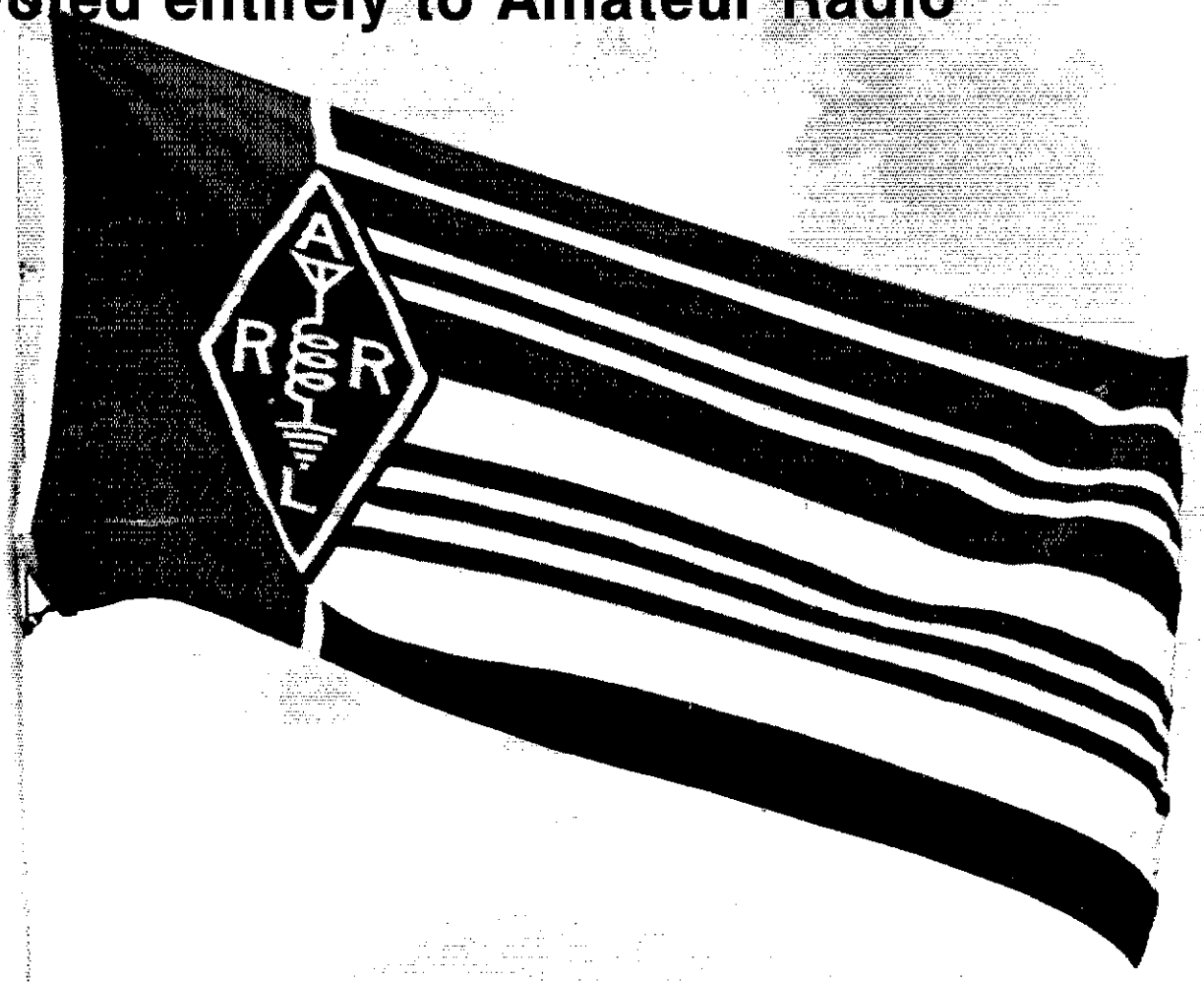
QST

October 1980 $2.50

devoted entirely to Amateur Radio



The ARRL flag

Shown with optional touch tone pad

tempo...

the first in synthesized portables gives you the broadest choice at the lowest price

...the new S-5

* The only synthesized hand-held offering 5 watts output. (Switchable for 1 or 5 watt operation)
* The same dependability as the time proven S-1. Circuitry that has been proven in more than a million hours of operation.
* Heavy duty battery pack.
* External microphone capability.
* The S-5's exciting low price...only $299.00
* With touch tone pad $339.00

SPECIFICATIONS

Frequency Coverage:	144 to 148 MHz
Channel Spacing:	Receive every 5 kHz, transmit Simplex or ± 600 kHz
Power Requirements:	9.6 VDC
Current Drain:	17 ma-standby 900 ma-transmit
Antenna Impedance:	50 ohms
Dimensions:	40 mm x 62 mmx 170 mm (1.6" x 2.5" x 6.7")
Weight:	17 oz.
Sensitivity:	Better than .5 microvolts nominal for 20 db

SUPPLIED ACCESSORIES
Telescoping whip antenna, ni-cad battery pack, charger.

OPTIONAL ACCESSORIES
12 Button touch tone pad (not installed): $39 • 16 Button touch tone pad (not installed): $48 • Tone burst generator: $29.95 • CTCSS sub-audible tone control: $29.95 • Rubber flex antenna: $8 • Leather holster: $16 • Cigarette lighter plug mobile charging unit: $6 • Matching 30 watt output 13.8 VCD power amplifier (S30): $89 • Matching 80 watt output power amplifier (S80): $149

The new improved Tempo S-1

- The first and most thoroughly field tested hand-held synthesized radio available. 800 channels in the palm of your hand.
- Simple to operate. (You don't need a *degree in computer programming)*
- Heavy duty battery pack allows more operating time between charges.
- External microphone capability
- The lowest price ever...$259.00
- *The S-1T (With touch tone pad installed)...$289.00*

The Tempo S-2

Tempo is first again. This time with a superior quality synthesized 220 MHz hand held transceiver. With an S-2 in your car or pocket you can use 220 MHz repeaters throughout the U.S. It offers all the advanced engineering, premium quality components and exciting features of the S-1. The S-2 offers 1000 channels in an extremely lightweight but rugged case.

If you're not on 220 this is the perfect way to get started. With the addition of the S-25 (25W output) or S-75 (75W output) Tempo solid state amplifier it becomes a powerful mobile or base station. If you have a 220 MHz rig, the S-2 will add tremendous versatility. Its low price includes an external microphone capability, heavy duty ni-cad battery pack, charger, and telescoping whip antenna.
Price...$349.00 With touch tone pad...$399.00

Now available is the expanded line of Tempo commercial hand helds..."big name" quality at affordable prices. The FMH-12 & FMH-15 operate in the 135 to 174 MHz range and the FMH-40 & FMH-44 in the 440 to 480 MHz range. Tempo also offers the FMT-2 & FMT-42. They provide excellent VHF or UHF mobile communications and feature a remote control head for hide-away mounting.
Also available is the superb MR-3 pocket receiver...a miniature, 2 channel VHF high band monitor or paging receiver.
Please call or write for complete information. Also available from Tempo dealers throughout the U.S. and abroad.

TEMPO VHF & UHF SOLID STATE POWER AMPLIFIERS

Boost your signal. . . give it the range and clarity of a high powered base station. VHF (135 to 175 MHz)

Drive Power	Output	Model No.	Price
2W	130W	130A02	$209
10W	130W	130A10	$189
30W	130W	130A30	$199
2W	80W	80A02	$169
10W	80W	80A10	$149
30W	80W	80A30	$159
2W	50W	50A02	$129
2W	30W	30A02	$ 89

UHF (400 to 512 MHz) models, lower power and FCC type accepted models also available.

TOLL FREE ORDER NUMBER: (800) 421-6631
For all states except California.
Calif. residents please call collect on our regular numbers.

