3PZO, 215-449-9727.

**Rhode Island (West Greenwich)**—Aug 23: The Hope Valley ARA will hold its First Annual Flea Market 8 AM-2 PM at the West View Inn. Free admission. Plenty of free parking. Sellers fee \$5 per space, tables not supplied. Inside space available in case of rain. Talk-in on 165/765, 52 and 223.90. Further info, may be obtained from any club member or Ray Ortigues, 35 Hornet Rd, N Kings town, RI 02852.

**Tennessee (Lebanon)**—Aug 31: The Lebanon Hamfest, sponsored by the Short Mountain Repeater Club, will be at the Cedars of Lebanon State Park, US Hwy 231. Outdoor facilities only, exhibitors bring your own tables. Talk-in on 146.31/91. Food and drinks available. For further information, contact Mary Alice Fanning, KA4GSB, 4936 Danby Dr, Nashville, TN 37211.

**Tennessee (Chattanooga)**—Sep 6-7: The Eighth Annual Hamfest Chattanooga Amateur Radio and Computer Convention will be held at the new convention and trade center, South Hall. Highlights include license exams on both days, all dealer and flea-market displays indoors, free admission, convenient parking and lodging facilities, plus various forums. Amateur exams on Sat will be given by WCARS/VEC for \$4, and Sunday's will be given by ARRL/VEC for \$4.25. All 610 forms, checks or money orders, and license copies should be sent to Hamfest Chattanooga, PO Box

# W1AW Schedule

April 27-October 26, 1986

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 February 1986 QST, pages 9 and 85" 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 85.

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

On Wednesdays at 2230 UTC, an IARU Region 2 bulletin in English and Spanish on 45.45-baud Baudot is sent on the regular teleprinter frequencies, beamed to Central and South America.

On alternate Saturdays at 2230 UTC, Keplerian Elements for active amateur satellites will be sent on 45.45-baud Baudot on the regular teleprinter frequencies. The next date for transmission will be given in regular satellite bulletins.

W1AW CW and voice bulletins are sent on OSCAR 10, Mode B, subject to reactivation of the transponder. Look for CW on 145.840 MHz and SSB on 145.962 MHz.

Teleprinter bulletins are 45.45-baud Baudot, 110-baud ASCII and 100-baud AMTOR, FEC mode, Baudot, ASCII and AMTOR (in that order) are sent during all 1500 UTC transmissions, and 2200 UTC on TThFSSn. 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 1.

3377, Chattanooga, TN 37404, by Sep 3. Walk-ins will be accepted on a space-available basis. Please bring positive ID and your original license. Flea-market tables \$11/\$6 for one day or \$10 for two days, electrical power \$10 extra. Talk-in on 146.19/79. Cooperating motels are Holiday Inn Trade Center, tel 615-756-0002; Best Western of Chattanooga, tel 615-266-7331; Days Inn on 20th St, tel 615-267-9761. Specify your attendance at Hamfest Chattanooga. For additional information, please write to Hamfest Chattanooga, PO Box 3377, Chattanooga, TN 37404, or call Nita Morgan, NADON, at 404-820-2065 for dealer exhibitors, or Barbara Gregory, WA4RMC, at 615-892-8889 for flea-market info.

**Texas (Levelland)—Aug 3:** The 21st Annual Northwest Texas Emergency Net Picnic and Tailgate Swapfest will be held in the city park. Free registration begins at 8 AM and swapping all day. Lunch at 12:30. Bring your own picnic basket. Talk-in on 28/88, the Levelland repeater. For more info, contact John R. Bell, W5NCIX, 208 Pat St, Levelland, TX 79336.

**Texas (San Angelo)—Aug 16-17:** The San Angelo ARC will sponsor the CENTEX Hamfest 86 at the San Angelo Convention Center. Pre-registration \$5, \$7 at the door. CENTEX features a large air-conditioned flea market, two licensing sessions, ladies' events, seminars, discussions and many other activities. This year W5QX will also sponsor a special-events station commemorating the Texas Sesquicentennial celebration, with stations on packet radio and satellite. All attendees are welcome to operate one of the stations, and special QSL cards will be given for operators as well as contacts. RV hookups and hotel accommodations are available at or within a block of the hamfest. Coffee, rolls, drinks and sandwiches will be available at the grounds. Several contests are planned. Talk-in on 3922, 7213, 52 and 24/94. For more information, contact SAARC, Box 3751, San Angelo, TX 76902.

**Virginia (Bluefield)—Aug 24:** The East River ARC is sponsoring their Bluefield Hamfest at the Brushfork Armory. Doors open 9 AM-3 PM. Admission \$4 at the door. Activities include indoor flea market, radio dealers, forums and videotape showings. Paved parking and food available on site. Services include license exams at 9 AM, walk-ins only, \$4 fee. Talk-in on 145.49 and 146.52. For more info, contact flea-market dealer Don Anderson, WD8OOR, 304-325-3022.

**Washington (Tacoma)—Aug 16-17:** The Radio Club of Tacoma is sponsoring their hamfest at the campus of Pacific Lutheran University. Admission \$5, without dinner. For more information, contact Jerry Seligman, W7BUN, 12306 80th Ave, East Puyallup, WA 98373.

**West Virginia (Ripley)—Aug 9:** The Jackson County ARC is sponsoring their 9th Annual Hamfest at the Jackson County Junior Fairgrounds, 6 miles west of Ripley. Doors open 9 AM-4 PM. Admission \$3 at the door. Activities include technical forum, OSCAR 10 satellite demonstration, flea market, ladies' activities, humorous ham radio "videos." Refreshments available. Talk-in 07/67. For more info, contact Les Shockey, WB8SNO, RED 2, Box 36, Sandyville, WV 25275, tel 304 273-3525.

**Wisconsin (Green Bay)—Aug 16:** The Green Bay Mike and Key Club is sponsoring their Summer Swapfest at the Community Service Center, 1673 Dousman St. Take the Dousman St/Shawano Ave exit off Hwy 41. Talk-in on 72/12 and 96/36. Buy, sell or trade. Free admission and parking. Doors open 7 AM for sellers, 6 AM for commercial exhibits. Electronic equipment, components for hams, computer hobbyists and experimenters, old time radio and much more. Tables 8 ft/\$5 each, by reservation only. Table limit to 4 only; send SASE with name, call, address and check made payable to Green Bay Mike and Key Club, c/o Cathy Strommen, KD9WO, FCC Amateur Radio exams given, registration preferred; send 610 form to Larry, KD9JA, 1005 S East St, Apt 111, Appleton, WI 54915. Food and beverages also available.

## Correction

The address of the Shenandoah Valley ARC was listed incorrectly in last month's column. For information on the 36th Annual Winchester Hamfest, to be held Aug 3 in Berryville, Virginia, write SVARC, PO Box 139, Winchester, VA 22601.

[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

I would like to get in touch with . . .

any hams who have ever been associated with Johns Hopkins University and are interested in starting a net. Skip Collins, KA3FGV, 2426 Kentucky Ave, Baltimore, MD 21213.

any WW II radio mechanics or operating instructors who were trained at St Louis University AAFRIS or who taught at Scott Field, Illinois/Truax Field, Wisconsin. Abbott Rosenberg, WA6JOB, 234 Via Linda Vista, Redondo Beach, CA 90277.

any hams who are alumni of the Northwestern University Amateur Radio Society. Martin Feuerstein, KJ4Y, 2145 Sheridan Rd, Evanston, IL 60201.

anyone with a manual/schematic for an Azden PCS-3000. Al Bingham, KC8UP, 2395 E Beaver Rd, Kawkawlin, MI 48631.

QST congratulates . . .

John McCann, KW4U, of Richmond, Virginia, on being appointed Commissioner for the Department of the Visually Handicapped.

Conan Barger, W3CVE, of District Heights, Maryland, on receiving a plaque from the Air Force in appreciation of his outstanding service in training military radio operators.

George Gero, WA2FEF, of New York City, New York, on being elected a member of the Board of Governors of the New York Mercantile Exchange and treasurer of NYMEX.

## ON GIVE NOVICE EXAMINATIONS, PART 2

*Here is part 2 of our suggestions for giving Novice examinations. (Part 1 appeared in the June issue.)*

### The Code Test

After the candidates are assembled and seated, explain the procedure in detail. They will be given a code-receiving test at 5 WPM. First, there will be a one-minute practice session. Then you will check to see if any adjustments (such as volume) are necessary. Then the five-minute examination will begin. No questions are allowed during the five-minute test.

After the five-minute code transmission has ended, the candidates will have some time (usually 20 minutes, if needed) to answer 10 questions about the text transmitted or to look over their copy. Then you collect the papers and score them immediately. If seven or more questions were answered correctly, or if there is one minute of solid, error-free copy, the candidate has passed the code-receiving test.

### Help for Those Who Don't Pass

On the other hand, the examination must be terminated at this point for those, if any, who did not pass the code-receiving test. Be sure to tell those who failed (1) where they can get additional help, (2) where they can take the Novice examination again and (3) that they are invited to the refreshments immediately after the examination, even though they did not pass. Such an invitation can be a big encouragement to discouraged candidates. They need a lift at that point!

### The Sending Test

The current FCC Rules still mention a code-sending requirement. The Commission has stated, however, that it will accept as valid a code test based on receiving *only*. This has become the standard practice for most VEC-conducted code tests for Technician- and higher-class licenses. If you, as the Novice candidate's examiner, want to require a sending test, that is well within your right—you are the one certifying that this person can send and receive the code.

In fairness to the candidates, however, you should be up front in stating your intent to administer a sending test, if that is the case. The candidate always has the option of finding another examiner if he or she refuses to take the sending test.

If you do give a sending test, here are the ARRL's recommended procedures. Presumably, you will have given the code-receiving test to all candidates at the same time, but obviously you cannot do so with the code-sending test. Therefore, it's a good idea to have a separate room available for the sending test. In such a room one candidate can send the required number of words at 5 WPM. Some candidates will be considerably more at ease if they know that nobody else is hearing their sending. Terminate the

sending test as soon as the candidate has sent 25 characters without an error. (Remember that numerals and punctuation count as two characters each.) Terminating at this point saves time, and the candidate certainly has passed the sending test.

The candidate, of course, is entitled to the full five minutes, if it requires that long for him to send 25 characters consecutively without an error.

### Avoiding Code-Test Fears

Many Novice examiners also teach the Novice course or are the person doing individual tutoring. In this case many examiners simply send code practice each week. Once the candidate demonstrates sufficient proficiency to pass the code test in a practice run, that practice is declared to be the test *after the fact*. Imagine the pleasant surprise to a hopeful ham who just did fine on code practice only to be told, "Congratulations, you just passed your code test!"

### The Written-Examination Process

Finally, you administer the written test, preferably by handing each candidate one or two scratch sheets and the sheet with the questions. Again ask each candidate to sign his name on *each* sheet, including the scratch paper. Emphasize that sufficient time has been allotted so that no candidate need feel rushed. State, if such be the case, that not everyone has the *same* questions. Doing so strongly discourages a candidate from trying to copy another's answers. Tell the candidates that, whenever they are finished, they may turn in their papers to you and leave the room. They may not, however, return to the room until all candidates have completed the examination. (This procedure prevents disturbing the candidates who are still writing the examination.)

Score the examination papers in the order you receive them. In most instances, it is inadvisable to discuss the results of the examination with anyone, until all are finished. Then, perhaps in the other room, talk with each candidate individually and privately. Tell those who have passed only that they have done so. Tell those who failed how many questions were missed.

It is neither necessary nor advisable to discuss the contents of the examination with any candidate, nor to defend the questions, answers or distractors (wrong answers). Be sure to keep all papers for one year, whether the candidate passed or failed, in case the FCC wants to inspect them.

### Wrapping Up the Details

Now is the time to tell the candidates when and where the Technician/General course will begin. Be sure that those who failed know where they can get additional help before attempting the examination again. It comforts some to know that there is no limit to the number of times they may take the examination. It is poor practice, however, to examine any candidate a second time on the same day.

At the time this column is being written, certificates for successfully passing the code examination cannot be issued by Novice examiners if the applicant passed the code but failed the written exam. These candidates must take the entire examination again. (Code certificates *are* issued to candidates who pass any code test at a duly registered test session using three accredited Volunteer Examiners.)

The Form 610 for each candidate who passes must be sent to the FCC, Box 1020, Gettysburg, PA 17325 within 10 days. Make sure you're using a Form 610 with a valid date of June 1984 or later. This date appears just below box 17 on the front of the form. (If you use a Form 610 with a date earlier than June 1984, the FCC will return it to the candidate without issuing the license.)

Before sending the Form 610 to the FCC, the examiner fills in and signs the top portion (Section II-A) on the back. (Leave blank the lower part of the back and the boxed-in section at the top on the front. These sections do not relate to the Novice examination.)

After you drop the 610s into the mailbox, you can go home with the assurance that you have been instrumental in making it possible for Amateur Radio to continue being the constructive force in the world that it has been for 72 years. You passed the test, too!

### ON HONORING ELMERS

Occasionally we receive a letter calling to our attention the superior performance of an Elmer. Your League wholeheartedly believes in the Elmer system. For years we have supported it with Elmer certificates, available to any ham who wants to award one to someone who helped him/her climb the ham-radio ladder. Now, the Ozark Amateur Radio Club (Mountain Home, Arkansas) has established a "Super-Elmer" award, the latest recipient of which is Frank Finger, W5ASD. Then, we received a letter from George Erickson, W5POG, of the National Association of Retired and Veteran Railway Employees, Inc, mentioning Kermit Kruger, K5JEA, as worthy of special mention as an Elmer. Another letter, this one from Bud Lewis, KA3FYX, has recalled his debt to his Elmer, Ken Thompson, WB3AHB. Gary Ambert, AI4J, has touchingly memorialized his Elmer, Robert Knapp, W4OMW, in one of his code-learning cassettes. And I owe an everlasting debt of gratitude to my Elmer, Mike Arnautoff, W6LUE.

Obviously we cannot mention in this column all those who have served magnificently as Elmers. But ham radio owes a great debt of gratitude to those who have so served. They will be long remembered as Elmers, and we never will be able to thank them enough for their selfless service. To encourage others to follow in their footsteps, your League is preparing a handbook for Elmers, which may be ready for distribution toward year-end. If any of you have trade tricks you're willing to share, please drop us a line at ARRL HQ. Many Elmers need and most usually want all the help and encouragement they can find.



## Management and Net Managers

Net managers, like their nets, come in assorted sizes, shapes and capabilities. Just as nets are formed for a variety of reasons—weather reporting during emergencies, traffic handling, ARES, social functions, DX spotting, etc—so, too, the manager of each net must function in a manner consistent with the purpose of the net. Since my primary concern is with NTS traffic nets, the following remarks and observations are addressed to the running of such nets.

What are the responsibilities and qualifications of a NTS net manager? Unfortunately, specifics have not been determined in these areas. The formal job description of this position simply states that a net manager is appointed, with the concurrence of the Section Traffic Manager (local and section nets) or League Headquarters (region and area nets); and that he or she be a licensed radio amateur and report net activity on a monthly basis to either the STM or Headquarters. What we presently lack is a set of specific standards against which we can measure management performance and objectives.

What should we look for when the time comes to appoint a net manager? Since we're dealing with traffic nets, it would seem obvious that a prospective net manager also be a "hotshot" traffic handler. Most often this is the primary criterion, and all too often, it is the wrong criterion. While a National Traffic System (NTS) net manager must be intimately familiar with proper traffic handling, monthly traffic totals bear little relationship to management capability. For example, it is a well-known fact that an excellent salesman (whatever the product) does not equate with an excellent sales manager, and so it is with traffic nets. All too often, no more thought is given to selecting a net manager than looking to see how many times Brass Pounders League was made in the last few months.

Once the selection of a manager has been made, and it's seldom turned down—human nature being what it is—what guidelines are available to define job performance and proper net operation? The new net manager is usually left with little guidance, except the past performance of the previous net manager.

So what needs to be done? The first, and most important, is to recognize that we are talking about a management position. The amount of traffic that a person handles should have little bearing on their selection as a net manager. To be sure, the prospective manager should have a firsthand knowledge of all phases of traffic handling. In addition, their ability to pass messages should be an example to all. The "traffic hog," that person who races from net to net grabbing each and every piece of traffic, is probably the poorest choice for a net manager. Traffic handling is a shared endeavor, and everyone should strive to be a team player.

Ideally, a net manager would already have some experience and background in professional management. How and where this experience has been gained makes little difference. General management techniques are applicable to any situation. The STM needs to take a look at the "whole" person when making this selection. Some characteristics come to mind: the candidate's ability to handle traffic, ability to lead other people, particularly when those other people are volunteers, and whether the prospective net manager has the time, energy and personal resources to adequately fill the position. Make no mistake about these last three items. Being an effective manager requires a certain expenditure of both time and energy along with some "out-of-pocket" expense.

### Possible Criteria for Net Managers

Once a net manager has been selected, by what criteria should performance be gauged? Several factors are characteristics of good net managers:

1) Net reports are sent promptly to the STM or League HQ, as the case may be. In other words, the paperwork is done on time each and every month.

2) The net manager is active on the net. While being there every session is unnecessary, a good manager is on a net the majority of the time. Realize that "presence," not interference, is needed during net operation.

3) The net manager realizes that the designated Net Control Station (NCS) is "boss for the day" so the manager doesn't interfere with the running of the net. However, the manager does take an active interest in the performance of each NCS and seeks continuously to improve their performance. This means spending some time with each individual NCS, working together to improve their skill in the smooth, efficient operation of the net.

4) The net manager functions as Net Control at least once a week. Each time the manager is NCS, it should be as an example to others on proper net operation. The best managers lead by doing rather than telling.

5) The net manager is quick to praise publicly, but reserves all criticism for private audience. A good manager monitors the performance of all net members, but particularly the Net Control Stations since they set the tone of the net. No one likes criticism, and it's best given in the form of a suggestion or observation. However done, it's a private matter between the manager and the individual.

6) The net manager works continuously to keep all liaison spots filled and encourages as many operators as possible to participate. A good manager recognizes that the "iron man" concept died some 40 years ago. Active participation by a large number of hams promotes a healthy net.

7) The net manager uses a newsletter as a training tool for teaching traffic handling,

proper net operation and for promoting a sense of belonging among the net members. A newsletter needs to be published at least four times a year, but does not need to be a large production item. Further, it needs only to be mailed to active net members. On a single, 8½- × 14-inch piece of paper, it should be possible to list a current roster, liaison assignments, preamble and items of current interest. Additionally, a portion of each newsletter should be devoted to teaching proper traffic-handling procedures.

Being a net manager is a tough, demanding job. Properly done, it can make a net move like clockwork with lots of active participation. Poor management, or even worse, no management at all can be the kiss of death on any net. The net manager assumes an important responsibility. For this reason, the STM or Area Staff may be faced with the unpleasant task of removing an ineffective manager. This must be done or they, in turn, are shirking their responsibility to the amateur community. The above-mentioned guidelines will provide the STM, Area Staff and net manager with a set of specific, identifiable objectives by which they can gauge management performance. The meeting of these objectives should be of paramount importance when considering a new manager or endorsing an existing net manager.—Bradley Wells, KR7L, Assistant Section Manager, Washington, and Member at Large, NTS Pacific Area Staff

### YOUR CONDUCTOR'S CABOOSE

The recently appointed Blue Ribbon Committee on Emergency Message Traffic met in Dallas during May. Those of us on the committee would like to offer our sincere thanks to those of you who sent us your comments, suggestions and criticisms. General policies as well as specific points (directly related to your comments) were addressed. Rest assured that those tasked with implementing any recommendations by the ARRL Board of Directors will rely, to a great extent, upon your specific comments.

### SPOTLIGHTS ON SERVICE ...

#### Beverly Hills Hams

Forty hams braved the rain in order to provide communications for the second annual Saint Patrick's Day parade in Beverly Hills, California. The parade included Grand Marshal Gene Kelly and stars such as Morgan Fairchild, Jimmy Stewart and Bernie Kopel. The ham communicators were organized by Frank Pettinato, WB6ELR, of the Los Angeles Police Department (one of many LAPD officers assisting the Beverly Hills Police Department during the parade).

Pagentry Productions, the promoters of the St Patrick's Day parade, liked the way the hams worked during the star-studded annual Holly-

wood Christmas parade (which they also promote), so they invited the hams to participate in this parade. "Last year only 10 hams participated, but this year 40 were asked to participate," Pettinato said. "This is based upon their success in the Hollywood parade as well as last year's St Patrick's Day event." He also added that although commercial communications equipment was used, the radio amateurs got information to the parade command post with less confusion.

Hams were stationed with each of the five grandstand announcers relaying changes in the lines of march to the announcer. Because of the heavy rains, many of the stars dropped out of the parade. Without the hams providing updated information on the changes, there would have been chaos. These changes were relayed to the hams by the command post and other observers along the parade route and, in turn, were passed on to the announcers. Radio amateurs also covered six Red Cross stations.—*Robert S. Zumalin, WA6VIP*

### Shipwrecked!

Amateur Radio was responsible for a quick rescue of four persons whose 35-foot sailboat stranded and sank on a remote reef in the Abaco islands of the northern Bahamas, about 200 miles northeast of Miami, Florida. At 8:05 PM Wednesday, March 12, Don Hughes, N4EOW, on the sailing vessel *Nomad*, heard a frantic distress call on Marine VHF Channel 16. The call was from the sailboat *Augusta of Tortola* near Moraine Cay. The sailboat was stuck on a reef, and it was sinking!

The *Nomad*, anchored at Alans Pensacola Cay (about seven miles south of Moraine Cay), repeatedly tried to establish communications with the *Augusta* without success. A call to any other stations in the area that might have heard the distress call also went unanswered. Winds were 15 to 20 knots from the southeast, and even the seas on the shallow Bahama Banks were very rough. It would have been foolhardy for another deep draft sailboat to attempt a night rescue attempt in these reef-strewn waters, especially in adverse weather conditions.

Since the Bahama Air Sea Rescue (BASRA) was out of VHF range and no relays would answer, N4EOW looked for the strongest station he could find on the Amateur Radio. NV5H, Dave in Eureka Springs, Arkansas, immediately acknowledged a "break for emergency traffic" on 7.278 MHz. All other traffic immediately cleared the frequency. Another station, N2DLK, in Long Island, New York, stood by

for relays. Dave was given the US Coast Guard's telephone number in Miami and relayed vital information. An acknowledgement was received from the Coast Guard in less than 10 minutes with their intentions to dispatch a Falcon jet to the scene.

At 10:40 PM, Coast Guard Jet 2109, approaching the Moraine Cay area, checked in with the *Nomad* on Marine VHF. At 11:05 PM, the jet reported a dim flashing light near Moraine Cay and requested a helicopter from Miami. The jet had to return to Miami for fuel, but returned at 1:15 AM. Almost at the same time, a floodlight-equipped Coast Guard helicopter arrived. Forty minutes later, at 1:55 AM, the helicopter sighted the partially-submerged sailboat lying on its side on a reef. Shortly thereafter, the survivors were sighted on a tiny uninhabited island. The helicopter managed a safe, night landing on a small beach and rescued four grateful persons and two dogs in good condition.

Less than six hours had elapsed from the time the brief distress call was received and the successful rescue was completed. This is certainly a tribute to the value of Amateur Radio and to the commendable performance of the US Coast Guard.—*Don Hughes, N4EOW*

### IN SERVICE

□ Fremont County, CO—Apr 19: The Royal Gorge Amateur Radio Club and ARES (District 15) jointly provided radio communications for the 1986 Fremont County March of Dimes Walkathon; 183 walkers participated. Fremont County Search and Rescue supervised the 16-km route with 8 checkpoints. Radio amateurs provided communication along the route at checkpoints and for the transportation vehicles. The March of Dimes organization and the Fremont County Sheriff Office were very complimentary of Amateur Radio.—*John A. McDermott, N8FGC, EC, District 15*

□ Hawaii—May 7: A large earthquake near the Aleutian Islands triggered a tsunami warning for the state of Hawaii at about 1415 (local time). All low-lying areas subject to wave damage were ordered evacuated. The first destructive waves were expected at about 1700. Maui County ARES members quickly gathered on the KH6H and KH6HHC repeaters. AH6GJ, who lives in a remote area of Maui that is popular with fishermen and campers, set out in his Jeep to warn people of the impending danger. Luckily, only a 5-inch rise in the tide was recorded at Maui's Kahului Harbor. The evacuation order was

cancelled, and all amateurs were excused at 1920.—*Melvin Fukunaga, KH6H, EC, Maui County*

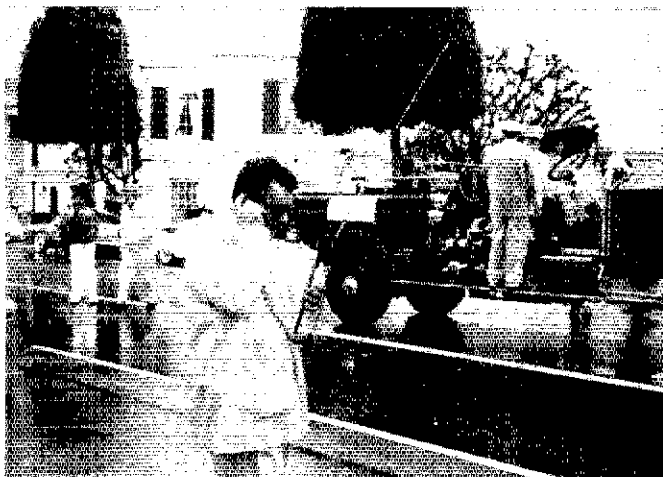
□ Forsyth County, NC—May 10: Twelve members of the Forsyth County ARES helped Tanglewood Park officials in this year's annual Tanglewood Steeplechase. Operators were assigned to the Judge's Stand, horse stables, course gates, rescue squad and shuttle buses for spectators. Few problems were encountered and communications went smoothly.—*Richard Batte, N4BMI, EC, Forsyth County*

□ New London, NH—May 16-18: Thirteen radio amateurs from New Hampshire and Vermont assisted the New Hampshire Lung Association conduct a three-day Bike Trek. The Bike Trek covered 157 miles, and the 119 bikers made two scheduled overnight stops. Amateurs provided communications by using 2-meter repeaters and simplex frequencies. Radio operators were aboard the administrative, medical, repair and roving vans. The remaining amateurs were stationed at checkpoints along the route.—*William J. Eachus, KB1DL*

□ Chicago, IL—May 18: Members of two ARRL-affiliated clubs, the Chicago Suburban Radio Association and the DuPage Amateur Radio Club, cooperated to provide communications for approximately 500 bicycle riders along the 22-mile route of the Liberty Ride Festival. No emergency situations and only one minor injury were encountered. An alteration of the planned route was made after radio amateurs reported high waves and path flooding. Communications were handled on 2-meter simplex and through the Western Area FM Amateur Repeater Club repeater.—*Wayne Burk, NA9B*

□ Berwick, PA—May 24: Columbia County Emergency Management Agency received notification of an Alert status at the Susquehanna Steam Electric Station (Nuclear-Powered Facility), Berwick, Pennsylvania. An Alert is second in a list of four different classifications which can occur in a nuclear-powered facility.

In response to the alert, the Emergency Operations Centers and their staff members were put into service. All personnel followed a standard operating procedure, and the Columbia County RACES was activated to link the EOCs with the county's emergency-management agency. Traffic was handled by the members of the Columbia-Montour Amateur Radio Club, and an emergency net was operating on the N3AAE repeater until the situation was under control.—*Anthony J. Camillocci, KA3BPN, Communications Officer, Columbia County*



As part of a network of radio amateurs, Chuck Carpenter, N6CFQ, relays information on the progress of the St Patrick's Day Parade in Beverly Hills, California. (WA6VIP photo)



Mountain ARC (MD) members proudly display their newest acquisition, a 1953 Reo Gold Comet van, which has been converted into an emergency-communications center complete with a 3500-watt generator. (WB3DQY photo)



# Rules, September VHF QSO Party

The rules for the 1986 September VHF QSO Party will be the same as for last year. The multipliers will again be grid squares (aka the 2° × 1° Maidenhead grid-square locators) worked per band. See Rules 4 and 5. Grid-square maps are available from ARRL HQ for \$1.

Official summary sheets and log sheets are available from ARRL HQ for an SASE, and all entrants should send for a set. Good luck from FN31!

## Rules

1) **Object:** To work as many amateur stations in as many different 2° × 1° grid squares as possible using authorized amateur frequencies above 50 MHz.

2) **Contest Period:** Begins 1800 UTC Saturday, Sep 13, and ends at 0300 UTC Monday, Sep 15.

### 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 and 1296-and-up categories will be recognized both in QST score listings and in awards offered. Contacts may be made on any and all bands without jeopardizing single-band entry status. Such additional contacts are encouraged and should be reported. 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 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.

4) **Exchange:** Grid-square locator (see Jan 1983 QST, p 49). Example: W1AW in Newington, CT, would send FN31. Exchange of signal reports is optional.

### 5) Scoring:

(A) **QSO points:** Count 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- and 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. Example: K3ONW works WA2GBG in FN12 on 50, 144, 220 and 432 MHz. This gives K3ONW 6 QSO points (1 + 1 + 2 + 2) and also four grid-square multipliers. Final score is 6 QSO points × 4 multipliers, or 24 points.

### 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

## VHF-UHF-EME LOG

432 log sheet 1 of 2

CALL USED NI80 APRIL SECTION OF COUNTRY OHIO  
EN60

4.13.1986  
 50 QSOs per side  
 Number each new multiplier as worked

FREQ.	MODE	DATE/TIME UTC	STATION WORKED	COMPLETE EXCHANGE		LIST NEW MULTIPLIERS	POINTS
				SENT	RCVD		
432	A1-A3	1448	N3QIZ	EN60	FN00	FN00	1
		21	K2TL		EM09	EM09	2
		2804	W3IP		FM19	FM19	3
		11	WBVP		EN90	EN90	4
		12	K8HVA		EN60	EN60	5
		15	W3TIS		EN90		6
		24	K2MTK		FN21	FN21	7
		2153	W2AC		EN91	EN91	8
		2208	W2AAL		EN60		9
		19	W4MYI		EM85	EM85	10
		23	W2BKC		EN72	EN72	11
		27	A84L		FM07	FM07	12
		35	W8GYP		EN81	EN81	13
		39	N4EAT		EM77	EM77	14
		47	VA4LIT		M65	EM65	15
		53	9RMDT		90		16
		364	33NF		2	EN3	17
		10	1D		1	W	18

Properly completed sample log sheet.

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. Crossband QSOs do not count. This does not prohibit working a station from more than one grid square with the same call sign.

(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 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, 1 1/4, 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 divid-

ing 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 of Technician class or higher using coherent radiation on transmission (eg, laser) and employing at least one stage of electronic detection on receive.

(I) The use of non-Amateur Radio means of communication (eg, telephone) for the purpose of soliciting a contact (or contacts) during the contest period is inconsistent with the spirit and intent of this announcement.

8) **Reporting:** Entries must be postmarked no later than 30 days after the end of the contest.

### 9) Awards:

(A) **Single operator**

(1) Top single operator score in each ARRL Section.

(2) Top single operator on each band (50, 144, 220, 432, 902 and 1296-and-up categories) in each ARRL Section where significant effort or competition is evidenced. [Note: Since the highest score per band will be the award winner for that band, an entrant may win a certificate with additional single-band achievement stickers.] For example, if WB0TEM has the highest single-operator all-band score in the Iowa Section and his 50- and 220-MHz scores are higher than any other IA single op's, he will earn a certificate for being the single-operator Section leader and endorsement stickers for 50 and 220 MHz.

(3) Top single-operator QRP portable multiband and single-band score in each ARRL Section where significant effort or competition is evidenced.

(B) Top multioperator score in each ARRL Section where significant effort or competition is evidenced. Multioperator entries are not eligible for single-band awards.

10) **Disqualifications:** See Jan 1986 QST, p 94.

## AUGUST

2-3

**ARRL UHF Contest**, Jul *QST*, p 87.

**YO-DX Contest**, Jul *QST*, p 87.

**160 Meter SSB Contest**, sponsored by the 160 Meter Wild Bunch, from 0000Z Aug 2 to 2400Z Aug 3. Single-operator and multioperator classes. Exchange RST and state, country or province (charter members include your number with the exchange). Count 10 points per QSO, 20 points per QSO for mobile stations. Multiply by the total number of states, countries, provinces, charter members, honorary charter members, members, mobiles and Wild Bunch membership award endorsements. Add 20 multiplier points for each mobile station worked, 3 multiplier points for each charter member worked, 2 multiplier points for each honorary charter member worked and 1 multiplier point for each member. Add 10 multiplier points for working each club station VE7WCV or WA1EXP. If you have the Wild Bunch Basic Membership Certificate, count a special multiplier of 20 points and 10 points for each endorsement sticker. Awards. Send logs by Sep 7 to Rob Koziomkowski, KAISR, 5 Watson Dr, Portsmouth, RI 02871.

5

**West Coast Qualifying Run**, 10-35 WPM, at 0400Z Aug 6 (9 PM PDT Aug 5). W6OWP prime, W6ZRJ alternate. Frequencies are approximately 3590/7090 kHz. 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.

9

**Summer Daze Sprint**, sponsored by the QRP ARC International, from 0200-0600Z Aug 9. Phone only. Suggested frequencies: 1.810 3.985 7.285 14.285 21.285 28.885 50.385 MHz. No 30-meter or 12-meter contacts. Work stations once per band. Exchange RS, state or province and membership number (or power output, if a nonmember). Count 5 points per member contact and 2 points per nonmember contact. Multipliers are states, provinces and DX countries (excluding W/VE). A state/province may be worked once per band for multiplier credit. Add multipliers separately for each band, 1 point each, then add total of multiplier points for all bands to arrive at total multiplier. Multiply QSO points by states/provinces worked per band by PEP power multiplier (8-10 W output,  $\times 2$ ; 6-8 W output,  $\times 4$ ; 4-6 W output,  $\times 6$ ; 2-4 W output,  $\times 8$ ; 0-2 output,  $\times 10$ ). More than 10 W output will be counted as check logs only. Bonus multipliers: If using battery power exclusively, multiply total  $\times 1.5$ . If using a single element, nonrotatable antenna,  $\times 1.5$ . If qualified for both of the above, do not use them. Instead, multiply score by 2.5. To that total, add 200 bonus points if all 10 US call districts are worked; add 200 bonus points if 5 Canadian Provinces are worked; add 200 bonus points if 5 DX countries are worked. Use of QRP ARCI summary sheets (for an SASE) is highly recommended for scoring. Mail logs to be received by Sep 9 to QRP ARCI Contest Chairman, Eugene Smith, KA5NLY, PO Box 55010, Little Rock, AR 72225-0010.

9-10

**European DX Contest**, CW, Jul *QST*, p 87.

14

**WIAW Qualifying Run**, 10-35 WPM, at 0200Z Aug 15 (10 PM EDT Aug 14). Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 147.555 MHz. See Aug 5 listing for more details.

16

**Novice Sprint**, sponsored by QRP ARC International, from 0200-0600Z on Aug 16. CW only. Work stations once per band. Exchange RST, state or province and membership number (or power output, if a nonmember). Count 5 points per member contact and 2

points per nonmember contact. Suggested frequencies are 3.710 7.110 21.110 28.110 MHz. Multipliers are states, provinces and DX countries (excluding W/VE). A state/province may be worked once per band for multiplier credit. Add multipliers separately for each band, 1 point each, then add total of multiplier points for all bands to arrive at total multiplier. Multiply QSO points by states/provinces worked per band by power multiplier (4-5 W output,  $\times 2$ ; 3-4 W output,  $\times 4$ ; 2-3 W output,  $\times 6$ ; 1-2 W output,  $\times 8$ ; 0-1 output,  $\times 10$ ). More than 5 W output will be counted as check logs only. Bonus multipliers: If using battery power exclusively, multiply total  $\times 1.5$ . If using a single element, nonrotatable antenna,  $\times 1.5$ . If qualified for both of the above, do not use them. Instead, multiply score by 2.5. To that total, add 200 bonus points if all 10 US call districts are worked; add 200 bonus points if 5 Canadian provinces are worked; add 200 bonus points if 5 DX countries are worked. Use of QRP ARCI summary sheets (for an SASE) is highly recommended for scoring. Mail logs to be received by Sep 16 to QRP ARCI Contest Chairman, Eugene Smith, KA5NLY, PO Box 55010, Little Rock, AR 72225-0010.

16-17

**New Jersey QSO Party**, Jul *QST*, p 87.

**New Mexico QSO Party**, Jul *QST*, p 87.

**SARTG World Wide RTTY Contest**, sponsored by the Scandinavian Amateur Radio Teleprinter Group, 0000Z-0800Z Aug 16, 1600Z-2400Z Aug 16 and 0800Z-1600Z Aug 17. 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 no. 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 countries. 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.

23

**WIAW Qualifying Run**, 10-35 WPM, at 2000Z (4 PM EDT). See Aug 5 listing for more details.

23-24

**All Asian DX Contest**, CW, sponsored by the Japan Amateur Radio League, from 0000Z Aug 23 until 2400Z Aug 24. 160 through 10 meters. Entry classes: single op, single band; single op, multiband; multiop, multiband. No crossband or crossmode QSOs. 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: JDI 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 JDI JT JY OD S2 TA UA/UN/UV/UW-UZ-RA/RN/RV-RW/RZ9-0 UD UF UG UH UJ 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.

**GARTG World-Wide RTTY Contest**, part 3, sponsored by the German AR Teleprinter Group. VHF portion is from 1200Z-1600Z Aug 23. HF portion is from 0700Z-1100Z Aug 24. 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.

## SEPTEMBER

3

**West Coast Qualifying Run**, 10-35 WPM, at 0400Z Sep 4 (9 PM PDT Sep 3). See Aug 5 listing for more details.

7

**LZ-DX Contest**, sponsored by the Bulgarian Federation of Radio Amateurs, from 0000Z-2400Z Sep 7. 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, Europe.

12

**WIAW Qualifying Run**, 10-35 WPM, at 0200Z Sep 13 (10 PM EDT, Sep 12). See Aug 5 and 14 listings for more details.

13-14

**ARRL VHF QSO Party**, this issue, page 82.

**European DX-Contest**, phone, Jul *QST*, p 87.

20

**Can-Am Contest**, phone, this issue, p 84.

20-21

**Scandinavian Activity Contest**, CW

21

**Can-Am Contest**, CW, this issue, p 84.

23

**WIAW Qualifying Run**

26-27

**ARRL 10-GHz Cumulative Contest**, Jun *QST*, p 84.

27-28

**Scandinavian Activity Contest**, phone

**Italian YLRC International Contest**, sponsored by the Italian YLRC "Elettra Marconi," 1300Z Sep 27 until 1300Z Sep 28. Phone and CW. YL and OM work Italian YL. Classes: single YL operator; single OM operator; SWL. Bands: 1.8, 3.5, 7, 14, 21 and 28. No crossmode or crossband QSOs. Work stations once per band. Exchange RS(T) and QSO nr. RC members add RC to exchange. Count 1 point for QSO between Italian YL station and European station. Count 3 points for QSO between Italian YL station and non-European station. Multipliers are number of YL RC members worked per band. Final score is total QSO points times total number of multipliers. Separate logs per mode and band. Send logs before Nov 30 to Olga Scolari, I0/VOK, Via Conte Verde No 50, 00185 Roma, Italy.

**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

**Grand Haven, Michigan:** The North Ottawa ARC will operate KA8USK, Jul 30-Aug 3, aboard the US Coast Guard Cutter *Mackinaw* as part of the Grand Haven Coast Guard Festival. Suggested frequencies: SSB—3.875 7.265 14.250; CW—7.110 14.050. For commemorative certificate, send QSL and 9- $\times$  12-in

SASE (39 cents) via NOARC, Box 44, Ferrysburg, MI 49404.

**West Bromwich, England:** The West Bromwich CRC will operate GB2OHM, GB4OHM and GB0OHM during the month of Aug to promote the Oak House

Museum. Operation will be SSB and CW on all HF bands. Details for awards from the stations on the air.

**Columbus, Ohio:** The Columbus ARA will operate W8TO Aug 1-17, 1600Z-0200Z daily, from a booth at the Ohio State Fair. Operation will be 10-80 meters.

For commemorative certificate, send QSL and SASE to WBTO, State Fair Event Coordinator, 280 E Broad St, Columbus, OH 43215.

**Doylestown, Ohio:** The Silver Creek ARA will operate WD8PNF Aug 2, 1400Z-2300Z, to celebrate their annual Skunk Day. Operation will be in the 40 and 20 phone bands. For a scratch-n-sniff certificate, send QSL via KA8CYF, 632 Ott Dr, Clinton, OH 44216.

**Canton, Ohio:** The Canton ARC will operate W8AL Aug 2-3, 1700Z-2200Z, to celebrate the Pro Football Hall of Fame Greatest Weekend. Suggested frequencies: SSB—7.270 14.270; CW—7.060 14.060. For a special HOF QSL, send QSL and SASE via Randy Phelps, KD8JN, 1226 Delverne Ave SW, Canton, OH 44710.

**Nacogdoches, Texas:** The Houston ECHO Soc will operate AC5Z Aug 2-3 to commemorate the Texas sesquicentennial. Operation will be 80-10 meters phone and CW, including Novice bands. For a special QSL and original pencil sketch of the field day site, send QSL and SASE via Houston ECHO Soc Special Events, c/o WB5INB, 7800 Bissonnet No. 215, Houston, TX 77074.

**Oshkosh, Wisconsin:** The Fox Cities ARC will operate W9KKK Aug 2-3, 1300Z-2200Z, in conjunction with the 34th annual EAA International Fly-In Convention and Sport Aviation Exhibition. Suggested frequencies: 3.875 7.240 14.250. Send QSL and SASE via Dick Roll, W9TA 933 Melissa St, Menasha, WI 54952.

**Akron, Ohio:** The Cuyahoga Falls ARC will operate W8VPV Aug 7-8, 2200Z-0300Z, and Aug 9, 1300Z-1900Z, from Derby Downs to celebrate the 49th running of the All American Soap Box Derby. Suggested frequencies: daytime—7.250 14.270; evenings—3.940 7.250. For certificate, send 9- x 12-in SASE to W8VPV, PO Box 614, Cuyahoga Falls, OH 44222.

**Racine, Wisconsin:** The Racine Megacycle Club will operate W9UDU Aug 8-10 to commemorate the 25th anniversary of the Postmark Collectors Club. Operation will be in the General phone bands. For QSL with special postal cancellation, send SASE to PO Box 4177, Racine, WI 53404-0177.

**Harmony, New Jersey:** The Penn-Jersey ARC will operate W2SJT 1600Z Aug 9 until 1600Z Aug 10 to honor the Oxford Furnace, a historic landmark. Operation will be on 450, 144 and all HF bands. For certificate, send 3 stamps to Ron Semonche, WB2TOJ, 263 W Carlton Ave, Washington, NJ 07882.

**Quebec, Canada:** The Club de Radio Amateur de Quebec is sponsoring a QSO Party, 1800Z Aug 9 until 1800Z Aug 10, to celebrate the 60th anniversary of their club. Suggested frequencies: 7.080 14.280. CW and phone. For a certificate confirming QSO, send QSL and 5 IRCs via CRAQ, PO Box 2341, Quebec, PQ G1K 7P5, Canada.

**Tullahoma, Tennessee:** The Middle Tennessee AS will operate W4UOT, 2300Z Aug 15 until 0300Z Aug 16 and 1700Z Aug 16 until 0300Z Aug 17, to commemorate the 1st reunion of Camp Forest. Suggested frequencies: SSB—3.860 7.235 14.240; CW—3.737 7.137. For commemorative certificate, send QSL and SASE via George A Stone, WD4CYV, 712 1st Ave, Tullahoma, TN 37388.

**Rochester, Minnesota:** The IBM RC will operate WD0GNK Aug 16, 1400Z-2100Z, to celebrate the 30th anniversary of the IBM Corp in Rochester. Suggested frequencies: phone—7.280 14.240; CW—7.140; FM—146.22/82. Certificate for QSL and SASE via IBM RC, WD0GNK, IBM Corp, Dept 868, Hwy 52 N, Rochester, MN 55901.

**Oelwein, Iowa:** The Great Plains ARC will operate KC0CP Aug 16-17 in conjunction with Railroad Days. Suggested frequencies: 3.970 7.235 14.235. For certificate, send QSL and SASE to KC0CP, Box 203, Oelwein, IA 50662.

**Bayard, Nebraska:** The Tri-City ARC will operate W8VQN Aug 16-17, 1000Z-2000Z each day, honoring the 35th anniversary of the Chimney Rock Monument. Suggested frequencies: phone—7.230 14.240 21.340; CW—7.110. For certificate, send QSL and 9- x 12-in (39 cents) SASE to WB0GPM, 1720 O St, Gering, NE 69341.

**Colorado:** The Arapahoe RC will operate special-event stations Aug 24, 1600Z-1800Z, from as many of Colorado's 14,000-ft mountaintops as possible. Suggested frequencies: CW—14.040-14.075; SSB—14.285; FM—146.52 146.46. QSL to K0NW via Call-book address.

**Maple Lake, Minnesota:** The Courage Handi-Ham System will operate W0EQO Aug 26-30, 1700Z-0300Z, from Camp Courage during Minnesota Radio Camp. Operation will be SSB and CW, 80-20 General bands and Novice bands. QSL to Handi-Hams, 3915 Golden Valley Rd, Golden Valley, MN 55422.

**Mount Pleasant, Iowa:** The Mount Pleasant ARC will operate W0MME Aug 26-Sep 1 at the 37th annual Old Threshers Reunion. Suggested frequencies: phone—3.970 7.270 14.271; CW—3.705 7.105 14.030. For QSL, send SASE to Dave Schneider, WD0ENR, 507 Vine, Mount Pleasant, IA 52641.

**Milwaukee, Wisconsin:** The Milwaukee RAC will operate W9RH, 2200Z Aug 28 until 0300Z Sep 1, from the Polish Fest. Operation will be 80-10 meters. Send QSL and SASE via Harry A Cieski, KD9AJ, 3760 S 43rd St Apt 21, Milwaukee, WI 53220.

**Waterford, Connecticut:** The Tri-City ARC will operate KA1BB, 1700Z Aug 30 until 2300Z Sep 1, from the I-95 weigh station, to promote safe driving during the Labor Day weekend, in conjunction with the 4th annual Stay-Awake Coffee Stop sponsored by BSA Troop 24, Niantic. Suggested frequencies: phone—3.895 7.245 14.295; CW—7.130; FM—146.52. QSL via Tri-City ARC, PO Box 686, Groton, CT 06340.

**Tombstone, Arizona:** The Old Pueblo RC will operate W7GV, 1300Z Aug 30 until 2200Z Sep 1, from the OK Corral, the site of the famous shoot out between the Earps and Clantons in 1881. This 5th annual event is dedicated to the memory of Harold Love. Suggested frequencies: SSB—3.980 7.280 14.280 21.380; CW—3.730 7.130 14.060. Send QSL and 8.5- x 11-in (39 cents) SASE to W7GV, PO Box 42601, Tucson, AZ 85733.

**Schaumburg, Illinois:** The Schaumburg ARC will operate WB9TXO Aug 31, 1600Z-2100Z, from the

grounds of the Schaumburg Septemberfest. Suggested frequencies: 7.286 14.286 21.386. For certificate, send QSL to SARC, PO Box 94251, Schaumburg, IL 60194.

**New 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 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-Events Stations:** To get your QSL or certificate from any of the special-event stations listed here, follow these simple guidelines. (1) After working the station, carefully fill out a QSL card for the QSO. Show the date and time accurately using UTC. (2) Prepare a self-addressed, stamped envelope. If sending for a certificate, use a 9- x 12-in envelope if you want an unfolded certificate, or a no. 10 envelope if folds are okay. Include enough postage for return of your envelope. (3) Mail both your QSL and your SASE to the address listed, or to the address given on the air by the station you QSO. Be patient. Special-event stations will often print their cards and/or certificates after the operation is over so they will know how many to order.

## Rules, CRRL Can-Am Contest

You say you've never worked a VE? Give the Can-Am a try on September 20-21 and these words will vanish from your vocabulary forever!

**Object:** Sponsored by the Ontario Contest Club and the Canadian Radio Relay League (CRRL) to increase friendship between Canadian and United States amateurs while providing a means of measuring operating skills and equipment performance.

**Contest Periods:** Phone 0000-2400 UTC September 20. CW 0000-2400 UTC September 21.

### Categories of Competition:

1) *Single Operator.* (Station must be operated by the licensee.) Single-operator stations may operate a maximum of 20 hours. One or two rest periods, totaling four hours, must be taken during the contest period. Mark these rest periods clearly in the log. Additional rest periods need not be logged.

- A) All Band
- B) Single Band
- C) QRP

2) *Multipoperator.* Multipoperator entries may operate the entire 24-hour period.

A) *Single Transmitter* (stations operated by more than one operator or other than the station licensee, or club stations).

**Bands:** 1.8, 3.5, 7, 14, 21 and 28 MHz. US General sub-bands are recommended for use.

**Exchange:** Signal report (RS on phone, RST on CW), sequential serial number (beginning with 001), and multiplier-area (MX) abbreviation, in that order (ie, 59001 CT, 59021 NY). Use two-letter postal abbreviations for the 50 US States, CN for Caribbean (KG4, KP1, KP2, KP4 and their A-, N- and W- prefix equivalents), PC for Pacific (which includes the remaining US possessions and Antarctica). Canadians will use: NL—(VO1, VO2); NB—(New Brunswick); NS—(Nova Scotia); PE—(Prince Edward Island); SI—(Sable and St. Paul Islands); PQ—(VE2); ON—(VE3); MB—(VE4); SK—(VE5); AT—(VE6); BC—(VE7); NW—(VE8); YK—(VY1 Yukon).

**Multippliers:** 50 US States, 2 US Possessions (Caribbean, Pacific); 10 Canadian Provinces; 2 Territories (NWT, YK); 1 Island (Sable, St. Paul). Maximum 65 multipliers on each band. Maximum possible total multiplier is 390.

**QSO Points:** Count two points for each US to US and Canadian to Canadian contact. Count 3 points for each US to Canadian contact. The same station may be contacted once on each band and mode.

**Scoring:** Final score equals the sum of total QSO points multiplied by the sum of total multipliers from all bands. Phone and CW sections of the

contest are considered separate contests. Combined scores for phone and CW will be used for overall competition. This combined score will be calculated by the Contest Committee, and will be the sum of phone and CW scores.

**Awards:** Certificates will be awarded to single-operator stations on both modes in each multiplier area. The top five multipoperator stations in each country will receive certificates for high combined phone and CW scores. Where appropriate, the Contest Committee will issue additional awards. Scores will be published in QST.

### Trophies (and Sponsors):

*Single Operator, Combined Score*

Canadian Champion (ARRL)

US Champion (CRRL)

*Multipoperator, Combined Score*

Canadian Champion (Albuquerque DX Assn)

US Champion (International Radio Sport Assn)

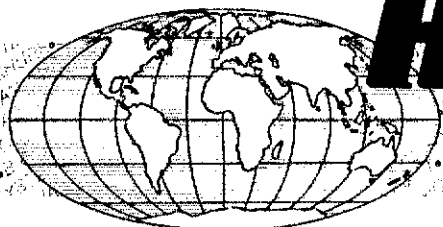
Trophies will be awarded at the Dayton Hamvention®. Each station is eligible for only one trophy.

**Logging Instructions:** All times must be kept in UTC. Indicate new multipliers once on each band. Check logs for duplicate contacts, correct QSO points and multipliers. Do not use separate logs for each band. Required rest periods must be clearly marked in the log. Each entry will consist of log sheets, summary sheets and signed declaration. Entries of over 200 total 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 the processing of entries. **Single Band:** Any band may be selected for the single-band category. All single-band entries will be judged in one category. The contestant should select the band that can result in the highest score. **QRP:** A maximum of 10-W input is allowed during the contest period.

**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, Box 65, Don Mills, ON M3C 2R6, Canada.





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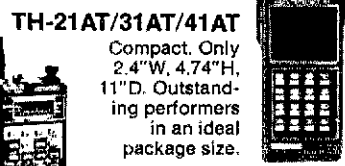
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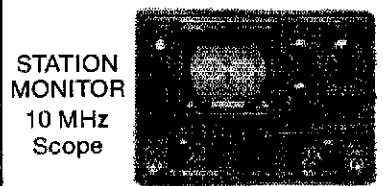


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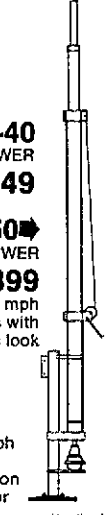


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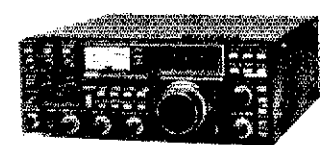


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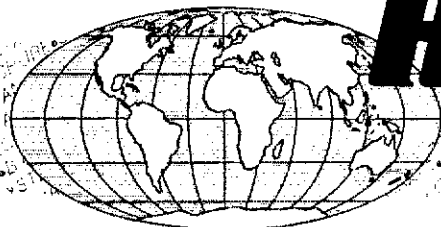


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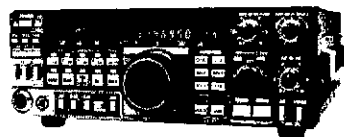
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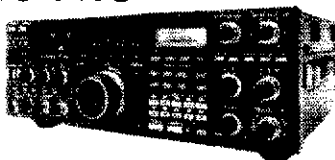
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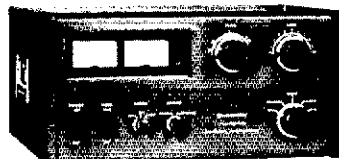
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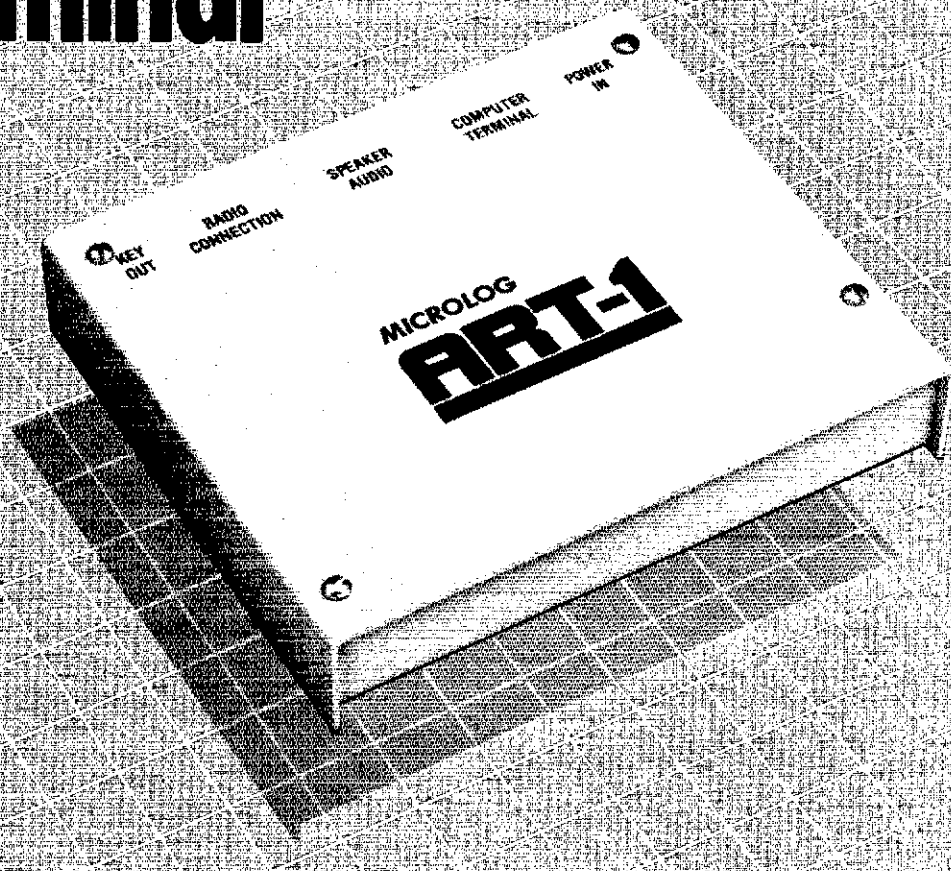
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Thanks for waiting, you'll be glad you did. We've packed a lot into the ART-1, because we knew you wanted a truly ALL-MODE Remote Terminal, without any extra pieces or RATT'S nest of wiring required, and, 'NO COMPROMISE' performance. Start now with full capability Receive & Transmit on RTTY, CW, & AMTOR for \$199, and later add Packet capability *inside* the shielded, all-metal ART-1 case. Plug in the ART-1 with one cable to your computer, make the connections to your radios, and forget it. All control functions and tuning indicators are via the keyboard and video. Small enough to go anywhere, and available now for your Commodore 64/128. Packet operation uses either TAPR compatible, or easy Microlog direct control commands not possible with conventional ASCII terminals. Packet option includes a separate internal computer enhanced demodulator optimized for 1200 baud, and dual-radio support for HF & VHF. It's like having two interactive terminals. (What good is a multimode unit that can only connect to ONE

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### Here are a few of its many features:

- on screen tuning indicators
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- full speed operation, morse to 99 wpm. Baudot to 132 wpm, ASCII to 300 Baud
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The KD14's flexible, easy-to-get-along-with radiating element measures a scant 12 inches. At the base is a 3¼ inch impedance transformer that gives added strength.

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Cut your losses and improve your gain when you operate with the new Larsen UHF KūLDUCKIE® KD14-HW, with no-nonsense warranty. You can see it at your favorite amateur dealer.

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active OBS and brings much experience and dedication to the BM post. Special thanks to Mary KW9J for the dedication during her tenure as ILN NM, and congrats to Art, W9BBI who has agreed to take over the IL drivers seat. With this month's report Mary has just cinched a PSHR certificate for making PSHR 12 times. Elmer, W9DBO, reports his retirement from the Illinois nets. Elmer intends to spend some time luring in the big ones. Good luck with the fish, and thanks for many years of faithful service...the nets will miss you! Hands Across America on May 26th might well have also been called Hands Across America: the response to the need for health and safety communications along the route by the Amateur Radio community in Illinois was outstanding. Thanks to all who participated for a professional job well done. Special thanks to Illinois HAA communications coord KC9OO and SEC W9QBH for all the work putting the effort together, and to all ECs for coordinating in their areas. Mark your calendars now for the 1986 Illinois QSO Party sponsored by the Radio Amateur Megacycle Society to be held from 1800Z on 12 October to 0200Z on 13 October. The exchange is RST and county for IL stations and RST and state, province, or country for others. Entries must be postmarked by 8 November and sent to Joe Lekostaj, W9GCJ, 9134 Ewing Ave, Evanston IL 60203. For more info contact Joe at the above address. Traffic: W9EHS 239, KA9FEZ 194, KW9J 185, W9NXXG 135, WB8RFB 129, NC9T 115, W9HLX 112, W9HOT 106, W9HJ 101, KA9EWN 67, W9KR 62, W0MAHO 58, KJ9L 56, KD9K 45, KZ9I 37, K9EUI 24, N7DOY 24, K9CNP 18, KA9BBV 17, K9WMP 16, W9LWH 16, W9TVD 13, K9EHP 12, N9DIX 12, W9LNO 12, WD9HQW 11, K9QEW 10, W9VEYIM 10, W9ARUM 6, W9DBO 4, W9LL 4, KD9TK 3.

INDIANA: SM, Ron Koczor, K9TUS—ASM: W9UMH. SEC: W9ZQE. STM: W9JUU. ACC: K9TUS. TC: K9PS. GLC: WA9VOO. OBC: KC9TA. PIO: K9DIY. OOC: KJ9G. SRC: N9WB. Net Managers: ITN KD9DU, QIN KJ9J, ICN KW9D, VHF W9PMT, IWN KA9ERC.

Net	Freq	Time	Daily	UTC	QNI	QTC	QTR	Sess.
ITN	3910	1330	2130/2300		3194	410	2373	90
QIN	3658	1430	0000/0300		672	331	1658	93
ICN	3708	2315			61	27	390	20
IWN	3910	1310			1709	0	385	31
IWN VHF	Bloomington				981	0	310	31
IWN VHF	Kokomo				1292	0	243	31
Hoosier VHF	Nets:				5085	155	4843	151

9RN-4: IN 100% tnx to K9WWW, W9FC, WA9QCF, W9JUU, KJ9J, W9UYU, NJ9F, W9HZ. Appointments: N9WB, OO, BPL: W9JUU, orig. 1, rcvd, 409; sent 414; del. 9. Hoosier hams did themselves proud in the May Hands Across America. Over 400 lined the route to take part in what was the largest public service event ever. Well done to all, especially W9UMH who pulled it all together! SSC of the month is the South County ARC; contact is N9DTG; club newsletter is SHORT SKIP; about 150 members are active in ARES and Red Cross support. Field Day, C&T classes, "pumpkin patrol," SET, and much more. LCARC is a general interest club with 3 repeaters. Keep up the good work! Contact me to see how the SSC program can help your club. Remember, you MUST maintain your ARRL membership to maintain your ARRL appointment. What do you think of expanded Novice privileges? I'd like to hear your reasoned opinion. August is a good time for antenna work...time to get ready for the Fall contest season. If your station can stand up to a real contest effort, you'll be ready for almost any emergency! If you are involved in public service, you could qualify for ARRL Public Service Honor Roll. Recognition includes listing in QST. Write for details...it's a worthy goal to pursue. Six clubs are in the process of joining Indiana's affil. clubs. Welcome aboard! Your club can benefit from affiliation; write Htrs for info. Station reports: W9JUU 833, KJ9J 276, KA9FFO 128, W9FC 123, WA9YIF 92, W9JZV 73, W9UEM 72, NJS5 64, W9UMH 59, K9TKE 47, WD9DWD 46, KA9EIV 43, WA9OCF 42, K9WWW 40, KD9ER 38, KB4HH 38, WD9HII 24, W9PMT 23, KW9D 23, WB9AFZ 23, W9IHR 19, K9KTB 19, WA9OKK 14, WD9GWM 14, K9BRF 12, W9XD 11, W9ZGC 11.

WISCONSIN: SM, Richard R. Regent, K9GDF—SEC: W9QAK. STM: K9UTQ. ACC: KA9FOZ. BM: W9JUSW. OOC: NC9G. PIO: K9ZZ. SGL: AG9V. TC: K9GDF. The 1986 Wisconsin QSO Party first-place plaque was presented to AC9C and 2nd place awarded to NA9D; in the multi-operator category K9EC, mobile N9EZ, and Greater Rice Lake Contest Club were winners. N9AAH is the D. Central Wisconsin Ham coverage of the Columbus Parade and Horicon Marsh Days in July was coordinated by KA9BK. August 2nd and 3rd. Special Events station W9KKK will operate at Experimental Aircraft Association Fly-In near Oshkosh with KA9JOL and W9TA as coordinators. August 16th Green Bay Mike and Key Club Swapfest, Community Center on Dousman Street open at 8 AM. Also August 16th, Rhinelanders Swapfest, South Park School open at 8 AM. Exams August 16th at Waukesha County Technical Institute, send card to WD3JKZ. August 18-21, Associated Public-Safety Communications Officers (APSO) National Conference at Milwaukee MECCA with THRL booth. Thanks to WA8ZTY for work on severe weather nets since 1978. Silent Key W9CCD, WA9DXR, and W9YGY. W9CXY now has amplifier to get through QRN. Traffic: W99PY 1471, K9CJ 774, KA9HII 249, K9GDF 223, W9CBE 201, W9CXY 157, WA9WYS 156, W9DND 120, W9UCL 115, W9BIC 112, N9DHT 93, KA9BL 86, N9BGE 85, AG9G 84, WD9ID 78, W9CYV 76, N9BDL 71, K9AKG 61, WD9FRI 54, W9HW 52, N9AUG 52, KA9KL 47, N9H 42, W9JUSW 34, K9FHI 29, K9BED 27, K9G8 27, KA9JY 23, K9JPS 20, W9TEM 14, W9UW 9, KA9BH 6. (Apr) K9BED 22, KY9P 14.

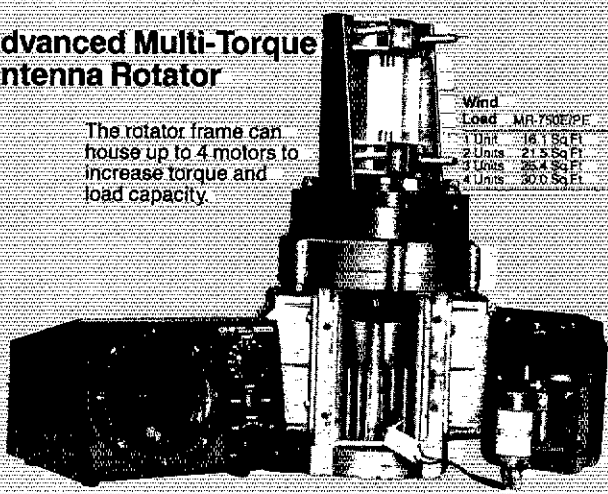
### DAKOTA DIVISION

MINNESOTA: SM, George Frederickson, Jr., K0BT—SEC: KA9ARP. STM: K0DCL. TC: K0LSE. PIO: N0BEI. OO/RFI: AD9S. SGL: W9WOW. BM: KB0MB. ACC: KB0RZ. Hello again! Summer's here, the heat is on and net activity is down, but that is normal. Folks just naturally like to be outdoors. Just be sure to take your HT with you, Hi! Our club salute for May goes to the Arrowhead RAC of Duluth. This group worked to make the Duluth Hamfest a worthwhile event. Those who were on the committee included Walt Dewsbury, KB0XG/Pres, John Anderson, AF9T/Board Mbr, Tom Robinson N0BK/Trans, Jerry Frederick N0BG/Rpts. Comm, Eddy Jonsstrom N0DGM/Comm, Dave Sevton N0X/A, Scott Swanson N0DGM/Sac, Larry Christianson KA0PLW, Peter Buchanan AF9Q, Duane Flynn KB0LJ/EC and Diane Cossetta KR6B. Thanks to each of you for your efforts. Keith McKay N0FKF is our "Amateur of the Month" for May. He has been very instrumental in the promotion of Amateur Radio Public Service in West Central Minnesota. Remember, if you have a nomination for "Amateur of the Month" contact K0BT, KA9ARP or myself. The criteria is given in March 1985 QST. Public Service Notes: Mankato ARC recently provided communications for the March of Dimes WalkAmerica, covering a distance of roughly 20 miles around the city of Mankato. Brainerd Area ARC helped in controlling traffic during the Memorial Day Parade in Grand Rapids. Two new novice operators received their call signs, thanks to the personal tutoring of WA0CEL in In-

# Superior Ham Accessories

## Advanced Multi-Torque Antenna Rotator

The rotator frame can house up to 4 motors to increase torque and load capacity.



Wind Load	MR-750E/PE	MR-300E
1 Unit	16.1 Sq Ft	5.42 Sq Ft
2 Units	21.5 Sq Ft	11.84 Sq Ft
3 Units	26.4 Sq Ft	17.79 Sq Ft
4 Units	30.0 Sq Ft	23.67 Sq Ft

Each motor is equipped with a Super Wedge and Clutch brake system (Slip clutch type) that works independently from the main frame gear train and protects the rotator mechanism from excessive torque.

Low voltage (24VAC) motors... Low-cost 6-wire control cable... can be installed on the same base as a TELEX unit.

### Specifications

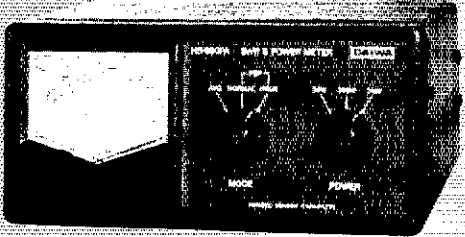
#### Rotator Unit

		MR-750E/PE	MR-300E
Rotation time	60 Hz	58 seconds (60 Hz input)	33 seconds (60 Hz input)
	50 Hz	70 seconds (50 Hz input)	39 seconds (50 Hz input)
Output torque Brake power	1 motor	610 lbs/inch 5,200 lbs/inch	220 lbs/inch 1,700 lbs/inch
	2 motor	1,200 lbs/inch 9,600 lbs/inch	440 lbs/inch 3,500 lbs/inch
	3 motor	1,800 lbs/inch 13,900 lbs/inch	650 lbs/inch 5,200 lbs/inch
	4 motor	2,400 lbs/inch 18,300 lbs/inch	870 lbs/inch 7,000 lbs/inch
Rotation angle	375 degrees		
Permissible mast size	1 1/2 - 2 1/2 inch (38 - 63 mm) < diameter >		
Control cable	6-wire cable 0.5sq - 1.25sq (AWG16/18/20 etc.)		
Continuous running	5 minutes Max. permissible		
Dimensions	15.6" H x 8.43" W x 8.43" D (397 mm x 214 mm x 214 mm)		
Unit weight	16.5 lbs (7.5 kg) < with 1 motor unit fitted >		

#### Controller Unit

	CR-4 (for MR-750E/MR-300E)	CR-4P (for MR-750PE)
Power source	117 V AC (50/60 Hz)	
Power consumption	200 W (with 4 drive motors)	
Motor running voltage	24 V AC	
Dimensions	4.9" H x 7.1" W x 6.9" D (125 mm x 180 mm x 175 mm)	
Weight	9 lbs (4 kg)	
Operation	Manual	Manual/Pre-set

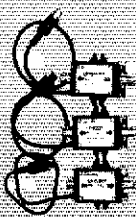
## New Cross Needle SWR/Power Meters for All Bands



15° angle face for easy reading and operation

Model*	Freq. Range Int. Sensor	Forward Power	Tolerance Full Scale	Connectors
NS-660A	1.8-150 MHz	30/300 W/3 kW	± 10%	SO-239
NS-660PA	1.8-150 MHz	30/300 W/3 kW	± 10% Av Pwr ± 15% PEP	SO-239
NS-663A/N	140-525 MHz	30/300 W/3 kW	± 10%	SO-239/N Type
NS-668	800 MHz-1.3 GHz	1.5/15/60 W	± 10%	N Type

\*Optional sensors adapt each meter for use on other bands.



### External Sensors (For indoor/outdoor use)

Permit operation over range of 1.8 MHz through 1.3 GHz. Optional for use with NS-660 series meters.  
 U-66H, 1.8-150 MHz, Max 3 kW, SO-239 Connectors  
 U-66V, 140-525 MHz, Max 300W, SO-239 Connectors  
 U-66VN, 140-525 MHz, Max 300W, N Type Connectors  
 U-66S1, 800 MHz-1.3 GHz, Max 60W, N Type Connectors  
 SC-20 60 ft. Cable with connectors for use with remote sensors

### SWR & POWER CROSS NEEDLE METERS

**CN-620B and CN-720B**  
 Frequency Range: 1.8-150 MHz  
 Power: 3 Ranges (Forward, 20/200/2000 W)  
 (Reflected, 4/40/400 W)

**NS-448**  
 900 MHz-1.3GHz  
 (Forward 5/20 W)  
 (Reflected 1.8/6.6 W)  
 Separate Sensor Type

Model	Frequency Range	Power Range
CN-520	1.8-60 MHz	200/2000 W
CN-550	144-250 MHz	20/200 W
CN-410M	3.5-150MHz	15 W/150 W
CN-460M	140-450 MHz	5 W/50 W
CN-465M	140-450 MHz	15 W/75 W
		5 W/25 W

Back Lit, with mobile bracket.



### POWER AMPLIFIERS

Band:	LA-2035R	LA-2065R	LA-4040R	LA-2155W
144-148 MHz	144-148 MHz	430-450 MHz	144-148 MHz	
0.5-3 W	0.5-5 W	10 W	10-35 W	
Max. Output Power:	30 W plus	60 W plus	35 W	30-150 W
Pre-Amp (Gain) 15 dB				

Model	Maximum I/Continuous I	Output VDC
PS-30XM	31A/24A	1-15
PS-310M	31A/24A	3-14.6
PS-310MD*	31A/24A	13.8
PS-560MD**	56A/44A	13.8

### POWER SUPPLIES

\*Sub-DC Outlets: 5.6A/5A, 3-14.6 VDC  
 \*\*Sub-DC Outlets: 10.6A/1-15 VDC

### AUDIO FILTERS

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### ELECTRONIC KEYS DK-210

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### COAXIAL SWITCHES

PAT. No. 59-000803

	CS-201	CS-201G	CS-401	CS-401G	CS-4
Frequency:	800 MHz	1.3 GHz	800 MHz	1.3 GHz	1.3 GHz
Connectors:	SO-239	N type	SO-239	N type	BNC type
VSWR:	Below 1.1:2				
Insertion Loss:	Less than 0.2 dB				



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# RF TRANSISTORS

2-30 MHz 12V (* = 28V)			
P/N	Rating	Each	Match Pr.
MRF412/A	80W	18.00	45.00
MRF421	Q 100W	22.50	51.00
MRF422*	150W	38.00	82.00
MRF426,1A*	25W	18.00	42.00
MRF433	12.5W	12.00	30.00
MRF449,1A	Q 30W	12.50	30.00
MRF450,1A	Q 50W	14.00	31.00
MRF453,1A	Q 60W	15.00	35.00
MRF454,1A	Q 80W	15.00	34.00
MRF455,1A	Q 60W	12.00	28.00
MRF458	80W	20.00	46.00
MRF475	12W	3.00	9.00
MRF476	3W	2.75	8.00
MRF477	40W	11.00	25.00
MRF479	15W	10.00	23.00
MRF485*	15W	6.00	15.00
MRF492	Q 90W	16.75	37.50
SRF2072	Q 65W	13.00	30.00
SRF3662	Q 110W	25.00	54.00
SRF3775	Q 75W	14.00	32.00
SRF3795	Q 90W	16.50	37.00
CD2545	50W	23.00	52.00
SD1487	Q 100W	38.00	78.00
2SC2290	60W	15.00	36.00
2SC2879	Q 100W	25.00	56.00

Q = Selected High Gain Matched Quads Available

### VHF/UHF TRANSISTORS

Rating	MHz	Net Ea.	Match Pr.
MRF212	10W	136-174	\$16.00
MRF221	15W	136-174	10.00
MRF222	25W	136-174	14.00
MRF224	40W	136-174	13.50
MRF237	4W	136-174	3.00
MRF238	30W	136-174	13.00
MRF239	30W	136-174	15.00
MRF240	40W	136-174	18.00
MRF245	80W	136-174	28.00
MRF247	75W	136-174	27.00
MRF260	5W	136-174	7.00
MRF261	10W	136-174	9.00
MRF262	15W	136-174	9.00
MRF264	30W	136-174	13.00
MRF607	1.75W	136-174	3.00
MRF641	15W	407-512	22.00
MRF644	25W	407-512	24.00
MRF646	40W	407-512	26.50
MRF648	60W	407-512	33.00
SD1441	150W	136-174	74.50
SD1477	100W	136-174	32.50
2N3866*	1W	30-200	1.25
2N4427	1W	136-174	1.25
2N5591	25W	136-174	13.50
2N6080	4W	136-174	7.75
2N6081	15W	136-174	9.00
2N6082	25W	136-174	10.50
2N6083	30W	136-174	11.50
2N6084	40W	136-174	13.00

### MISC. TRANSISTORS & MODULES

MRF134	\$16.00	SAV6	\$32.50
MRF136	21.00	SAV7	30.00
MRF137	24.00	S10-12	13.50
MRF138	35.00	2SC1075	25.00
MRF140	89.50	2SC1307	5.00
MRF150	89.50	2SC1946A	12.00
MRF172	62.00	2SC1969	3.00
MRF174	80.00	2SC2221	10.00
2N1522	7.95	2SC2269	20.00
2N4048	7.20	2SC2289	22.00
NE41137	3.50	2SC2312C	4.00
2N5590	11.00	2N5945	10.00
2N5642	14.00	2N5946	13.00

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international Falls. They are Bruce Biggens, KA0WRT, his XYL Karen, KA0WRU, and 10 yr old daughter Cassandra, KA0WRV, who recently moved to the area from California. Congrats to each of you. W0UJL and his XYL are celebrating 50 years together. Recent upgrades include KA8SYL to advanced and KB0CD to Extra. Our regards to the family and friends of Norb Faddema, W0DBE, who is a Silent Key. Finally, our nets will be looking for volunteers to assume NCS duties. If you'd like to participate, contact one of the net mgrs listed below. 73 de KD0CI...

NET	FREQ	TIME	QNI/QTC/SESS	MGR
MSN/RTTY	3620	8:30P	36/3/11	WA0LUT
MSN/1	3685	6:30P	346/95/31	KAEPEY
MSN/2	3685	10:00P	226/42/31	NCBE
MSN	3710	6:00P	213/29/30	KA0DDQ
MSPN/N	3929	12:00P	445/132/31	WB0WNJ
MSPN/E	3929	5:30P	777/129/31	WDB0GS
MINAMWXNT	3929	6:15P	258/44/20	K4AZA
PIC0NET	3975	9:00A	3859/26/148	W0B0AC

EMERGENCY FREQ: 3929, BULLETINS: 3685 & 3929  
Traffic: W0BWNJ 500, KT91 445, WA0TFC 368, KAEPEY 211, KD0CL 119, KA0DDQ 77, K00GI 56, W9DM 53, N0CLS 52, KD0CI 46, W0D0GUF 36, W0D0DD 35, KA0BFP 34, N10X 34, KA0AJF 30, W0D0GS 30, W0UCE 30, W0GFW 29, KC0T 28, KA0PDM 18, N0JP 17, K0DNH 16, W0B0UJ 16, KA0ARP 15, N0FOO 13, W0KYP 13, KA0POW 10, KB0CD 4, KA0CD 4, N0CRO 2.

**NORTH DAKOTA:** SM, Michael Mankey, WB0TEE—More upgrades: N0BX1 Bob to Extra, Technicians include: KA0WKX, Ter; KA0WGP, Karl; KA0WMM, Rebbecca; KA0WMS, Sharron; KA0WML, Jim; KA0VSU, Stan; KA0MQL, Bob; KA0SOM, Eunice. There was one General: KA0UJR, Tim. Of course, I have to mention that I was able to get my Extra. Remember that the Dakota Division Convention is next month, so be sure to get your registration done early. Fargo has a new controller: the 76 machine that talks to you and KD0YX. Tim says that it will do everything except windows. At the time I am writing this, the super-link machine had not yet arrived, but by the time you get this we are hoping that it will be operational in Bismarck, Carrington, Jamestown, and Devils Lake. We tried the temporary machine and worked well to Bismarck. Net Summary for May:

Net	Freq	Mgr	Sess	QNI	QTC
GOOSE RIVER	1990	W0CDO	4	100	46
DATA	3883	KA0FSM	24	421	33

Traffic: KA0FSM 88.

**SOUTH DAKOTA:** SM, R. L. Cory, W0YMB—STM: Ole Johnson, N0ABE. SEC: Warner Muns, KA0KPY. A packet radio Mail Box is not in operation in Flapi City, on two meters. The Black Hills ARC v6 exams resulted in 4 new techs 2 new generals 2 new advanced and 76 machine that talks to you and KD0YX in Watertown. KA0AG to Extra; KA0UEK KA0UOF KA0TXC to Tech; KA0WPC to Adv, Elaine and Jr. Tscheltzer to Tech. We welcome to our hobby new novices KA0WOB, KA0WEV, KA0WOC, KA0WOD, KA0WOE all of Watertown. With IRC cost going up to 80 cents DX ops will like QSL bureau even better. In May the S.Dak. CW net handled 118 messages. Net needs more checkins 7 PM CDT 6 PM MDT 3650 kHz Mon thru Fri. Traffic: K0ERM 218, KA0UEH 4, W0B0MF 32, WA0VRE 40, W0YMB 13, K0ZBJ 55, W0MZI 23, N0DPF 211, W0HCJ 6.