52 YEARS IN THE BUSINESS

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931 N. Euclid, Anaheim, Calif. 92801 714/772-9200
Butler, Missouri 64730 816/679-3127

Henry Radio

Prices subject to change without notice.

SOMETIMES THE BEST COSTS A LITTLE MORE...

BUT you get a LOT more for your money. For instance:

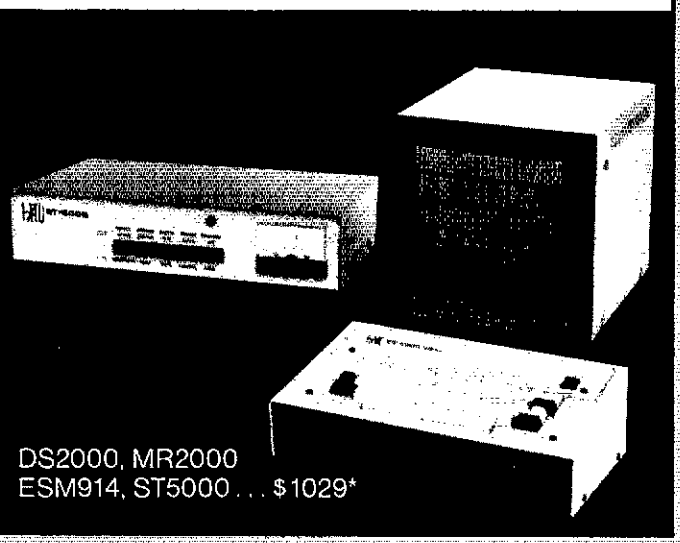
- Full length 72 character line and 24 line screen
- True "ASR" operation—type into 50 line on-screen buffer *while* receiving
- 150 line receive buffer and power off EAROM storage
- Ten HERE IS messages plus CW ID, WRU, and SEL-CAL
- Original split-screen plus bright/dim display of RX/TX text
- Control Functions *clearly marked* on the keytops
- On screen status indicators and time
- P31 eye-ease green screen phosphor (white also available)
- All three modes—CW, Baudot RTTY, and ASCII Computer code
- Upper/lower case ASCII with all control characters; 110-9600 baud
- ST6000 multiple active filters and detectors for super reception
- Crystal controlled TX tones matched to RX filters for true transceive
- Interface LOOP, RS232, MIL188 and CMOS with no extra options to buy
- Full RS232 Modem connector and full or half-duplex for computer use
- HAL one year warranty and ten years' experience with RTTY

DS3100 & ST6000 . . . $2550*

...AND THEN SOMETIMES IT DOESN'T!

COMPARE with other similarly priced systems—note these extra features and better performance for fewer dollars:

- Full length 72 character lines and 24 line screen
- "Semi-ASR" operation by typing into 255 character buffer *while* receiving
- Pretype the entire 1728 character screen
- Two programmable HERE IS messages plus CW ID
- Keyboard Operated Switch (KOS) for automatic TX/RX control
- Bright/dim display of RX/TX text
- Labeled controlled keys plus on-screen status line for easy operation
- All three modes—CW, Baudot RTTY, and ASCII Computer code
- 1-175 wpm CW; 60, 66, 75, 100, 133 wpm Baudot; 110, 300 baud ASCII
- Word wrap-around, Unshift On Space, Synchronous Idle
- Edit as you type with Word Mode
- High performance external demodulator rather than built-in compromise
- Internal Loop Supply and Motor control for full TTY machine compatibility
- Solid state RTTY Loop interface; both cathode and grid-block CW outputs
- HAL one year warranty and ten years' experience in RTTY



DS2000, MR2000
ESM914, ST5000 . . . $1029*

LOOK FOR THE BEST or THE MOST ECONOMICAL . . . WE HAVE BOTH!

*Prices for U.S. customers purchasing complete systems as specified in our catalog. Write for our complete catalog for detailed specifications and other system combinations. Prices and specifications subject to change without notice.

HAL COMMUNICATIONS CORP.
Box 365
Urbana, Illinois 61801
217-367-7373

For our European customers, contact: Richter & Co. D3000 Hannover 1 • Transradio SA, 6816 Bissone/Lugano • Radio Shack Ltd., London NW6 3AY • Erik Torpdahl Telecom, DK 3660 Stenlose Denmark

IC-720

The New Standard in Ham Radio

You're looking at the next generation in ham radio design. The ICOM IC-720 has standard features offered elsewhere as options... or not offered at all:

Transmit on all 9 HF bands...

Receive from .1 to 30 MHZ... with just a push of a button.

Dual built-in VFO's.

Automatic sideband selection (reversible). All solid state. Fully synthesized. Etc., etc., etc., etc.

There isn't enough room to list all of the specifications and features of this exceptional radio. So, please visit an authorized ICOM dealer or write to the address below for additional information.

ICOM

2112 116th Avenue NE, Bellevue WA 98004
3331 Towerwood Drive, Suite 307, Dallas TX 75234

October 1980 *Volume LXIV Number 10*

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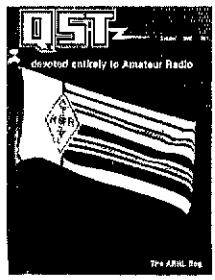
THE COVER

If you're a League member, you'll want an official flag. Several different versions of N4RX's winning design are available from League hq. See page 9.



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Rack Attack from DenTron

Components are the latest in communication systems adapting to your stations' needs. The DTR-3KA and DTR-1200L are equipped with heavy-duty handles for easy rack mounting and rack brackets that can be easily removed. The DTR-1200L linear amplifier provides 1200 watts SSB and 1000 watts CW input continuous duty. It features large 3½" shadow box, back lit meters for easy reading, and tuned input for compatibility with solid state or tube transceivers. The DTR-3KA antenna tuner handles a full 3KW PEP. It features a built in 2KW dry dummy load with thermostatically controlled forced air cooling, a remote sensor box to insure meter accuracy and 50 OHM impedance. Component racks available at your DenTron Dealer.

DTR-1200L Linear Amplifier

Frequency Ranges:

80 Meter Band	3.45 - 4.6 MHz
40 Meter Band	6.00 - 9.0 MHz
20 Meter Band	10.00 - 16.00 MHz
15 Meter Band	20.95 - 23.50 MHz
10 Meter Band	Export Model

Modes:	USB, LSB, CW, RTTY, SSTV
Power Input:	1200W - SSB, 1000W - CW
Power Requirements:	234/117 VAC 50/60 Hz
RF Drive Power:	150 Watts maximum and 65 watts minimum for 1 KW DC input.
DC Plate voltage:	idle + 2300V approximate
Duty Cycle:	100% SSB, CW, RTTY, SSTV
Input Impedance:	50 Ohms nominal
Input VSWR:	1.5 to 1 average
Output Impedance:	50 Ohms nominal
Antenna load VSWR:	2 to 1 maximum
ALC:	negative going, adjustable from front panel
Spurious Emissions:	IMD - greater than 30 db down Harmonics - greater than 40 db down
FCC Type Accepted	
Size:	5¼" H x 17" W x 13" D (19" W with rack brackets)
Weight:	46 pounds

Switchable 12VDC accessory output voltage

Multimeter:

Plate Voltage	0 - 3000VDC
Plate Current	0 - 500ma
Relative Output	Adjustable

Front Panel Plate Voltage Switching

DTR-3KA Antenna Tuner

Frequency Coverage: 1.8 - 30 MHz continuous
Built in 2 KW PEP Dummy Load - Forced Air Cooled
Input Impedance: 50 ohms (Resistive) to transmitter
Antenna Inputs
- Coax 1, 2 & 3 - unbalanced—may range from a few ohms to a high impedance
- Long wire - low to high impedance
- Balanced line - 75-660 ohms

Power Capability: 3000 watts P.E.P.
Wattmeter: 200 watts forward
2000 watts forward
200 watts reflected
Accuracy: ± 5%
Remote sensor box
3½" backlit meters
Dummy Load: with manual or automatic forced air cooling.
Integral 3KW Balun

DenTron Radio Co., Inc.
1605 Commerce Drive
Stow, Ohio 44224
(216) 688-4973

Ringo Ranger II: We've made the best better.