### DELTA DIVISION

**ARKANSAS:** SM, Joel M. Harrison, W85IGF—ASM: KSUR. SEC: NSBPU. STM: W9OK. ACC: N15D. SGL: W5LCI. TC: W5FD. BM: W5HYW. Repeater Coordinator: W85FDP. The Queen Wilhelmina Hamfest and flea market will be held the first weekend after Labor Day, September 6 & 7, 1986 on Rich Mountain in Mena. As those of you know who have been there in the past, this is one you don't want to miss. Contact Stan Ross, K5VR, for additional information. W5KL is recovering from an illness that has had him down for about a month. Leland reports he is back on his feet and feeling fine. I am still receiving some mail at my old address. Please refer to page 8 of QST for the current one. The NW Ark group reports the first contest was a big success. Traffic: W50FL 118, W9OK 29, W5UJL 29, W4AZJ 24, W85GQH 21, W5YCE 20, N5ECT 10, W85IGF 8, AC5W 6, K5GK 2, K5UR 2. Contact N15D for ARRL Club information.

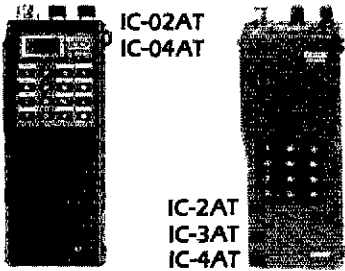
**LOUISIANA:** SM, John "Wondy" Wondergem, K5KR—The Louisiana Council of Amateur Radio Clubs (LCARC) was organized in April 1976 to promote amateur radio in Louisiana and encourage cooperation among the clubs and groups. Any club or group is entitled to membership. Annual dues are \$10. Meetings are held on Saturdays at each major La. Hamfest. Notices and minutes are mailed prior to each meeting. Recent accomplishments of LCARC are an La. Amateur Directory, a band-plan agreement, repeater coordination guidelines, handicap ham-plate legislation, coordination of public service events, hamfest support and much more. The May '86 members are: Acadiana ARC, ARC of Shreveport, Baton Rouge Packet Society, Catholic High ARC, Central La ARC, Delta DX Delta '75 Campers, Iberia ARC, Iberville Repeater Assn, Jefferson ARC, Lakeview Repeater Group, Livingston RAS, Metro Target Assn, New Orleans VHF Club, Opelousas Area ARC, QCWA, Chapter 109, Radio Amateur Service Club, Rosedale Repeater Assn, Shreveport ARA, 735 Repeater Assn, St. Mary Radio Trans. Soc., Southeastern La. ARC, S0WELA, Southwest La. Repeater Club, Tri-Parish Repeater Group, 22 Repeater Fund, Twin City Hams, Thibodaux ARC, United Radio ARC and Westside ARC. The Council works best when every club and group are members! Is yours?

**MISSISSIPPI:** SM, Paul Kemp, KWST—ASM: K5ONE. SEC: K4HKD. SGL: AL7GQ. ACC: KCSVD. STM: K5BW. PIO: KA5VBE. OOC: W5VMC. VHF Coord: N5DWU. BM: AJ0X. TC: W5SXXC. Congrats on recent increased efforts to bring in new blood to amateur radio; Hattiesburg ARC continuing regular novice classes and Hattiesburg ARC continuing to actively recruiting and training fresh amateurs. Healthy turnout of Mississippi hams at AMACOM, the New Orleans Hamfest; make plans for Bloxi in October. Regret to report that W85VEL is a Silent Key. Hattiesburg ARC operated special event station at the "Great American Birthday Party" on July 4th at Paul B. Johnson State Park, Jackson's 146.76 and Yazoo City's 146.70 repeaters recently relocated for increased coverage. Tishomingo ARC into some innovative Packet, VHF/UHF and satellite activities. Hurricane season is now upon us... is your station ready for emergency operations if needed? Hattiesburg ARC station W6CJR, operated by KA5YFE and K5SZ, handled more than 150 messages in and out of Missouri booth during May contest. New appointments: KUSV, EC, Clarke County; N5EPP, EC, Neshoba County. SEC K4HKD recently presented 27 ARRL Handbooks to gulf coast area high schools. New Jackson ARC officers: AE5H, president; NF5P, 1st v.p.; N5ILY, 2nd v.p.; N5DNC, treasurer; WD4DDA, secretary. W5JHS, founder of Gulf Coast Hurricane and Gulf Coast Sideband nets, celebrated 86th birthday in May. Several Hattiesburg ARC members organizing QCWA chapter; interested south Mississippi hams should contact K5QNE, C4ND(W5KLV) Sessions 31 QTC 741 (Mississippi reported 100% by N5AMK).



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**IC-735**

New compact general coverage receiver/ham band transceiver.

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**IC-271A/H 2 Meter  
IC-471A/H 430-450MHz**

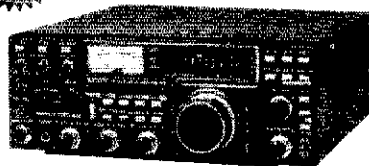


**IC-1271 1260-1300MHz**



**HANDHELD ACCESSORIES**

IC-14 Vinyl Case for IC-02AT  
BC-35 Drop In Charger  
BP-2 425mA 7.2V NICAD Battery  
BP-3 250mA 8.4V NICAD Battery  
BP-4 Alkaline Battery Case  
BP-5 425mA 10.8V Battery  
BP-7 425mA 13.2V NICAD Battery  
BP-8 800mA 8.4V NICAD Battery  
HM-9 Speaker Mic  
CP-1 Cigarette Lighter Cord  
DC-1 DC OP Pack  
Leather Case for IC-2AT  
HS10 Headset for HTs  
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HS10SB PTT Switch Box



**IC-751A**

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**IC-3200A**

Dual Band  
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**IC-R7000**

25 - 1300MHz receiver direct entry and scanning



**IC-28A  
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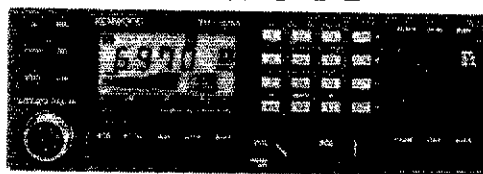


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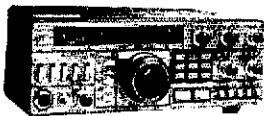
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TM-2530 TM-2550 TM2570  
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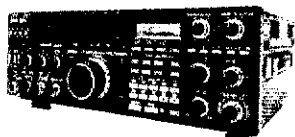


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TS-940S

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- MS-1 Mobile Charger for TR2600
- PB-26 NiCd Battery for TR2600
- LH-3 Leather Case for TR2600
- SC-9 Soft Case for TR2600
- BT-3 Battery Case for TR2600
- PB-21 NiCd Pack for TH-21/41
- PB-21H 500 MAH NiCd Pack for TH-21/41
- BT-2 Battery Case for TH-21/41
- SC-BT Soft Case for TH-21AT/41AT
- BC-6 Two-Pack Quick Charger
- BC-2 Wall Charger for BP-21H
- AI-3 BNC Adapter for TH-21/41

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## HANDHELDS



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**MA SERIES CRANK-UP TUBULAR TOWERS**

Will handle 10 sq. ft. antennas at 50 MPH winds.

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD Top	SEC. OD Bot.	SUGGESTED HAM PRICE
MA-40	40"	21'6"	2	242	3"sq.	4 1/2"	\$ 735.00
MA-55D	55"	22'1"	3	435	3"sq.	6"	\$1245.00
MA-650MDP*	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 MARR base rotor base and motor drive



\*MDP models complete with heavy-duty motor drive with positive pull down.

**FREE STANDING CRANK-UP TOWERS**

Will handle 18 sq. ft. antennas at 50 MPH winds.

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD Top	SEC. OD Bot.	SUGGESTED HAM PRICE
TX-438	38"	21'6"	2	355	12 1/2"	15"	\$ 925.00
TX-455	55"	22"	3	670	12 1/2"	18"	\$1395.00
TX-472	72"	22'8"	4	1040	12 1/2"	21 1/2"	\$2295.00
TX-472MDP*	72"	22'8"	4	1210	12 1/2"	21 1/2"	\$3695.00
TX-489	89"	23'4"	5	1590	12 1/2"	25 1/2"	\$3995.00
TX-489MDPL*	89"	23'4"	5	1800	12 1/2"	25 1/2"	\$5995.00

\*TX-472MDP includes heavy-duty motor drive with positive pull down. TX-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"	21 1/2"	\$2095.00
HDX-572	72"	22'8"	4	1420	15"	25 1/2"	\$3595.00
HDX-572MDPL*	72"	22'8"	4	1600	15"	25 1/2"	\$5495.00
HDX-589MDPL*	89"	23'8"	5	2440	15"	30 1/2"	\$7195.00

\*Includes heavy-duty motor drives with dual level wind and positive pull down. HDX-572MDPL includes limit switch brackets only. HDX-589MDPL includes limit switches and limit switch brackets.

**FREE STANDING "LOW PROFILE" COMPACT CRANK-UP TOWERS.**

Will handle 18 sq. ft. antennas at 50 MPH winds. (TMM-433HD handles 24 sq. ft.)

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD Top	SEC. OD Bot.	SUGGESTED HAM PRICE
TMM-433SS*	33" w/o mast	11'4"	4	315	10"	18"	\$ 985.00
TMM-433HD*	33" w/o mast	11'4"	4	400	12 1/2"	20 1/2"	\$1195.00
TMM-541SS*	41" w/o mast	12'	5	430	10"	20 1/2"	\$1295.00

\*Hy-Gain and some Alliance rotors when installed inside tower will restrict retracted height by approx. 24". Most Kenpro models allow full retraction

Standard bases included with all towers (except MA-770, 770-MDP and 850-MDP).

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DRNS (WB5YDD): Sessions 82 QTC 652 QTC (Mississippi represented 100% by NSAMK, KTSZ, WSHKW, KBSW, N5HGN and K5QNE).

Net	Sess.	QNI	QTC
GCBSN(W5JHS)	31	1432	15
MSBN(W5HKW)	31	1934	48
MMN(W5JSL)	31	593	5
MTN(K5OAF)	31	174	66
MSN(W5YFX)	21	76	13
MLEN(W5D50)	4	95	0
HAN(W5JBP)	4	2	2
AFBSN(K5GN)	4	53	0

Traffic: KBSW 445, NSAMK 391, K5OAF 175, W5WZ 40.

TENNESSEE: SM, John C. Brown, NO4Q—ASM/ACC: WA4GLS, OQAA, W9FZW, PIO: N7EJL, SEC: WA4GZQ, SGL: WA4GZQ, STM: NG4J, TC: W4HKJ. It has been noted that the attendance at the hamfests this season has been up somewhat. Your Section Manager is very gratified about this as he has had a chance to meet many of you person to person. The acquisition of the new amateur license manuals and subsequent upgrading is well noted all over the section. A reminder that the Chattanooga hamfest will be in September this year and not October as in the past. Cedars-of-Lebanon, Memphis, and Tri-Cities will be same as in the past. Just a reminder that the time of the year is near at hand to send in the FORM for the coming year's auto plates. The present plates will only receive decals, the application is supposed to be sent in to motor vehicle department. Be sure that a copy of your ticket and copy of your ARES membership card is attached. It is used to indicate that you still live in Tennessee and are still a licensed amateur radio operator, as well as an ARES member. The effort of the Memphis Area Council of Amateur Radio Clubs relative to the "Hands Across America", Don, K4EBU and all the section participants is appreciated. Not many outside of the route volunteered their services. I failed to mention above about the ARES cards. These are issued by the EC of your County or district. If your County does not have an EC, and you would like to take on the job, I am sure that your SEC, WA4GZQ, can help in that endeavor. There is always a shortage of working volunteers in the section. Section activity for this reporting period is as follows: LF Sessions 74, QNI 4435, QTC 106; VHF Sessions 21, QNI 1490, QTC 439; CW Sessions 41, QNI 196, QTC 56. CW net honor roll—NG4J, STM says that some of the net managers are still not getting their reports in and on time, come on YOU NET MANAGERS. Station activity for the period is as follows: NG4J 249, NG4J 242 (last month), KJ4JE 242, W9FZW 188, WA4FMR 121, K4WVQ 87, W4DDK 85 (last month), W4DDK 66, W4TDB 54, N4N43 33, W4PFP 20, KE4LS 11, W4TV 9, K4SKDB 9, K4WOP 8, W4SYE 8, W4PSN 5, K4UQ 3. K4JJE was awarded the Brass Founders' League certificate for having 122 originated and delivered traffic.

**GREAT LAKES DIVISION**

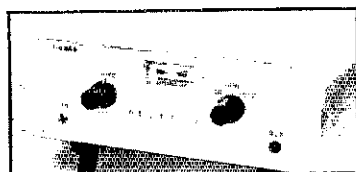
MICHIGAN: SM, James R. Beeley, WB8MTD—SEC: WB8BBY, STM: WB8SIW, OO COORD: NJ8S, ACC: K8SB, SGL: N8CNY, TC: W8YZ. I am pleased to announce the appointment of Jim Wades, WB8SIW, to the post of Section Traffic Manager. Once again we are fortunate in having an STM with a strong ARES background along with his traffic qualifications. He served very effectively as EC for Oakland County for several years, and he is no stranger to anyone who frequents the traffic nets. Jim also is thoroughly "in tune" with present technology, with plans for promoting and implementing packet as a medium for both routine and emergency traffic handling. This is the height of the hamfest season. I wish I could get to them all, but there isn't any way. Chelsea was great. This one is growing, drawing more hams and more exhibitors each year, and their luck with the weather is phenomenal. FD will be history by the time you read this. Who among MI affiliated clubs will receive the Motor City RC's annual Ollinghouse award, honoring former SCM W8ZBT? For the first time since its inception in 1977, MCRRC won its own award for 1985, placing first with a percentile rank of 97.9%. It was my honor and pleasure to make the presentation to them at their June meeting. Washnetwan County ARES has acquired the most unusual commercial vehicle—ah, trailer—that I've ever seen. According to EC N8DKM, a late-model Plymouth Voyager was donated to the group by the Chrysler Proving Grounds on condition that it never be driven. So they made a trailer out of it, dismantled the engine and drive train, removed the entire front suspension, welded on a trailer tongue, did the rest of the necessary mods to make it a fully trailerable vehicle and now are in the process of installing radio gear and related items. Makes for a strange appearance, but it fills the requirements as well as anything I've ever seen. Ham ingenuity to the front again! At the request of the Saginaw Valley ARA I have placed in nomination for the annual Hiram Percy Maxim award Mark Edward, N8KBC, Mark has worked closely with the annual Friendship Games, and so has SVARA—for two consecutive years now, the club has been nominated for the President's Volunteer Action Award. I'm sure we all wish Mark and SVARA every possible success. My thanks to the many amateurs who, on very short notice, helped out with communications for MI's part in "Hands Across America." Metro area DEC K8BTH accepted primary responsibility for organizing the effort and he did commendably. Net summary (Net, QNI, tic): QMN, 841, 182; NITN, 509, 170; MACS, 483, 83; UPN, 1119, 76; MNN, 236, 61; GLETN, 753, 36; WSSBN, 811, 32; VHF nets (22 rts), 1000, 58; Traffic: K8CPS 473, W8CJB 64, N8BZ 118, K8BYZ 118, W8DHB 68, W8DUQ 83, K8GXV 61, K8COP 53, N8CNY W8EOI 47, K8UPE 40, W8RNC 39, N8EXS 39, W8BMTD 37, K8HAP 35, N8AHA W8YU 28, W8BVMH 22, W8DPAF W8SCW 20, W8BOSE 17, W8BMB 15, K8EQO 14, W8URM 13, W8EIB 12, K8ZJU 11, W8BITT 4.

OHIO: SM, Jeffrey A. Maass, K8ND—NET QNI QTC Sess. Time (Local) Freq. MGR  
 BNE(E) 178 118 30 1845 3.577 W8JMD  
 BN(L) 205 89 28 2200 3.577 W8BO  
 BNR 236 116 31 1800 3.605 W8EK  
 BSSN 535 281 59 0945, 1900 3.873 K8OZ  
 ONN 168 34 30 1825 3.708 W8RKBW  
 OSN 302 134 31 1810 3.577 N8AEH  
 OSSBN 2047 557 93 1030, 1615, 3.9725 W8JGW & 1844  
 OSSN 206 82 31 0845 M-F 3.577 K8GLV  
 0800 S-Sn 3.577 K8GLV  
 O6MN 105 18 13 2100 50.16 W8BCTX  
 Ohio Section ARES Net 1900 Sun. 3.875 W8BMPV  
 Hamfests for August: Canton Hall of Fame, 10th; Warren, 17th; and Marysville, 24th (unconfirmed). Amateur Exams in August: Mentor 2nd, Maumee/Toledo 9th; Columbus and Portsmouth 16th; Canton 30th; Elyria 31st. The Second Annual Ohio Section Conference and Picnic will be held in August, but as this is written details are unknown. This will be a chance to gather with active Amateurs from around Ohio, discuss issues of importance to Amateur Radio and to the Ohio Section, and to just plain socialize with some of the voices that we encounter on the air. Data will be published in the Ohio Section Journal, and will be publicized on the various traffic nets around the State. August is Ohio State Fair time (Aug 1-17), so while you are in the Columbus area give me a call

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#### Friday September 5

1500 Exhibits Open  
1830 Dinner Dance Cruise  
2100 Exhibits Close

#### Saturday September 6

0700 Registration Open  
0730 International Breakfast  
0900 Exhibits Open  
0900 Tech Sessions & Forums Start  
1130 Ladies Luncheon  
1300 Old Town & Tijuana Shopping Tours  
1300 W/OORE Youth Forum  
1600 ARRL FORUM  
1700 Exhibits Close  
1830 Social Hour  
1930 Banquet  
Midnight Wouff Hong

#### Sunday September 7

0700 Registration Open  
0800 DX Breakfast  
0800 Other Special Interest Breakfasts  
0900 Exhibits Open  
0900 Tech Sessions & Forums Start  
1200 Exhibits Close  
1200 Closing Ceremony And Grand Prize Drawings  
1300 Convention Closes  
1300 "T" Hunt Starts



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September 5, 6, & 7, 1986

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—	Int Breakfast (1st 500)	Sat @ 10.00	_____
—	Banquet (1st 1100)	Sat @ 25.00	_____
		Sat Sun	
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—	Old Town (1st 80)	_____	@ 6.00 _____
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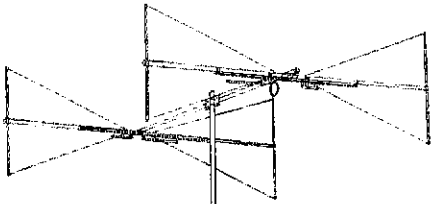
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## Highlights

- o ARRL, MARS, DX Forums
- o Technical Sessions
- o International Breakfast
- o Special Youth Activity
- o Public Service Sessions
- o VEC License Exams
- o Banquet - W/OORE & K6DUE
- o Ladies Luncheon - WA6OHB
- o Alternative Activities
- o San Diego Zoo, Sea World
- o Old Town & Tijuana Tours
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on the 147.09 K1L/TR repeater! The Amateur Radio exhibit at the Fair will be a complete and varied Amateur station, with emphasis placed on education. It will be located in the Buckeye Building as in previous years; stop in and visit! If you would like to help man the booth for a few hours, contact NREFB for information. Congratulations to Dick Stuart, KD8EO, who received a letter of thanks from the National Weather Service and an Emergency Communications Commendation from the ARRL Ohio Section for his assistance in the May 15th tornado touchdown near the Huron/Crawford County line. At the request of Cleveland Skywarn, he volunteered to drive to the area (a distance of 100 miles one way) at the height of the severe weather and surveyed the damage for the NWS. Damage from this tornado was limited, but Dick's actions gave the NWS much needed information regarding the storm. Well done! The Hands Across America (HAA) event on May 25 easily qualified as Ohio's largest-ever public service activity! We were asked to provide one Amateur per mile along Ohio's 593-mile segment of the nationwide chain of people. We estimated that we would need 700-750 Amateurs, and we had over 815 Amateurs participating in 21 counties! Special thanks to SEC Larry Solak, WB8MPV, for coordinating the event, and to each of the Emergency Coordinators along the route who organized operations in their counties. We all learned something from that one-day event! New appointees: OBS: KA8KEJ, KA8UYM. OES: N8CND, KA8UPR. ORS: N8PBE, NK8B. Congratulations! With regret, I report that N8CYM and W8OOL are Silent Keys. In last month's column I wrote that W8OOL was resigning as EC for Hardin County for health reasons; he passed on three weeks after that was written. September will be Ohio's "Traffic Handling Month"; this will be a good time to introduce your club or net to traffic handling procedures. If you need a speaker or information, contact your SM or STM KF8J for assistance. Please make a point of checking into a net and sending at least two messages during the month of September! (...and bring a friend or two!) Traffic: N8EFB 345, WB8JGW 332, W8PMJ 332, KV8Q 262, KA8DI 230, W8JMD 226, KA8GJV 209, W8SKP 204, W8BO 191, W8BKF 166, KE8BE 158, N8EVC 146, K8TVG 136, W8CZV 134, W8BDVH 126, N8GHS 126, KA8KHS 121, W8FPA 119, W8HGH 112, KF8J 103, KA8KS 92, W8AS 89, W8AS 88, KD8KU 85, KC8UZ 80, W8DMO 78, KA8CFG 74, W8DJYE 74, KD8FW 69, W8EK 68, N8GEC 61, W8HED 52, W8BKW 52, KBAN 51, N8AEH 49, KC8D 49, KE8F 48, W8BKW 46, NE8X 46, KB8DH 45, KA8NXX 45, W8WEG 44, N8FWA 42, KA8OQF 42, KA8TNT 42, N8BB 41, W8RIB 37, KC8MR 33, W8ADYS 33, N8FWA 32, KB8LM 32, NK8B 31, N8BI 31, NM8J 31, N8FPH 30, KD8XL 30, KC8YV 29, K8ND 24, W8BHZ 23, KC8WH 22, K8RC 21, W8ZOL 20, W8BCT 18, W8CZM 17, K8DXZ 16, W8BKW 16, W8BKC 16, N2NS 13, W8BHL 12, N8FBE 12, K8NJO 12, KE8EY 11, W8LUJ 11, W8SWM 11, N8QK 10, KA8LAY 10, W8BRS 10, KD8W 9, N8CIV 9, KB8OW 9, N8CIS 8, KC8KY 8, KA8RJC 8, KD8W 8, N8CIV 7, W8CCK 7, W8BYF 7, W8ZM 7, W8ZM 7, W8ZM 7, W8BCK 6, W8CSP 6, N8CIV 6, W8BATN 6, NR8C 5, KD8IC 5, W8FG 5, KA8UPR 5, KB8VOY 5, W8BWW 4, KA8RR 4, W8MVE 4, KA8SON 4, KE8EN 3, W8BGM 3, N8GIO 3, KA8MF 3, W8WU 3, W8BPK 2, N8BIF 2, K1LT 2, KA8P 2, N8CIV 1, KA8MF 1, W8BNE 1, KA8VET 1, W8BYS 0. (Apr) W8PMJ 270, KD8WH 15, KB8VOY 12, K8IQB 3.

**HUDSON DIVISION**

**EASTERN NEW YORK:** SM, Paul S. Vydareny, WB2VUK—ASM: K2ZM. STM: WB2MCO. SEC: AK2E. ACC & SC: N2BFG. BM: WB2EAG. SGL: KB2HQ. TC: KC2ZO. ATC: WA2VGM.

NET	TIME/DAY	FREQ.	NET MANAGER
ESN	230Z	3.590	W2WSS
CDN	230Z	146.34/94	WB2ZCM
HVN	2330Z	144.535/135	KA2MYJ
NYPON	2100Z	3.913	WB2IDS
NYSIM	1400Z	3.677	WB2EAG
NYS/EL	2300/0200Z	3.677	KU2N
SCRN	0000Z	147.735/135	KV2UJ
SDN	0130Z	147.66/06	K2ZVI

NET LISTINGS (QNI/ATC) AESN 54/2 ATEN 15/10 HVN 159/40 NYS/M 315/168 NYS/3 368/227 NYS/L 328/147 SDN 362/70. CLUB NEWS: Albany ARA heard Dr. Vonnegut talk on atmospheric electricity. They welcome new members KB2AMU, KB2AJ who took AARA training class. W2APF received Blackburn Distinguished Service Award for his efforts to help people as an amateur radio operator. CCNR worked on Field Day plans. Mt. Beacon heard WA2TIF talk on computer applications in ham radio. OMARC planned Field Day; note they finished 2nd in November Sweepstakes in local club category. Rip Van Winkle ARC planned field day. Saratoga RACES will hold Hamfest on 6 Sep. SK-N2FQ. New officers: KG2I-Pres N2PEP-VP KV2A. Sec N2B2S-Treas. Dir: KA2DXK N2EKT KB2PQ KY2N. SARA heard W2B5H on start of SARA. Welcomed new members KA2WJ, KB2AFC, KA2T, KA2KQT. W2AF had QRP session. W2AF heard about WAFN and SKYWARN from N2BYN. APR PSHR: WB2EAG MAY PSHR: W2PKY WB2VUK KA2MYJ WB2MCO K2ZVI KC2TF WA2YBM. Traffic: W2PKY 226, KC2TF 209, WB2MCO 117, WB2VUK 112, KA2MYJ 108, K2ZM 45, K2ZVI 40, WA2YBM 39, K2HNW 32, KA2TQW 14. (Apr) WB2EAG 289, WA2CJY 10, N2FTR 9.

**NEW YORK CITY-LONG ISLAND:** SM, John H. Smale, K2IZ—ASM/ACC: WB2IAP. ASM/VE: W2NL. SEC: KA2RGI. OOC: N82T. TCC/RF: W2JUP. STM: WA2ARC. PIO: W2IYA.

The following are traffic nets in and around the section:  
 NLI\* 3630kHz 1900/2200 WB2EUF mgr  
 NCVHF 6.745rpt 1930 m-f K2MT mgr  
 BAVHF 6.67rpt 2000 m-f K2YOK mgr  
 SCVHF 5.37rpt 2030 m-f W2G2D mgr  
 ESS 3590kHz 1800 W2MGR mgr  
 NYS/M 367kHz 1000 WB2EAG mgr  
 NYS 367kHz 1900/2200 WB2EAG mgr

\*Denotes section net, all times are local, please try and check in whenever possible. LIMARC will continue to sponsor examination Sessions on the second Saturday of the month at N.Y. Inst. of Technology, Rt. 25A, Old Westbury, in Salten Hall, Rm. 2. Applicants are reminded to please bring 2 forms of I.D., original and a copy of your FCC license, check for \$4.50, made payable to ARRL/VEEC, 2 pens/pencils and a calculator for the math questions. For further info, contact Woody Gerstner, WB2IAP, 42 Mohawk Ave., East Atlantic Beach NY 11561. In the "Darling, we are getting old" Dept., WB2IDP will be getting married this year. Seems like only yesterday he was in high school, but then again, my oldest turns 13 in June, and it doesn't seem it was that long ago that I was using a TX-1 and 2BC. K2GCE is planning to go to Germany this summer to visit his son. LIMARC celebrated their 20th anniversary at Harry's Americana in Farmingdale, Pres. WA2KXE reports that WB2ALW did a FB job in the arrangements and WB2DIN likewise with the Anniversary Journal. New Pres. for Hall of Science ARC is WA2QCZ. The club also had WB2IAP as guest speaker for the June meeting. WA2DHF, Vice Director for the Hudson Div, was guest speaker at Radio Central. If your club needs a really good speaker, try and get Steve. He usually has an excellent slide show to

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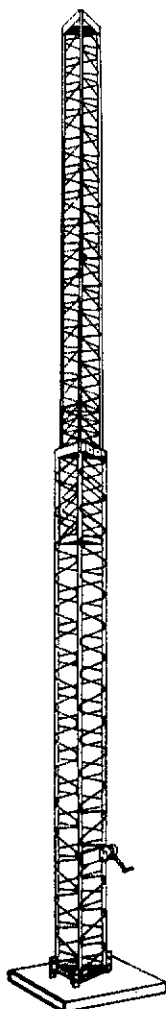
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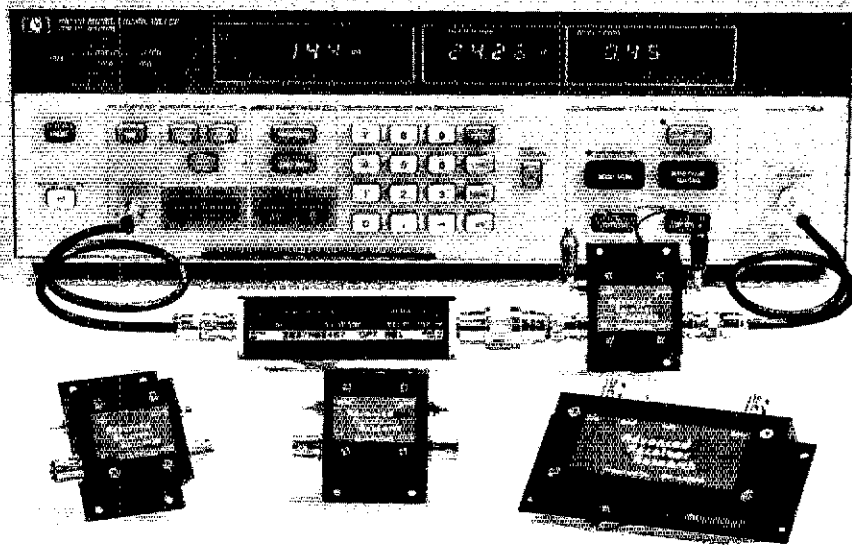
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P50VD	50-54	< 1.3	15	0	DGFET	\$29.95
P50VDG	50-54	< 0.5	24	+12	GaAsFET	\$79.95
P144VD	144-148	< 1.5	15	0	DGFET	\$29.95
P144VDA	144-148	< 1.0	15	0	DGFET	\$37.95
P144VDG	144-148	< 0.5	24	+12	GaAsFET	\$79.95
P220VD	220-225	< 1.8	15	0	DGFET	\$29.95
P220VDA	220-225	< 1.2	15	0	DGFET	\$37.95
P220VDG	220-225	< 0.5	20	+12	GaAsFET	\$79.95
P432VD	420-450	< 1.8	15	-20	Bipolar	\$32.95
P432VDA	420-450	< 1.1	17	-20	Bipolar	\$49.95
P432VDG	420-450	< 0.5	16	+12	GaAsFET	\$79.95

Inline (rt switched)						
SP28VD	28-30	< 1.2	15	0	DGFET	\$59.95
SP50VD	50-54	< 1.4	15	0	DGFET	\$59.95
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
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SP432VDG	420-450	< 0.55	16	+12	GaAsFET	\$109.95

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go with it. Tu-Boro Radio Club had Joe K2WNL, the ASM/VE, as a guest speaker at their meeting. WB2PHT is now K2DSX, congratulations Charlie. Traffic: K2YQK 213, K2GCE 60, W2GKZ 16.

**NORTHERN NEW JERSEY:** SM, Robert R. Anderson, K2BJG—ASM (VE Liaison) N2XJ. SEC: KB2ZM, STM; KA2HNO. OO/IAAC: (Open). ACC: KY2S. PIO: WB2NGV. SGL: W2KB. TC: K2BLA. BM: N2CXX. May appointments are: KA2SPH replaces WA2OPY as NM of TCETN. ECs: KC2EV, N2BSF, N2FJV, NK2K, W2PXE, and WA2ALM. OE5s: KC2EV, N2BSF, N2FJV, NK2K, and WA2ALM. The following QOs having passed the required exam are now members of the Amateur Auxiliary to the FCC's Field Operations Bureau: KA2BZS, W2DZ, and W2IBB. Thanks for a job well done goes to all of the NNJ general ham population who pitched in, and to our many ARES members who provided leadership on May 25th providing communications in support of the "Hands Across America" project. Al Helfrick, K2BLA, our NNJ TC put on a superpresentation on his "Ham's Spectrum Analyzer" (see QST 12/85) at the May meeting of TCRA. This and other technical presentations are available from our NNJ TC. Club program chairman are invited to contact Al at RD 4 Box 87 Burlington NJ 07005. Steve Mendelshon, WA2DFH, our ARRL Hudson Division Vice Director, and resident of our NNJ Section is continuing to provide "ARRL UPDATE" latest information from the League to club newsletter editors. If your club would like to be added to the distribution list please contact WA2DFH at 384-0680. The Englewood ARES 28th annual NJ QSO party will be held on Aug 16/17. Congratulations to the following who were newly licensed or upgraded during May sessions conducted by: NNJ VE Board (Crantford), Ocean/Monmouth ARC, Bergen ARC, and New Providence ARC. Novice: R. Lambin, L. Marin, D. Sirotisk, J. Handler, M. Mayer, T. Sessink, J. Lockart, A. Satz, and P. Wilciff. Technician: KB2AMA, KA2YAK, KA2ZNP, KB2ANW, KB2ACZ, KA2STJ, KA2LU, KA2GZ, KA2ZJK, and N. Kraikowski. General: N2GGD, KA2UGO, KA2YBD, J. Roselli, D. Browning WA2ACP, KB2ACQ, KB2APE, N2FVB, WB2HER, KA2NOD, KA2TSK, KA2TMU, KA2ZOG, KA2YZD, T. Hata, and KA2SMS. Advanced: N2EHN, N2GHF, N2EYR, KA2WLE, KA2WJV, N2FJU, N2FUD, N2FUR, N2GGH, KA2WFO, WB2ZBS, and KA2ZJJ. Extra: N2FRK, KD2KL, KA2ZDA, KC2ZW, W2GGH, WB2UJD, W2BIK, and W2JEK. A special note this month, is a young lady who passed her novice exam, Dawn Schneider of Dumont. She is the 7 1/2 year old harmonic of KA2YZO and new member of BARRA. May Data:

Net Mgr. Freq. Time Sess QNS QNI QSP

NNJ	W2RXX	3695	1000	Dy	31	186	181
NJPN	W2CC	3950	1800	Dy	31	127	95
NNJ/3	AG2R	3695	1900	Dy	Not		
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ORTN	WB2QMP	149.12	2000	Dy	31	348	149
TCETN	KA2SPH	146.685	1930	Dy	31	50	25
NJPTN	(PBBS)	145.01	WA2SNA-1 and WB2GWD-0				

NNJ Amateur Radio Public Info Line: 201-735-8550. SAR/PSHR: N2XJ 262/120, N2DPX 106/1, KA2SPH 83/119, K2VX 28/1, W2XD 20/1, W2CC 18/1, WB2QMP 137/67.

### MIDWEST DIVISION

**IOWA:** SM, Rollin J. Savers, WB9AVW—SEC: KD0RG, BM: K0IR, ACC: WB9QAM, PIO: N0BAJ, TC: K0DAS, ST: AK0G, STM: K0BXL. Seven other amateurs and I were present at Governor Branstad's office on May 27th. Branstad signed a proclamation declaring June as Amateur Radio Month. There has been a lot of controversy over the "so called OCC-Ottumwa Command Center." Information that I have received, pro and con, has been very contradictory. Therefore as far as I am concerned, no such operation, "matter closed." Iowa Code net now meets at 7 PM instead of 8 PM on M-W-F. A follow up—there were 75 of the 140 students of James Madison High School of Burlington who passed the novice code test. Hats off to IARL Amateur Radio Club, Eric, K0BXL is working on a VCR tape which will include all about the N.T.S. and about traffic handling. He made this available for clubs to show. K00Z back in hospital again.

NET	QTC	FREQ	TIME	DAY	MGR	
75 mtr noon	1141	54	3970	1730	Dy	WB9JFF
ITEN	72	13	3970	2300	Sun	KD0BG
TLCN	301	135	3560	2330	Dy	W0YLS

ICN 59 13 3705 0000 M-W-F NDOJ  
Traffic: W0SS 25, WA0ALX 186, K0GP 114, W0YLS 113, K0BZL 79, WB9JFF 45, W0HTP 40, KA0GSA 37, K0KQJ 29, W0JL 20, K006G 16, W0FR 14, W0LFT 12, K0BRE 8, W0WB 8, W0B37R 8 and others as listed in the Special Olympics which was appreciated by the Waterloo Rec Center.

**KANSAS:** SM, Robert M. Summers, K0BXF—SEC: N0BLD, STM: W0YRH. With the storm season upon us, news of several groups participating in the SWAPNET system is evident. I know that both N0BLD and myself would be interested in knowing just how many ARES-affiliated nets are a part of the system. PLEASE drop us both a line informing of your groups activity. We are in the process of considering some radical changes in the ARES Zone structure in KANSAS. Your thoughts as to how each club and or EC area should be re-arranged would be appreciated, if you would like to share them with us. NET activity for the month of APRIL is as follows: KSBNI QNI 1192 QTC 127 Net Manager W0FRC. KPN QNI 424 QTC 26, Mgr W0FRC. KWN QNI 800 QTC 648, Mgr WA0HOZ. KMVN QNI 691 QTC 598, Mgr WA0HOZ. CSTN QNI 1902 QTC 50, Mgr W0DE. QKS QNI 193 QTC 66, Mgr WB0ZEN. EFFECTIVE JUNE, Wendell Wilson, W0TQ, will assume the manager spot of QKS. The net will attempt to reconstruct in several ways including slowing down in speed to entice a few more QNI. QKS-SS QNI 43 QTC 10 Mgr W0MYM. Ks RTTY net QNI 52 QTC 10 Mgr KA0CUF. By the time you read this column it will almost be time for SET 1986. DO TAKE PART THIS YEAR!!! Encourage others ALSO!!! Traffic: NG0CC 585, W0FR 252, W0FRC 238, K0BU 128, W0FDJ 72, K0BXF 61, W0BKB 59, WA0HOZ 57, W0YRH 46, W0H 37, WB0ZEN 25, W0KL 21, W0MYM 15, W0PB 12, W0BBO 7, W0CHJ 5.

**MISSOURI:** SM, Ben Smith, K0PCK—Newly elected club officers for the Lake Ozark ARC are Pres. KAGMCI, VP. K9IMX, Sec/Treas. K0BAW and manager of their local club nets WB7TL. The amateurs in the Kimberling City area have formed a new amateur radio club known as the Kimberling Amateur Radio Club. Elected officers are: Pres. N0QGF, VP. K0PHI, and Sec/Treas. K0ARET. They have voted to apply for ARRL Affiliated Club recognition. Good luck to the Kimberling ARC. The St. Charles ARC will hold their Hamfest Sunday August 24 at Blanchette Park in St. Charles. The honor of being the 1986 Ham of the Year of the Ozark Amateur Radio Society goes to WB0SQY. As of May 8, the Southwest Missouri ARC 2 meter repeater has a link to the 34/94 repeater in Pittsburg, KS. This should be a great benefit in weather spotting on the Missouri-Kansas borders. The OARE Picnic and Swapmeet will be September 14 at the park in Monett, MO. May was a very busy month of public-service work for amateurs in Missouri. A community station and national level. Members of the Central Missouri Radio Assoc. provided communication for a Cross Country Pony Jumping contest and the Ozark Tricolour. The Heart of America assisted with the March of Dimes WalkAmerica and the Research

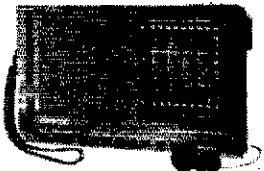
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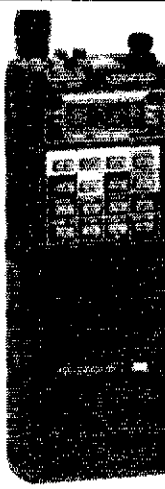
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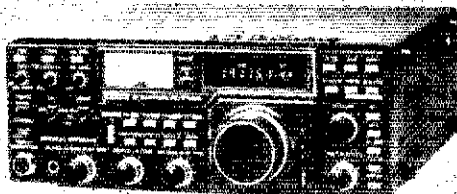
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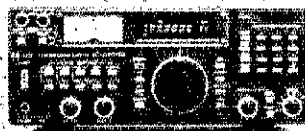
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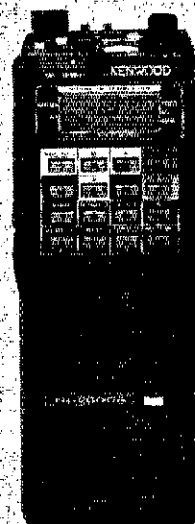
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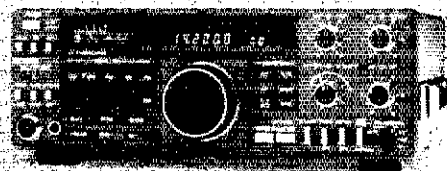
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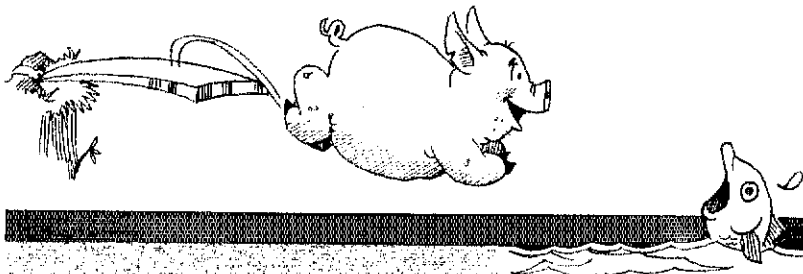


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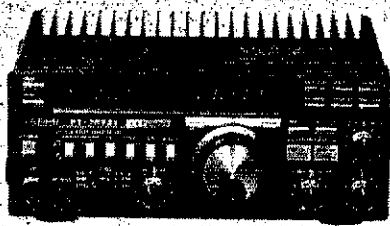




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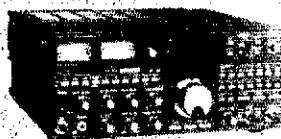
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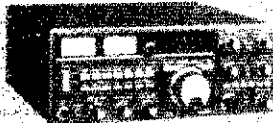
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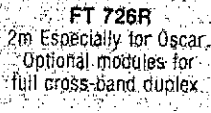
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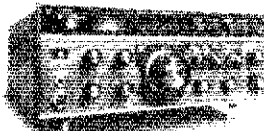
## SANTEC



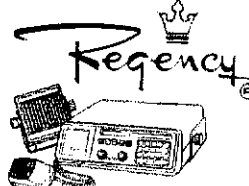
**ST-20T 2m HT**  
**ST-400ET 440 MHz HT**  
**ST-200ET 220 MHz HT**

**KDK**  
**FM240 2m, 25-watt**

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**CORSAIR II Model 561**



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MX7000 25 MHz-1.2 GHz ..... 429.95

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R3 10-15-20m Vertical	268.95
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10-4CD 4-element 10m	111.95
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Pro 57 10-12-15-17-20m	465.95
Pro 67 10-12-15-17-20-40m	579.95

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4-BTV 10-40m Vertical	87.95
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67-144 2-meter Base Vertical	115.95
66-144B 2m Base Vertical	87.95
MO-1/MO-2 Masts	21.50
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20 meters	15.50 21.50
30 and 40 meters	17.95 25.95
75 meters	19.95 36.95

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3935 TH6DX 5-ele 10-15-20m	CALL
3955 Explorer 14 10-15-20m	CALL
2035 3-element 2-meter Beam	CALL
20R5 8-element 2-meter Beam	CALL
2145 14-element 2-meter Beam	CALL
BR86 Beam Rotun	CALL
V2S 2 meter Vertical	CALL
V4S 440 MHz Vertical	CALL

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AVANTI HM 151.36 2m On-glass	31.95
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KLM 435-18C 18-ele Circ Polar	111.19
KLM 2m-22C 22-ele Circ 2m	109.00

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Procom 450 padded phones	35.50
Procom 400 desk mike	57.75
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45G	Call

Each package includes top section, mid section, base, rotor shell, guy brackets, guy wire, turnbuckles, equalizer plates, guy anchors, cable clamps, thimbles. Ask about substitutions and custom designs. Tower packages are shipped freight collect FOB our warehouse.

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H654HD 64-foot/higher load	CALL
H670HD 60-foot/higher load	CALL

Order Hy-Gain rotor and receive free shipping on all.

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LM354 54-foot/higher load	1575.00

Shipping not included. Shipped direct from factory to save you money.

**PHILLYSTRAN** CALL

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Mini-R 95% Shield	135.00

**Cableware Hardline** CALL

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Alliance HD73	105.00
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Hy-Gain Tailwhisper 12X	CALL
Hy-Gain Heavy-duty 300	CALL
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Kempco KR5400 azimuth/elevation	399.95

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83188 Reducer RG59/mini B	0.25
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Telephone Test Equipment	
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D1010N UHF Amp/N connectors	299.95
B215 2m Amp, 2 in, 150 out	249.95
A1015 8m Amp, 10 in, 150 out	269.95

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ATR10 Ant Tuner 1 kW	242.95
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NEW AL80A 1200 watt Amp	659.95
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**AMP SUPPLY**

LA 1000A 160-15m Amp	429.95
LK 5002BNT HF Amp no tune	1443.95
AT 1200A 1200 PEP Tuner	209.95
LK 5002B 2.5 kW hipster!	1176.00

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LA-2035R 2m Amp with preAMP	74.95

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2 watts in, 30 watts out 2m Amp	69.95
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2 watts in, 120 watts out 2m Amp	169.95
200mW in, 30 watts out 2m Amp	84.95

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RS12A	59.95	RS35M	149.95
RS20A	89.95	VS20M	124.95
RS35A	133.95	VS35M	169.95
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583 3-position Coax Switch	25.25
585 6-position Coax Switch	29.95
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370-15 All-band Dipole Antenna	129.95

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CN-720B 2kW HF Watt Meter	120.00
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CNS-518 Antenna Tuner 2.5 kW	279.95
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  - \$100 on HG37SS/HG52SS Towers
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• Rebates are based on itemized proof of purchase dated July 1 to September 30, 1986. Each product must be itemized by model number and price.

• Rebate requests must be postmarked no later than October 31, 1986 and mailed to Telex Communications, Inc., 9600 Aldrich Ave. So., Minneapolis, MN 55420, Attn: Amateur Customer Service

VAN BORDEN		
PD80D	80-10 dipole kit	34.95
PD80A	80-40 dipole kit	32.50
PD40D	40-10 dipole kit	30.95
SD80	80 shorted dipole	28.95
SO40	40 shorted dipole	28.95
ALL BANDER	160-10m	28.95
	AND MORE!	

LARSEN		
LM150MM		41.90
NL150MM		45.90
NMO150MM		42.90
RD4 142' HD		16.95
	AND MORE!	

CABLE & CONNECTORS		
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Columbia RG 213		32c/ft
RG8U		28c/ft
RG 8X		15c/ft
RG59/U		14c/ft
PL 259/Silver		1.10/1.49
N-Male for 8U		4.80
BNC(M)-DHF(R)		4.80
	AND MORE!	

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Larsen KDM-150 HD		16.95
Larsen Dual Banders		36.45
Umadilla 1.1		17.95
Ant. Spec. AP151.3G		34.50
X-Panda Five		14.95
Butternut HF3B		185.00
Hufler UGM		19.95
Antenna Dual Band		81.00

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IH7DXS	7 el. tri-band	586.96
TH5MK2S	5 el. tri-band	603.96
EX-14	4 el. tri-band	388.95
TH3JRS	3 el. 750W pep	241.95
18AVT/WBS	5 band trap vert	133.95
14AVO/WBS	4 band trap vert	82.95
V2S	2cm. omni-direct	54.95
V4	70cm omni-direct	65.95
HB144MAG	2m mag mt	36.95
	AND MORE!	

TET		
HB433SP	40, 15, 10, 3 al.	244.95
MV3AH	7-21 2B vert	48.95
MV3AHR	7-21 2B vert	60.45 with radio
MV3BHR	14-21 2B vert	80.45 with radio
MLA-4	loop 3.5/7/21/72	139.95
80-10	28 MHz Swiss Quad	178.95
SOY-06	7m. Swiss Quad	95.95

BUTTERNUT		
80-10 vertical		125.00
50-40 vertical		174.00
3M vertical		52.90
RMK0	mp mag. mt.	41.95
TBR16XS	180m add on	45.00
MPS	mt. post sleeve	5.50
	AND MORE!	

CUSHCRAFT		
4 el. tri-band	100.00	45AG
3 el. tri-band	274.00	AS250
10, 15, 20 remote tuned		AS450
vert.	225.95	TB-3
5 band trap vert	105.00	M200
32-19	19 el. 2m boom	96.95
215WB	15 el. wide band 2m boom	84.50
424B	24 el. 70cm boom	79.95
416TB	16 el. OSCAR 435 MHz	60.00
A144-10T	10 el. OSCAR 145.9 MHz	83.00

AOP-1	OSCAR pack 2m & 70cm	150.00
AR-2	2m vert. ringo	24.50
ARX-2	2m vert. ringo ranger	31.00
ARX-2B	2m vert. ringo ranger II	37.00
	AND MORE!	

HUFLER		
6BTV	6 band trap vert	128.95
5BTV	5 band trap vert	108.95
4BTV	4 band trap vert	84.95
67-144	Fix stat. 2m. collinear	116.95
MD-1/MO-2	mobile mast	21.95
RM10/RM15	10m/15m resonator (sta)	11.85
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RM40/RM40S	40m. sid. super	17.95/25.95
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SSM-2	stainless bal. mt.	17.95
SGM-1	stainless bal. & spring	17.95
OO-1	quick disconnect	13.95
SGM-2	2m. 5/8 mag. mt.	28.95
HOT	truck mt. w/swivel ball	16.95
	AND MORE!	

**Time is limited —**  
**Rebate Offer expires**  
**September 30, 1986**  
**FREE FREIGHT**

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2M-22C	2m. satellite	67.95
70cm satellite	2m. satellite	117.55
435-40CX	70cm satellite	113.95
		155.95

MOSLEY		
3 el. tri-band		228.00
3 el. tri-band		179.00
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3 el. tri-band		289.00
7 el. tri-band		465.00

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10' sect.		51.50
2-3 top sect.		92.10
10' sect.		115.90
2-2 top sect.		126.00
access shelf		15.00
access shelf		48.75
thrust bal.		53.95
10" mast		32.25
short base		26.25
short base		48.50
rod pole		187.50

HY-GAIN ROTORS		
12x	20 sq. ft.	344.25
15 sq. ft.	HAM IV	209.95
CD4511	8.5 sq. ft.	203.95

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KR5400A	azimuth/elevation	283.95

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Hospital Hill Run in Kansas City. The St. Charles ARC helped with the Wentzville YMCA Biathlon. When a tornado hit the Sikeston, MO area and disrupted long distance telephone service in Southeast Missouri for almost three days the amateurs in the area plus amateurs from St. Louis, Camdenton and Jefferson City went to the tornado area to provide extra help. Other amateurs across the state spent many hours at their rigs disseminating the Health and Welfare traffic from Sikeston. Under the direction and leadership of K9OCU, the amateurs of Missouri joined many other amateurs of the nation to provide communications for Hands Across America. Silent Key reported to me: KA6NLV. Nets reporting:

NET	Ses	QNI	QTC	Day	Time	Freq	MHz	Mgr
MON	62	279	115	Dly	7:00P/45	3.585		KBSI
MOSSB	31	682	90	Dly	8:00	3.963		K19Y
MEOW	31	488	60	Dly	5:30	3.963		K8DSQ
HBN	22	310	23	Mon-Fri	12:05	3.800		K8W3C
MTTN	17	131	13	Mon-Sat	6:30	3.370		NBKEK
MACFON	5	43	7	Wed	8:15	222.42/4.02		AIGO
RRABN	30	412	6	Dly	8:00	146.39/7.9		KABLLN
ZAEN	4	63	3	Tue	8:00	147.84/24		NOBE
ARESN	5	60	1	Sat	9:00	147.855/255		N9FCW
LOZBC	27	423	0	Mon-Sat	6:00AM	146.13/1.73		WBRTL
LOZFM	50	108	0	Fri	9:00	146.13/1.73		WBRTL
GMEN	5	72	0	Wed	9:00	146.18/7.6		K8PKC
SARN	4	37	0	Thu	9:00	146.437/0.03		WBENW
JOCOC	4	27	0	Wed	8:00	146.407/0.0		WB8DZX
LOZCW	5	20	0	Sat	9:00	3.707		WBRTL

Traffic: NBSB 156, WBQMA 142, ND0M 129, KC6AS 70, KBYB 75, KTY 72, K8PKC 67, AIGO 61, KZ6N 60, NBKEK 42, W8OJLD 42, K8OBF 40, K9OCU 36, N8QG 34, W8OCJB 23, W8GYP 20, K8OJY 12, W8AKUH 6, K8SI 2.

**NEBRASKA:** SM, Vern Wirka, WB8GQM - STM: Jerry Kohn, W8BEGC. There are some vacation appointments available in Nebraska. If you are interested, please contact your Section Manager. The Ak-Sar-Ben Amateur Radio Club of Omaha sponsors a CW net that meets every Thursday evening at 8:00 PM Central Daylight Time on 21.125 MHz. The CW net is aimed at helping new novices get on the air and improve their CW skills, but everybody is welcome to check in with net control station W8ASD. The Pine Ridge Amateur Radio Club of Chadron reports an unplanned demonstration of static discharge during a recent meeting. According to the Pine Ridge club newsletter, the monthly meeting was interrupted by a snapping sound coming from the workbench in the club meeting room. The snapping turned out to be a classic demonstration of static discharge between the outer and inner conductors of a disconnected coaxial cable. Club members were shown what proper grounding techniques should be observed to prevent such an occurrence. Traffic: K8DKM 219, WB8ED 145, K8OZL 79, W8KK 75, K8BECB 18, N8DA 16, W8BOK 14, W8BQG 8.

## NEW ENGLAND DIVISION

**CONNECTICUT:** SM, Robert J. Koczur, K1WGO - STM: K1EIC. SEC: K1EOL. BM: K3ZJ. ACC: K61M. OOF/PI: N11I. TC: W1HAD. PIC: KX1B. SGL: K1AH.

**NET FREQ LOCAL TIME QTC QNI NM**

CN	3640	1900/2000	184	315	K1EIR
PHN	3965	1800 m-s	105	180	K1BHT
NVTN	22188	2130	25	180	N1BON
RTN	13773	2100	44	231	K1AJAN
WCN	7818	2030	203	497	W1GXZ

This column is being written from my hospital room where I am recuperating from surgery. Consequently it may be a little short, but I'll do the best I can. From Tri-City AHC: Will be operating a special events station KA1BB from the Waterford, CT 1-95 in promote state Labor Day auto travel from 1700Z Aug 30 through 2300Z Sept 1 on 14.295, 7.245 and 3.995 MHz phone and on 7.130 MHz CW. From WHARA the West Haven Amateur Radio Association: Recently provided priority communications for a simulated drill in conjunction with the VA hospital and the United States Armed Forces. We provided communications on the military ambulances from Hartford to the West Haven VA. This event was such a success and the VA realized how effective amateur radio can be in the case of a disaster situation, the mayor of West Haven issued a proclamation making May 17 West Haven Amateur Radio Association Day in West Haven. Congrats WHARA. All other news will have to wait for next month when I am back on my feet. 73s. Traffic: W1GXZ 442, KA1MDM 245, WB1CQO 220, KA1GWE 187, W1EWF 155, K1MKJ 139, N10AV 127, N1EOD 52, K1A1BH 48, N10CW 31, W1BDN 26, W10Y 21, K1A1KC 16, WB1EFJ 15, WA1NLD 9, W10V 5, W1U1C 3.

**EASTERN MASSACHUSETTS:** SM, Lueck Hurder, KY1T - ASM: K8HL. SGL: K3HL. OJAF: KA1KF. SEC: KB1PA. STM: KW1U. ACC: KAZE. TC: K1U1U. PIC: K1HLZ.

**NET MGR FREQ TIME/LOCQTY QTC QNI**

EMRI	N1AJJ	3658	1900/2200	DY	381	287
EMRIPN	N1BGW	3830	1730	DY	478	287
EM2MN	K1AMR	145.23	2000	DY	443	428
NEEPN	K1BZD	3945	0830	SN	11	51
HHTN	WB1CMQ	0464	2230	DY	424	546
EMRISJ	N1WIC	3715	1600/2030	DY	111	226
CITN	KB1AF	7450/45	1930	DY	310	320

A very busy month for the EMASST traffic people as N1BBI/MM continues to crank out messages by the thousands - check out the traffic totals at the end of this column - as well as the large number of people who made PSHF this month. Tie to all for yet another job superbly done! State Government Liaison K3HI checking out Mass. laws to determine if there is anything on the books similar to the disastrous Ontario "nuisance" law that could affect Amateurs here. N1CLC & Falmouth A.R.A. working on a means to get Nat'l Weather Service storm warnings promptly into the hands of officials at Emergency Operations Centers around Sector 2C. SEC KB1PA hosted an excellent meeting of DECs, ECs and interested parties at State Civil Defense HQ in Framingham with an eye-opening tour immediately following. Wellesley ARS sponsors something very interesting that might be of interest to you - try a "Get acquainted night", when new licensees are encouraged to get on the air for first time QSOs, with club members ready nearby to assist. May Traffic: "B" BPL: N1BBT 4404B, KW1U 2436B, KB1AF 689B, WA1TB 649B, KY1T 649B, N1BGW 647B, KA1AE 546B, WA1FCO 403, KA1BBU 283B, N1DDC 280B, KN1K 274, N1BHH 267, KA1AMR 226, KB1TA 219, WB1CMQ 218, N1CVE 199, KA1EID 191, K1GRB 180, N1AJJ 157, K1EBC 148, KB1PA 130, KA1LH 105, WA1FNM 103, KA1CO 100, W1ZHC 100, N1DVI 96, KA1ON 86, W1CE 57, K1LCO 37, K1BZD 36, W1DMM 21, N10PE 19, N1DYZ 17, K1GZ 16, KA1K 18 to be added to "B" BPL. REMINDATIONS: HAVE YOU EXPRESSED YOUR OPINIONS TO YOUR DIVISION DIRECTOR AND SECTION MANAGER LATELY?

**MAINE:** SM, Cliff Laverty, W1RWG - ASM: W1KX. SEC: KA8LVO. STM: K1WV. ACC: KY1C. BM: W1JTH. OOC: W1KX. PIC: KY1E. SGL: K1NIT. TC: K1PW. Field Day operations have been planned by PAWA, Ellsworth AWA, Sandy River ARC, Blackstrap Rptr Assn, Aroostook ARA, and



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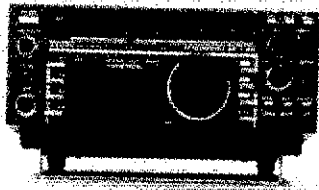
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ALL ITEMS ARE GUARANTEED OR SALES PRICE REFUNDED

## EQUIPMENT

- Kenwood ..... Call for prices on all Kenwood
- Kenwood TS940S, contesters delight ..... Call
- Kenwood TS 440 ..... Call for trade
- Icom R7000 25-2000 MHz ..... 849.00
- Icom IC3200 ..... 489.95
- Sanlec ST20T Handi Talkie ..... 289.00
- Icom IC735 ..... 799.00
- Ten-Tec 2510 (Easy OSCAR) ..... 489.00



## ACCESSORIES

- B&W VIEWSTAR ANTENNA TUNER ..... 89.95
- Heil HC3/HC4/HC5 ..... Stock
- Heil BM10 Boom Mike headset ..... 59.95
- CSI Private Patch III ..... 469.95
- FLUKE 77 auto-ranging digital multimeter ..... 125.00
- Darwa CN620B, 20-200, 2000W ..... 109.95
- Alinco F1 H 230D- Excellent buy ..... 79.00
- Nye MB5-A (for the big boys!) ..... 529.00
- Shure 444D ..... 54.95
- Wahl 7470 Soldering Station ..... 49.00
- Kenwood IF 10A, B, C ..... Stock
- Kenwood IF 232C Level translator ..... 49.00
- Miller C514T Low pass filter ..... 43.50
- B & K Test Equipment VOM, oscilloscopes, generators, etc. .... CALL

## ANTENNAS

- Isopole 144 MHz ..... 44.95
- A4 ..... 269.00
- 402CD ..... 279.95
- 424B ..... 84.00
- 215WB New, 15 El, 2M beam ..... 79.95
- AOP-1, Complete Oscar Antenna ..... 149.95
- Butternut HF6V, 80-10 vertical ..... 125.00
- HF2V, 80 & 40 vertical ..... 119.00
- HF4B ..... 189.00
- Hustler G7-144 ..... 119.95
- Hustler 6BTV ..... 139.00
- Ham4 Rotator, T2X, CD45-2 ..... Call
- KLM HF World Class Series Antennas ..... Call Don
- Alpha Delta Twin Sloper ..... 49.00
- Coax Seal ..... 2.00/roll
- B&W Dipoles ..... Less 10%
- Hy-Gain TH7DXS ..... 489.00
- Explorer 14 ..... 349.00
- Discoverer 1 element 40M ..... 169.00
- 2 element 40M ..... 369.00
- 3 element only ..... 249.00
- CD 45-2 Great Tribander Rotor ..... 169.00
- V2S (Zmellar) ..... 59.00
- HG52SS 5/2 ft. crankup tower ..... 1199.00
- Prepaid freight when you order other Hy-Gain items with tower
- KLM KT-34A ..... 339.00
- 40M-2 ..... 299.00
- New Telex/HyGain 2-18s Complete
- HD OSCAR system ..... List 365.00 ..... Your Cost 269.00

## OTHER ANTENNAS

- Larsen Kuldock ..... 17.00
- Larsen 440 HW 1/2 wave Kuldock ..... 25.00
- Avanti AP151.3G on Glass Antenna ..... 36.00
- Anteco 2M, 5/8, Mag. Mount, Comp ..... 25.00
- Avanti APR450-5G on glass ..... 39.00
- Orion 2M 1/2 wave handy Antenna ..... 19.00
- Van Gordon SLA-1 160-80-40 Sloper ..... 34.00
- Valor AB-5 Mobile ..... 79.95
- Stoner DA100 D Active Rx Antenna ..... 190.00
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- Eimac 3-500Z ..... 109.95
- GE Industrial Tubes ..... Call
- GE 12BY7A ..... 7.00
- GE 6JS6C ..... 12.95
- Cetron 572B ..... 69.00
- GE 8950 ..... 14.00

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- We stock SAMS, TAB, ARRL, RSGB, Ameco Radio
- Pubs ..... Call
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Philmore Field Strength/SWR Meter ..... 19.95  
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- 24 Pin Solder tail dip sockets ..... 25/each
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- 2.5A/1000PIV Epoxy diode ..... 29 each or 19.00/100
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- 3N201 ..... 95
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- 365pF cap. .... 1.95
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- 1/8, 1/4, watt carbon resistors ..... .05 each
- Meters 0-3000 VDC 2 1/2" Square 0-1 Amp DC ..... 9.95
- Drake—Collins mike plug ..... 2.00
- Miniature toggle, 5A/125VAC ..... 1.50 each
- Close out on rigs & accessories. All the time ..... Call
- We may have what you're looking for.

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- 9913 low loss, solid center, foil/braid shield ..... 51c/ft.
- 8214 RG8 Foam ..... 45c/ft.
- 8237 RG8 ..... 39c/ft.
- 8267 RG213 ..... 55c/ft.
- 8000 14 Ga stranded copper ant. wire ..... 13c/ft.
- 8448 8 conductor rotor cable ..... 33c/ft.
- 9405 Heavy duty 2-16 Ga 6-18 Ga ..... 56c/ft.
- 9258 RG8x ..... 20c/ft.
- 9269 RG-62A/U ..... 16c/ft.
- 8403 Mic Cable, 3 condctr & shield ..... 45c/ft.
- 100 feet 8214 w/ends installed ..... 54.00
- 8669 7/16" tinned copper braid ..... 1.00/ft.
- International Wire RG214, non-mil. good cable ..... 70c/ft.
- International Wire 9086 exact replacement for Belden 9913 ..... 36c/ft.
- International 16 Ga stranded antenna wire ..... 6c/ft.
- International 4063 RG-213 ..... 28c/ft.

## AMPHENOL

- 831SP-PL.259 Silverplate ..... 1.25
- UG176 reducer RG8X ..... .30
- 831J Double Female UHF ..... 2.00
- 82-61 N Male ..... 3.00
- 82-97 N Female Bulkhead ..... 3.00
- 82-63 Inline Female N ..... 4.00
- 82-98 N elbow ..... 3.00
- 31-212 BNC-RG59 ..... 1.50
- 31-2 BNC-RG58 ..... 1.50
- 34025 N Male, RG58 ..... 3.00
- 34125 N Female-UHF male ..... 8.00
- 3128 BNC Female-PC259 ..... 3.00

## TOWER ACCESSORIES

- 1/4" E.H.S. Guy cable, Rohn US, 1000 ft. .... 250.00
- 3/16" E.H.S. cable, Rohn US, 1000 ft. .... 210.00
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- 3/16" Guy Cable, 3700 #7 x 7 strand, import ..... 12c/ft.
- 3/8 x 6 E&J Turnbuckle ..... 7.95
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- 1/4" wire clips ..... .50
- 1/4 Thimbles ..... .45
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## COMPUTER STUFF

- Kantronics UTU-XT ..... 319.00
- Fits any computer (even yours!)
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- AEA PK-64, does RTTY, ASCII, AMTOR also ..... 199.00
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- NEW Kantronics Packet II ..... 199.00
- MFJ 1270 ..... 115.00
- AEA PM-1 ..... 149.00

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	3-10	25-50	50-125	100-200	200-500	400-1000
5 watts	5A	5B	5C	5D	5E	5F
10 watts	10A	10B	10C	10D	10E	10F
25 watts	25A	25B	25C	25D	25E	25F
50 watts	50A	50B	50C	50D	50E	50F
100 watts	100A	100B	100C	100D	100E	100F
250 watts	250A	250B	250C	250D	250E	250F
500 watts	500A	500B	500C	500D	500E	500F
1000 watts	1000A	1000B	1000C	1000D	1000E	1000F
2500 watts	2500A	2500B	2500C	2500D	2500E	2500F
5000 watts	5000A	5000B	5000C	5000D	5000E	5000F

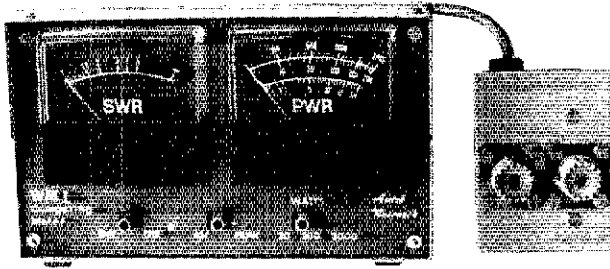
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- **READS SWR DIRECTLY.** Even when you're talking on SSB!
- **GREATLY SIMPLIFIES TUNER ADJUSTMENT.** SWR reading not affected by forward power. No confusing readings.
- **REMOTE RF HEAD.** A must! Up to four feet from meter. Coax can't pull meter off table.

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**For SSB & CW**  
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Continuously variable main frequency. (250 to 2500 Hz)

AUTEK pioneered the ACTIVE AUDIO FILTER back in 1972. Today, we're still the engineering leader. Our new QF-1A is the latest example. It's INFINITELY VARIABLE. You vary selectivity 100:1 and frequency over the entire usable audio range. This lets you reject whistles with dual notches (to 70 dB), or reject SSB hiss and splatter with a fully adjustable lowpass plus aux. notch. Imagine what the NARROWEST CW FILTER MADE will do to QRM! HP rejects low frequencies. Skirts exceed 80 dB. 1 watt speaker amp.

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MMT 144/28 144 MHz 10 Watts	186.00
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MMT 220/28-S 220 MHz 15 Watts	242.00
MMT 432/28-S 432/435 MHz 10 Watts	285.00
MMT 1296/144-G 1296 MHz GaAsFET 2 W.	362.00
MMT 1296/144 OSCAR Mode-L 2 Watt xmit	278.00

## CONVERTERS

MMC 144/28-HP 2 m GaAsFET	74.00
MMC 432/28-S 70 cm Down to 10m	83.00
MMK 1296/144 23 cm Down to 2 m	186.00

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PREAMPLIFIER BUILT-IN	PX PRICE
MML 144/30-LS 144 MHz 30 Watt HT AMP.	\$129.00
MML 144/100-LS 144 MHz 100 Watt HT AMP.	232.00
MML 144/200-S 144 MHz 200 Watt GaAsFET	395.00
MML 432/30-L 432 MHz 30 Watt HT AMP.	232.00
MML 432/100 432 MHz 100 Watt ATV/SSB/FM	395.00
MML 432/50 432 MHz 50 Watt / 10 Watt in	204.00
MML 1296/15 1296 MHz 15 Watts	CALL

## PREAMPLIFIERS GaAsFET

MMG 144V 2 m RF Switched	65.00
MMG 1296 23 cm	111.00

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MMC 435/600 70 cm Block Converter	55.00
MTV 435 20 Watt 70 cm xmitr	285.00

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6 PM — 10 PM technical EST.

Bangor. At its annual mtg. Blackstrap elected N1AKP pres. K1MBZ vice, N1AKR sec, KA1KAR treas. KD2EU mem-at-large. N1DNY activities mgr. St Albans Hamfest will be held Sunday, August 10. Windsor Hamfest will be held Saturday, Sept 6. Boxboro Oct 18-19. PSHR: WB1CBP, WA1YNZ, W1RWG.

Net	Sessions	Checks	Traffic	Manager
Sea Gull	27	814	123	K1GUP
LPine Tree	21	72	31	WA1YNZ
MePubSvc	4	71	3	KL7UG
RACES	4	64	9	W1RWG
AroostookEm	3	51	1	WA1YNZ

Please send ur traffic reports on the Sea Gull or the Pine Tree by the fifth of the month. Traffic: AK1W 185, WB1CBP 182, W1RCO 85, ND1A 81, KA1JQJ 60, W1BWX 52, W1WFG 50, W1KX 42, WA1YNZ 32, W1JTH 28, W1OTO 9, W1IDA 7, W1VEH 6, KA1FTL 4.

**NEW HAMPSHIRE:** SM, Bill Burden, WB1BRE—SEC: W1NH. SM: K1OSM. May kept us all very busy as fleamarkets, public service activities, and club meetings put us on the road! The "Fosstrader's" fleamarket at Deerfield included the first use of the new ARRL booth with excellent response. Director K1KI, HQ staff members and field org volunteers helped run the booth. More excellent public-service activities around the state—GARA provided comm support for MS trash pickup project in Manchester, also March of Dimes Walkathon on May 27. A team of 8 hams put together on short notice by W1HCP to support March of Dimes walk in Exeter. (Thanks, Joe!) The Nashua club provided comm and safety support to the Girl's Club annual walkathon. This one was done exclusively with HT's in the local park. The Port City club supported the March of Dimes walk in Portsmouth. Don't miss these opportunities for your club or group to do a valuable public service activity. They also function as emergency communications drills with a little more realism and excitement than "canned exercises". The month wrapped up with the quarterly meeting of the NH Amateur Radio Assoc in Concord. N1NH spoke on current activities in the Amateur Auxiliary program. N1CIR reported on comm support of a state-wide bike trek for the Lung Assoc. **AROUND THE STATE—W1GGA** is new president of the Port City Club. They recently had 8 upgrades from an upgrade class. NA1E recently elected president of GARA. KB1X appointed as Asst Emerg Coord for Manchester City. Plans are underway for a "5x5 expedition" to the Isle of Shoals in Sept. Contact KB1KJ for more information. Congrats to W1FYR for making BPL. Traffic: NHN 181, G5FM 185, G5PN 41, N1CXP 486, W1PEX 282, W1FYR 201, K1IE 148, K6UXO 147, N1NH 138, W1TN 130, K1PQV 84, KA1LBH 72, N1AKS 71, K1M 64, W1ALE 63, K1TQV 40, KA1LBW 28, KA1LMR 13, WB1GXM 12, KA1HPO 10, WA1YNZ 8, NE1J 8, K1OIQ 6, N1ALM 5, N1DQA 3, K1ACL 3. (Apr) KA1LBW 28, KA1LBH 27, K1ACL 12, NE1J 11, N1DQA 2.

**RHODE ISLAND:** SM, John Bob Vota, WB1FDY—A certificate of merit was issued to the N.P.A.R.C., N.C.R.C. and O.S.A.R.G. for their services rendered to the town of N. Prov. as communications and Traffic control. These Clubs are proving that we can work as a team even with different club interest. Great job people! Keep it up. The N.C.R.C. worked with the YMCA Wheel Chair Race recently. Trx guys for another great job done. The 76 Auction was another good day at buys and sell ball QSOs. Hope Valley Amateur Radio Association Flea Market August 23, 1985 Saturday Rte 3 west Greenwich, R.I. West Inn Inn. Finally AA FCB in R.I. approved. Note: Amateur to Amateur only, approved. Traffic: KA1JXH 217 (P.S. 109), W1E0F 200, WA1CRV 63, KA1KML. A.R.E.S. Thurs. Even. 73s.

**WESTERN MASSACHUSETTS:** SM, Don Haney, KA1T—PIO/ACC: K1BE, SEC/SSL: WB1HH, CO/RRF: N1CM, BTM: W1UD, TC: KA1JMM. As part of the Special Service Club program, W1HOD has been appointed as HF and VHF Awards Manager for Hamdan County RA. AI can validate your WAS, 5-band WAS, and VUCC applications. And HCRFA received an award from Monsanto for their community service activities. N1DYU of Proving Station on 220 repeater. Second annual Massachusetts flea market continued their success trail with 184 attendees. Congrats to N1DMU who again made Brass Pounders for third time since last December. Nice going Dan. Yankee Rowe test will be history when this is read and am sure that hams will again have provided super support. PSHR (Apr/May): WB1HH 105/111, N1DMU 97/100. Traffic (Apr/May): N1DMU 337/544, WB1HH 41/217, W1UD 152/214, KA1T 89/97, KA1EKQ 88/63, W1KK 45/47, W1ZPB 29/11, WA1OPN 9/10.

## NORTHWESTERN DIVISION

**ALASKA:** SM, Jim Moody, Jr., N1L7C—May was the month for emergency preparedness. First Mount St. Augustine threatened to cause additional havoc and then our shorelines were threatened with a tsunami from an earthquake south of Adak in the Aleutians. The Snipper's and Sea-Saw nets had record check-ins and handled the situations very expertly. It seems like everyone was climbing Mt. McKinley this year! The amateurs that live around the base of the mountain certainly stayed busy this year providing support for the climbers. Alaska nets:

NAME	TIME	FREQ
Alaska-Pacific	1830	14292
Snipers	0200	3920
Sea-Saw	0500	3900
Motley Group	0500	3933

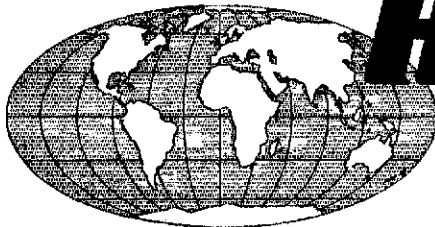
**IDAHO:** SM, Lem Allen, W7JMH—Club News: The Boise Club will field a VE Team for Exams at the Nat'l Antstream Trailer Convention in Boise June 28 and July 3 and again at W1MU on Saturday, August 2. held a "Tail-Gate" auction at the May meeting, raised over \$200 to help pay for new antenna for 146.34/94 Repeater. No other clubs sent information this month. **PEOPLE AND THINGS:** Our Sympathy to N7DYU, who broke her wrist while attending family Memorial Day camp near Bend, OR. Congrats to KA7KGF, KA7TKK, KA7NFW, N7HTJ new Advanced; WA7ZHR, new General; KA7THW, Martin Gabica and Wm. Link, new Texs; Brian Snyder, new Novice and WA7DLC, who got 20 WPM Certificate. **NET REPORTS:**

FREQ-TIME	SES	QNI	QTC
FARM	3937 Lsb 8P Da	32	2017 38
ID CD	3930 10:04 M-F	32	772 20
MD	3635 CW 9P Da	31	270 109
NW TFC	146.38/98 FM 730P Da 31	718	29

**GENERAL:** Use an Antenna Tuner. It will lower your Standing Wave Ratio and cut down on radiation of Harmonics and Spurious frequencies. Traffic: N7BHL 234, W7GHT 89, W7JMH 30, WB7CYO 3.

**MONTANA:** SM, Les Belyea, N7AIK—The first packet station in Havre is on the air—KA7RRR. Upgrades reported: to extra—KA7TTO, to advanced—N7DYL, WB7SIE, KA7PHT, to general—N7FMT, KA7GKQ, to tech—KA7WVI, congrats to all. Seventeen hams and 20,000 spectators attended the 1986 Bozeman Chamber of Commerce Air Show (Thunderbirds), show officials were well pleased and said amateur radio would be needed in future shows. N7ATT and N7IBG from Billings are now Mr. & Mrs. I best of luck to both. WA7GQO

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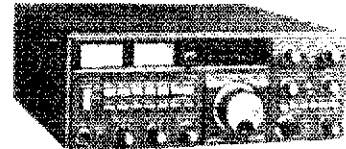
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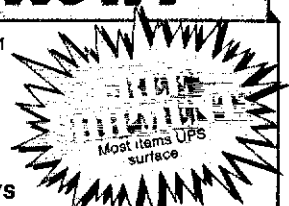
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NEWS	7	SESS	ANI	OTC	MGR
IMN	31	13	0	0	KE7NO
MTN	31	270	109	109	WA7GQO
MSN	4	2019	196	0	KF7R
		69	0	0	K0PP

Traffic: W7TGU 564, KF7R 86, WB7WVD 64, N7AIK 16.

OREGON: SM, William R. Shrader, W7QMU—STM: W7VSE. SEC: N7CPA. PIO: KC7YN. SGL: KA7KSK. STC: N7ENI. ACC: KB7CC. OO: N7SC. RFI: AK7L. Upgrades: KE7BK (Extra); KA7MFK, N7ENI, W7ENW, WA7HHX, (Adv); N7IBO, N7FLE, WB7DXS, N7HPA, (Gen); KA7RRG, KA7NUS, KA7WVK, KA7WVI, KA5TUV, (Tech). Congratulations! A special congrats for KA7MDI who advanced from Novice to Tech. Colleen is blind. KA7VRW scored well but was the only one submitting scores for Oregon in the ARRL Novice Round-up. Come on gang! Long time Rogue Valley amateurs W7BEG passed away. The RTTY circuits will miss his signal. Lightship Columbia operation for the 125th Birthday of Astoria was successful despite poor band conditions. 156 QSOs were made in a 16h hour period. WB7SIC is retiring as OTVARC's newsletter editor. KA7RFD with K7JF as backup is taking over. Thanks AI for many years of SUPER newsletter, they will have a rough time filling your shoes. Many helped during the recent Alaska earthquake/Tidal Wave Standby. Included were WA6KLA (EC), W7LYV (EC), N7FBB (EC), K7RUC (EC), WB7BBG (EC), W7BFX (EC), WA7AAJ (OES), N7CPA (SEC), KD7G (WA SM), K7WWG, VE7FB. ECs were from Portland and neighboring coastal counties. Thanks gang! Traffic: W7VSE 631, K7OVK 139, N7FJK 138, W7ZB 110, W7FBF 66, N7BWW 8, W7AID 27, WA7VTD 27, W7LNE 15. (Apr) N7ELF 127, WA7VTD 26

WASHINGTON: SM, Gene Sprague, KD7G—ASM: KR7L. ASM (East/AC): KC7PH. OOC: N7I. STM: KD7ME. TC: W7BUN. SEC: N7DRI. APF: N7MNTS. Congratulations to the new Assistant Section Manager for Eastern Washington, KC7PH. Tom will also continue as ACC. Also to the new EC for Snohomish Co., KA7VEE. EVENTS: HAMFAIR '86 on Aug 16 & 17 at Tacoma, WA, presented by the Radio Club of Tacoma. There were two events this year that did not appear in the column because the info did not arrive in time for publication. Please get your event info to me no later than 70 days before the 1st of the month in which the event will occur. PUBLIC SERVICE: The month of May was very active with scheduled activities and some surprises. King Co. ARES has received two thank you letters for their communications help in the Special Olympics on May 10 and Hands Across Seattle. Many Amateurs from several areas in May: 30-June 1 for the Special Olympics. Activities in other parts of the section included the Spokane Liac Bloomsday Run with 40 Amateurs taking part. The surprise of the month was the Tsunami warning. First, thanks to all the good listeners, who were available if needed, but did not transmit. We needed the clear frequency to conduct emergency and priority communications. Second; tnx to the ROs, ECs and Amateurs directly involved in the emergency, who manned their radios automatically on the Washington Emergency Net frequency. Your performance was outstanding. A special thanks to the British Columbia, Canada, Section Manager, VE7FB, who provided us with official information from his country. All our coastal and inland counties and inland counties which could be affected were represented, along with British Columbia, Oregon, and Crescent City, CA area. Several Eastern Washington counties were present and provided relays and NCS relief when signals were weak. The official information was shared by all on the net including the State Department of Emergency Management, which was manned by the Thurston Co. WEN members. Our hats are off to all of you who perform these essential public service activities. This is what governmental and public agencies expect of us and helps retain our privileges. Want to help? Check with your local EC. Thanks to KR7BT, KA7CC, W7GHI and K7CJ. ARES ECs who send reports after each activity. Traffic: WB7WOW 848, W7LG 198, KR7F 151, N6EQZ 148, W7GB 89, AD7Q 89, WA7QBN 58, K7SUX 57, KA7TCE 53, K7AJT 46, W7IEU 43, K7GXZ 39, W7IGC 31, W7APS 29, N7GGJ 23, KA7EEF 16, N7GDW 13, K7OXL 10, KD7TJ 9, N7FXM 5, W7AID 3, KD7MW 3, KD7G, KR7L, KD7ME, KC7PT. (No individual scores) Motto: Learn from the past, live in the present, and plan for the future, 73.