The new Cushcraft Ringo Ranger II incorporates Cushcraft's latest design features for increased performance and greater operating pleasure. Ringo Ranger II is the most recent design from Cushcraft's engineering team, the visionary [illegible] founder Jess Cushman. With 60 years of [illegible] and antenna design [illegible] the [illegible] world's [illegible] first 2 meter [illegible] antenna [illegible]

The new Cushcraft Ringo Ranger II is [illegible] existing best performance [illegible] antenna [illegible]

Ringo Ranger II incorporates [illegible] new [illegible] [illegible]

[illegible]

[illegible] strong enough to endure wind and ice storms. Built in lightning arrester to reduce static noise and lightning [illegible] conveniently mounted and it fits nicely on [illegible] with other antennas.

ANTENNAS

RX-2B	145-174 MHz
RX-220B	220-225 MHz
RX-450B	435-470 MHz

[illegible] conversion kit includes decoupling [illegible] with mounting hardware, RG-8/U cable, [illegible] built in lightning arrester, [illegible]

CONVERSION KITS

[illegible]	
[illegible]	
[illegible]	

Available through dealers worldwide.

[illegible] CORPORATION

The Antenna Company
48 Perimeter Road, P.O. Box 4680
Manchester, NH 03108

KENWOOD
...pacesetter in amateur radio

Hand-shack.

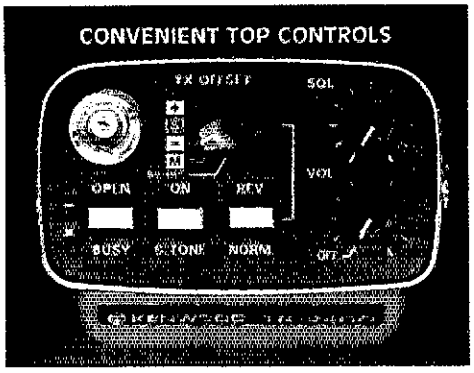
Synthesized, big LCD, 10 memories, scanning, DTMF Touch-Tone®

TR-2400

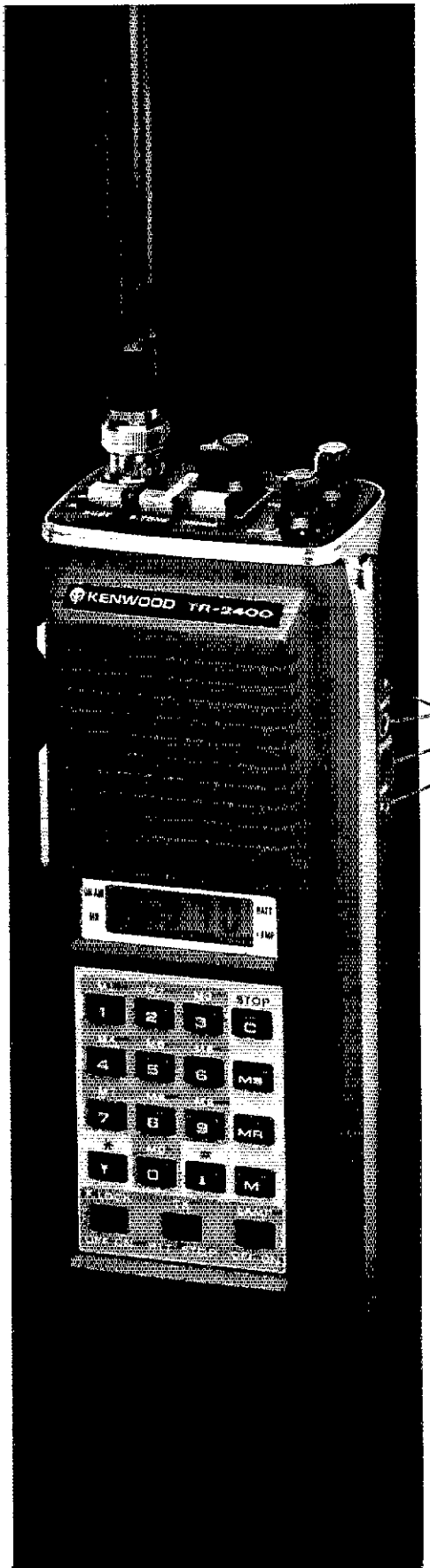
Put a ham shack in your hand. The TR-2400 is the ideal hand-held for 2 meters FM. It features a large LCD readout that can be read in direct sunlight or in the dark, 5-kHz-step PLL synthesized operation, 10-channel memory, scanning, and 16-button autopatch DTMF encoder.

TR-2400 FEATURES:

- **Large LCD digital readout**
  Readable in direct sunlight (better than LEDs). Readable in the dark (with lamp switch). Virtually no current drain (much less than LEDs) and display stays on. Rugged and dependable in hot or cold temperature ranges. Shows receive and transmit frequencies and memory channel.
- **5-kHz-step frequency selection**
  PLL synthesized keyboard channel selection system. No "5 up" switch needed. Selects from 144.000 to 147.995 MHz.
- **UP/DOWN manual scan**
  Single or fast continuous 5-kHz steps from 143.900 to 148.495 MHz for Amateur and MARS or CAP simplex or repeater operation.
- **10 memories**
  Retained with battery backup (only 0.8 mA). "M0" memory may be used to shift the transmit frequency any desired amount to operate on repeaters with nonstandard split frequencies.
- **Built-in autopatch DTMF (Touch-Tone®) encoder**
  Uses all 16 buttons of keyboard while transmitting.



- **Automatic memory scan**
  Checks all 10 memory channels. Programmable to lock automatically on either BUSY (signal present) or OPEN (no signal) channels.
- **Subtone switch**
  Activates subaudible tone encoder (not Kenwood-supplied).



- **Repeater or simplex operation**
  Convenient mode switch shifts transmit frequency +600 kHz or -600 kHz or to the frequency stored in "M0" memory.
- **Reverse operation**
  Nonlocking switch shifts receiver to transmit frequency and transmitter to receive frequency.
- **Extended operating time**
  With LCD and overall low-current circuit design. Only draws about 28 mA squelched receive and 500 mA transmit (at 1.5 W RF output), for longer operating time between charges.
- **Two lock switches**
  Prevent accidental frequency change and accidental transmission.
- **BNC antenna connector**
  Easy to connect external antenna.
- **LCD "arrow" indicators**
  Show "ON AIR," "MR" (memory recall), "BATT" (battery status), and "LAMP" switch on.
- **High-impact case and zinc die-cast frame**
  Extremely rugged with antenna counterpoise.
- **External PTT microphone and earphone connector**
  Easily accessible on right side of transceiver.
- **Compact and lightweight**
  Only 2-13/16 inches wide, 7-9/16 inches high, and 1-7/8 inches deep. Weighs only 1.62 pounds (including antenna, battery, and hand strap).