## PACIFIC DIVISION

EAST BAY: SM, Bob Valio, W6RGG—ASM: W6ZF, N6DHN. SEC: W6LKE. STM: K6APW. OOC: N6BZ. "ORZ NBARA" Editor N6BLG tells it like it is in the May issue! LARK is having a contest to elect their new president. W6B, says, "We either pull our own in public service and keep our ranks strong in number or slowly fade away." The are words for all of us to consider. MDARC's award-winning "THE CARRIER" is searching for a new editor. WA6GNO, who has been editor "since before there was fire," is ready to retire. EBARC welcomed new members Tim Howe, Tom Girmsley, Russell Hutton and Sam Darrett. N6ALE. N6IA presented an entertaining treatise on the venerable "bug" in the latest issue of their newsletter, "THE BLOWN FUSE." HARC's "THE CHEWED RAG" editor N6MSY has published his last issue. Coast Fire Station News #6 is now primarily equipped for 2-meter FM and all HF bands. May traffic: W6DOB 141, W6VOM 121, K6APW 92, W6BUZX 58. (Apr) K6AGD 176, W6DOB 109, K6APW 76, W6BUZX 52, N6IA 27. (Mar) K6APW 81.

NEVADA: SM, Joe Lambert, W8IKD—Field organization growing with newly appointed Clark Co. EC: NK7N. AEC: WB5PTO, WA4MV. ATCs: N7ALX, N7DBN. OBSORS: WB5PTO. KE7EH of Reno recently gave a multi-media presentation of Amateur Radio Services to the students of St. Albert's Elem. School. The all-day presentation was made to accommodate the interests and needs of all grade levels, and was very successful. ARES/RACES program topic of LVAC Mtg. presented by N7CXD and WB7QBJ. ARES initiated training program at Red Cross with bi-monthly meetings. Weekly nets Tues. 7 PM, 145.39. Contact NK7N. Nevada Section luncheon May 17 in Reno was well-attended and provoked lively discussion. W6JEB and WA6JZG provided Memorial Day phone patches at Reno VA Hosp. K7HRW reports N7CXD doing great job with So. Nev. ARES program. New ham store in Sparks (Reno Radio) operated by KA7QYX and WA6ICB. Traffic: WB5PTO 57, K7HRW 2.

PACIFIC: SM, Army Curtis, AH6P—Aloha and hata adai to all of the Pacific. Emergency communications were well tested during the tsunami alert on May 7. Many stations on all islands participated with nets on VHF and HF activated. Outstanding job folks! Exams on Kauai saw KH6US upgrade to Extra, KH6JJC and KH6KK both to advanced. Well done! On Maui the next exam is scheduled for August 9. Contact KH6LA for info. KH6JJS and AH6GR are new VEs on Maui. On the Big Island, WH6BDH is on sabbatical for the summer, and AH6GO is filling in as EC during his absence. Nice to see so much talent! I visited the Kauai ARC this month. Great bunch! Looking forward to doing it again. Traffic: KH6S 46, KH6H 21.

SACRAMENTO VALLEY: SM, Bob Watson, W6IEW—STM: WA6WJZ. SGL: N6IG. ACC & TC: W6RFF. DEC North:

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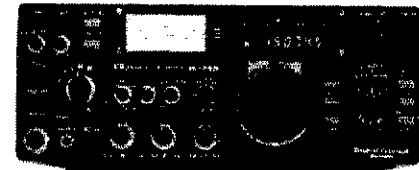
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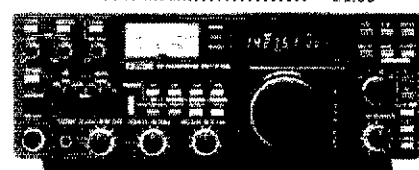
William P. Paia, WB4NFB  
5829 Parakeet Drive  
Burke, VA USA 22015



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IC-735 HF transceiver/SW rcvr/mic	889.00	769 <sup>95</sup>
PS-55 External power supply	169.00	149 <sup>95</sup>
AT-150 Automatic antenna tuner	399.00	359 <sup>95</sup>
FL-32 500 Hz CW filter	59.50	
EX-243 Electronic keyer unit	50.00	
UT-30 Tone encoder	16.50	



IC-745 9-band xcvr w/1-30 MHz rcvr	999.00	799 <sup>95</sup>
PS-35 Internal power supply	169.00	149 <sup>95</sup>
EX-241 Marker unit	20.00	
EX-242 FM unit	39.00	
EX-243 Electronic keyer unit	50.00	
FL-45 500 Hz CW filter (1st IF)	59.50	
FL-54 270 Hz CW filter (1st IF)	47.50	
FL-52A 500 Hz CW filter (2nd IF)	96.50	89 <sup>95</sup>
FL-53A 250 Hz CW filter (2nd IF)	96.50	89 <sup>95</sup>
FL-44A SSB filter (2nd IF)	159.00	144 <sup>95</sup>
SM-6 Desk microphone	40.00	
HM-12 Extra hand microphone	39.50	
MB-12 Mobile mount	21.99	



IC-751 9-band xcvr/1-30 MHz rcvr	1399.00	999 <sup>00</sup>
IC-751A 9-band xcvr/1-30 MHz rcvr	1499.00	1299
PS-35 Internal power supply	169.00	149 <sup>95</sup>
FL-32 500 Hz CW filter (1st IF)	59.50	
FL-63 250 Hz CW filter (1st IF)	48.50	
FL-52A 500 Hz CW filter (2nd IF)	96.50	89 <sup>95</sup>
FL-53A 250 Hz CW filter (2nd IF)	96.50	89 <sup>95</sup>
FL-33 AM filter	31.50	
FL-70 2.8 kHz wide SSB filter	46.50	
HM-12 Extra hand microphone	39.50	
SM-6 Desk microphone	40.00	
RC-10 External frequency controller	35.00	
MB-18 Mobile mount	21.99	

Other Accessories:	Regular	SALE
PS-15 20A external power supply	149.00	134 <sup>95</sup>
PS-30 Systems p/s w/cord, 6-pin plug	259.95	234 <sup>95</sup>
OPC Opt. cord, specify 2, 4 or 6-pin	10.00	
SP-3 External speaker	54.50	
SP-7 Small external speaker	49.00	
CR-64 High stab. ref. xtal (745/751)	56.00	
PP-1 Speaker/patch (specify radio)	139.00	129 <sup>95</sup>
SM-8 Desk mic - two cables, Scan	69.95	
SM-10 Compressor/graph EQ, 8 pin mic	119.00	109 <sup>95</sup>
AT-100 100W 8-band auto. antenna tuner	399.00	359 <sup>95</sup>
AT-500 500W 9-band auto. antenna tuner	499.00	449 <sup>95</sup>
AH-2 8-band tuner w/mount & whip	549.00	489 <sup>95</sup>
AH-2A Antenna tuner system, only	429.00	389 <sup>95</sup>



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GC-5 World clock	79.95	
HF linear amplifier	Regular	SALE
IC-2KL 160-15m solid state amp w/ps	1795.00	1389
6-meter VHF Portable	Regular	SALE
IC-505 3/10W 6m SSB/CW portable	469.00	419 <sup>95</sup>
BP-10 Internal Nicad battery pack	79.50	
BP-15 AC charger	12.50	
EX-248 FM unit	49.50	
LC-10 Leather case	34.95	

VHF/UHF base multi-modes	Regular	SALE
IC-551D 80W 6-meter SSB/CW	735.00	649 <sup>95</sup>
EX-106 FM option	125.00	112 <sup>95</sup>
BC-10A Memory back-up	8.50	
IC-271A 25W 2m FM/SSB/CW	735.00	649 <sup>95</sup>
AG-20 internal preamplifier	56.95	
IC-271H 100W 2m FM/SSB/CW	944.00	789 <sup>95</sup>
AG-25 Mast mounted preamplifier	84.95	
IC-471A 25W 430-450 SSB/CW/FM xcvr	839.00	729 <sup>95</sup>
AG-1 Mast mounted preamplifier	89.00	
IC-471H 75W 430-450 SSB/CW/FM	1149.00	989 <sup>95</sup>
AG-35 Mast mounted preamplifier	84.95	

Accessories common to 271A/H and 471A/H	Regular	SALE
PS-25 Internal power supply for (A)	99.00	89 <sup>95</sup>
PS-35 Internal power supply for (H)	169.00	149 <sup>95</sup>
PS-15 External power supply	149.00	134 <sup>95</sup>
SM-6 Desk microphone	40.00	
EX-310 Voice synthesizer	41.25	
TS-32 CommSpec encode/decoder	59.95	
UT-15 Encoder/decoder interface	12.50	
UT-15S UT-15S w/TS-32 installed	79.95	

VHF/UHF mobile multi-modes	Regular	SALE
IC-290H 15W 2m SSB/FM, TTP mic	549.00	479 <sup>95</sup>
IC-490A 10W 430-440 SSB/FM/CW	649.00	569 <sup>95</sup>
VHF/UHF/1.2 GHz FM	Regular	SALE
IC-27A Compact 25W 2m FM w/TTP mic	389.00	349 <sup>95</sup>
IC-27H Compact 45W 2m FM w/TTP mic	429.00	379 <sup>95</sup>
IC-28A 25W 2m FM, UP/DN mic	419.00	369 <sup>95</sup>
IC-28H 45W 2m FM, UP/DN mic	449.00	399 <sup>95</sup>

UT-29 Tone squelch	41.00	
HM-16 Speaker/microphone	39.00	
IC-37A Compact 25W 220 FM, TTP mic	449.00	349 <sup>95</sup>
IC-47A Compact 25W 440 FM, TTP mic	489.00	429 <sup>95</sup>
PS-45 Compact 8A power supply	112.95	99 <sup>95</sup>
UT-16/EX-388 Voice synthesizer, 47A	31.00	
SP-10 Slim-line external speaker	31.95	
IC-3200A 25W 2m/440 FM w/TTP	569.00	469 <sup>95</sup>
UT-23 Voice synthesizer	31.00	
AH-32 2m/440 Dual Band antenna	32.95	
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Larsen PO-TLM Trunk-lip mount	20.18	
Larsen PO-MM Magnetic mount	19.63	
IC-1271A 10W 1.2 GHz SSB/CW Base	1049.00	929 <sup>95</sup>
PS-25 Internal power supply	99.00	89 <sup>95</sup>
EX-310 Voice synthesizer	41.25	
TV-1200 ATV interface unit	115.00	106 <sup>95</sup>
UT-15S CTCSS encoder/decoder	79.95	
IC-120 1W 1.2 GHz FM Mobile	499.00	449 <sup>95</sup>
ML-12 1.2 GHz 10W amplifier	339.00	299 <sup>95</sup>

Repeaters	Regular	SALE
RP-3010 440 MHz, 10W FM, xtal cont.	1049.00	949 <sup>95</sup>
RP-1210 1.2 GHz, 10W FM, 99 ch. synth	1259.00	1129
Cabinet for RP-1210 or 3010	269.00	



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Deluxe models		
IC-02AT for 2m	369.00	299 <sup>95</sup>
IC-04AT for 440 MHz	399.00	339 <sup>95</sup>
Standard models	Regular	SALE
IC-2A for 2m	239.00	189 <sup>95</sup>
IC-2AT with TTP	269.50	209 <sup>95</sup>
IC-3AT 220 MHz, TTP	299.95	249 <sup>95</sup>
IC-4AT 440 MHz, TTP	299.95	249 <sup>95</sup>

Accessories for Deluxe models	Regular	SALE
BP-7 425mah/13.2V Nicad Pak - use BC-35	67.50	
BP-8 800mah/8.4V Nicad Pak - use BC-35	62.50	
BC-35 Drop in desk charger for all batteries	74.95	
BC-60 6-position gang charger, all batts	349.95	SALE
BC-16U Wall charger for BP7/BP8	19.95	
LC-11 Vinyl case	18.49	
LC-14 Vinyl case for Dlx using BP-7/8	18.49	
LC-02AT Leather case for Dlx models w/BP-7/8	39.95	

Accessories for both models	Regular	SALE
BP-2 425mah/7.2V Nicad Pak - use BC35	42.50	
BP-3 Extra Std. 250 mah/8.4V Nicad Pak	31.25	
BP-4 Alkaline battery case	13.75	
BP-5 425mah/10.8V Nicad Pak - use BC35	49.50	
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CP-10 Battery separation cable w/clp	19.99	
DC-1 DC operation pak for standard models	18.75	
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LC-2AT Leather case for standard models	39.95	
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HS10 Boom microphone/headset	19.50	
HS-10SA Vox unit for HS-10 & Deluxe only	19.50	
HS-10SB PTT unit for HS-10	19.50	
ML-1 2m 2.3w in/10w out amplifier	89.95	SALE
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Receivers	Regular	SALE
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RC-11 Infrared remote controller	59.95	49 <sup>95</sup>
FL-32 500 Hz CW filter	59.50	
FL-63 250 Hz CW filter (1st IF)	48.50	
FL-44A SSB filter (2nd IF)	159.00	144 <sup>95</sup>
EX-257 FM unit	38.00	
EX-310 Voice synthesizer	41.25	
CR-64 High stability oscillator xtal	56.00	
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MB-12 Mobile mount	21.99	
R-7000 25 MHz-2 GHz scanning rcvr	969.00	849 <sup>95</sup>
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KF6KJ, DEC Sierra: KA6GHI, SECTION NET: First Sunday each Month, on 146.085, input up, Yuba/Sutter repeater WD6AXM/R. Note CHANGE OF TIME to 8:00 PM to avoid conflict with 60 Minutes, Net Control--WG6E/W6RFF. Thanks to the Yuba/Sutter ATC for sponsoring the July Section meeting in their area. I hope that next month like to sponsor the December Section meeting? These meetings should be moved around to make them available to as many in the section as possible. Congratulations to the many Sacramento hams from many organizations and to the Sacramento EC, Ron Wenstrom, KJ6R for finally getting together to form an area wide Emergency Council. Although an excellent job was done in the floods of last February, a more serious communications emergency could have severely taxed the control of the participants. The new council will supply the needed coordination. Kittle Hinek, N6UGJ of the Tehama ARS has expressed the interest of their club in becoming affiliated with the ARS. Last month I announced that we have a new Section Level Official--Paul Sewell, N6MDL as Public Information Officer. Unfortunately, Paul has changed jobs and will not have time for the PIO activity, so we still need a PIO in the section. Also a Bulletin Manager and an OO Coordinator are needed to fill the immediate Section Level vacancies.

**SAN FRANCISCO: SM, Bob Smith, NA6T**—The Great Field Day challenge is upon us. Will SCRA, Inc. out contest REDXA? VK6GF was the guest speaker at SCRA for June with his 17 miles of McQuarie Island. If you missed it, you missed a good one. HARC-FWRA is getting active once again with communications for marathon activities. Get out and offer your help for bike run and KS-athons. Rod, KB6ZV, the Pac Div Director, will be featured guest at HARC-FWRA in September. The DNARC repeater was the source for information concerning tainted chicken scare in Club City. It will end this week. The ARS will have a new Section Level Official--Paul Sewell, N6MDL at the Field Day club house in Marin. LPH-ERS from the boonies, NABT from the "Emerald Triangle," ARS Humboldt from the Bay, SCRA from Two Rock, HEXDA from the mountain, WHERE WERE YOU? Don't forget the SCRA and VOMARC fleamarket/hamfest in September and the Pacific Division Convention in October. VE information, VE hotline: 408-984-8353, or check the local packet BBS in the section. Traffic: KX1A 184, K6FWG 137, W6PW 126, K6TB 88, K6TWJ 85.

**SAN JOAQUIN VALLEY: SM, Charles McConnell, W6DDP**—SEC: WC6U, STM: N6AWH, TC: WA6EXV, ACC: N6EBC, Asst. SMS: W6TRP and K6YK, WC6U is the new SEC. Thanks to WA6YAB for a job well done. N6MCY is the new EC for W Kern County. N6MXK is CBS. Officers of the Calaveras ARS are: Pres KB6EY, VP K6WJO, S/T KB6EMO. The club meets the 3rd Friday at 7:30 PM at the C&P in San Andreas. KB6GO and WB6SV are SILENT KEYS. Congrats to the following upgrades: Extra KA6ONN; Advanced KA8RTA, KA6YSW, and N6LOL; Technician KB6KRJ, W6BZM, KB6JZR, KB6LNR, KB6MKC, KA6YSS, KA6GKN, KB6MKB, and KB6AZ. KB6LNR is N6NNB. W9KGV is W6SX. exW2NSI is N6NNM. N6MXG has a PCS 5000. N6MZF has a TS 430. The ARRL Pacific Division Convention is October 3-6 in San Jose. You should have received registration information. Traffic: N6AWH 158, W6DDP 26, WA6YAB 12, K6PMG 9.

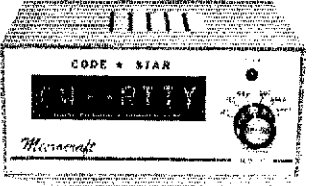
**SANTA CLARA VALLEY: SM, Glenn Thomas, W6B6W**—SEC: K6ITL, STM: N6JLJ, ASM: N6SN & N6JQJ, TC: WA6PWW, ACC: W6MKM. Thanks and congratulations to WB6OML. Santa Clara County has officially recognized that ARS and RACES are the same organization, wearing "different hats." A major breakthrough indeed. Congratulations to the IBM ARC on the graduation of 7 new hams from their class. Our new SWL, N6LJL, needs monthly traffic reports from NTS participants, the F.O.R.M. group (WA6PWW, N6KL, WB6MRQ, W6N6, WB6W, and WB6MLC) participated in the Armadillo run, mobile from most of northern Cal and western Nevada... the Pacific Division Convention will be October 3-5 at the LeBaron in San Jose, see ya there! New ATC KE6DN has been busy speaking at various clubs on ATV, Foothills, EMARC, and Memorex among others...speaking of ATV, there is a new ATV repeater, KE6DN, with input in the 420 MHz band and output in the 1240 MHz band...Congrats to N6BIS on her "Antenna" article. There have been reports that she is now also using the capton to provide "faded Antennas." OO reports: KA6Y, W6DU, ORS reports should be in my hands by the second of the month! Traffic: KA6SKW 14, W6PRI 22 (Apr) KA6SKW 15, W6PRI 5.

**ROANOKE DIVISION**

**NORTH CAROLINA: SM, Rae Everhart, K4SWN**—SEC: AB4W, STM: K4NLK, BM: K4IWW, ACC: WC4T, PIO: WA4OBR, TC: K4TLT, OOC: K1PLR, SGL: KE4ML, BIG NEWS this month is the DIVISION CONVENTION at Virginia Beach, VA on 23-24. BIG SHELBY HAMFEST Labor Day Weekend 30-31. KE4ML, Section SGL, says reports are encouraging on passage of Amateur Radio License Plate Bill. Department of Motor Vehicles has passed that bill (2079) and the legislature section got plates this far in '86. Hope HB-952 passes in Senate. Thanks to everyone who helped in any way with the bill. AA4MP reports that a group of amateurs organized and helped in a land search for a missing child in a campground. Amateurs found the child and also found another child that was missing but had not been reported missing to authorities. Amateurs are READY to serve, however, some agencies wait for us to contact them instead of them contacting us. Let's make them and the public more aware of AMATEUR RADIO. KJ4W reported a tornado to the NWS on evening of 19th. This again was at Red Springs with 5 people injured and property damage. This article is a good report on the importance of radio was very helpful to everyone. Thanks Bill. The LPM 86 was very enjoyable and well attended from all 4 sections. Five resolutions were passed: 1. ARRL NOI get in business of issuing call signs. 2. That "Operating an Amateur Radio Station" pamphlet be reinstated. 3. Future LPMs be held weekend AFTER Mothers Day. 4. League publications such as VE manuals, License Manuals, Field Services Directory be issued in LOOSE LEAF NOTEBOOK format. 5. Power Limit in FCC NPRM 86-161 on 1 1/4M band be increased to 50 watts to accommodate existing equipment on the market. New station appointments: W4US, W4UT, Official Observers. Congrats to N4EC 2 who are in Electric In the Air contest. Will miss KB4GDT/KB4QH from K4EG club who are moving to Florida. Silent Key: K4PVJ. Application for SSC status from W4DW is awaiting W4UG's signature. Congrats to the Raleigh gang. We are NOW in middle of the Hurricane Season so be prepared and practice to be ready to go in case we are needed. KJ4SW new EC in Johnson County. Have 10 club applications pending for League affiliation. Has your club become ARRL affiliated? The CSN is a very fine training net for Novice/Techs. Give it a try--JOIN TODAY. At 6 PM daily on 3715 kHz. Traffic: K4NLK 267, N4JL 166, K4JHF 164, KA4TLG 66, KA4EYF 129, AA4MP 108, W4B4 68, W4B4H 64, N4L ST 62, W4AMH 61, K4INV 61, AA4MP 61, K4SWM 54, KB4OGR 54, WA4MNR 52, KA4YMY 35, K4IWW 33, NE4J 33, N4NT0 32, N4NOY 28, W4EHF 26, N4LUO 24, W4BCYN 23, K4YV 21, K4MDE 20, W4MFR 19, N4MOU 18, K4GI 17, N4MMM 17, N4JEC 13, N4T4K 12, W4EQK 10, W4HTE 10.

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K1PLR 8, K4FOY 7, N4LUB 7, WD0DQL 6, WD4RMO 6, N4JRE 5, N4KYD 4, N4CJ 2. Totals: SARs 141, TFC 1975 for May 86.

**SOUTH CAROLINA:** SM, Jimmy Walker, WD4HLZ—ASM: WB4UDK, ACC: WD4HLZ, BM: W0IKT, OOC: W4NTO, PIO: KJ4DT, SEC: K4SUG, SGL: WD4HLZ, STM: W4ANK, TC: NE4G, AIRS: W4DRF, ATC: K4ZN. Please note that I am assuming the duties of ACC. Since I will be receiving club information for HQs maybe we won't be operating in a vacuum as we have over the past several months. A word of caution to all clubs and individuals owning and operating repeaters. The liability insurance snowball is rolling down hill and Amateur Radio is being caught in the middle. There are several instances of requirements for \$20,000 minimum liability coverage for amateur repeaters to remain in operation on certain facilities. The tort liability issue for municipalities in SC could force all repeaters to be removed from local government facilities without proof of coverage. Don't get caught short! Liability insurance coverage will be another expense in repeater operation - start planning now. Traffic: K4ZN 208, W4FMZ 103, KB4BZA 94, WB4UDK 63, W0IKT 51, KA4LHM 42, K4ZB 28, WA4JWS 12.

**VIRGINIA:** SM, Claude Feigley, W3ATQ—STM: KB4WT, SEC: WB4UHC, ACC: NT4S, OOC: W4HU, BM: AB4U, TC: WB4MAE.

VTN	1 PM	3907	AA4AT
VSN	6 PM	3947	K4VWK
VSN	8:30 PM	3680	NN4I
VN (EARLY)	7 PM	3680	N4GHI
VN (LATE)	10 PM	3680	K4AXF
VLN	10:15 PM	3947	KJ4MF

It is with deep regret that I report Robert Stewart, W4VYG, as a Silent Key. Bob was an active member of the Virginia Fone Net (VFN) and served as NCS for many years. Note that KJ4MF, Steve, in Williamsburg, is now the Net Mgr for the VLN. All reports should go to him. Tnx to N4KSO for a job well done. Congrats to NK4U on being named a V.P. of the Foundation Amateur Radio Assoc. Plenty of ARES training being provided by participating in community activities—Williamsburg group active in Kodak Liberty bike ride, Richmond group active with James River canoe races, and Portsmouth club with a Special Events station. K4JUM reports the Fauquier gang active in a marathon on K4MZ and K4LOU meeting with their Red Cross chapter to coordinate emergency preparedness. Our "TC", WB4MAE, reports the League is sending him technical correspondence received from Virginia hams for response by section "ATC" appointees—looks like this program is gaining speed. W4HU has received the QCWA Meritorious Award for his outstanding services to QCWA. W4KX and WB4CGJ received certificates for being licensed for 60 years, W4GF and W4YY received 55 year, K4LMB a 50 year certificate, WB4PNY, WA4EQW, WB4MAE, NN4I, NT4S and W3ATQ attended the Division League Planning Meeting in Greenville. N4EXQ reports 56 amateurs provided communications for the Special Olympics in Richmond. Future exam schedulers: Aug. 2 Harrison Road, K4MZ and K4LOU; AA4MB; Aug. 24 Div. Convention, Va Beach, contact N4LOW; Sept. 6 Williamsburg, contact WJ4X, Sept. 27 Richmond, contact WU4G. It was good seeing many of you at the Manassas hamfest hope to see more at Berryville, Aug. 3 and the Division Convention at Va. Beach Aug. 23-24. OOs W8IRT and W4HU continue to monitor the bands for infractions of FCC rules. Tnx to the Chesapeake Amateur Radio Service club, our latest affiliated club, for their FB Newsletter. Traffic activity continues strong with a monthly traffic count of 4294 with 59 stations reporting. Again N4GHI and N4EXQ lead the gang both making 591. Welcome back to N4U who has been reinstated as an ARES Traffic Net Mgr. N4EXQ has 421 calls, 352, KB4WT 321, WA4CGK 307, K4MTX 203, AA4GL 186, K4JST 152, W3ATQ 141, KB4NGO 131, W4JLS 110, WD4OCW 89, K4JUM 76, WD4MIS 72, NN4I 69, K4JM 65, WB4FLT 57, NT4S 53, K4GF 51, N4KSO 51, N6ANQ 50, W44LJ 50, K4VWK 39, K4AXF 30, WB4KIT 29, WB4KSG 29, NT4U 26, K4JUM 25, K4MLC 23, K3RZR 22, W4T2C 22, WB4UHC 18, WD4ALY 13, N4FNT 6, N3RC 5, WA4TVS 4, WB4ZNB 3, WB4DQZ 2, W4YE 2.

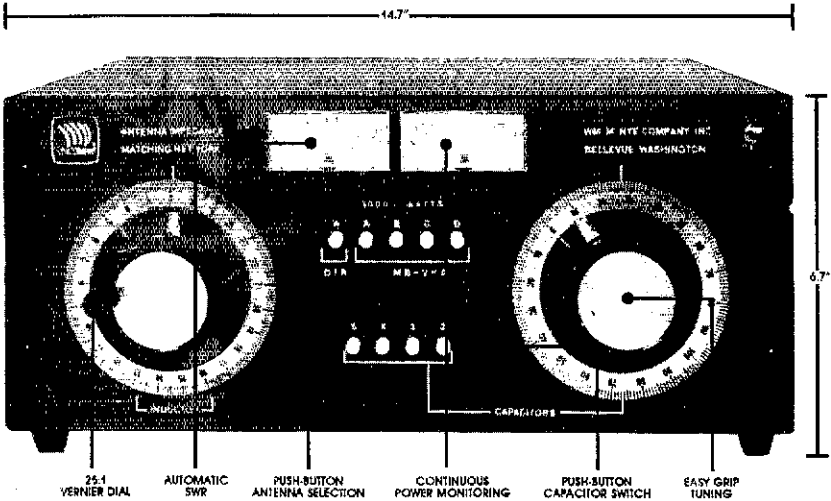
**ROCKY MOUNTAIN DIVISION**

**COLORADO:** SM, Bill Sheffield, K0WJ—ASM: W0RSG, K4RMOA, SEC: W0RQB, STM: W0ZCA, OOC: W0CFL, ACC: WB0DUV, PIO: N0FCO, SGL: W0DOL, TC: N0CFL, BM: K4C2W. Thanks to ECHO & SARES, we now have digital communications from the Eastern Slope to the Western Slope. One link is needed in Vernal Utah, and packet communications will be thru to the West Coast from Colorado. The June VHF QSO party had more activity than ever. Multiop teams from many clubs along with individuals mountaintopped giving out some rare grids. Their planning was equal to this year's Field Day Contest which the section always gears up for. Participation was evident in all classes from 1A to 6A all over the state. RRRL SWAP & ARRL Colorado State Convention is Aug 10th at the Jeffco Fairgrounds in Golden. F1C2E will be attending from the League. Hope to see you all there. For info contact N0FKK. Severe weather & tornadoes have kept the SWN and ARES on constant alert...thanks to all for the time and effort devoted to this public service. 73, K0WJ, NETS: Col, QNI 832, QTC 51-inf 84, 27 sess; CWN, QNI 78, QTC 48, 27 sess; CWXN, QNI 3596, QTC 2302, 31 sess; HNN, QNI 1647, QTC 99-inf 344, 31 sess, NCTN, QNI 327, QTC 98, 29 sess; SCTN, QNI 95, QTC 14, 14 sess. Traffic: WA0HJZ 2905, N0BQP 1839, K0RXX 806, K0JAN 722, WB4C 488, N0DZA 87, KB0Z 84, WB0FFV 82, WD0BSZ 80, KA0NLI 27, W0NFW 20.

**NEW MEXICO:** SM, Joe T. Knight, W5PDY—ASM: W5HD, DEC: KB5XD, STM: ND5T, NMs: WA5UJO K6LL W5VQ, TC: W8GY, ACC: W5HD. Southwest Net (SWN) meets daily on 3553/7083 at 0230 UTC and handled 115 msgs with 156 stations in. New Mexico Floodrunner Net meets daily on 3939 at 0100 UTC and handled 46 msgs with 120 stations in. New Mexico Breakfast Club meets daily on 3939 at 1330 UTC and handled 108 msgs with 844 stations in. Yucca 2-mtr Net 78/18 handled 10 msgs with 468 checkins. Caravan Club 2-mtr Net 68/06 handled 30 msgs with 145 checkins. SCAT 2-mtr Net 66/06 handled 6 msgs with 662 checkins. Hands Across America a great success with 85 Hams covering 1-40 from AZ to TX state lines. Alamogordo Ham Fest Aug 30, 31. Lots of Packet around the state. W5RGX a SK (a great DF'er). New 99/39 Rpt on Gallinas Pk. Traffic: ND5T 556, W5DAD 148, W5SX 44, WD5AHH 22.

**UTAH:** SM, Jim Brown, N7AG—SEC: Rich Fisher, N5TK, STM: John Sampson, W7OCX. The TADARC Campout/VE Exam at Lookout Pass was termed a success by those attending—sorry I could not be there this year. Congrats to Bill Moyer, N7IE, and his Bendel FEIMA (Federal Emergency management agency) in process of setting up an hams Packet system based upon amateur equipment and experiences. Be sure to get your Field Day submissions in to the ARRL on time! 73 de N7AG. Traffic: N7ASY 71, W4TME 64, W7OCX 14, N7G 11, N7BQE 3.

**WYOMING:** SM, Dick Wunder, WA7WFC—Asst. Section Mgr: K4TAW5, Steve Cochrane, Sect. Emergency Coord: W7TVK, Jim Anderson, Sect. Traffic Mgr: N57X, Mary Ann Lenth. Packet Radio is getting a good start with numerous stations on the air in the Big Horn Basin and in Cheyenne. Distances on the air on 145.01 MHz in Cheyenne and on Copper Mtn. Some interest being expressed by Casper hams. I am work-



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Most amateurs habitually store favorite operating frequencies and modes in memory for quick and easy recall when needed. Preferred SSB frequencies for 160, 80, 40, 30, 20, 15, 12 and 10 meters can thus be stored in memories one through eight, and preferred CW frequencies can be stored in memories nine through sixteen. Memories 17 through 24 can be designated as "operating memories"; their contents being reprogrammed as desired during on-the-air activities.

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knob, no less) while making DX contacts, returning bands from either VFO, and refreshing "used memory contents" is truly an operator's delight and a contesteer's dream come true. The final "bank" of eight memories might be used to store favored International shortwave stations, aircraft, weather, maritime and time/propagation broadcast frequencies. Those memories contents can be fluctuated according to personal interests. A small file card is convenient for keeping track of memory banks one, two, and four. Bank three's continuously changing contents can be listed on the station's scratch pad.

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**Newly Designed Features.** The IC-751A boasts a number of newly designed features for better performance...new 9MHz notch filter to drastically reduce QRM, new AGC system, new compressor for better audio and a new AF gain control system to improve control of the CW sidetone volume.

**Options Available.** Options for the IC-751A include the IC-PS30 external AC system power supply, IC-PS35 internal AC power supply, IC-AT500 antenna tuner, IC-EX309 microprocessor interface connector, SM-8 or SM-10 desk mics, IC-2KL linear amplifier, RC-10 remote controller, SP-7 or SP-3 speakers, IC-EX310 voice synthesizer and GC-5 world clock.

**Optional Filters.** FL-52A CW 455kHz at 500Hz, FL-53A CW-N 455kHz at 250Hz, FL-63A CW-N 9.0106MHz at 250Hz, FL-33 AM 9.010MHz at 6000Hz, and CR-64 high stability 30.72MHz crystal filter.



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Handheld**



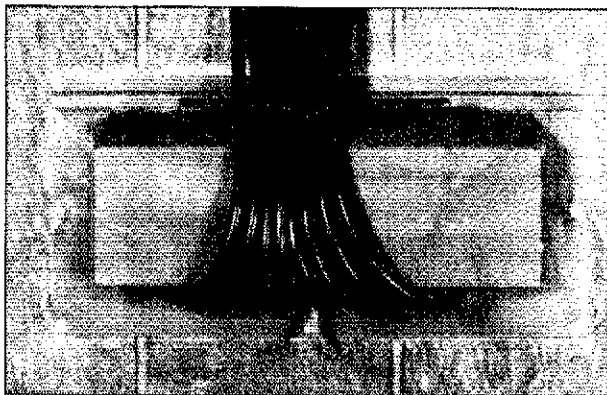
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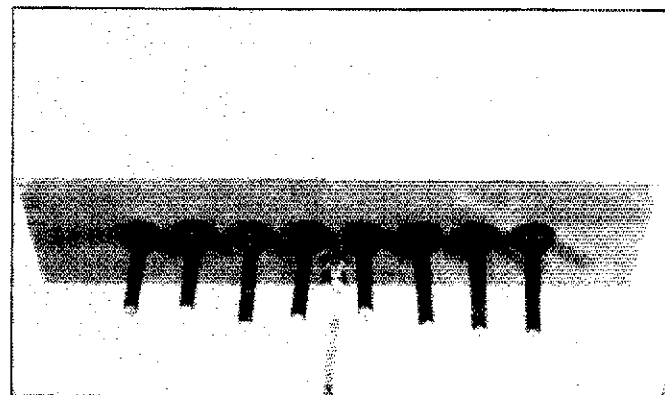
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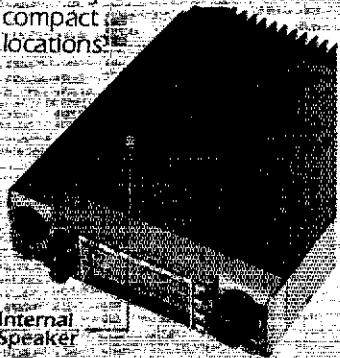
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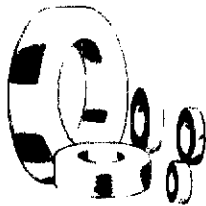
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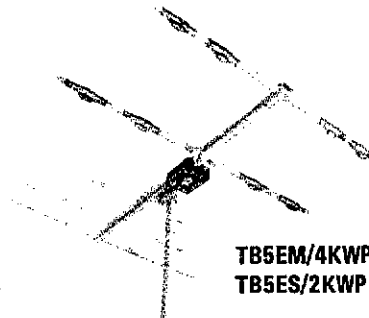
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ing with KD7AN to put together a Wyoming Packet Map & would like info on active stations and Digipeters. Hope to have map at Wyo Hamfest. TNX to NQ7C for copy of line newsletter from the Sheridan Radio Amateur League. Wyo Cowboy Net held 22 sessions with 90 QRM, 8 QTC. Traffic: NN7H 109, NQ7Q 21, K7BLM 13, W7HLA 2.

## SOUTHEASTERN DIVISION

ALABAMA: SM, Joseph Smith, Jr. WA4RNP—STM: N4JAW. SGL: K44WVU. BM: KF4VV. OOI/AUX: AA4BL. TC N4AU. ATC:WB4BYQ. ACC: WA4RNP. It's time for the North Alabama Hamfest in Huntsville. I hope to see you there this month. I thank Stan, KF4VQ, for the good job he has been doing as EC for Tuscaloosa Co. The new EC is David Morgan, WC4S. Also the new EC for Shelby Co. is KJ4DD. Woods McRoy. The "D" Net now has a new net manager. I appointed Don Bixler, N4DCS, as a replacement for Mark, WD4NYL, who has done an excellent job for the last year. Thanks Mark. I have two Silent Keys to report this month: William Howard Bryant, K4VFP, of Gadsden, and Windal D. Wilhide of Florence. They will be missed by many. By the time you read this, there should be a new club in the Centerville area with their own repeater for use during bad weather. Very seven three. Joe. Traffic for May; CAND reports 741 messages in 31 sessions with Ala rep 100% by WA4JDH, WACKS and NW4X. DRNS reports 652 messages in 62 sessions with Ala rep 94% by WA4JDH, WACKS, NW4X, KC4GS and WA4JF. AENB reports 118 messages in 31 sessions. BPL WA4JDH. PSHR WA4JDH, WACKS, WD4NYL, WA4RNP and WX4I. Totals: WA4JDH 977, WACKS 167, WD4NYL 127, K4AOZ 38, WA4RNP 37, WX4I 30, WA4JF 28.

GEORGIA: SM, Eddy Kosobucki, K4JNL—ASM: K4VHC. SEC: NC4E. STM: W4PIM. ACC: W44ABY. BM: K4VHC. OOC: NA4I. PIO: WA4PNY. SGL: WB4TZ. For info on the GA STATE TAG on our web site for the 1989, WBAUVW informed me that he and our SGL, WB4TZ, are going back full bore to get the bill repealed. They are going to need all the help they can get from you. After this fall's election, find out who our new legislators are & get to know them because they represent all of us. There could be other issues concerning us that could affect the hobby. I will be making a mailing to all clubs & key people thruout the GA section when anything comes up. The Coastal Emergency Team was recently organized with 41 ARES members. For further info contact K44HHE in Savannah. Albany & Rossville Hamfests very successful according to reports. New locations helped tremendously. Congrats to W4PIM, K4JNL & W4RZL on 50 years as members. The World Congress Center is the site for the '86 Atlanta HAMFESTIVAL on July 19 & 20. If you have any gripes or ideas regarding the hobby, come to the ARRL booth & somebody will listen. I'm sure that someday all HAMS will want their calls put in the SILENT KEY column. If you hear or read abt a SK please mail the info & obituary out of the paper to me or directly to the ARRL. PSHR for May are: W4PIM, K4MOG, KB4JPN, W4HON & KF4FG. After two and a half months of 60 & 70 hrs a wk, I'm back on my normal sked. If I missed ur hamfest or was slow in answering ur correspondence pse forgive me. Director Butler, W4RFH, has asked me to sign remind all who are planning a Hamfest or function to please contact him in writing or by phone so he can list it in his book. Also for the forms for an ARRL sanctioned HAMFEST, CU in ATLANTA. Traffic: W4PIM 120, W4WXA 110, WB4WQL 71, K4MOG 57, KF4FG 46, K4BAI 34, N4UZ 28, W4HON 26, KA4HHE 22, W9NXC 22, K4IAG 17, WB4SPB 12.

NORTHERN FLORIDA: SM, Roy Mackay, N4ADI—STM: WB4GHU. SEC: WA4PUP. PIO: WA4PUO. BM: KB4LB. SGL: KC4N. OO: K4JJE. TC: N4KF. Your SM would like to receive copies of all club newsletters so any items of general interest may be made to other readers. This is being written while WF4X is recovering from a stroke and we all wish him a speedy recovery. Two NOFL radio active operators have recently been elected Net Traffic Managers. Judy, NS4C, is now NM of NFFP and Larry KD4KK is NM of TNJN. These nets hold annual elections and we congratulate them both. By this time the NOFL Section has changed SM's, with N4ADI replacing WF4X. We thank Phil for his leadership since July '86 and also all the other section volunteers for their efforts. Most of you won't even know that there's been a change except for the AGC and ASM which are appointments still to be made. The JAX Hamfest will be AUG 8 and 9 with our Section as host. There will be updates on all activities of the Section so come on up and meet your volunteers and offer them suggestions for possible improvements. DBAHA officers for 1986 are: Art, KA4WDC Pres. Dave WA4JIO VP, Bob WA4JDD Sec. and Steve K4SFT Treas. OARC officers are Al, AM4J, Pres. Gene, KA4RCW, VP. Alar, WA4UFY, Treas. Jim, K4AHO, Secy. We wish these clubs and their officers a great year. All operators are reminded that the info for SAFs and PSHRs is needed by the 5th of the month so publication deadlines can be met. Some of the data is coming via Packet BBS and we hope to encourage the use of this medium. Technology is giving us new ways to communicate and we need to get our act together and participate in these new modes for our future enjoyment and service. Traffic: WX4H 521, N4PL 436, WB4ADL 488, KB9LT 249, K44VK 240, WA4QXT 234, WD4JIO 202, KD4KK 185, AA4IT 164, WF4Y 144, WB4MHI 123, KB4LB 104, NC4M 100, KF4J 102, NA4AO 99, KF4TM 98, WA4PUP 80, N4EDH 69, W4MGO 62, WB4GHU 59, KB4FIY 53, WA4SXW 45, NF4O 44, N4AOX 40, W4KIX 38, WB4TZR 37, WD4FJY 36, KA4KAH 34, N4ADI 32, WA4EYU 27, N4DY 25, NS4C 23, NQ4P 22, K44CQ 21, W7YWF 20, KF4GY 16, W8IM 15, WB4AWG 14, W4ENL 12, WD4HBP 10, KV4HI 9, N4IIP 9, KJ4HS 7.

SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PFK—SEC: W4SS. STM: K4ZK. TC: K4IT. BM: WD4KBW. PIO: W4WYR. SGL: KC4N. OOC: W4SS. ACC: WA4NBE. K4IT gave a report on the first meeting of the Blue Ribbon Committee—He said it was very productive and a lot was accomplished. His report was given on the ARRL Information Net which meets on 3940 kHz every Saturday morning at 8:00 AM EDT. Hope you will join us there or at least listen. I receive a large number of club bulletins each month and really appreciate the information. This month I received one from the Martin County ARA and a part of it featured K4ZK. Bill, our ST in Southern Florida, got his first Amateur radio license more than 50 years ago when he was in high school in Seattle. He made his own equipment—including coils made of wire and oatmeal boxes. After high school, Bill went on to study radio and work as a professional radio operator both on ship and land for 12 years. He then entered the diplomatic service and worked in Australia and the Middle East. In Iran, where he was president of the Amateur Radio club, he helped the Shah's brother install a radio "shack" in the palace. K4ZK is also Martin County EC as well as the volunteer coordinator of communications. K4ZK also keeps an updated traffic-handlers listing by call and CTR for both Florida sections. A couple of days ago, I counted over 200 traffic handlers in the Southern Florida Section in his listing—the Southern Florida Section averages about 75 station activity reports per month—Should I say more? KB4LKT, who is active on QFNS, sent a radiogram stating he is overjoyed at having passed the General exam! N4LH reports that he and several other hams participated in a civil defense drill

# IC-02AT

## ICOM 2-Meter Handhelds

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.

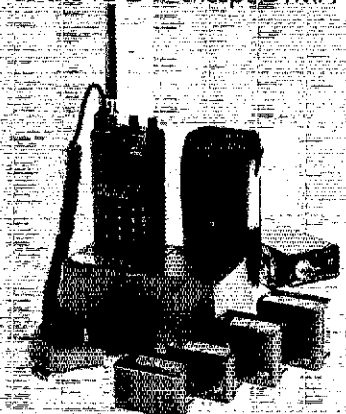
**Frequency Coverage.** The IC-02AT covers 140,000 through 151,550MHz and the IC-2AT, 141,500 through 149,994MHz...both include frequencies for MARS operation.

**IC-02AT Features.** ICOM's top-of-the-line IC-02AT handheld has the following outstanding features:

- DTMF direct keyboard entry
- LCD readout
- 3 watts standard, 5 watts optional (with IC-BP7 battery pack)
- 10 memories which store duplex offset and PL tone (odd offset can be stored in last 4 memories)
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- 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 selec-

tion. 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, 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.

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held by the city of Tamarac. Congrats to K14ZW who has been elected Net Manager for the Southwest Florida Traffic Net—and many thanks to KF4JA who is retiring as manager of both the Southwest Florida Traffic Net and the Tropical Phone Traffic Net. WD4KBW, Bulletin Manager, reports 52 bulletins received and 112 sent during May by AA4BN 11, W4DL 35, WA4EIC 49, KA4GUS 30, K4IEK 12 and WD4KBW 27. 73 ce WA4PFK. Traffic: W9CUL 3389, W3VFI 1061, WA4CK 403, KA4ZL 243, W4NFK 231, KA4JL 208, K4B 184, WA4EIC 182, WA4RUE 179, KF4JA 174, K4EUK 169, WB4WYG 133, AA4BN 124, K4IA 122, N4KFU 103, KA4GUS 98, W4TAH 81, W4DL 76, KA4NFX 75, N4JOA 62, W4PKP 58, WD4KBW 55, KF4RL 54, KA4YHS 47, N4NML 42, W3TLV 41, KY0T 41, N4MXH 39, K5IHH 35, N4HAS 32, W4SME 31, K4OVC 30, KB4MON 28, W7F4 28, KYB7 27, KB4KAW 26, KA4SIH 26, N4ET 24, K4FOU 24, KB4PL 23, WA4HHD 18, K4BLM 16, WA9VND 16, K8ABY 15, WA8BQM 14, KB4LCT 14, WD4NXX 13, W4ESH 13, WD9AEP 12, W4HXU 11, KB4EWO 10, N4ILN 10, W3LJR 9, W4MPV 9, WA4YR 8, K4IRT 8, WD4MCC 7, W4MFD 6, WK4F 6, KD4GF 6, K14ZV 4, KA4KD 4, KA4GDU 4, AA4CH 3, N4W4R 2, N4XG 2, AA4IF 1, Total 8455. Total operators 68. (Apr) WA4HHD 17.

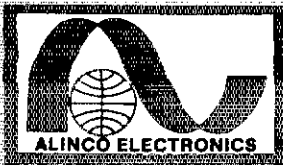
### SOUTHWESTERN DIVISION

ARIZONA: SM, Jim Swafford, W7FF—STM: W7EP. N.M.s: K6LL, KA7HEV, WB7CAG. Congratulations and hearty thanks to all AZ hams and clubs who participated in the Across America exercise on 25 May. Wish I could list everyone individually, but space will not permit here. Understand over three hundred AZ operators volunteered their efforts and that the "Hands" route occupied by the public volunteers was very adequately covered by the VHF/UHF nets that were set up. Would suggest that those of you who participated and enjoyed this event consider joining Amateur Radio Emergency Service (ARES) and participate in future emergency drills and exercises. To join, contact our SEC, Ed, KX7P at callbook address, or your local EC. Many AZ clubs busy getting ready for Field Day Test. Please send reports of your activity. No. AZ DX Ass'n newsletter reports that K7BTE has worked 235 countries on long running DX. For less Far East, W7YS made WAS on 160 meter CW. OSCAR Ten has experienced internal failures in its programming unit and all operators are to contact QRT until problem can be defined and possibly remedied. Unusually high solar radiation is suspected cause. Check AMSAT weekly nets for latest status info. ARCA advises VE exams will be given again this year at Flagstaff (July 25-27). Contact Bob, N7ECE, or Bernie, W9YOY, for additional info. Navajo Co. ARC sent nice report. They're doing great. Their club repeater, KA7ARZ, is off 146.08/68. Your SM enjoyed meeting many of the Superstition ARC members at their May meeting. Scottsdale ARC is sponsoring design contest for new club QSL card. They plan joint PD operation with Payson club. K7YM from Central AZ DX Assoc. reports considerable improvement in 20 mtr DX due to low "A" and "K" indices. Also some are now predicting the bottom of the sun spot cycle will be reached very soon, like maybe June! ARRL's Gateway packet newsletter reports that Arizona is now a part of WESTNET via a gateway digipeater on 145.01, W7BNI on Union Mtn. near Prescott. Plans are in the works for future digipeaters in Phoenix and Tucson. W7DRR, our OBS in Page, is giving weekly bulletins on their two mtr rpt. DEC K7KYW orchestrated a simulated emergency test at Tucson Red Cross, using RACES repeater and Com-Van. Good work, gang. Green Valley RC sent latest report. Thanks. Bruce, N7CEE, reports nine stns on packet in Flagstaff. KA7MUL again made BPL for fourth straight month for the PSIR for May. Keep those cards and letters coming in! C U at Flag. 73. JIM

	QNI	TFC
AZ Cactus VHF	249	59
AZ Cactus HF	498	79
SWN	156	115
ATEN	631	116
Apache JRN	87	14
Traffic: KA7MUL 635, KB7FE 177, W7EP 172, N5TC 131, K6LL 114, WB7CAG 86, KA7HEV 51, W7GAW 40, W7KXE 29, K7JKM 13, K7POF 10, K7NMQ 4. (Apr) K7JKM 20.		

LOS ANGELES: SM, Bob Poole, AJ6F—ASM: K6IYK. SEC: AK6Y. STM: W6INH. ACC: KX7C. CDC: K6BMG. TC: WB6JPC. W6D reported that the SoCal East Coast worked the Annual Torrance Armed Forces Day 10, and SK runs the 17th; N6LEM directed the seven operators who handled the communications for the thousands of runners. Ron, KX1V (formerly N6FD and LAX Section ACC), is now in Nashua, New Hampshire, and wishes to say hello to all the old friends here in the section. Thanks to all the LAX field day participants who sent their PD report via packet; those who did so were entitled to the 100 point Report and Packet bonuses. Thanks to W6KA and W6SD for annual club reports. The Tournament of Roses Radio Amateurs (TORRA) net is each last Thursday until September and then every Thursday at 19:30 local on 147.9127 with the semi-annual meeting on Sept. 13, call in on the net for details. W6QCY is the EC for the West San Gabriel Valley. Thanks to W6TRW (TRW ARC) club for letting me attend their May picnic and July meeting; nice to meet the crew there. Lockheed Radio Club presents monthly exam sessions in Burbank; call Marie at 818-848-9340 for info. In spite of the short notice of revised schedule, the LAACARC and several clubs including Hughes, Northrop, SCORAN and Downey apologies to others, again pulled the N6BSA duty at the Boy Scouts Camporee at Cal State Dominguez Hills; KN6H reported that everyone present enjoyed another smashing success with this important youth event. Hands Across America terminated in Long Beach at the OCULB. LATINOAMERICANO de CALIFORNIA (RALAC); either call on 224.88(-) or write Jose at Box 303, Alhambra, 91802. WA8TJM and the Palos Verdes ARC provided communications for the Palos Verdes Marathon on June 14th according to Pres K5KT; amazing how Clint (TMJ) can be in several places at once! Contact N6JSX for all details regarding the WA6TEY memorial "old-fashioned" T-hunt; this hunt formed in memory of Ray Frost. The Rio Hondo club is very active in Ham Classes and exam sessions; write RHARC Box 8008, Whittier, 90609. Contact KF6UF for details on the Relay Repeater Club; activities include a 1.2 GHz repeater and a low-band net (among others). W6FNO/R which was the backbone of the California HAA activity was also aided with 200 pieces of emergency traffic in May; DEC WB6MK-A and EC KA6ZDL report in addition to the emergencies there were





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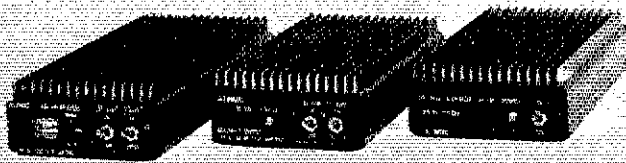
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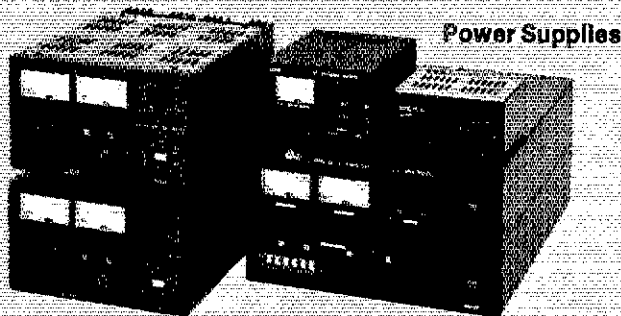
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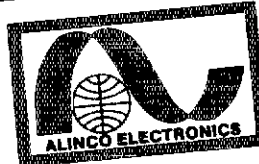
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communications for foot races, rescue operations, special events as a routine calls performed this last month. N8IB is still looking for parts and equipment to be sent to Ecuador to the deprived ham community there; contact Chuck via the LAACARC or call me. Thanks to the Downey Club for the monthly bulletin; am I getting YOUR Bulletin? The new QSL manager for Slim Sample, AHS PK64, is N6NW; contact Neal for your PK64 QSL needs. Please excuse the short notice for your Los Angeles STM traffic files. Yours truly, W6NH, has been in the hospital for seven days and unable to keep up with activities. If I missed you this month, I'll try to make it up. Traffic: K6UYK 611, W6NH 328, N6LHE 118, W6NKE 18.

**ORANGE:** SM, Joe H. Brown, W6UBQ—ACC: Philip, KB6FRW. Computer-generated confirmation cards are now sent to affiliated clubs whose annual reports have been completely processed at League HQ. Please note, cards are not sent until the club's annual report or membership has been completely processed. Any questions or materials needed see Section News, July 85 QST for address. The Morongo Basin Amateur Radio Club has sound advice. Those persons who are not now members of the American Radio Relay League, join through your club. When you renew your membership in ARRL, please do so through your club. The Fullerton Employees Association sez the most important thing on Field Day is to have fun, train ops to operate efficiently, rack up a lot of contacts and eat as much as possible! I think a good plan would include pairing up experienced contesters with those who may be "contest shy" or less experienced. Such an arrangement would be mutually beneficial and in-line with the purpose of Field Day. Southern Cal Six Meter Club election results Pres. Bob, K6PHE, VP, W1AA5D, Sec. Gracia, N6FL, Treas. Dave, WA6PMX, SCSMC sponsored T. Hunt following the VHF/UHF Conference winners. Bob K6PHE & Grace, N6FL. An idea from the Citrus Belt ARC Newsletter. Transportation: If because of age, health, or other reasons you do not have a way to get to the club meetings, please let one of the club officers know so arrangements to see that you get there and back. We need you at the meetings. BM: Brooks, K6GGS took over the statistical job of keeping track of assignments and records. Over 150 Amateur Operators in the Orange section were involved. OOC: Ralph, W6RE reports that on the 8th of May 1985, Mr. Larry Gun, W6DIA, No. 1 OOC Field Day Supervisor, Joe Brown, W6UBQ, Orange SM and Ralph Alexander, W6RE, OOC/LIC met in Long Beach, CA to sign the memorandum to establish a section wide local interference Committee structure to address problems of Amateur to Amateur interference in accordance with the Amateur Auxiliary to the FCC FOB. A lot of work is still ahead for chairmen and members of the committee. For those interested in this program please contact the SM or OOC/LIC, STM: Ernie, WA6QCA, PSRR WF6D, WB6QBZ, WA6QCA.

May 1986 NET Rpt. BPL WF6O  
NET FREQ TIME SES QNI QTC NM  
SCN/1 CW 3598 1830 31 220 238 WF80  
SCN/2 CW 3618 1914 31 199 244 WF80  
SCN/3 FM 146.645 2100 31 363 272 WA6QCA  
RN6/D SSB 7276 Daily 0945 and 1500. Stations unable to use or access the CW or 2 meter NETS should use RN6/D. SEC: Jim, AE8N, Coordinator of the Hands Across America Amateur Radio Support in the Orange Section did an outstanding job. With the full support of the County DECs, ECs and members of the ARES/RACES Groups, what could go wrong. The Amateur Community came thru. We were asked to do a job and it was done. Jim will write up the critiquis. With all the what to do, not to do and what is, it should be a valuable paper for future projects. Hospital Support: On April 16th an unannounced medical drill was called in Alameda Co. in support of the National Disaster Medical System. With the exception of two, all hospitals in the county had an amateur station in service within 40 minutes of notification. Fantastic. For 3 hours, May 27, 28, 29, Orange County Hospitals, Fire, Police, transportation, Red Cross and Local County Disaster Officials simulated a 7.5 involving over 400 casualties. 23 of 26 hospitals invited Amateur Operators to participate in this yearly county wide drill. These hospitals include amateur radio in their disaster plans. The 3 drills were mid-morning on week days. Only three of the twenty nine hams active in the drill were tired. All others re-arranged work schedules or took time off to participate. TC: John, KD7XG. Now working on a severe TVI problem in the city of Orange. Help was given to Warren Co. Penn. on an antenna ordinance program. The TC program appears to be an effective tool for Amateur Radio. A very busy month for the HAM community. "CONGRATULATIONS." Traffic: WF6O 849, K6VC 109, AB0A 108, N6GOT 108, WB6QBZ 87, KA6HJK 79, K6DD 65, WA6QCA 67, W6RE 30, W6CPB 19.

**SAN DIEGO:** SM, Arthur R. Smith, W6INI—SEC: W6INI. PIO: KG6LF, TC: N6NR, 8TM: N6GW. Hope to see all of you at the 1986 ARRL National Convention, Sep 5-7, in San Diego. Still a few days left to make the Aug 15 "Advanced Registration" deadline. If you aren't pre-registered, it is strongly recommended that you register on Friday, Sep 5, between 1300 and 2100 to avoid a possible delay. Registration starts on Saturday, Sep 6 at 0700. While the Registration Chairman promises minimum delay, your early registration is important. Non-Amateur Junior and Senior High School students are invited to attend a Youth Forum with a panel headed by astronaut Tony England, W6ORE. There is no charge, but participants must be pre-registered. For info, call the Convention hot-line, 619-292-7918. 1986 officers: San Diego County Amateur Radio Council Chmn WD6BBW, VChmn W6PDA, Sec K65MU, Treas N6CQW; 220 Club Pres W6INI, VP W6PDA, Sec N6ELP, Treas W6LJZ. ARES 10 m net meets at 1000 each Sunday on 28.275 MHz. Net Controls are W6TEF, WA6BCO, W66MIS, W6GJL. N. Cal County IFC net 30 min, handled 43 mos. ARES CW held 4 sessions, 20 check-ins. Traffic: N6GW 42.

**SANTA BARBARA:** SM, Byron Looney, K6FI—Santa Barbara Harvest scheduled 17 August at Elks Lodge, Goleta. Central Coast Club conducting survey of ham operators. Registration on Cuesta Ridge above San Luis Obispo. This will be a great help for the packeteers. Now is the time to consider sending key ARES people to CSTI for Earthquake school. 1986/87 classes now being registered. Contact the SM for details. Eastern Bay ARC has completed another Novice/General class. New publication, The Amateur Radio Emergency Service and Amateur Radio, A National Resource are available from ARRL. These are good handouts for any public relations event. SLO county now using ARES Photo ID with Sheriff's endorsement. See your EC if you need one. Hope to see you in San Diego in September! Traffic: W6WJZ 258, W6WJZ 240, N6LBY 213, W6BZD 20, K6SPL 7, W6RFF 6, N6HYM 28, K6CFF 26, WA6ZUD 16, W6BSRO 14, W6DEEZ 10, WA6ERZ 2.

**WEST GULF DIVISION**  
NORTHERN TEXAS: SM, Phil Clements, K5PC—Asst. SMI/ACC: N15V, STM: AE1, TC: W5LNL, BM: W5QXK, SGL: W5LXP, RFI: W5JBP, PIO: K5HGL, Ham-Corn '86 was a great success, with over 400 flea market tables full of goodies.

New

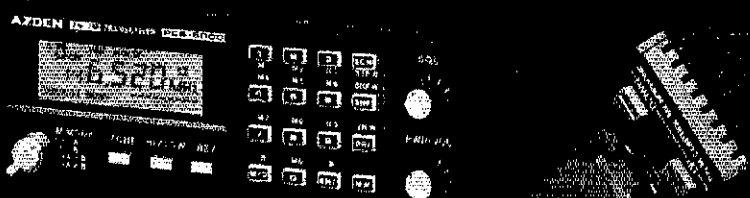
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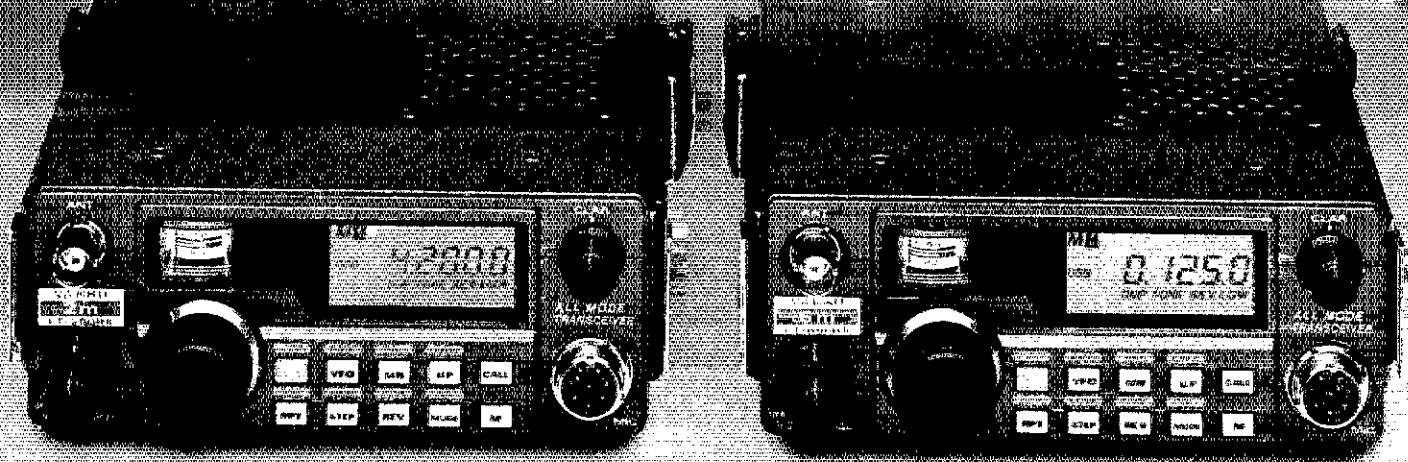
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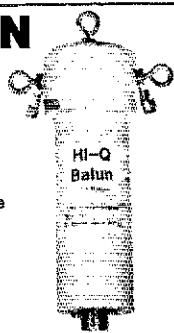
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PD-8010	80,40,20,10/15	130'	43.95
PD-4010	40,20,10/15	68'	37.95
PD-8040	80,40/15	130'	39.95
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Dipole shorteners — only, same as included in SD models			
S-30	30/75		\$13.95/pr.
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lots of dealers and manufacturers, and a great slate of programs. Congrats to the Ham-Corn staff who did a super job! ATC/KASOYV travelled to Dublin to assist WB5LWN in the operation of his HF rig. Later, Jim put on his EC hat and administered CPR to a heart attack victim until the ambulance arrived. New officers for the Texoma Amateur Radio Club (Sherman) for the coming year are: K5OUK/Pres. KESWLV/P. W5GCV/Sec. Tres. W5JCS/Activities Dir. A nice newsy letter from Cass Co. EC/W5QQQ, Louie has worked for many years in converting a fail-out shelter into an EOC for ARCS use. The building contains a new repeater; (146.86) along with complete stations for HF and VHF. This is one of the best installations in our Section! Neighboring ECs K5DPI and N5BBC work closely with Louie, covering a vital four county area in East Texas. Hurricane season is upon us—with the abundant spring rains, a flood situation at this time will create chaos in our Section. Let's be ready to move if a communications emergency arises, PSRR for May: A651.

**OKLAHOMA:** SM, Dave Cox, N5SN—ASM: K5WG. SEC: W5ZTN. STM: K5VX. ACC: N5JY. BM: W5AS. PIO: W5SIFB. OOC: K5WG. SGL: W5NZS. TC: W5QMJ. Ham Holiday, ARRL West Gulf Division Convention for 1986, is just around the corner. On the weekend of August 1-3 well over 1000 hams are expected to converge on the Lincoln Plaza in OKC for the biggest hamfest this state has ever seen. CQRA always puts on an excellent event so — BE THERE! The sooner State Games (SSG) is history for a new repeater; (146.86) along with complete stations for HF and VHF. This is one of the best installations in our Section! Neighboring ECs K5DPI and N5BBC work closely with Louie, covering a vital four county area in East Texas. Hurricane season is upon us—with the abundant spring rains, a flood situation at this time will create chaos in our Section. Let's be ready to move if a communications emergency arises, PSRR for May: A651.

**SOUTH TEXAS:** SM, Arthur R. Ross, W5KR—Big news of the month is Hands Across America; there was even a mild version in the Rio Grande Valley with Amateur Radio well represented: WA2VJL, KA5UVY, N5GNK, K5OYR and "Miguel the Gopher" helped San Benito make a nice effort. Simulated "Hurricane Poly '91" stormed through the Rio Grande Valley on a test of emergency readiness: W5GUP, K5DG, KA5UVY, W5SHZ, KA5PX, N5AYI, KA5SJH, N5GNK and "Gopher Miguel" (son of WA2VJL) were among those who turned out; there may have been others but I didn't hear about them. Texas Southmost ARC, Hartington, has new Amateur Radio vests; CHARRC, Brownville, will have their vests soon; Amateur Radio will be visible as well as audible. RN5 Mgr W55YDD reports 652 messages in 62 sessions; STX represented 48% by W5KLV, W5BPA, W5FOU, W5CTZ, N55V, K55KO, W5SZ, N5DFO, A5JK, W5TUK, W5ZJY, W55YDD. NG5Z reports formation of a new club: Dayton Area Amateur Radio Team; they are looking for way to affiliate with ARRL. OBS W5KLV reports 7 bulletins, 30 satellite bulletins, 4 propagation forecasts, 6 DX bulletins, 3 CRRL bulletins given 187 readings on 9 nets. CAND Mgr W5KLV reports 741 messages in 31 sessions: DRN5 represented 100%; STX stations were W5AC, N55V, W5KLV, W55FOU, N55V, K55KO, W55YDD, W5BPA. Amateur Radio is wonderful! SM W5KR went to Groves, 453 miles from Brownsville, to see his granddaughter graduate from high school; he left two 2-meter hand held rigs in Groves; one contact with W55YDD who found a traveling Ham and the hand held units are back home without benefit of public conveyance!

Traffic: W5KLV 439, W55YDD 418, W5CTZ 233, A5JK 205, W5FOU 160, W55GKH 99, W5BPA 74, W55Z 47, WA2VJL 46, W5BGE 39, K4HZR 23, KA5UVY 4. (Apr) W5BPA 104, AC5Z 40, WA5UZS 7, WA5WCY 5.

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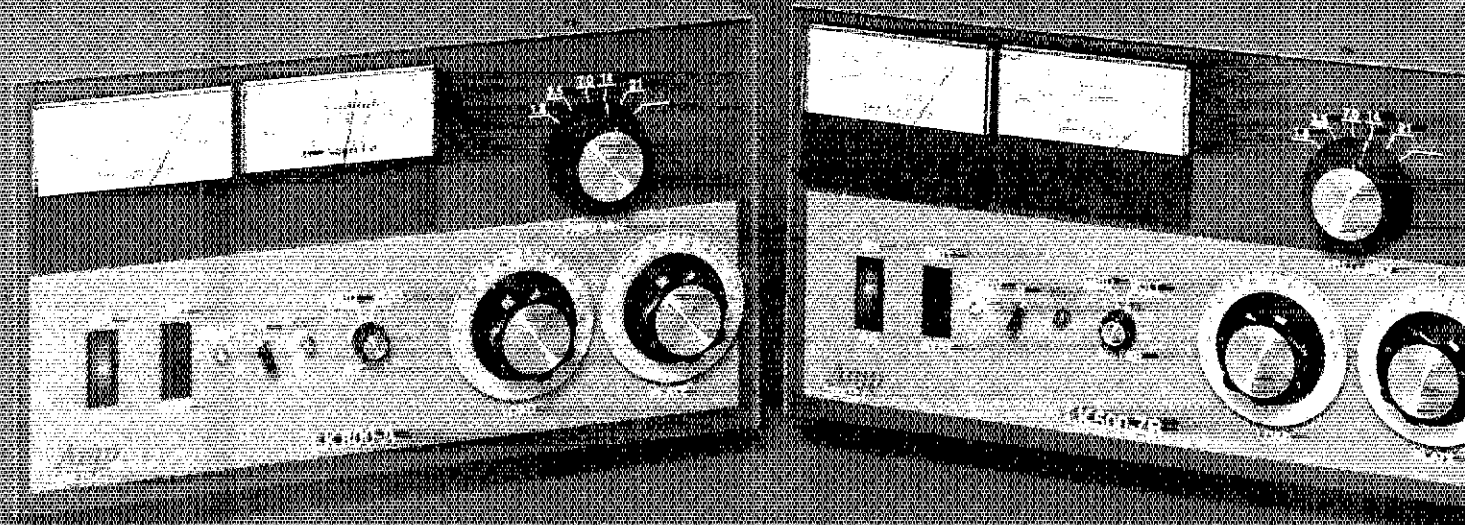
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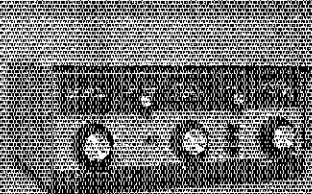


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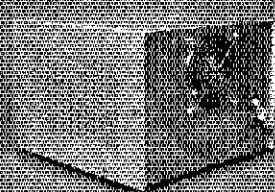
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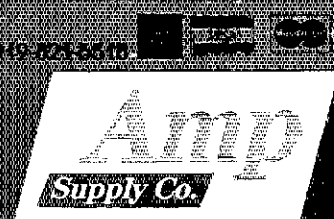


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(1) Advertising must pertain to products and services which are related to Amateur Radio.

(2) The Ham-Ad rate is 85 cents per word. This includes firms or individuals offering products or services for sale. A special rate of 25 cents per word applies to individuals seeking to dispose of or acquire personal station equipment, and to hamfest and convention announcements.

(3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied. Submitted ads should be typed or clearly printed on an 8-1/2" x 11" sheet of paper.

(4) Closing date for Ham-Ads is the 13th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received 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.

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The League reserves the right to decline or discontinue advertising for any reason.

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PROFESSIONAL CW operators, retired or active, commercial, military, gov't, police etc. invited to join Society of Wireless Pioneers—W7GAQ/6 Box 530, Santa Rosa, CA 95402.

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THE Veteran Wireless Operators Association, a non-profit organization of communications people founded in 1925, invites your inquiries and application for membership. Write VWOA, Ed F. Pleuler, Jr., Secretary, 46 Murdock Street, Fords, NJ 08863.

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THE FLORIDA Amateur Digital Communications Association (FADCA) publishes a monthly newsletter, the FADCA Beacon, about Packet Radio. Write for a sample copy, FADCA, 812 Childers Loop, Brandon, FL 33511.

FCC EXAMS, Novice-Extra, Sunnyvale VEC ARC. 408-255-9000, 24 hour. 73. Gordon, W6NLG, VEC.

THANK YOU for attending Warren Ohio Hamfest, See you August 17, 1986.

ILLINOIS: Sept. 20 & 21, The Peoria Area Amateur Radio Club presents Peoria Superfest '86 at Exposition Gardens, W. Northmoor Rd., Peoria, IL. Admission \$3 advance, \$4 gate, children under 16 free. Gate opens 6:00 A.M., commercial buildings 9:00 A.M. Talk-in 146.16/76 call W9UVI. Latest Amateur & computer product displays, huge flea market, free Sunday bus to Northwoods Mall. FCC exams Saturday & Sunday, all classes. Full camping facilities. For tickets and into SASE to Superfest '86, Box 3461, Peoria, IL 61614.

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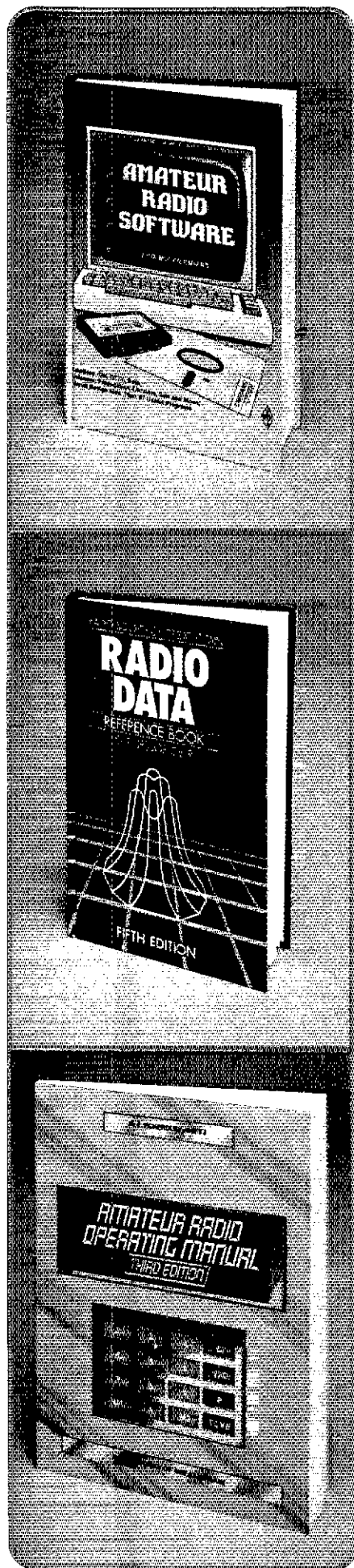
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**RADIO DATA REFERENCE BOOK** by G.R. Jessop, G6JP. This handy publication is divided into 9 chapters: Units and symbols, Basic calculations, Resonant circuits and filters, Circuit design, Antennas and transmission lines, Radio and TV services, Geographical and meteorological data, Materials and engineering data, and Mathematical tables. You'll find hundreds of useful tables, charts, and formulas. Fifth Edition, Copyright 1985, 244 pages, \$15.00 hardbound.