Microphone PTT and audio terminals

Charger terminal

Earphone jack

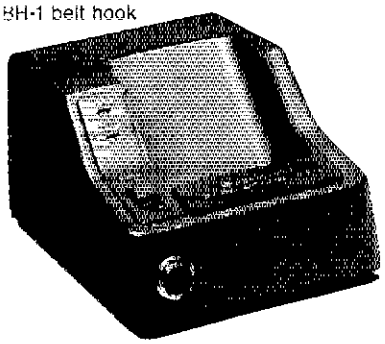
STANDARD ACCESSORIES INCLUDED:

- Flexible rubberized antenna with BNC connector
- Heavy-duty (450-mAh) NiCd battery pack
- External-standby (PTT) plug
- AC charger
- Hand strap
- External-microphone plug
- Earphone

NOTE: *Price, specifications subject to change without notice and obligation.*

OPTIONAL ACCESSORIES:

- ST-1 base stand (shown) which provides 1.5-hour quick charge and automatic switch to trickle charge, floating charge (operate while charging), 4-pin connector for dynamic microphone, and SO-239 antenna connector
- BC-5 DC quick charger (1.5 to 2.0 hours)
- LH-1 deluxe leather case (top-grain cowhide)
- PB-24 extra battery pack with charger adapter
- BH-1 belt hook



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...pacesetter in amateur radio

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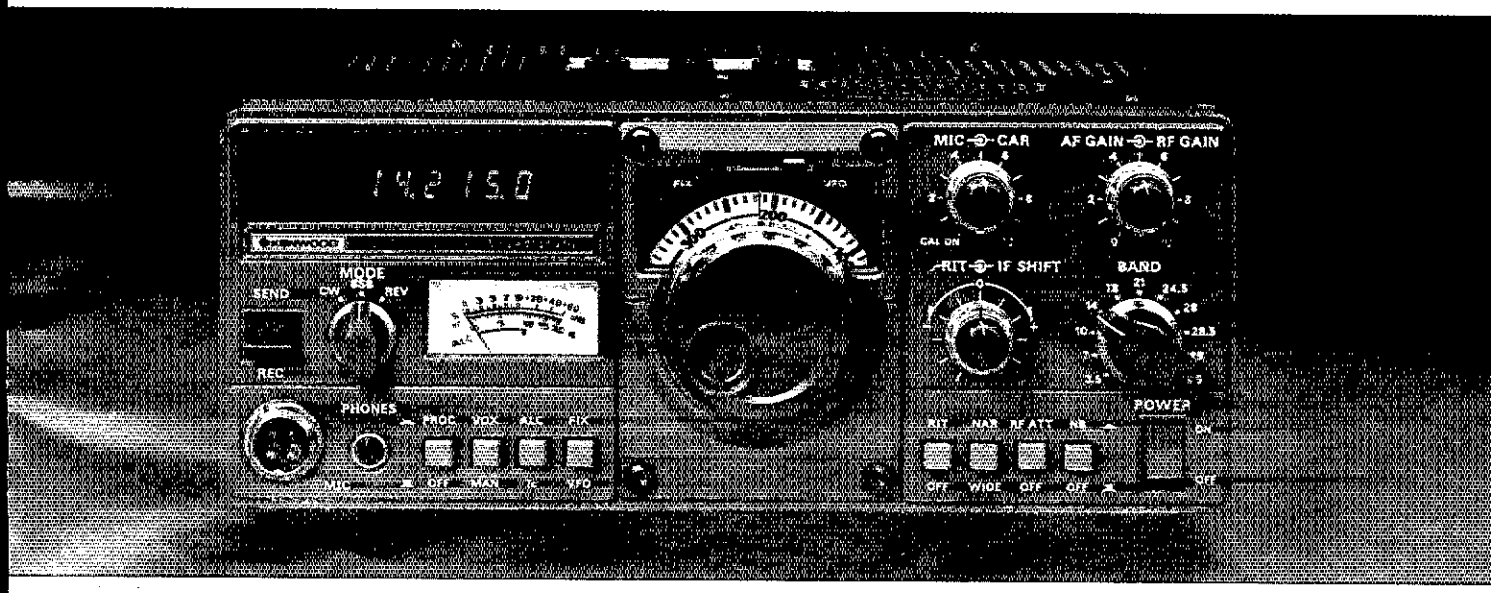
1111 WEST WALNUT / COMPTON, CA 90220

Small wonder.



Processor, N/W switch, IF shift, DFC option

TS-130S/V

An incredibly compact, full-featured, all solid-state HF SSB/CW transceiver for both mobile and fixed operation. It covers 3.5 to 29.7 MHz (including the three new Amateur bands!) and is loaded with optimum operating features such as digital display, IF shift, speech processor, narrow/wide filter selection (on both SSB and CW), and optional DFC-230 digital frequency controller. The TS-130S runs high power and the TS-130V is a low-power version for QRP applications.

TS-130 SERIES FEATURES:

80-10 meters, including three new bands
Covers all Amateur bands from 3.5 to 29.7 MHz, including the new 10, 18, and 24-MHz bands. Receives WWV on 10 MHz. VFO covers more than 50 kHz above and below each 500-kHz band.

Two power versions . . . easy operation
TS-130S runs 200 W PEP/160 W DC input on 80-15 meters and 160 W PEP/140 W DC on 12 and 10 meters. TS-130V runs 25 W PEP/20 W DC input on all bands. Solid-state, wideband final amplifier eliminates transmitter tuning, and receiver wideband RF amplifiers eliminate preselector peaking.

Built-in speech processor
Increases audio punch and average SSB output power, while suppressing sideband splatter.

- **CW narrow/wide selection**
  "N-W" switch allows selection of wide and narrow bandwidths. Wide CW and SSB bandwidths are the same. Optional YK-88C (500 Hz) or YK-88CN (270 Hz) filter may be installed for narrow CW.
- **SSB narrow selection**
  "N-W" switch allows selection of narrow SSB bandwidth to eliminate QRM, when optional YK-88SN (1.8 kHz) filter is installed. (CW filter may still be selected in CW mode.)
- **Sideband mode selected automatically**
  LSB is selected on 40 meters and below, and USB on 30 meters and above. SSB REVERSE position is provided on the MODE switch.
- **Built-in digital display**
  Six-digit green fluorescent tube display indicates actual operating frequency to 100 Hz. Also indicates external VFO or fixed-channel frequency, RIT shift, and CW transmit/receive shifts. Also analog sub-dial for backup frequency indication.
- **IF shift**
  Allows IF passband to be moved away from interfering signals and sideband splatter.
- **Single-conversion PLL system**
  Improves stability as well as transmit and receive spurious characteristics.
- **Built-in RF attenuator**
  For optimum rejection of intermodulation distortion.
- **Built-in VOX**
  For convenient SSB operation, as well as semi break-in CW with sidetone.
- **Effective noise blanker**
  Eliminates pulse-type interference such as ignition noise.
- **Built-in 25-kHz marker**
  Accurate frequency reference for calibration.
- **Compact and lightweight**
  Measures only 3-3/4 inches high, 9-1/2 inches wide, and 11-9/16 inches deep, and weighs only 12.3 pounds. It is styled to enhance the appearance of any fixed or mobile station.

Optional DFC-230 Digital Frequency Controller
Allows frequency control in 20-Hz steps with UP/DOWN microphone (supplied with DFC-230). Includes four memories (handy for split-frequency operation) and digital display. Covers 100 kHz above and below each 500-kHz band. Very compact.

Ask your Authorized Kenwood Dealer about the compact, full-featured, all solid-state TS-130 Series.

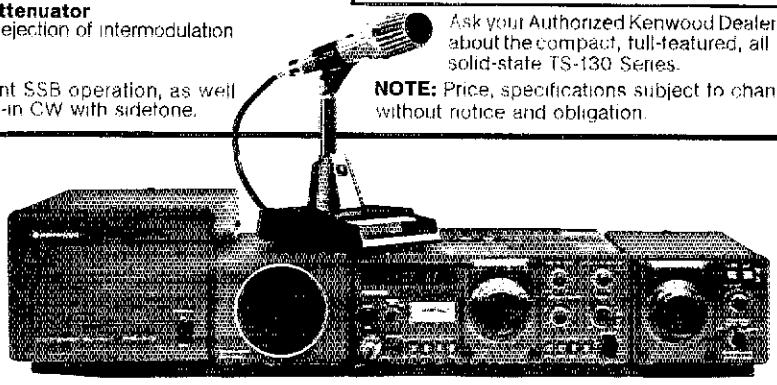
NOTE: Price, specifications subject to change without notice and obligation.

MATCHING ACCESSORIES FOR FIXED-STATION OPERATION:

- PS-30 base-station power supply (remotely switchable on and off with TS-130S power switch).
- SP-120 external speaker
- VFO-120 remote VFO
- MC-50 50kΩ/500Ω desk microphone

Other accessories not shown:

- YK-88C (500 Hz) and YK-88CN (270 Hz) CW filters
- YK-88SN (1.8 kHz) narrow SSB filter
- AT-130 compact antenna tuner (80-10 m, including 3 new bands)
- MB-100 mobile mounting bracket
- MC-30S and MC-35S noise cancelling hand microphones
- PC-1 phone patch
- TL-922A linear amplifier
- HS-5 and HS-4 headphones
- HC-10 world digital clock
- PS-20 base-station power supply for TS-130V



- SP-40 compact mobile speaker
- VFO-230 digital VFO with five memories

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The American Radio Relay League, Inc., is a noncommercial association of radio amateurs, bonded for the promotion of interest in Amateur Radio communication and experimentation, for the relaying of messages by radio, 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.

It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is noncommercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its board.

"Of, by and for the amateur," it numbers within its ranks practically every worthwhile amateur in the nation and has a history of glorious achievement as the standard-bearer in amateur affairs.

Inquiries regarding membership are solicited. A bona fide interest in Amateur Radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisite, although full voting membership is granted only to licensed amateurs.

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"It Seems to Us..."

The ARRL Flag

This month's cover shows the new ARRL flag, the winning design by N4RX in a contest held many months ago. N4RX, Ralph Holberg, of Mobile, Alabama, was one of nearly 300 entrants who submitted designs for consideration as the official ARRL flag. Now, as we shall detail to you shortly, that design is available in a number of forms for you to display at your home, in your Amateur Radio club meeting room, at your Field Day site or public service activity, on your yacht, on your automobile, or on a jacket.

First, something of the symbolism of this flag. The colors of the field are common to the U.S. and Canadian flags. In fact, the colors specified by the flag manufacturer are identified as OG (Old Glory) red, white, and blue.

There are 15 horizontal stripes, red and white, and one vertical red stripe at the hoist, all suggesting the stripes of the U.S. and Canadian flags, the field thus having 16 divisions corresponding to 16 ARRL divisions. The horizontal red stripes spell "QST" in Morse, a "dah" stripe being 3 times a "dit" stripe in width, all having the correct dit-dah-space proportions.

The ARRL emblem, in blue and white and in official design and proportions, is centered on the broad red stripe at the left. A narrow white line, known by vexillologists as a fimbriation, provides contrast between the vertical red stripe and the horizontal red stripes.

After some small problems in manufacture, replicas of the ARRL flag are now available for individual purchase by members, in various forms. They are made of nylon, with suitable grommets for hoisting. The two-foot by three-foot size is available for $15, while the four-foot by six-foot size is priced at $21. (We shuddered, too, at these prices, but had to base our initial order on a production run somewhat smaller than that for U.S. or Canadian flags!) And oh yes, another reason for the higher cost is the fact that the League emblem has to be reproduced separately on the reverse side of the flag, so that the letters in the emblem will read right.

There are two other versions of the flag design available for your use. If you live in one of those states (such as Connecticut) where the front license plate, for reasons for state economy, has been eliminated, we now have some metal versions, the same size as the standard automobile license plate, so that oncoming cars can easily and instantly spot that you are a radio amateur and a member of the League. These are available for $5 each.

Finally, we have some shoulder patches, similar in construction to the present emblem jacket patches, which can be sewn to whatever type of garment you customarily wear to hamfests, flea markets, and conventions. These too are $5 each.

If you are proud of your association with Amateur Radio and the League, we hope you will obtain one of these several versions of the flag design and display it prominently. We hope, too, that every affiliated club will want to obtain one of the flags to display in their meeting room and at public club functions or public service activities.

Finally, if you like the design, send a QSL to the designer (Ralph Holberg III, N4RX, P. O. Box 47, Mobile, AL 36601) — he'd be delighted to hear from you. — *Richard L. Baldwin, W1RU*

League Lines...

A reminder -- The ARRL Simulated Emergency Test is October 18 and 19. Contact your SCM (page 8 of this issue) for information on activities planned for your area.

Nick Laub, WØCA, has achieved recognition for being the first radio amateur to win the Worked All Continents Award via satellite. Congratulations, Nick!

Good news for QST readers interested in the upper reaches of the amateur bands: "The New Frontier," the column devoted to the world above 1 GHz, has been reinstated, under the conductorship of Dr. Robert Atkins, KA1GT. Bob will be happy to hear from anyone with contributions or suggestions for the column. Write him via ARRL hq.

Having trouble with radio frequency interception (RFI) of your signal by consumer electronic devices? By industrial electronic equipment? If so, please send a brief description of the trouble, name of the device and its manufacturer, approximate age of the device and model or serial number if known to Hal Richman, W4CIZ, Technical Advisor, ARRL RFI Task Group, 3908 Lake Blvd; Annandale, VA 22003 (or via W1UED at ARRL hq.). If the manufacturer has been helpful in solving the problem, please include that fact and the name of your contact in the company.

Phase Two of FCC's fee refund program is now underway. Amateurs who paid fees of $20 or less but more than $4 to FCC for licenses, between August 1, 1970 and February 28, 1975 only, may be able to get a partial refund. For instance, on a $9 fee for new Amateur license of those days the refund is $3.28; on a modification and renewal fee of $9, the refund is $6.95; and on a CB fee of $20 the refund is $17.99. ARRL has forms and instructions: Send a long, self-addressed stamped envelope marked in lower-left corner "FCC Refund" to Special Requests, ARRL, Newington, CT 06111.

Effective October 1, 1980, the Mecklenburg Amateur Radio Society in Charlotte, North Carolina will assume operation of the ARRL Incoming QSL Bureau serving the prefixes W4, K4 and N4. The new address is W/K/N4 QSL Bureau, Mecklenburg ARS-W4BFB, P.O. Box DX, Charlotte NC 28220.

In order to support a number of additional worthwhile programs in support of Amateur Radio, ARRL is going to establish a Development Office, to seek contributions to the League and/or the ARRL Foundation on a long-term basis from a number of sources. If you're a pro in this business and would like to exercise your talents on behalf of the League by heading up our Development Office, we want to hear from you. A knowledge of Amateur Radio and the League is desirable, but more important are your enthusiasm and your professional competence in the field of fund-raising and grantsmanship. Contact R. L. Baldwin at ARRL hq.

FCC has abolished its Radiotelephone Third Class Operator Permit. According to the Commission, "Ninety-eight percent of third class permits are issued to persons who have no real need for them and there is no public interest benefit derived from issuing them." The third class permits were granted to those passing a basic practice and rule examination so that holders could become routine operators at a-m, fm and TV broadcast stations.

The ARRL hq. Technical Department is accepting applications for career positions as Assistant Technical Editor and Laboratory Technician. Interested persons with experience and an Associate Degree or higher in electronics should contact Jerry Hall, K1TD, or Doug DeMaw, W1FB, at Hq.

The basic rules under which ARRL operates are contained in a booklet entitled, Articles of Association and Bylaws of the American Radio Relay League, Inc. The booklet also states the rules and regulations concerning ARRL conventions, advisory committees, the Communications Department, affiliated societies, and the policies governing the availability from Headquarters of lists of ARRL members and affiliated clubs. A copy of this booklet is available to any League member upon request. Please send an s.a.s.e. with your request to League headquarters.

The Magnetospheric Echo Box — A Type of Long-Delayed Echo Explained

Radio amateurs have helped unlock the mystery of LDE signals that have puzzled scientists for over five decades. Continued observations, however, are still needed.