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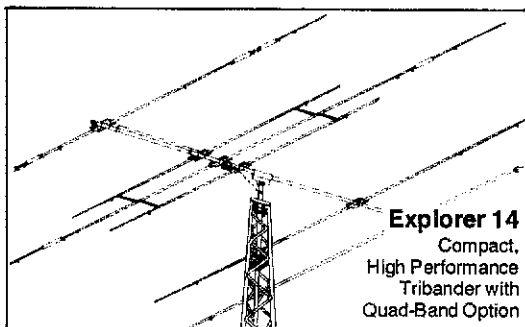
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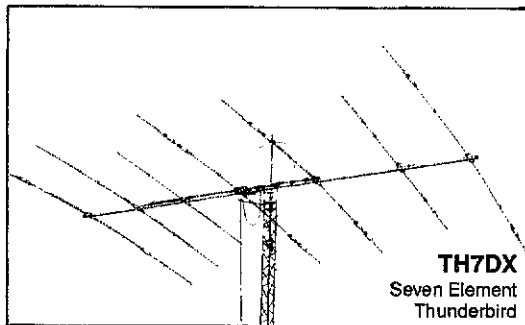
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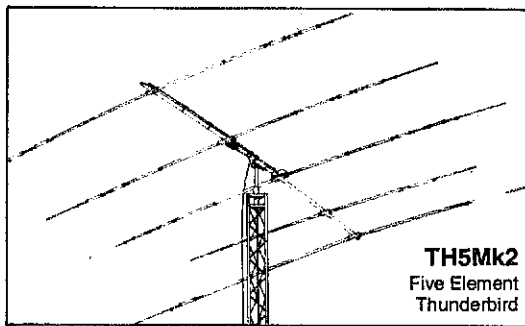
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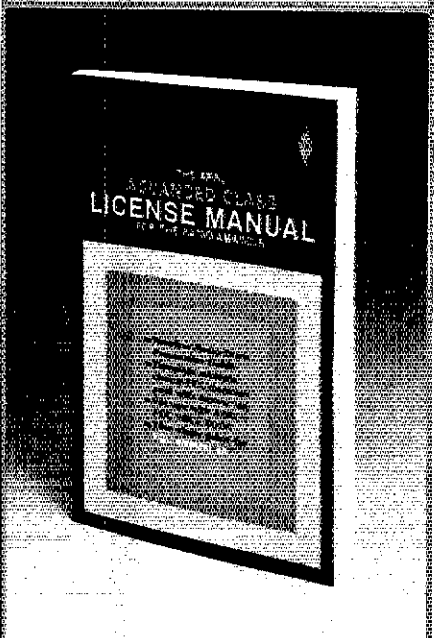
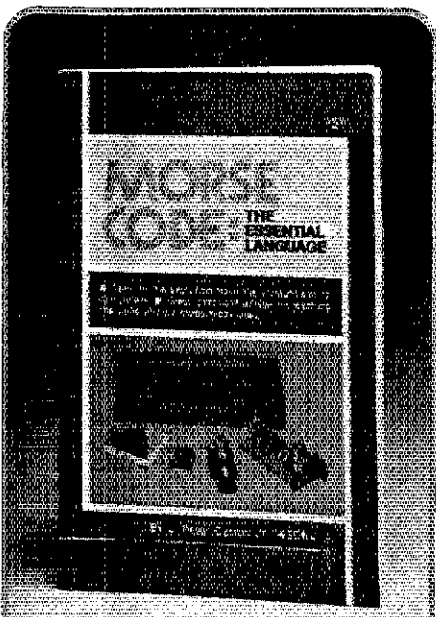
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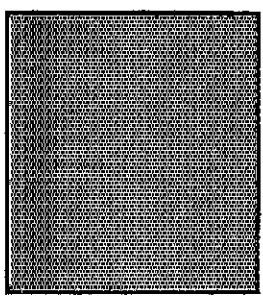
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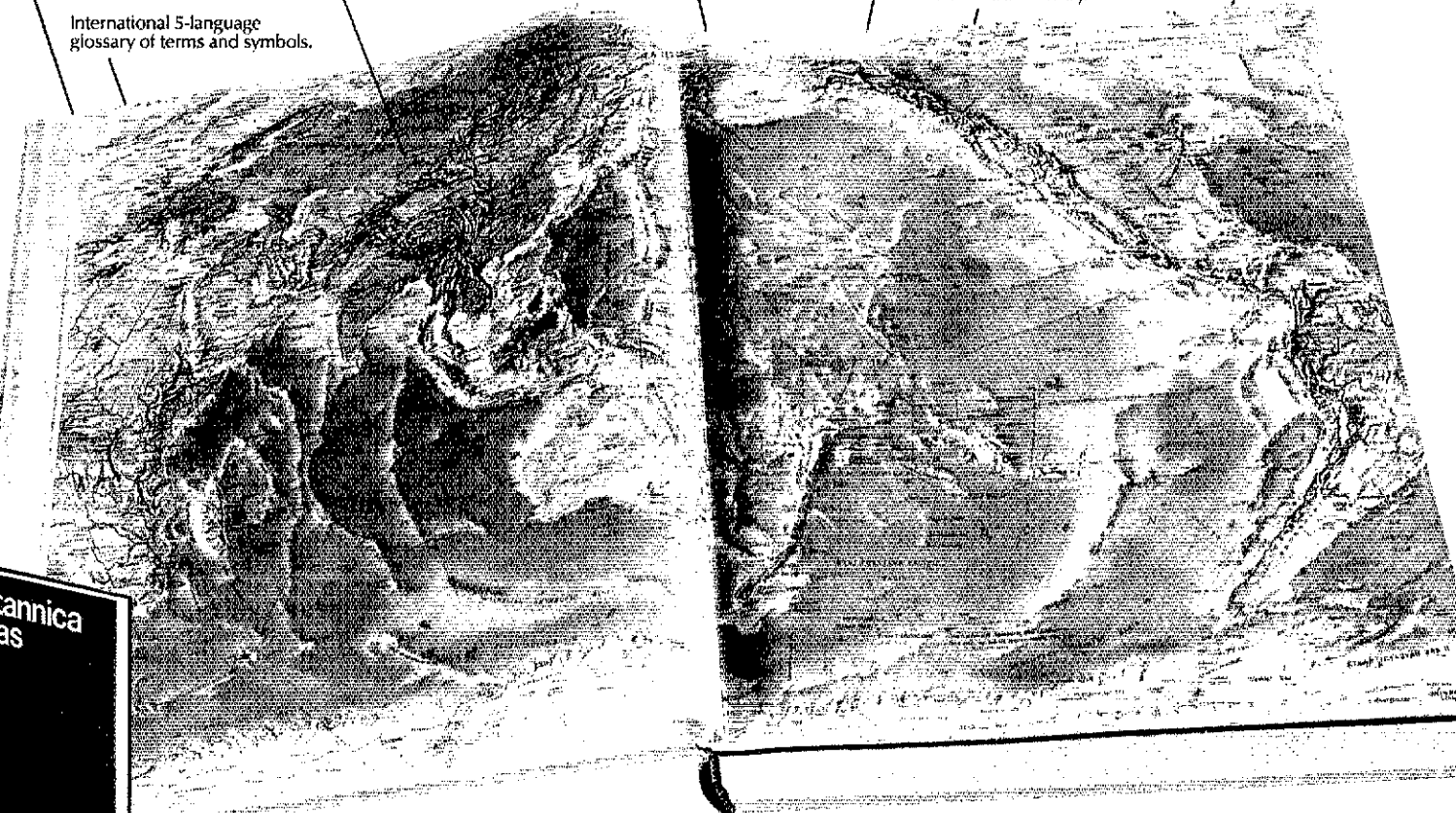
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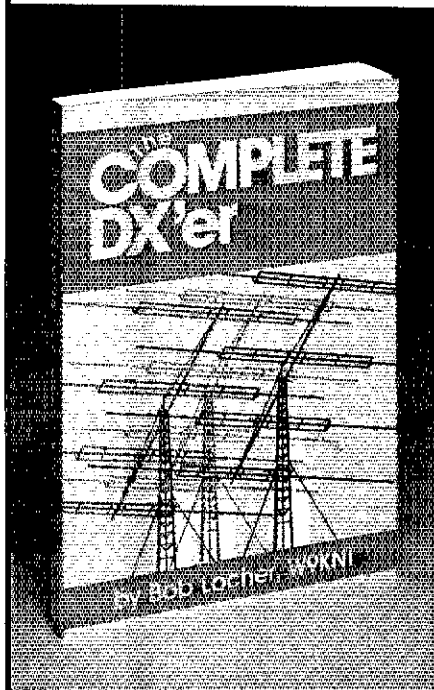
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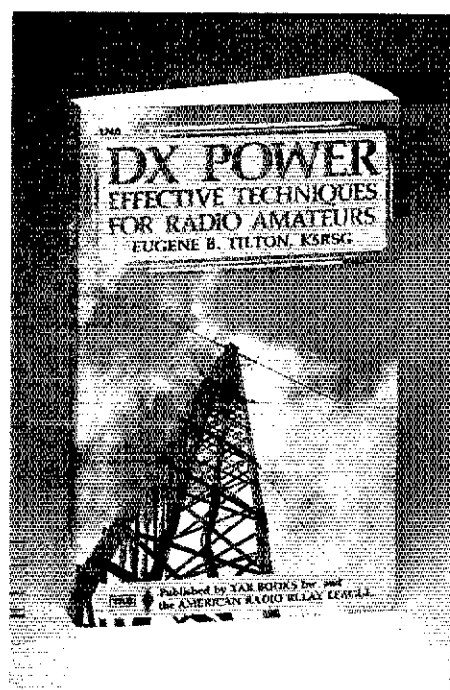
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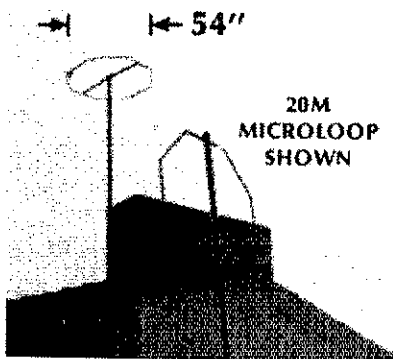
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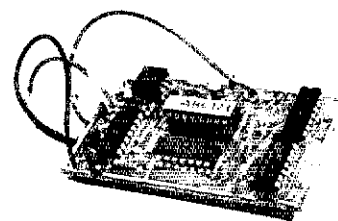
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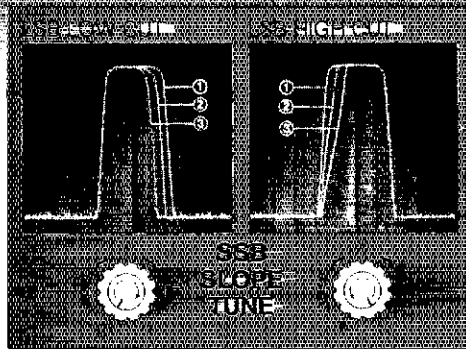
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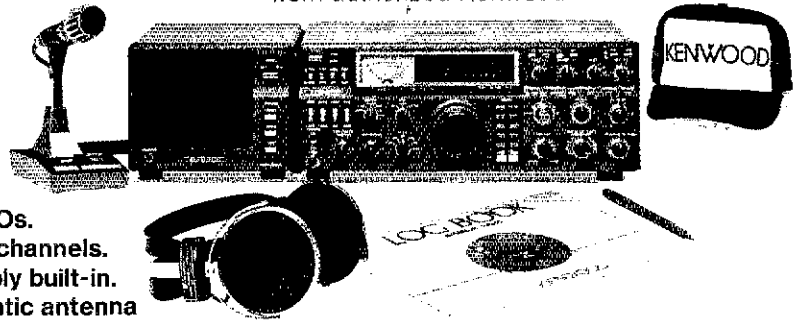
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Alpha 374A Linear 1569 c	TR-9000 2m Xcvr 289 c	
<b>FALCON</b>		
5123 30/150w 2m amp \$149 w		

<b>RM-76</b> Microproc control 49 m	<b>FV-700DM</b> Remote VFO 89 m	<b>FT-901DE</b> Xcvr 499 c
SP-40 Mobile speaker 19 m	FT-9010E Xcvr 399 f	FT-9020M Xcvr 699 v
MC-50 Desk microphone 29 m	SP-901P Spkr/patch 49 f	YK-901 Keyboard 89 f
MC-60A Desk mic 55 m	YK-901 Keyboard 89 f	FC-901 Ant tuner 99 f
MC-85 Desk mic 59 m	989 Ant tuner \$199 f	FTV-901R Xvtr w/2m 249 c
<b>MFJ</b>	422 Keyer/paddle 69 f	FC-102 Ant tuner 159 m
989 Ant tuner \$199 f	<b>MIRAGE</b>	FP-107E External ps 89 m
422 Keyer/paddle 69 f	8-23 2m amp \$ 59 m	FT-707 Xcvr 369 m
<b>NPC</b>	<b>ROBOT</b>	FTV-707 Xvtr (no module) 89 m
LR-10 7.5A ps \$ 39 m	800C Terminal \$269 v	FT-757GX Xcvr 589 w
<b>SEARS</b>	800 mod to 800C term 249 m	FT-980 Xcvr 969 w
FRG-7 (Yaesu) SW Rcvr \$169 m	<b>SONY</b>	FI-ONE/fm/ram/4 filts \$1269 mf
<b>SPECTRONICS</b>	ICF-2002 SW receiver \$169 m	
DD-1 Dig disp; Yaesu \$ 69 m	<b>TEC-TEC</b>	
<b>TEN-TEC</b>	505 Argonaut Xcvr \$199 c	
505 Argonaut Xcvr 269 f	515 Argonaut Xcvr 49 m	
251 9A supply 329 m	525 9A Xcvr 359 m	
525/250 Hz cw fil 469 f	525 Dig Xcvr/cw/ssf 89 m	
225 Power supply 89 m	570 Century/21 Xcvr 189 mw	
276 Calibrator 19 me	979 Power supply 69 f	
979 Power supply 249 mv	240 160m conv 69 f	
244 Dig display 89 m	545 Omni-A Xcvr 249 m	
546 Omni-D series B 399 m	546 Omni-D series B 599 m	
546C/2 cw/ssf/nb 99 m	243 Remote VFO 679 mw	
560 Corsair Xcvr 699 m	560/500 Hz CW filter 139 fe	
263 Remote VFO 89 m	561 Corsair II Xcvr 99 m	
252M Power supply 79 m	252M/O Power supply 79 m	
262G Power supply 89 v	260 Power supply 119 m	
255 Power supply 129 m	260G Power supply 129 mfv	
260 Power supply 99 m	280 Power supply 69 m	
234 Speech processor 99 m	214 Desk mic 29 mw	
700A Hand mic 19 w	USA	
1400C 14" color monitor \$149 m	<b>YAESU</b>	
<b>FR-101S</b> Ham Rcvr \$149 f	FR-101S/6/2/fm/cw 249 m	
FR-101E Xcvr 229 c	FL-101 Transmitter 389 fc	
FL-101B Xcvr 449 fc	FT-101E Xcvr 399 m	
FT-101EE Xcvr 389 f	FT-101EX Xcvr 449 m	
FT-101F Xcvr 399 v	FT-101Z Xcvr 469 v	
FT-101ZD Xcvr 69 c	FV-101Z Remote VFO 19 m	
FV-101Z Remote VFO 129 f	SP-101B Speaker 449 m	
FT-625RD 6m Xcvr 399 c	FT-225RD 2m Xcvr 279 m	
FT-730R 440 FM Xcvr 89 f	FP-12 12A ps 89 f	

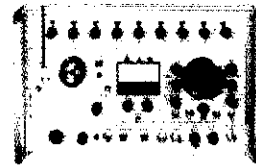
FT-ONE/fm/ram/4 filts \$1299 f
FRG-7700 SW Rcvr 269 c
FRV-7700F VHF conv 59 m
FP-80 4.5A ps 24 w
YD-148 Desk mic 19 f
YD-844 Desk mic 19 f

<b>SATELLITE TV EQUIPMENT</b>
<b>AMPLICA</b>
85° LNA \$ 59 m
100° LNA 29 m
110° LNA 25 m
<b>DRAKE</b>
85° LNA \$ 59 m

6-12-86

## USED GEAR INFORMATION

(1) This list was prepared from an inventory taken on the date shown. The letters after the prices indicate in which store the equipment was located at that time. The quantities vary, in some cases there are several of an item; others, only one. Due to the lead and distribution time of this publication, some of the items may have already been sold by the time you see this ad. However, due to the number of trades we are involved in each day, some items are in stock that are not listed. (2) We reserve the right to sell certain power supplies and accessories only with matching transmitters or transceivers, depending on our stock situation. (3) Sometimes used gear is serviced after we receive your order. Please allow for a few days delay in shipping your order. (4) No trades on used gear. (5) Used gear policies do not apply to any New Equipment specials, Closeouts, etc.



## SINGER-GERTSCH

**FM-10CS** signal generator with RFM-10A, FIM-3 and ODM-1 options..... \$3695  
OAM-1 AM module FM-10C... 195  
Purchased new, and used exclusively in our service department. Good condx, operational, manual.

## New Equipment Closeouts

(Most are available at the Milwaukee Store only.)

<b>AEA</b>	<b>KLM</b>	
MM-2 Morsematic keyer \$149 <sup>95</sup>	219-226-50 220 1:1 balun 19 <sup>95</sup>	
KT-2 Keyer/Trainer 79 <sup>95</sup>	<b>MICROLOG</b>	
BT-1 Basic Trainer 49 <sup>95</sup>	ACT-1 Terminal/keyboard 269 <sup>95</sup>	
Isopole 220 Jr base antenna 29 <sup>95</sup>	<b>MIDLAND</b>	
<b>AMERITRON</b>	18-940 2m, 5/8 tk/rf ant. 12 <sup>95</sup>	
SPR-8 Audio processor 19 <sup>95</sup>	18-950 220, 5/8 tk/rf ant. 12 <sup>95</sup>	
<b>AMP SUPPLY</b>	18-951 220 5/8 mag. mt. 14 <sup>95</sup>	
LK-500ZA Linear amplifier 989 <sup>95</sup>	<b>NEC</b>	
<b>COLLINS</b>	JB-1201M 12" grn scrn mon. 89 <sup>95</sup>	
AC-2808 Blower kit 269 <sup>95</sup>	<b>RCA</b>	
<b>CUBIC (SWAN)</b>	TC-1109 9" b-w monitor 89 <sup>95</sup>	
WM-1500 Wattmeter 549 <sup>95</sup>	<b>REGENCY</b>	
<b>DRAKE</b>	ACT-R-92AP Aircraft scanner 49 <sup>95</sup>	
TV-300-HP High pass filter 9 <sup>95</sup>	<b>ROBOT</b>	
<b>HAL</b>	800 Terminal/keyboard 249 <sup>95</sup>	
CT-2100 CW/RTTY Terminal 399 <sup>95</sup>	<b>TAXAN</b>	
<b>HYGAIN</b>	KG-12N 12" grn scrn mon. 79 <sup>95</sup>	
330S 3el 15/i0m beam 99 <sup>95</sup>	415 12" Hi-res color mon. 299 <sup>95</sup>	
274 2m BNC rubber duck 4 <sup>95</sup>	<b>TRAM</b>	
AR-500DII Rotor 79 <sup>95</sup>	Dual meter SWR/wattmeter 69 <sup>95</sup>	
<b>ICOM</b>	USI	
IC-751 HF Transceiver 999 <sup>00</sup>	PI-2 12" green mon. 89 <sup>95</sup>	
GC-4 World clock 59 <sup>95</sup>	<b>YAESU</b>	
<b>KENWOOD</b>	FV-101Z Remote VFO 69 <sup>95</sup>	
TS-660 6/10/12/15m xcvr 569 <sup>95</sup>	FV-107 Remote VFO 69 <sup>95</sup>	
VFO-180 Remote VFO 69 <sup>95</sup>	FV-707DM Remote VFO 69 <sup>95</sup>	
R-11 Portable SWL rcvr 69 <sup>95</sup>	SC-1 Station console 59 <sup>95</sup>	
TR-3500 440 HT 229 <sup>95</sup>	FM-708R 440 HT 199 <sup>95</sup>	
RM-76 Control unit 39 <sup>95</sup>		

## AES® Store Locations

<b>m</b> = Milwaukee, WI 53216; 4828 W. Fond du Lac Ave.	(414) 442-4200
<b>w</b> = Wickliffe, OH 44092; 28940 Euclid Ave .....	(216) 585-7388
<b>f</b> = Orlando, FL 32803; 621 Commonwealth Ave ....	(305) 894-3238
<b>c</b> = Clearwater, FL 33575; 1898 Drew St .....	(813) 461-4267
<b>v</b> = Las Vegas, NV 89106; 1072 N. Rancho Dr .....	(702) 647-3114
<b>e</b> = Chicago, IL Erickson Communications (associate)	(312) 631-5181

## Local Phone

## Nationwide

## In-State

1-800-558-0411	1-800-242-5195
1-800-321-3594	1-800-362-0290
1-800-327-1917	1-800-432-9424
1-800-634-6227	



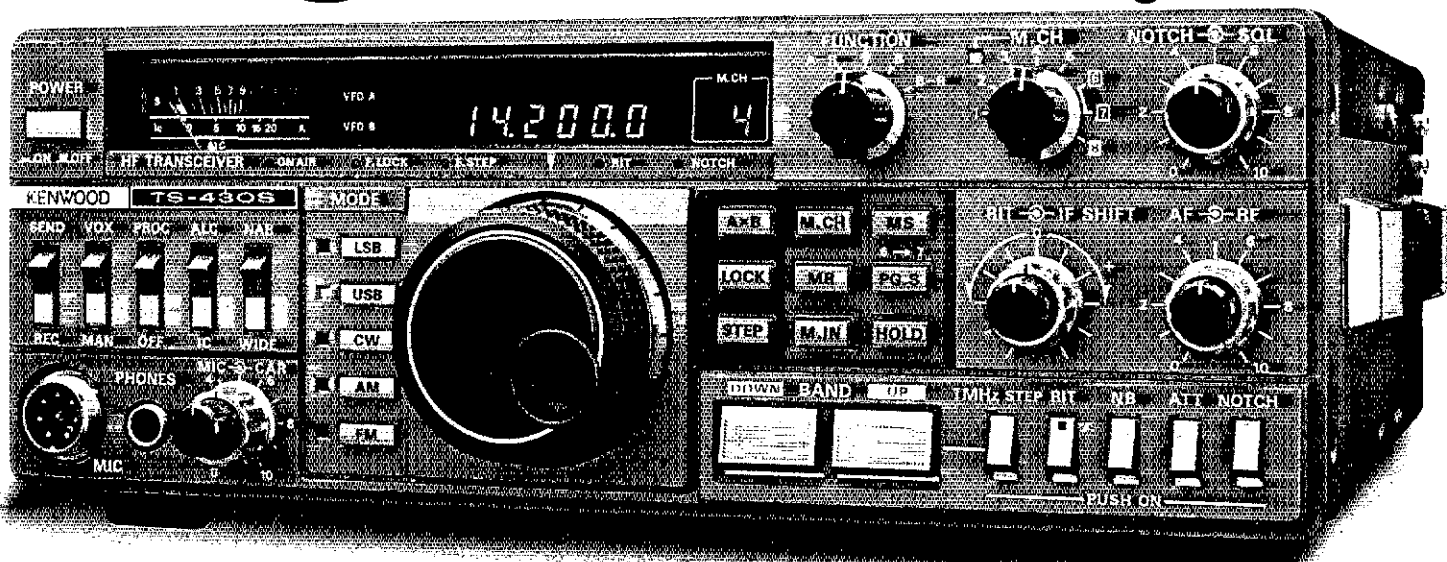


# KENWOOD

...pacesetter in Amateur radio

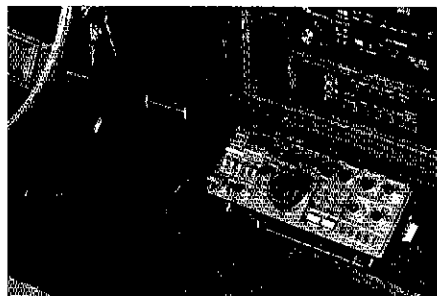
Now more  
affordable!

## “Digital DX-terity!”



### TS-430S

**Digital DX-terity**—that outstanding attribute built into every Kenwood TS-430S lets you QSY from band to band, frequency to frequency and mode to mode with the speed and ease that will help you earn that dominant DX position from the shack or from the mobile!

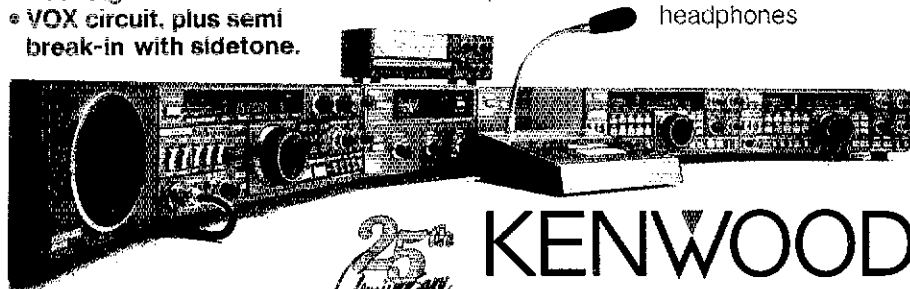
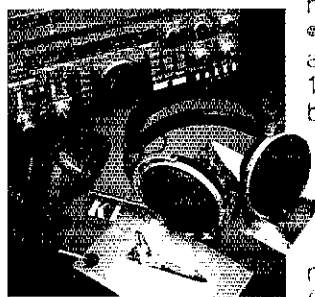


- **Covers all Amateur bands**  
160 through 10 meters, as well as the new 30, 17, and 12 meter WARC bands. High dynamic range, general coverage receiver tunes from 150 kHz to 30 MHz. Easily modified for HF MARS operation.
- **Superb interference reduction**  
Eliminate QRM with the IF shift and tuneable notch filter. A noise blanker suppresses ignition noise. Squelch, RF attenuator, and RIT are also provided. Optional IF filters may be added for optimum interference reduction.

- **Reliable, all solid state design.**  
Solid state design permits input power of 250 watts PEP on SSB, 200 watts DC on CW, 120 watts on FM (optional), or 60 watts on AM. Final amplifier protection circuits and a cooling fan are built-in.
- **Memory channels.**  
Eight memory channels store frequency, mode and band data. Channel 8 may be programmed for split-frequency operation. A front panel switch allows each memory channel to operate as an independent VFO or as a fixed frequency. A lithium battery backs up stored information.
- **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



25th  
Anniversary

## KENWOOD

TRIO-KENWOOD COMMUNICATIONS  
1111 West Walnut Street  
Compton, California 90220

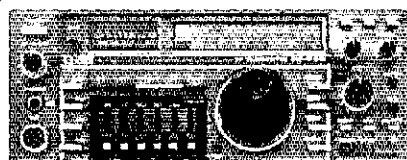
Complete service manuals are available for all Trio-Kenwood transceivers and most accessories. Specifications and prices are subject to change without notice or obligation.



# ICOM

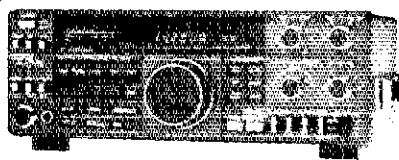
# KENWOOD

# YAESU



IC-735

HF Equipment	List	Juns
IC-735 Gen. Cvg Xcvr	889.00	Call \$
IC-745 Gen. Cvg Xcvr	999.00	Call \$
IC-751A Gen. Cvg Xcvr	1499.00	Call \$
<b>Receivers</b>		
IC-R7000 25-1300+MHz Rcvr	969.00	Call \$
IC-R71A 100kHz-30 MHz Rcvr	849.00	Call \$
<b>VHF</b>		
IC-271A All Mode Base 25w	735.00	Call \$
IC-271H All Mode Base 100W	944.00	Call \$
IC-27A FM Mobile 25w	389.00	Call \$
IC-27H FM Mobile 45w	429.00	Call \$
IC-28A FM Mobile 25w	419.00	Call \$
IC-28H FM Mobile 45w	449.00	Call \$
IC-2AT FM HT	269.50	Call \$
IC-02AT FM HT	369.00	Call \$
<b>UHF</b>		
IC-471A All Mode Base 25W	839.00	Call \$
IC-471H All Mode Base 75w	1149.00	Call \$
IC-47A FM Mobile 25w	489.00	Call \$
IC-4AT FM HT	299.95	Call \$
IC-04AT FM HT	399.00	Call \$
IC-3200A FM 2m/70cm 25W	569.00	Call \$
<b>220MHz</b>		
IC-37A FM Mobile 25w	449.00	Call \$
IC-3AT FM HT	299.95	Call \$
<b>Repeaters</b>		
IC-RP3010 440 MHz	1049.00	Call \$
IC-RP1210 1.2 GHz	1259.00	Call \$



TS-440S/AT

HF Equipment	List	Juns
TS-940SAT Gen. Cvg Xcvr	2099.95	Call \$
TS-940S Gen. Cvg Xcvr	1899.95	Call \$
TS-930S/AT Gen. Cvg Xcvr	1699.95	Call \$
TS-830S Xcvr	999.95	Call \$
TS-630SP Xcvr	799.95	Call \$
TS-430S Gen. Cvg Xcvr	779.95	Call \$
TS-440S/AT Gen. Cvg Xcvr	1099.95	Call \$
TS-440S Gen. Cvg Xcvr	949.95	Call \$
<b>Receivers</b>		
R-1000 200kHz-30 MHz	519.95	Call \$
R-2000 150kHz-30 MHz	629.95	Call \$
TS-670 All Mode Quad 6M	749.95	Call \$
<b>VHF</b>		
TS-711A All Mode Base 25w	839.95	Call \$
TR-751A All Mode Mobile 25w	TBA	Call \$
TM-201B FM Mobile 45w	339.95	Call \$
TM-211A FM Mobile 25w	369.95	Call \$
TM-2530A FM Mobile 25w	399.95	Call \$
TM-2550A FM Mobile 45w	459.95	Call \$
TM-2570A FM Mobile 70w	549.95	Call \$
TH-21AT FM, HT	239.95	Call \$
TR-2600A FM, HT	349.95	Call \$
<b>UHF</b>		
TS-811A All Mode Base 25w	949.95	Call \$
TM-401B FM Mobile 25w	369.95	Call \$
TM-411A FM Mobile 25w	449.95	Call \$
TH-41AT FM, HT	249.95	Call \$
TR-3600 FM HT	359.95	Call \$
<b>220MHz</b>		
TM-3530A FM 220MHz 25w	TBA	Call \$
TH-31AT FM 220 MHz HT	249.95	Call \$
TL-922A HF Amp	1399.95	Call \$



FT 757GX

HF Equipment	List	Juns
FT-ONE Gen. Cvg Xcvr	2859.00	Call \$
FT-757GX Gen. Cvg Xcvr	899.00	Call \$
FT-767 4 Band New	1759.95	Call \$
<b>Receivers</b>		
FRG-8800 150kHz-30 MHz	599.95	Call \$
FRG-9600 60 - 905 MHz	679.95	Call \$
<b>VHF</b>		
FT-270RH FM Mobile 45w	439.95	Call \$
FT-203R/TT FM Handheld 3w	259.95	Call \$
FT-209RH FM Handheld 5w	359.95	Call \$
<b>UHF</b>		
FT-770RH FM Mobile 25w	449.95	Call \$
FT-703R/TT FM Handheld 3w	299.95	Call \$
FT-709RH FM HT 4w	359.95	Call \$
<b>VHF/UHF Full Duplex</b>		
FT-726R All Mode Xcvr	925.00	Call \$
6m/726 6m Module	215.95	Call \$
430/726 430-440MHz	299.95	Call \$
440/726 440-450MHz	299.95	Call \$
HF-726 10-15-20M	225.95	Call \$
SU-726 Sate Duplex	109.95	Call \$
<b>Dual Bander</b>		
FT-2700RH FM 2m/70cm 25w	599.95	Call \$
<b>220MHz</b>		
FT-109 RH New HT	TBA	Call \$
FT-103R/TT FM HT	279.95	Call \$
<b>Repeaters</b>		
FTR-2410 2m Repeaters	1075.00	Call \$
FTR-5410 70cm Repeaters	1249.00	Call \$

**JUN'S**  
**ELECTRONICS**  
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INCLUDES ALASKA HAWAII

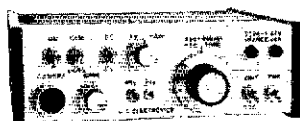
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## AMATEUR TELEVISION

### NEW 70 CM ATV TRANSCEIVER



**\$299 delivered**  
**TC70-1**

SEE US AT DAYTON  
BOOTH 359

\* **FULL COLOR, SOUND & LIVE ACTION** just like broadcast TV. Get on this exciting amateur video mode at our affordable ready to go price.

\* **FEATURES:** small 7x7x2.5". Push to look (PTL) T/R switching. GaAsfet downconverter tunes whole 420-450 mHz band. Two switch selected video & audio inputs . . . 10 pin color camera jack & RCA phone jacks. Xmit video monitor output. Over 1 watt pep RF output on one or two (add \$15) selected crystal controlled freq: 439.25, 434.0, or 426.25 mHz.



## P.C. ELECTRONICS

Maryann WB6YSS 2522 PAXSON ARCADIA, CA 91006 Tom W6ORG



**ATV APPLICATIONS:** you can show the shack, projects, home video tapes, computer graphics & listings, repeat SSTV, or even Space Shuttle video & audio if you have a home satellite receiver. Do public service events such as marathons, races, parades, search & rescue, major fires, repeat weather radar, etc. DX depends on terrain and antennas, typ. 1 to 40 miles. For greater DX we have 20 watt amp for \$109 and 50 watts for \$185.

**WHAT IS REQUIRED FOR A COMPLETE OPERATING SYSTEM?** The TC70-1s downconverter outputs to any TV on ch 3 for receiving. Connect a good 70 cm antenna and low loss coax. Plug in camera, VCR, computer, etc. or any composite video source. Plug in mic for standard 4.5 mHz TV sound. Connect to 13.8 vdc for base mobile or portable. SEE Chapt. 20 1985 ARRL Handbook. That's it!

**CALL (818) 447-4565 OR WRITE FOR OUR CATALOG,** more info, or who is on in your area. Downconverters start at \$49 to receive. We stock antennas, modules and everything you need for ATV. Prices include UPS surface in cont. US. Transmitting equipment sold only to licensed Tech class or higher amateurs verifiable in 85 callbook or copy of new license.

# KENWOOD

...pacesetter in Amateur radio

## Handy Handful...

### TR-2600A/3600A

Kenwood's TR-2600A and TR-3600A feature DCS (Digital Code Squelch), a new signalling concept developed by Kenwood. DCS allows each station to have its own "private call" code or to respond to a "group call" or "common call" code. There are 100,000 different DCS combinations possible.



The Kenwood TR-2600A and the TR-3600A pack "big rig" features into the palm of your hand. It's really a "handy handful"!

#### Optional accessories:

- TU-35B built in programmable sub-tone encoder
- VB-2530 2-m 25 W RF power amp.
- ST-2 base stand/charger
- MS-1 mobile stand/charger
- PB-26 Ni-Cd battery
- DC-26 DC-DC converter
- HMC-1 headset with VOX
- SMC-30 speaker microphone
- LH-3 deluxe leather case
- SC-9 soft case with belt hook
- BT-3 AA manganese/alkaline battery case
- EB-3 external C manganese/alkaline battery case
- RA-3 2-m telescoping antenna
- RA-5 2-m/70-cm telescoping antenna
- AX-2 shoulder strap w/ant. base
- CD-10 call sign display
- BH-2A belt hook

More TR-2600A and TR-3600A information is available from authorized Kenwood dealers.

#### • Simple to operate

Functional design is "user friendly." Built-in 16-key autopatch encoder. TX STOP switch, REVERSE switch, KEYBOARD LOCK switch, high efficiency speaker.

#### • Large LCD

Easy to read in direct sunlight or in the dark with convenient dial light that also illuminates the top panel S-meter.

#### • Extended frequency coverage

Allows operation on most MARS and CAP frequencies. Receive frequency range is 140-160 MHz. (TR-3600A covers 440-450 MHz.)

#### • Programmable scan

Channel scan or band scan, search for open or busy channels.

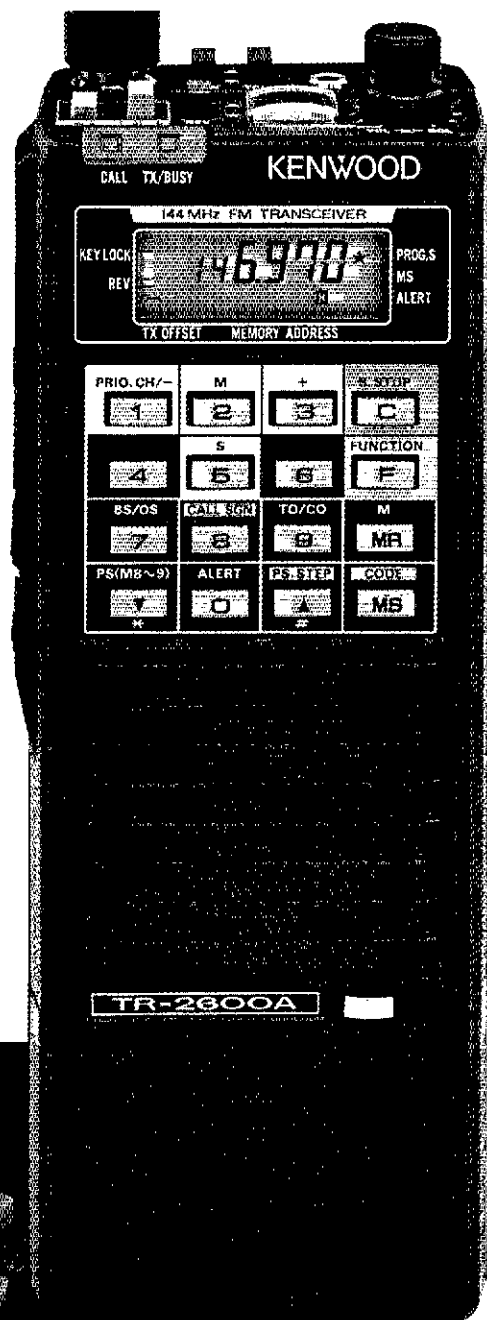
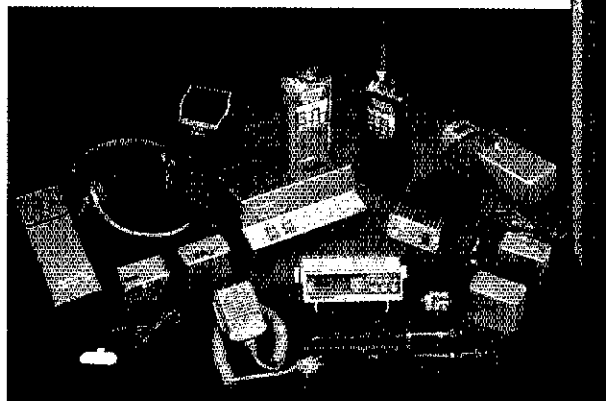
#### • SLIDE-LOC battery case

#### • 10 Channels

10 memories, one for non-standard repeater offsets.

#### • 2.5 watts high power, 350 mW low

TR-3600A has 1.5 watts high or 300 mW low.



## KENWOOD

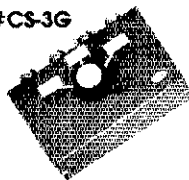
TRIO-KENWOOD COMMUNICATIONS  
1111 West Walnut Street  
Compton, California 90220

TR-2600A shown. TR-3600A is available for 70 cm operation.  
Complete service manuals are available for all Trio-Kenwood transceivers and most accessories.  
Specifications and prices are subject to change without notice or obligation.

# coaxial R. F. antenna switches

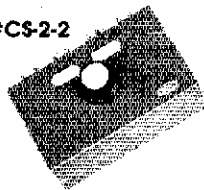
Heavy Duty switch for true 1 Kw POWER - 2 Kw P.E.P.

#CS-3G



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\*

#CS-2-2



2 Pole, 2 Position, bypasses,  
linears, reflectometers, antenna  
tuners, etc.  
#CS-2-2 -  
UHF connectors / \$34.25\*

#CS-6G



Single Pole, 5 Position, all unused  
positions grounded.  
#CS-6G -  
UHF connectors / \$32.00\*  
#CS-6G-BNC -  
BNC connectors / \$46.50\*

\* Shipping and handling for any item add \$2 each.

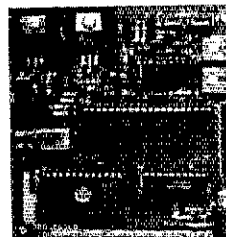


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## MICROCOMPUTER REPEATER CONTROL



\$129

Introducing the MICRO REPEATER CONTROLLER RPT-2A, a new concept in LOW COST, EASY TO INTERFACE, microcomputer repeater control. Replace old logic boards with a state of the art microcomputer that adds NEW FEATURES, HIGH RELIABILITY, LOW POWER, SMALL SIZE, and FULL DOCUMENTATION to your system. Direct interface (drop in) with most repeaters. Detailed interface information included. Original MICRO REPEATER CONTROL article featured in QST 1 Dec. 1983.

TWO CW ID MESSAGES  
TIME OUT TIMER  
PRE-TIMEOUT WARNING MSG.  
POST TIMEOUT CW MSG  
COURTESY BEEP  
AUXILIARY INPUTS

RECONFIGURABLE-COR INPUT  
HIGH CURRENT PTT INTERFACE  
SINE WAVE TONE GENERATOR  
LOW POWER 9-15 VDC @ 200ma  
SIZE 3.5" x 3.5"

ALL CONNECTORS INCLUDED  
RPT-2A KIT ONLY . . . \$129 plus \$3.00 shipping

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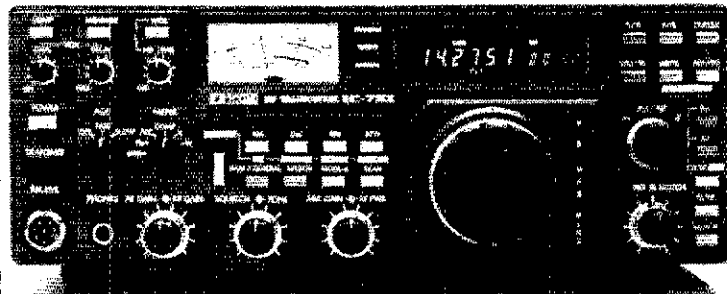
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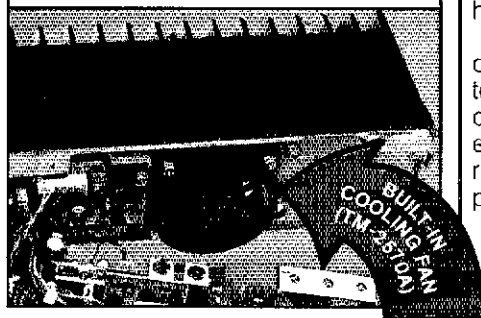
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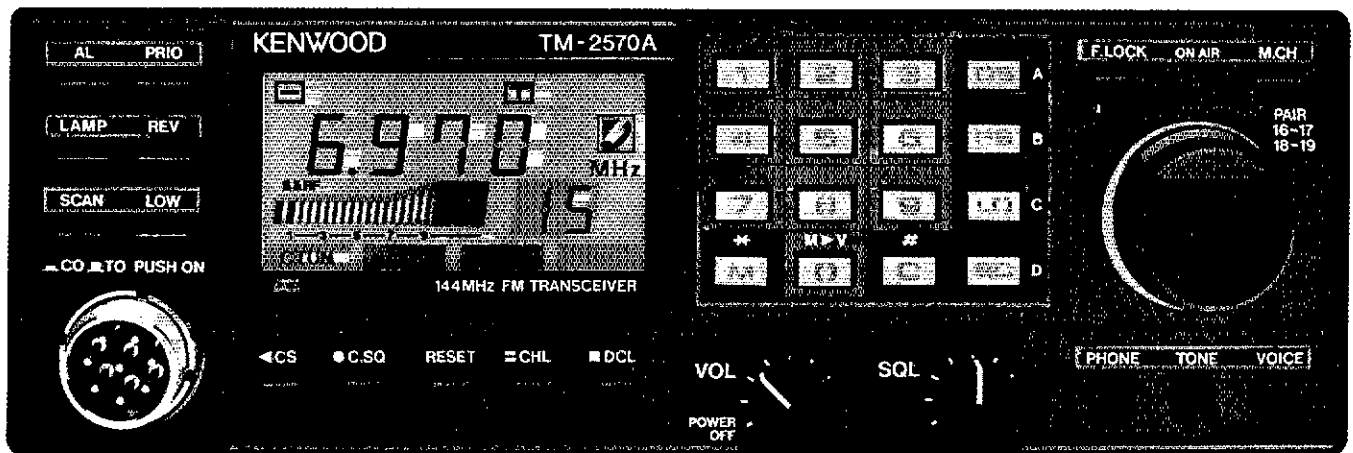


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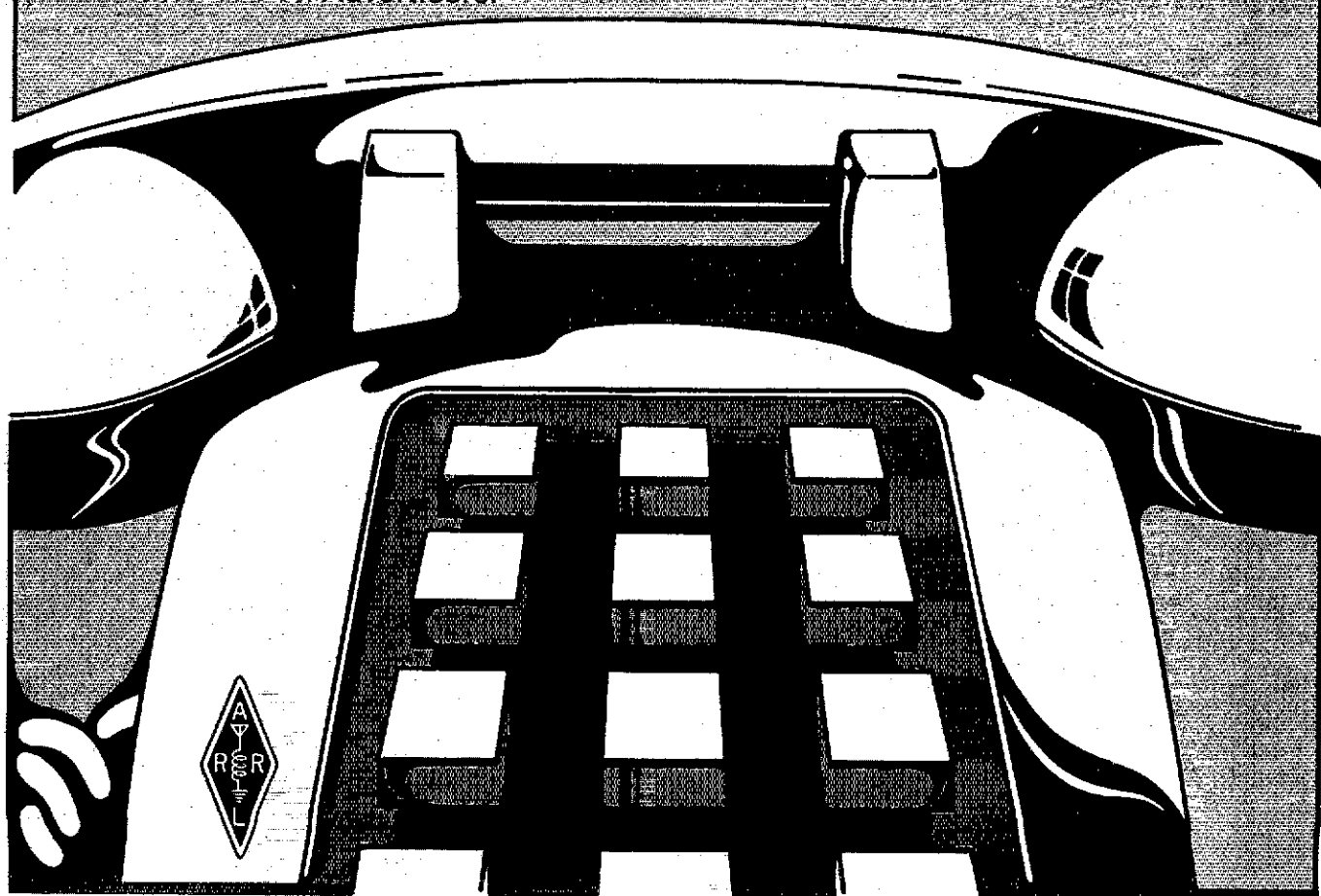
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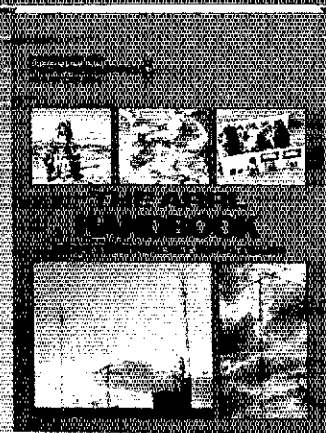
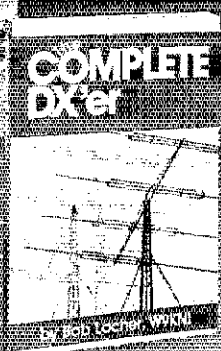
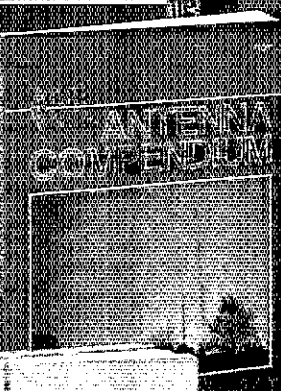
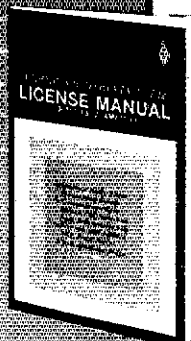
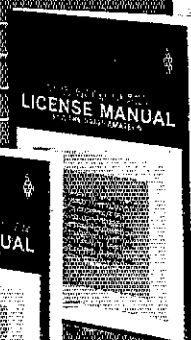
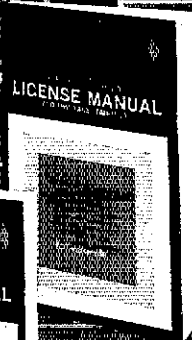
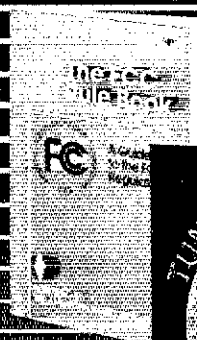
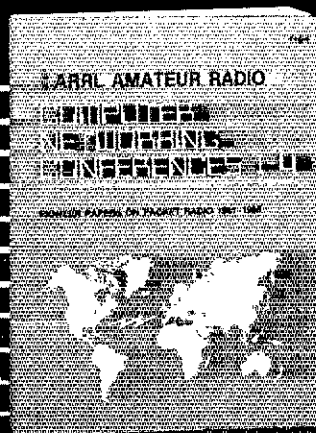
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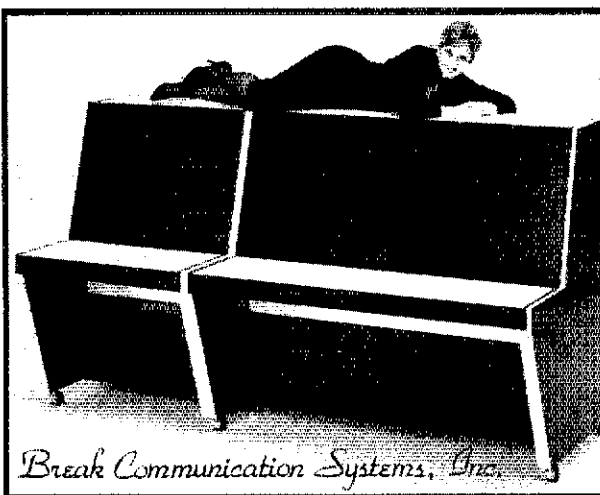
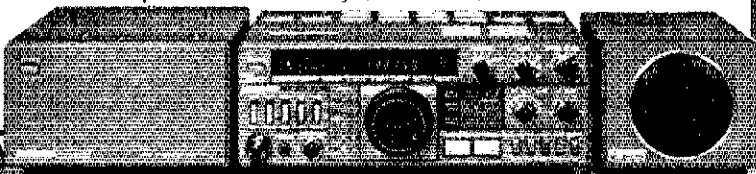
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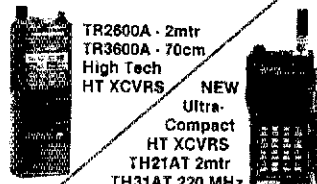
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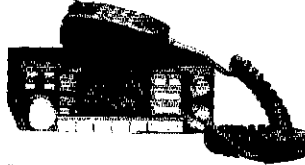
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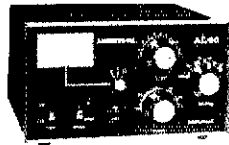
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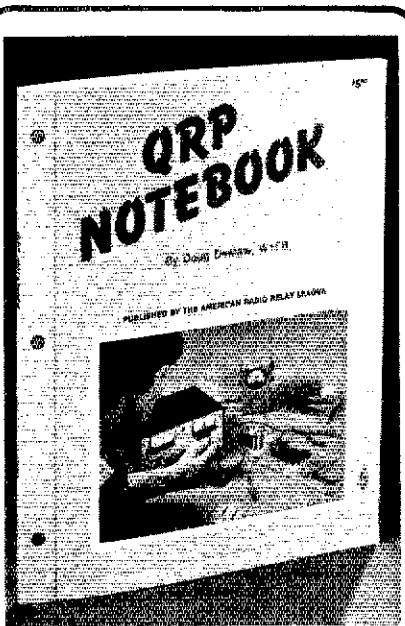
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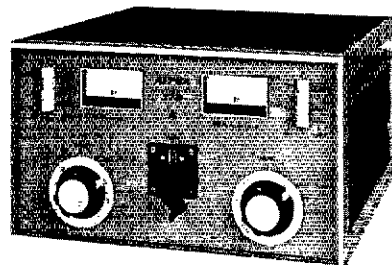
Experimentation and low-power operating go hand in hand. Construction of a complete modern transceiver is a major undertaking, but some of the circuits in this book can be put together in an evening or a weekend from a few dollars' worth of parts. Once built, the equipment can be tested and improved as your understanding and skill grow. Many of the simpler circuits can be used later as parts of the more complex projects.

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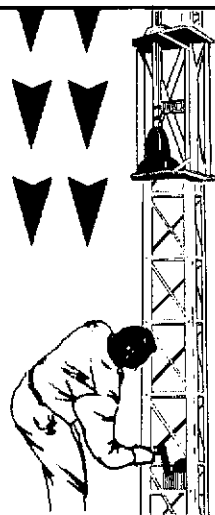
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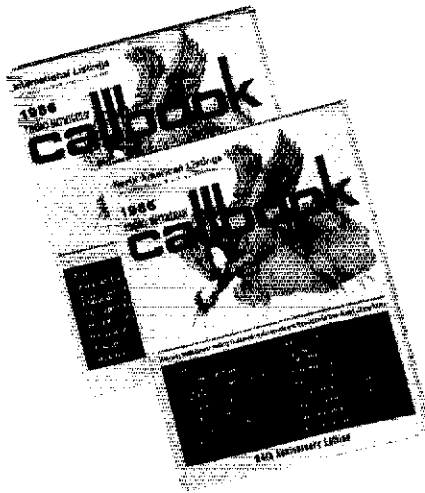
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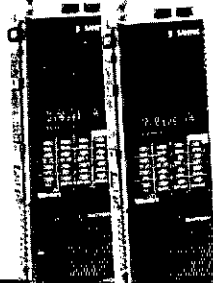
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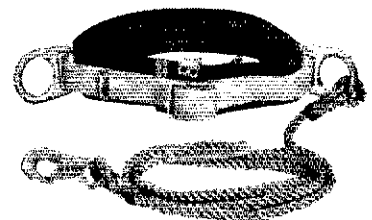
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228FB	28 element 2 mtr. 'Boomer'.....	\$149.00
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424B	24 element 'Boomer'.....	\$81.00
R3	20-15-10 mtr. vertical.....	\$267.00
10-4CD	4 element 10 mtr. 'Skywalker'.....	\$108.00
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48TV	40-10 mtr. vertical.....	\$79.00
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CDE	CD45-II [8.5 sq. ft.].....	\$155.00
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[2-18 & 6-22]	4080 - per foot.....	\$0.18
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FOR SALE: Yaesu FT-902DM all mode, all band xcvr, Heath SB-614 Monitor Scope, SB-634 Sta. Console. Moving. WDSIAA 504-845-8067 before 9 P.M. CDT.

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GONSET 2-METER AM Transceiver with Manual. Model 3341. Includes plans for FM conversion. \$35 plus UPS. J. Lieb, Box 3750, Ventura, CA 93006. 805-644-7696.

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THE RADIO CLUB of Junior High School 22 N.Y.C. Inc. is a non-profit organization incorporated under the laws of the State of New York with the goal of using the theme of Ham Radio to further and enhance the education of young people. Your equipment donation would be greatly appreciated. Please contact WB2JKJ via Callbook or telephone 516-674-4072, 24 hours, seven days a week. Thank You!

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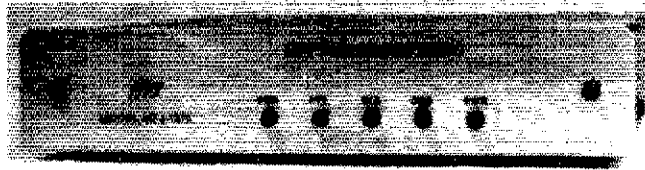
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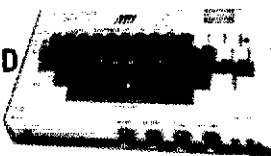
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You get the convenience of a dedicated keyboard—no program to load—no interface to connect—just turn it on and it's ready to use.

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Lab quality power supply gives you plenty of voltage and current for all your analog and digital circuits. 3 completely isolated outputs: 2 variable 1.5-20 VDC at 0.5 amp and a fixed 5 VDC at 1 amp. Connect in series or parallel for higher voltage and current. It's short circuit protected, has excellent line (typ. 0.01%/V) and load regulation (typ. 0.1%). Lighted meters monitor volt./cur. 12x3x6 in. 110 VAC.

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—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. 6½ x 3¼ x 4½ inches.

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Instantly select any antenna or rig by turning a knob. Organizes coax cables and eliminates plugging and unplugging. Unused terminals are grounded to protect your equipment for stray RF, static and lightning. 2 KW PEP, 1 KW CW. For 50 to 75 ohm. Negligible loss, SWR, and crosstalk gives high performance. SO-239s. Convenient desk or wall mounting.

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\$29.95 MFJ-1701



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This new breakthrough 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.

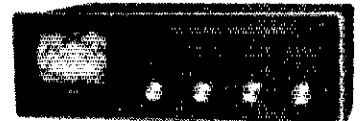
- Indicate transmission line radiation due to high SWR, poor shielding or antenna imbalance.
- Detect re-radiation from rain gutters and guy wires that can distort antenna field patterns.
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- Locate the best place for your mobile antenna.
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Monitors RF current by sensing magnetic field. Uses an electrostatically shielded ferrite core, FET RF amplifier, op-amp meter circuit for excellent sensitivity, selectivity. 1.8-30 MHz. Has sensitivity, bandswitch, tune controls, telescoping antenna for field strength meter. 4 x 2 x 2 inches.



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MFJ-949C \$149.95



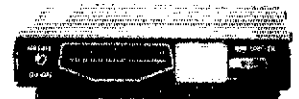
MFJ's best 300 watt tuner is now even better! The MFJ-949C all-in-one Deluxe Versa Tuner II gives you a tuner, cross-needle SWR/Wattmeter, dummy load, antenna switch and balun in a new compact cabinet. You get quality conveniences and a clutter-free shack at a super price.

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.

Run up to 300 watts RF output—and match coax, balanced lines or random wires from 1.8 thru 30 MHz. Tune out SWR on dipoles, vees, long wires, verticals, whips, beams/quads. 10x3x7 in.

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# MFJ TUNERS

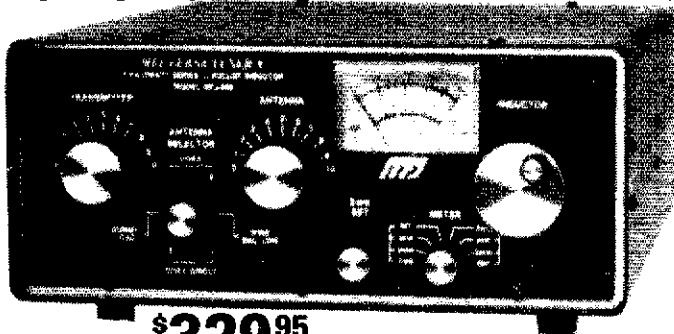
This may be the world's most popular 3 KW roller inductor tuner because it's small, compact, reliable, matches virtually everything and gives you SWR/Wattmeter, antenna switch, dummy load and balun — all at a great price!

Meet "Versa Tuner V". It has all the features you asked for, including the new smaller size to match new smaller rigs—only 10 3/4" W x 4 1/2" H x 14 7/8" D.

Matches coax, balanced lines, random wires—1.8 to 30 MHz, 3 KW PEP—the power rating you won't outgrow (250pf-6KV caps).

Roller inductor with a 3-digit turns counter plus a spinner knob for precise inductance control to get that SWR down to minimum every time.

Built-in 300 watt, 50 ohm dummy load, built-in 4:1 ferrite balun.



MFJ-989

**\$329.95**

Accurate meter reads SWR plus forward and reflected power in 2 ranges (200 and 2000 watts). Meter light requires 12 VDC. Optional AC adapter, MFJ-1312 is available for \$9.95.

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.

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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.

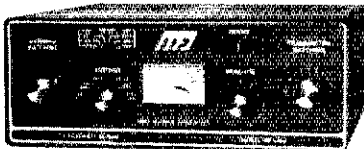
New airwound inductor! Larger more efficient 12 position airwound inductor gives lower losses and more watts out. Run up to 300 RF power output.

Matches everything from 2.8 to 30 MHz! dipoles, inverted vee, random wires, verticals, mobile whips, beams, balanced and coax lines.

Built-in 4:2 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-962 **\$229.95**

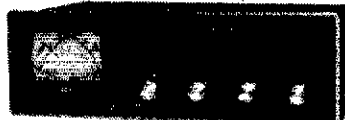


Run up to 1.5 KW PEP and match any feedline continuously from 1.8 to 30 MHz: coax, balanced line or random wire.

Built-in SWR/Wattmeter has 2000 and 200 watt ranges, forward and reflected power. 2% meter movement. 6 position antenna switch handles 2 coax lines (direct or through tuner), wire and balanced lines. 4:1 balun 250 pf 6 KV variable capacitors. 12 position inductors. Ceramic rotary switch. All metal black cabinet and panel gives RFI protection, rigid construction and sleek styling. Flip stand tilts tuner for easy viewing, 5 x 14 x 14 in.

## 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).

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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.

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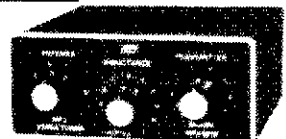
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6 positions. White markable surface for antenna positions.



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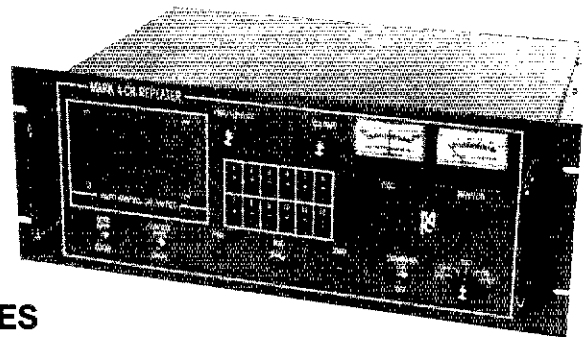
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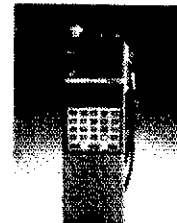
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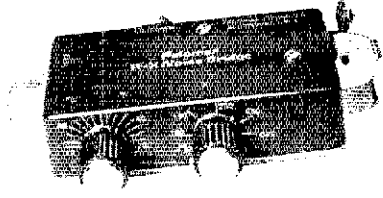
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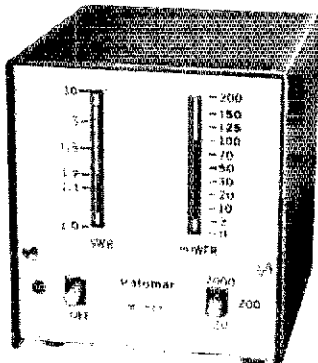


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### Index of Advertisers

AEA: Advanced Electronic Applications, Inc.: 4  
ADN: Advanced Design Networks, Inc.: 132  
AVC Innovations: 124  
Advanced Receiver Research: 100  
Alinco Electronics Corp.: 119  
All Electronics Corp.: 141  
Alpha Delta Communications, Inc.: 108  
Amateur Electronic Supply: 101, 109, 134, 138  
Amateur Wholesale Electronics: 121  
American Radio Relay League: 118, 124, 128, 130, 131, 132, 138, 143, 144, 145, 146, 149, 153, 157  
ARRL National Convention: 97  
Ameritron Div., Prime Instruments, Inc.: 152  
Amidon Associates: 111  
Amp Supply Co.: 126  
AMRAD: 108  
Associated Radio: 98  
Autek Research: 106  
Autocode: 132  
BCS-Break Communications Systems, Inc.: 147  
Barker & Williamson: 138  
Barry Electronics: 110  
Bencher, Inc.: 153  
Buckmaster Publishing: 141  
Butternut Electronics Co.: 98  
C-Comm: 94, 95  
Certified Communications: 147  
Communication Concepts, Inc.: 100  
Cotec: 147  
Cubex: 153  
Curtis Electro Devices: 132  
Cushcraft Corp.: 5  
Daiwa USA Inc.: 91  
Delaware Amateur Supply: 140  
Desert Designations: 111  
Dick Smith Electronics: 141  
ECM Electronics: 140  
EEB/Antenna Bank: 104  
EGE, Inc.: 102, 103, 118  
Encomm, Inc.: 142  
Fairfield Amateur Radio Association: 116  
Fair Radio Sales: 140  
Fox Tango Corp.: 120, 140  
Glen Martin Engineering: 149  
Ham Radio Outlet: 86, 87, 88, 107

Ham Station, The: 156  
Heaster Inc., H.L.: 120  
Henry Radio Stores: Cov. II  
Hustler Inc.: 92  
ICOM America Inc.: 2, 112, 113, 115, 117  
IIX Equipment Ltd.: 141  
Jun's Electronics: 136  
K2AW's Silicon Alley: 132  
Kantronics: 93  
La Cue Communications: 120  
Lambda Vector Corp.: 114  
Larsen Electronics, Inc.: 90  
MFJ Enterprises, Inc.: 154, 155  
Madison Electronics Supply: 105  
Memphis Amateur Electronics Inc.: 147  
Michigan Radio: 114  
Micro Control Specialties: 156  
Microcraft Corp.: 110  
Microlog Corp.: 89  
Missouri Radio Center: 160  
National Tower Company: 151  
Nemal Electronics International, Inc.: 124  
Northeast Electronics Supply Co., Inc.: 147  
N.P.S., Inc.: 138  
Nye Co., William M.: 111  
P.C. Electronics: 136  
PX Shack, The: 106  
Palomar Engineers: 116, 158  
Payne Radio: 149  
Processor Concepts: 138  
rf Enterprises: 99  
RF Parts Co.: 92  
Radio Amateur Callbook: 150  
Radiokit: 96  
Radio World: 124  
Ross Distributing Company: 111  
Space Electronics Corp.: 116  
Spider Antennas: 153  
Spi-Ro Manufacturing, Inc.: 120  
Telex Communications: 127, 129  
Telrex Labs: 116  
Texas Towers Inc.: 148, 159  
TNT Radio Sales, Inc.: 152  
Trio-Kenwood Communications, Inc.: Cov. IV, 1, 6, 7, 133, 135, 137, 139  
U.P.I. Communication Systems, Inc.: 150  
U.S. Tower Company: 96  
Universal Amateur Radio: 150  
Universal Radio Co.: 141  
Van Gordon Engineering: 124  
Van Valzah Co., H.C.: 157  
W9INN Antennas: 140  
Watt Engineering: 147  
Western Electronics: 150  
Wheeler Applied Research: 157  
Williams Radio Sales: 150  
Wrightapes: 140  
Yaesu USA: Cov. III, 10, 122, 123



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\*Note—towers rated at 80 mph to EIA specifications

## RG-213U

\$ .29/ft \$279/1000 ft  
Up to 600 ft via UPS

- RG-213/U—95% Bare Copper Shield
- Mil-Spec Non-contaminating Jacket for longer life than RG8 cables
- Our RG-213/U uses virgin materials.
- Guaranteed Highest Quality!

## RG-8X

\$ .19/ft \$179/1000 ft

- RG8X—95% Bare Copper Shield •Low Loss
- Non-contaminating Vinyl Jacket Foam Dielectric

Cable Type	Imped.	10 MHz	30 MHz	150 MHz	450 MHz
RG-213/U	50	6	9	2.3	5.2
RG8X	52	8	12	3.5	5.8
RG-58/U	52	1.4	1.9	6.0	12.5
1/2" Alum	50	3	5	1.2	2.2
1/2" Heliax	50	2	4	9	1.6
1/2" Heliax	50	1	2	5	9

## ALPHA DELTA

DX-A 160-80-40 Sloper... \$49

## CUSHCRAFT

A3 3-el Triband Beam	\$229
A4 4-el Triband Beam	\$299
A743 & A744, 30/40 mtr KIT for the A3 & A4	ea. \$79
R3 20, 15, 10mtr Vertical	\$275
AV5 80-10mtr Vertical	\$109
D40 40mtr Dipole	\$159
40-2CD 2-el 40 mtr Beam	\$299
AS0-5-5-el 6mtr 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 2mtr Beam	\$99
220B 17-el 220MHz Beam	\$99
424B 24-el 432MHz Beam	\$85
ARX2B 2mtr Vertical	\$39

## BUTTERNUT ELECTRONICS CO

### HF6V 80-10 Mtr. Vertical Antenna \$129

Delivered (Cont. USA)

- Full Legal Power 80/10 Meters
- Optional Stub Tuned Radial Kit Model STR II \$29
- Optional Roof Mounting Kit Model RMK II \$49 (includes STR II)
- Optional 160 Meter Resonator Kit Model TBR 160 \$49

### HF2V 80/40 Meter Vertical Antenna \$129

Delivered (Continental USA)

- Optional 160 Meter Resonator Kit Model TBR 160 \$49

## ROHN GUYPED TOWERS

10 ft Stack Sections

20G \$39.50	45G \$112.50
25G \$49.50	55G \$149.50

All 20G, 25G, 45G and 55G Accessories In Stock at Discount Prices - CALL!

Foldover Towers	Height	Ant Load*	Price
FK2548	48 ft	15.4 sq ft	\$899
FK2558	58 ft	13.3 sq ft	\$949
FK2568	68 ft	11.7 sq ft	\$999
FK4544	44 ft	34.8 sq ft	\$1199
FK4554	54 ft	29.1 sq ft	\$1299
FK4564	64 ft	28.4 sq ft	\$1399

25G Foldover Double Guy Kit... \$249  
45G Foldover Double Guy Kit... \$269

\*Above antenna loads for 70 MPH winds and Guys at Hinge & Apex

All Foldover Towers Shipped Freight Prepaid Continental USA! Foldover Prices 10% Higher West of Rockies

## HARDLINE/HELIAXTM

Lowest Loss for VHF/UHF!

1/2" Alum w/poly Jacket	\$ .79/ft
1/2" LDF-4-50 Andrew HeliaxTM	\$1.79/ft
1/2" LDF-5-50 Andrew HeliaxTM	\$3.99/ft

select connectors below

## hy-gain

Discoverer 2-el 40-mtr Beam  
Discoverer 3-el Conversion Kit  
EXPLORER-14 SUPER-SPECIAL  
OK7 10 30/40 mtr. And-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  
18 AVT/WB 80-10mtr Vertical  
18HTS 80-10 mtr Hy-Tower Vertical  
23BS 3-el 2 mtr Beam  
25BS 5-el 2 mtr Beam  
28BS 8-el 2 mtr Beam  
214BS 24-el 2-mtr Beam  
2810 30/40 mtr Trap Dipole  
55BS 30-10 mtr Trap Dipole  
556B 80-10 mtr KW Balun W/Coax Seal

Limited Quantities purchased at old prices. Call for current prices.

## HF4B "Butterfly"

\$199. (del. cont. USA)

- Covers 10, 12, 15, 20M
- Compact Beam Design
- Max. Element Length of 12.5'
- Light Weight, Only 17 lbs.
- Use with TV Rotor

Free Shipping On Butternut Accessories Also When Purchased With Antenna

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KT34A 4-el Broad Band Triband Beam	\$339
KT34XA 6-el Broad Band Triband Beam	\$489
2m-14C 14-el 2-mtr Satellite Antenna	\$89
2m-16LBX NEW-16-el 2-mtr Beam	\$99
2m 22C NEW-22-el 2-mtr Satellite Antenna	\$119
432-30LBX NEW-30-el 432 MHz Antenna	\$199
435-18C 435 MHz Satellite Antenna W/CS-2	\$119
435-40CX 435 MHz Satellite Antenna W/CS-2	\$159

## ROTORS

Alliance HD73 (10.7 sq ft rating)	\$119.95
Alliance U110 (3 sq ft rating)	\$49
Telex CD 4511 (8.5 sq ft rating)	\$CALL
Telex HAM 4 (15 sq ft rating)	\$CALL
Telex Talltwister (20 sq ft rating)	\$CALL
Telex HDR3000 Heavy Duty (25 sq ft rating)	\$CALL
Kenpro KR500 Heavy Duty Elevator Rotator	\$189
Kenpro KR540 AZ/EL Rotor Package	\$319

## 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)

## TOWER/GUY HARDWARE

3/16 EHS Guywire (3990 lb rating)	\$ 15/ft
1/4 EHS Guywire (6650 lb rating)	\$ 18/ft
5/16 EHS Guywire (11,200 lb rating)	\$ 29/ft
5/32 x 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 x 9E (1/2" x 9" Eye to Eye Turnbuckle)	\$9.95
1/2 x 9EJ (1/2" x 9" Eye & Jaw Turnbuckle)	\$10.95
1/2 x 12EE (1/2" x 12" Eye & Eye Turnbuckle)	\$12.95
1/2 x 12EJ (1/2" x 12" Eye & Jaw Turnbuckle)	\$13.95
5/8 x 12EJ (5/8" x 12" Eye & Jaw Turnbuckle)	\$16.95
3/16 "Preformed Guy Grip	\$2.49
1/4 "Preformed Guy Grip	\$2.99
6" Diam - 4 ft Long Earth Screw Anchor	\$14.95
500 D Guy Insulator (5/32" or 3/16" Cable)	\$1.69
502 Guy Insulator (1/4" Cable)	\$2.99
5/8" Diam - 8 ft Copper Clad Ground Rod	\$12.95

## PHILLYSTRAN GUY CABLE

HPTG2100 Guy Cable (2100 lb rating)	\$ 29/ft
HPTG4000 Guy Cable (4000 lb rating)	\$ 49/ft
HPTG6700 Guy Cable (6700 lb rating)	\$ 69/ft
9901LD Cable End (for 2100/4000 cable)	\$8.95
9902LD Cable End (for 6700 cable)	\$9.95
Socketfast Potting Compound (does 6-8 ends)	\$14.95

## GALVANIZED STEEL MASTS

Heavy Duty Steel Masts 2 in OD - Galvanized Finish

Length	5 FT	10 FT	15 FT	20 FT
12 in Wall	\$29	\$49	\$69	\$89
18 in Wall	\$39	\$69	\$99	\$129
25 in Wall	\$69	\$129	\$189	\$249

## AMPHENOL CONNECTORS

Silver PL259... \$1.25  
UG21B N Male... \$2.95 UG23D N Female... \$2.95

## Antenna Wire & Accessories

Solid Copperwire	12 ga. \$ .12/ft	14 ga. \$ .10/ft
Stranded Copper	14 ga. \$ .10/ft	16 ga. \$ .09/ft

1/2 mile 18 ga copper-clad steel wire... \$30  
6 inch heavy-duty end insulator... \$3.00/ea.  
Dog-bone insulator \$ .79 Coax seal... \$2.50

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11 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... \$25.95  
G5RV all band antenna... \$49.95

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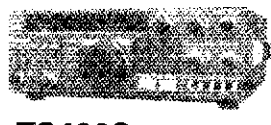
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- 2.5 W/300 MW 2 Meter HT
- LCD Readout
- 10 Memories
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**TH-21AT "THE Smallest HT"**

- Compact Pocket Size
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- Dual VFO's
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- 100% Duty Cycle

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- Duo-Band Full Duplex
- 25 Watt
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**FRG-9600**

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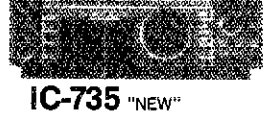
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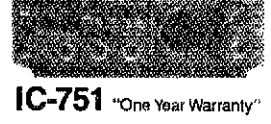
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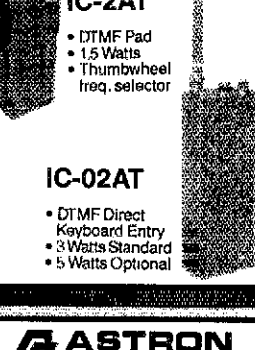
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- 9 Memories
- Scanning

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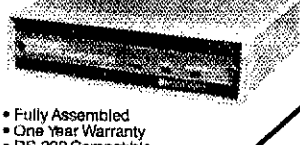
- DTMF Pad
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Two affordable radios in one—that's exciting.

Yaesu's dual-band FT-727R packs our best HT know-how into one compact design. At a price that's in step with your ham budget.

Hit hard-to-reach repeaters with a powerful 5 watts on both 2 meters and 440 MHz.

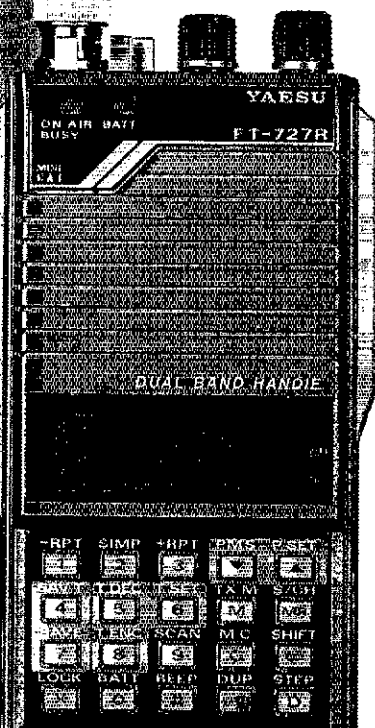
Work the bands quickly and easily with a wealth of microprocessor-controlled commands:

Jump between the separate VHF and UHF VFO registers. Ten memories store any VHF or UHF frequency, and tone encode/decode information. (Four memories retain repeater shift data).

Scan the memory channels, the entire band, or a band segment. And return to any special frequency with the priority feature.

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Prices and specifications subject to change without notice.

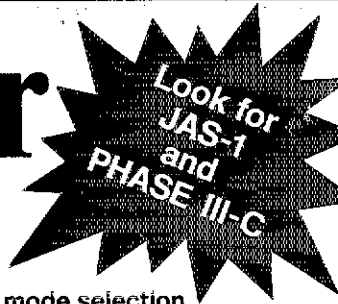
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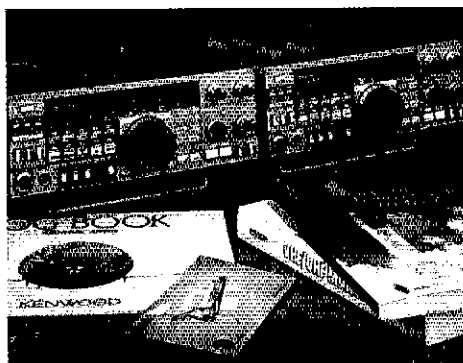
## Matching Pair

### TS-711A/811A VHF/UHF all-mode base stations



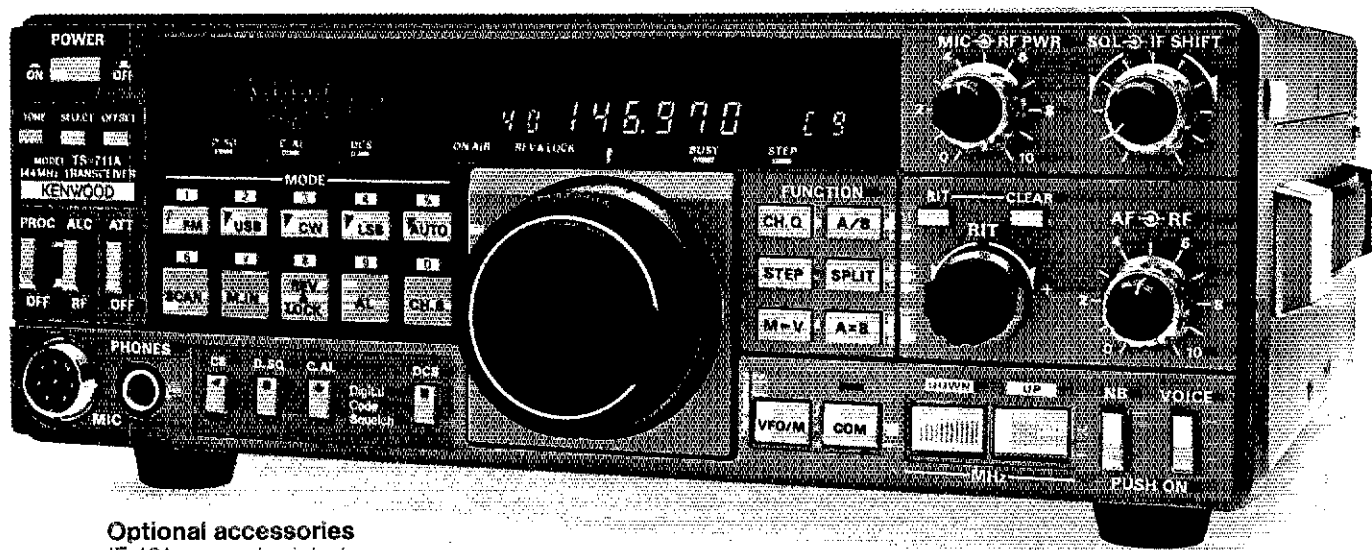
The TS-711A 2 meter and the TS-811A 70 centimeter all mode transceivers are the perfect rigs for your VHF and UHF operations. Both rigs feature Kenwood's new Digital Code Squelch (DCS) signaling system. Together, they form the perfect "matching pair" for satellite operation.

- **Highly stable dual digital VFOs**  
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- **40 multi-function memories**  
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- **Versatile scanning functions**  
Programmable band and memory scan (with channel lock-out). "Center-stop" tuning on FM. An "alert" function lets you listen for activity on your priority channel while listening on another frequency. **A Kenwood exclusive!**
- **RF power output control**  
Continuously adjustable from 2 to 25 watts.

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You may select the mode manually using the front panel mode keys. Manual mode selection is verified in International Morse Code.
- **All-mode squelch**
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- **Speech processor**  
For maximum efficiency on SSB and FM.
- **IF shift**
- **"Quick-Step" tuning**  
Vary the tuning characteristics from "conventional VFO feel" to a stepping action.
- **Built-in AC power supply**  
Operation on 12 volts DC is also possible.
- **Semi break-in CW, with side tone**
- **VS-1 voice synthesizer (optional)**  
More TS-711A/811A information is available from authorized Kenwood dealers.



#### Optional accessories

- IF-10A computer interface
- IF-232C level translator
- CD-10 call sign display
- SP-430 external speaker
- VS-1 voice synthesizer
- TU-5 CTCSS tone unit
- MB-430 mobile mount
- MC-60A, MC-80, MC-85 deluxe desk top microphones
- MC-48 16-key DTMF, MC-42S UP/DOWN mobile hand microphones
- SW-200A/B SWR/power meters:  
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- SWT-1 2-m antenna tuner
- SWT-2 70-cm antenna tuner
- PG-2J DC power cable

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