By O. G. Villard, Jr.,* W6QYT, D. B. Muldrew,** and F. W. Waxham, Jr.,*** K7DS

After 52 years, the mystery of one of the two types of long-delayed echoes (LDEs) reported by radio amateurs has been solved. The explanation turns out to be hf-wave trapping in occasionally occurring, tubular magnetospheric "ducts." These ducts stretch from northern to southern hemispheres along the earth's magnetic-field lines. Thanks to ionospheric-sounder satellites, the effect is now understood. In fact, the circumstances under which 80-meter operators can best access these up-to-60,000-kilometer-long magnetospheric echo boxes are set forth in this article.

Radio amateurs can be proud of the major contribution their reports have made in solving the problem of "echoes of the first type," which are characterized by delays of less than 1 second. Two explanations, based on modern plasma physics, have recently been published on the second type, which have delays of more than 1 second. Recently, Goodacre[1] has published recordings of what he believes are LDEs with delays between 1.5 and 9 seconds. Further reports of echo delays in excess of one second would be extremely helpful. Because LDEs seem to be so infrequent, both in time and space, amateurs provide perhaps the best hope of obtaining a meaningful number of reports against which to test the theories.

*Trustee, W6YX, Radioscience Laboratory, Stanford University, Stanford, CA 94305; also SRI International, Menlo Park, CA 94025
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[1]References appear on page 14.

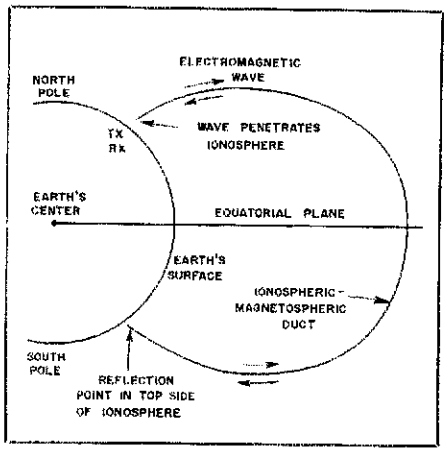

Fig. 1 — Sketch of a magnetospheric duct of the type responsible for 80-meter echoes having delays of 0.27 second. The duct length is about 40,000 kilometers and it passes over the equator at a height of 12,700 km. Diameter of the duct is only a few kilometers — too small to show on this scale.

A Noteworthy Example of How Radio Amateurs Can Help Science

On the evening of February 12, 1977, operation of a network of at least a dozen 75-meter ssb phone stations, centered in the Seattle-Tacoma area of the state of Washington, was almost totally disrupted by an echo of remarkable strength, clarity and delay. The delay was considerably in excess of the round-the-world value of 140 milliseconds. Virtually all the network stations in the Seattle area heard it, not only on their own signals, but also on each other's. Three stations in California that broke in heard the echo on the Seattle stations, but not on their own transmissions. Three other participating stations in New York, Utah and Oklahoma did not hear the echo at all.

For nearly two hours, the various stations observed the echo, marvelling at its clarity. In addition to testing it with cw and voiced bloops and bleeps, some station operators transmitted "chirps" by holding down the key and varying the frequency of their oscillators. Throughout, one of the authors, K7DS, ran his battery-operated tape recorder with the microphone held close to the speaker of his receiver.

This incident represents a noteworthy example of what radio amateurs can do to aid science. It is now virtually certain that this echo was caused by hf radio-wave trapping in a thin but enormously long magnetospheric duct, or tube, extending along the earth's magnetic-field lines high above the equator and into the southern hemisphere, as shown in Fig. 1. That something as unusual as this might occasionally occur was first proposed in 1959[2] and studied theoretically in 1962;[3] actually, radio amateurs had been observing anomalous 80-meter echoes all along,[4] but their data had never been collected. The necessary breakthrough came when the Canadian "Alouette" ionospheric-sounding satellite was launched in 1962. In exploring the topside of the ionosphere, the unexpected ducts were soon observed.[5,6,7,8] Since Alouette I actually flies through the ducts, it collects information relatively rapidly. Because the same ducts are random in occurrence and highly localized, scientific groups

using ground-based sounding equipment have been unsuccessful in collecting significant information on them. It is fair to say that their ground-to-ground communication capabilities have only been revealed by Amateur Radio reports. Of these, by far the best and most comprehensive to date resulted from the February 12, 1977, episode described above.

Matters of Considerable Theoretical and Practical Interest

Fig. 2 shows a frequency-amplitude-time contour diagram of some of the manually generated "chirps" that permit especially accurate measurement of time delay. Throughout the duration of this event, the echo delay remained constant at 0.225 (±0.005) second. The calculated propagation time for a signal, trapped in a duct which terminates above Seattle, is 0.23 second. The recorded data (additional to that shown in Fig. 2) give an unparalleled feel for the size of the geographical region from which a duct can be accessed, the minute-to-minute variation of the strength of the ducted signal, the bandwidth, the multi-path, the short-term fading, the dispersion, the time delay and the attenuation. These are all matters of considerable theoretical and practical interest.

Another good example of ducted echoes is the multistation event reported by W6ONY and cited in reference 4. It took place around 0500 UTC on December 1, 1961. The delay was reported as varying between 0.1 and 0.5 second; the echo was heard by various stations in the Los Angeles area but not outside. On the basis of these and other findings, it is possible to be quite certain that the majority of the LDEs in the 80-meter band, which have been reported over the years, have been explained.

Source of the Echoes

A definable channel which guides radio waves over long distances is normally called a "duct." An example at microwave frequencies is the familiar waveguide. Hams normally transmit hf signals from place to place by reflecting them from the bottom side of ionospheric layers. As is well known, when the radio frequency becomes sufficiently high, signals penetrate completely through the ionosphere and are lost into space — unless of course, they are reflected or echoed back by something like a satellite or the moon. It now turns out that there is yet another way for penetrating hf signals to be returned to the transmitting station. If the frequency is less than or equal to about 4 MHz, waves can be trapped in column-like ducts (ionospheric waveguides, if you will) extending along the magnetic field of the earth. (See Fig. 1.) Such signals are guided over the equator and in most instances are reflected from the top of the ionosphere in the other hemisphere.

Such ducts consist of slight, localized depressions in the background electron density — perhaps one percent. They are remarkably small in diameter — perhaps a few kilometers. Their phenomenal stability — considering their size and enormous length — is explained by the magnetic field of the earth, which effectively locks them into position.

Ducts appear when irregularities in the lower ionosphere are created and moved by winds. Such moving clouds of plasma exert a drag on that portion of the magnetic field of the earth which penetrates them, thereby slightly displacing bundles of magnetic field lines. Because the lines have continuity, motion at their lower end will produce corresponding motion all along their length. It is this motion which creates the ducts even in the near vacuum far above the height of maximum ionization in the ionosphere.

Since the electron-density change is so small, it is remarkable that hf waves can be guided at all. Not surprisingly, there is a practical upper limit to the radio frequency of about 5 MHz. Fig. 3 is a recording made by Alouette of echoes resulting from ducted propagation when the source is a transmitter in orbit.

Once in a duct, a signal will travel essentially at the velocity of light, passing over the equator at a height which can be as much as 20,000 kilometers. The total one-way path length can be 60,000 km. When the signal comes close to the earth again, it can be reflected from the top side of the ionosphere; i.e., at a height above the electron-density maximum. In the northern hemisphere, winter conditions of low electron density an hour or more after sunset make it easy for 80-meter waves to penetrate the ionosphere and enter a duct. Opposite conditions exist in the southern hemisphere (where it is summer), so that the guided wave encounters a dense ionosphere and is reflected back. To an observer in the northern hemisphere, the long duct thus becomes an efficient echo box.

Brief History of LDEs — The Amateur Contribution

Long-delayed echoes were first reported in Norway in 1927 by an engineer named Jörgen Hals, not long after the beginning of shortwave broadcasting. The echoes attracted attention because their delays of 3 to 10 seconds far exceeded the delay (0.14 second) required for transmission completely around the earth. Hals described the echoes he observed as distorted replicas of the outgoing transmission.

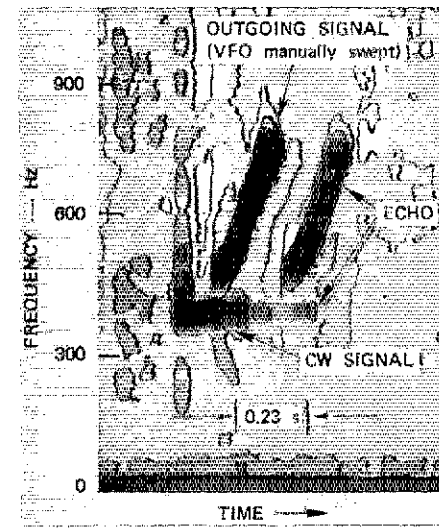

Fig. 2 — Typical frequency-amplitude-time contour plot of the echo heard in the Seattle area between 10:30 P.M., February 12, and 12:30 A.M., February 13, 1977 (local time). Relative amplitude is shown by the density of the contour lines. In this example, the transmitting station's VFO was varied manually, thus permitting exceptionally accurate measurement of delay.

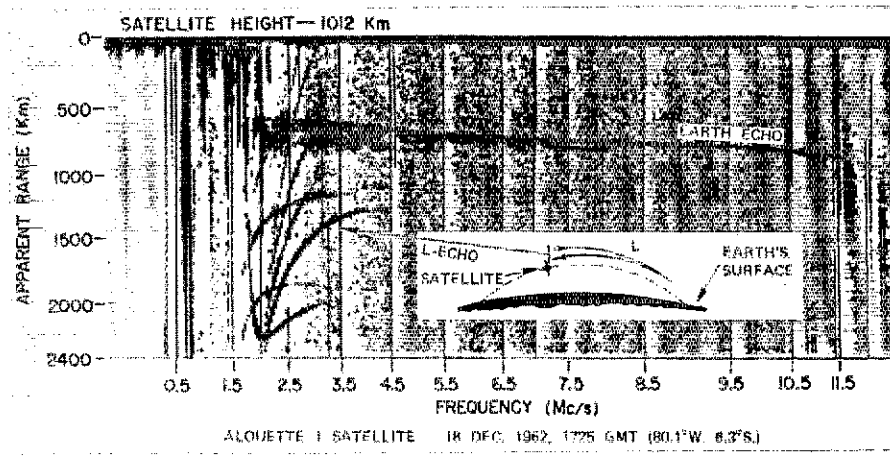

Fig. 3 — Delay-time (apparent range) versus frequency recording made by "Alouette 1" — a sounder in the topside ionosphere. The arrow in the sketch points to echo representing radio wave energy which traveled from the sounder along a duct until it was reflected from the top of the ionosphere in the southern hemisphere. The other echoes result from signals that bounce back and forth in the duct between the northern and southern hemispheres. Such ducts are responsible for the echo shown in Fig. 2. (See reference 5.)

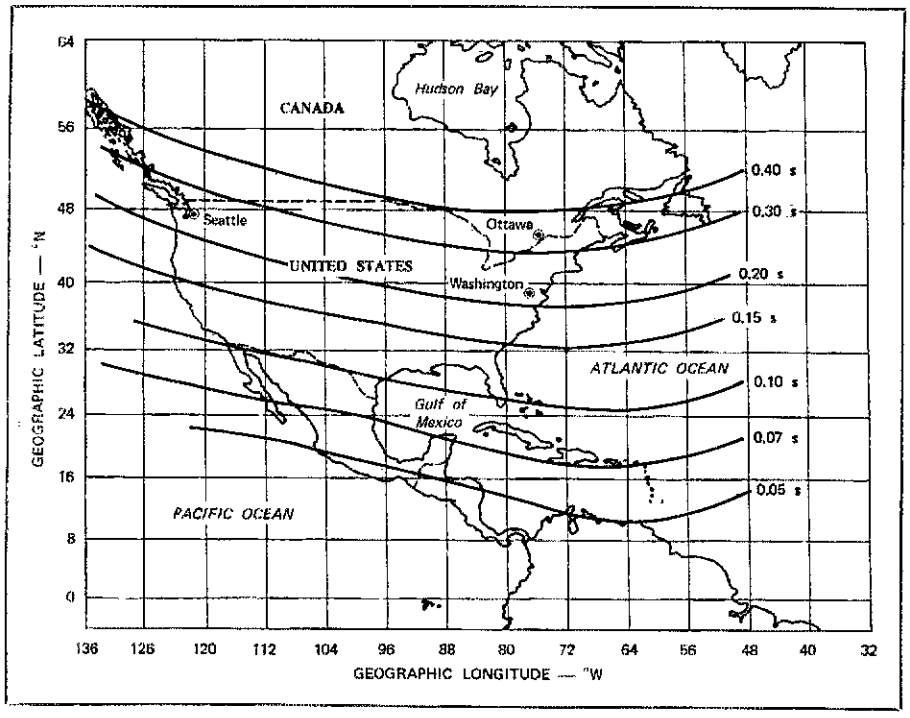

Fig. 4 — The relationship between duct location and round-trip echo delay time from Central America to Canada.

Often there would be more than one. More details can be found in a *Journal of Geophysical Research*[8] article that contains a complete review of LDE literature.

Hals communicated his findings to some of the leading radio scientists of his day — Störmer in Norway, van der Pol in Holland and Appleton in England. The first two apparently corroborated his observations. There was great difficulty in understanding why the signals didn't die away into inaudibility as round-the-world transmissions do.

In spite of many theoretical articles, scientific interest in the subject lagged during the 1930s. Just after World War II, the prestigious Cavendish Laboratory of Cambridge University started a special search for LDEs during which 27,000 signals were transmitted without one echo being heard.[9] One explanation offered was that the early observations might have been artifacts of the crude equipment of those days. A second was that the filling up of the radio spectrum that had occurred in the intervening 20 years might well have prevented further observations because of interference.

These explanations did not fully satisfy one of the authors, W6QYT, who initiated some experimental transmissions from Stanford University in 1958. He was aided by B. Dueno, KP4HF, of Mayaguez, Puerto Rico. Although some possible LDEs were recorded, it was never fully feasible to rule out alternative explanations for the observations. During the work, however, several instances of amateur observations of LDEs having both short (0.1 to 1.0 second) and long (3 to 30 seconds) delays came to light. This fact was reported in an article for *QST* and further reports were solicited.[10] A truly gratifying number of observations then poured in; they were summarized and published in two additional *QST* articles.[4,11]

These amateur reports extended over a period of years. They represent perhaps the most solid evidence of the reality and continued existence of LDEs of both kinds.

It became clear that the effect had not simply disappeared in the years since 1927; it has been present all along, although of such infrequent and sporadic occurrence that it is easy to understand why it had escaped observation by scientists and commercial users of radio alike. Only hams, it seems, are interested enough observers to catch these occasional oddities. Without their reports, it seems unlikely that the LDE phenomenon would enjoy its present credibility with the scientific community.

Fortunately, the reporting hams did not restrict themselves solely to echoes having 3- to 30-second delays, but sent in any type of echo which they thought unusual, irrespective of the actual delay. When echo delays are compared by frequency band, it becomes immediately apparent that something is unusual at 80 meters; a large percentage of the echoes at that frequency (or lower) are reported as having durations of less than 2 seconds. This finding was very encouraging because it suggested that the reports were not too badly contaminated by hoaxes. If the majority *were* hoaxes, the same spread of delays should be observed on each band, since there is little reason to expect that hoaxers would single out for special treatment any one band more than another.

It also turns out that estimating time delays accurately is very difficult when an unexpected and thus startling event such as an LDE takes place. This fact was verified in a simple test in which a group of radio amateur volunteers were asked to write down the time delays of simulated tape-recorded LDEs. Some actual one-second delays, for example, were reported as short as 0.3 and as long as 3 seconds. But the unmistakable difference between the reported 4-MHz time delays and those for higher bands shows clearly that the amateurs' estimates of time delay should, on the average, be treated with respect.

Now, what about those 80-meter echoes of relatively short delay? They, of course, turn out to be those from the magnetospheric echo box.

How to Access the Echo Boxes

The 160- and 80-meter bands are clearly the best to use. One duct, detected with satellite sounders, guided waves of frequencies up to 7 MHz, but this is very rare.

Being directly beneath the mouth of the duct is not necessary in order to have a signal trapped in the duct. However, the farther away from the mouth the transmitter is, the less the likelihood of trapping a signal.

The mouths of the ducts in the northern hemisphere exist all the way from Central America to southern Canada. Those at the lower latitudes have shorter lengths and, correspondingly, the trapped radio waves have shorter delay times. Higher latitude ducts are longer and the maximum delay time likely to be encountered is about 0.4 second. Calculated contours showing the relationship between delay time and geographical position are given in Fig. 4. At one location, ducted echoes have a time delay equal to round-the-world (RTW) propagation. RTW echoes, however, are seldom encountered at such low frequencies. Very high antennas would be required. On the other hand, the ducted echoes can be accessed with very simple antennas.

Ducts tend to be more numerous at the lower latitudes. They reach a maximum around 20° to 30° N. at American longitudes.

The Best Months

The best months for radio amateurs in North or South America for finding these ducted LDEs are December and January. In these months, the best conditions for receiving ducted echoes will be found in the northern hemisphere, as previously explained. Ducting in February and November is about half as common as

ducting in December and January, but at least twice as common as from May to October.

The best times are probably between 1900 and midnight (local time). One of the Seattle stations in K7DS's recording (we're not sure which one) said, "I've experienced it (the echo) three times on 80 meters in the last several years, but I've never figured out what it was."

For optimum results, an antenna that directs radiation more or less upward or in the direction of the magnetic field (30° south of vertical in the central United States) should be used. Avoid vertical antennas; a horizontal dipole or sloper is fine. If feasible, the dipole should be oriented east-west in order to direct the energy north and south. Quick transmit-receive switching or having another station do the transmitting is naturally very desirable. The radio operator's receiver should not have too long an agc time constant whenever echoes are being sought. For verification, the time delay must somehow be measured. A tape recorder is almost indispensable.

Current Theories of the Second Type of LDE and the Need for More Reports

LDEs having time delays in the 0.5- to 30-second range cannot be explained by the ducting phenomenon. Ducts of sufficient length do not exist. Several theories have been offered to explain the echoes having longer delays. One of these is by Crawford and his students.[12] A more recent theory is by one of the present authors.[8] Both theories overcome the central problem of explaining signal decay with time by postulating an amplifying interaction between waves and streams of electrons in the ionosphere or magnetosphere. In the Crawford theory, the electrons stengthen waves directly; in the new theory, there is an intermediate step. This step enables LDEs at vhf and uhf, such as the one reported by Rasmussen,[13] to be explained.

Both theories depend on various assumptions about the physical state of the ionosphere or magnetosphere that are difficult to check. The best way to decide between explanations is to see how well they explain actual occurrences. The authors would be very grateful for additional reports of unusual echoes occurring in any frequency band. Of particular interest will be any echoes which have been Doppler shifted slightly from the original frequency and LDEs that indicate distortion. Distortion could include acquisition of a modulation not present in the original signal such as hum, voice sidebands or on-off keying. Frequency shifts and distortion, however, will make recognition much more difficult.

The assistance of E. L. Hagg, A. C. Fraser-Smith and D. M. Mandelkern, WA4BAX, is gratefully acknowledged.

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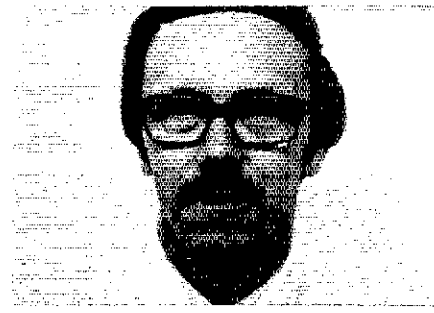
Strays

TA PROFILES

We express our sincere thanks to ARRL Technical Advisor David L. Ingram, K4TWJ, of Birmingham, Alabama, for his professional expertise in SSTV. Being involved in electronics since the age of seven, Dave received his Amateur Radio license at age 14. His primary interests in Amateur Radio are SSTV, DXing, OSCAR, 10-meter fm, QRP and evaluating/studying new gear. He holds an Extra Class license and a Radar-endorsed "First Phone" commercial license.

Dave is an instructor of comprehensive courses in electronics technology at United Electronics Institute. He has authored five books, each relating to a specialized area of Amateur Radio, coauthored a sixth book, and has published over 250 articles.

In his leisure time, Dave enjoys collecting and constructing antique ham equipment. He is also enthusiastic about sports cars and photography. — *Marian Anderson, WB1FSB*



K4TWJ, Technical Advisor for SSTV

QST congratulates . . .

Leonard R. Kahn, WB2SSP, of Freeport, New York, who has been selected to receive the Radio Club of America's Armstrong Medal in recognition of his developments in the fields of ssb, independent sideband, voice processing, low-distortion and high-efficiency modulation techniques, diversity, and time-diversity communications techniques and, most recently, a-m stereo broadcasting.

MORE THAN JUST THE TIME

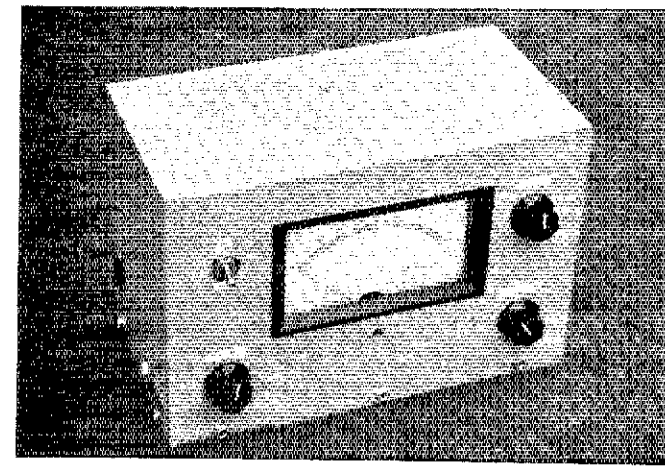
A complete description of WWV, WWVH and WWVB services is available from the Superintendent of Documents, Washington, DC 20402. The 16-page illustrated booklet costs $1.50 (ask for S/N 003-003-02105-9). — *Tom Frenaye, K1KI*

DOTS AND DASHES

If you enjoy telegraphy, be it American Morse (landline) or continental (international) radio code, you might find the Morse Telegraph Club of interest. A quarterly publication, "Dots and Dashes," edited by Cecil Combs, WØVZH, is sent to all members. The publication covers news of interest to code operators and has an Amateur Radio section. For more information write Mr. A. J. Long, Secretary, Morse Telegraph Club, Inc., 520 W. Schwartz St., Salem, IL 62881. — *Jim Romelfanger, K9ZZ, Baraboo, Wisconsin*

A Reflectometer for Twin-Lead

This instrument measures SWR directly on 300-ohm transmission lines from 3.5 to 450 MHz.



By Fred Brown,* W6HPH

Despite its unpopularity, twin-lead is not really bad stuff. Compared to almost any kind of flexible coaxial line, twin-lead has lower loss per unit length (when dry) and is also considerably cheaper. It is an obvious first choice for connection to a balanced antenna or for tuned-feeder antenna systems.

Amateur literature abounds with descriptions of reflectometers for 50-ohm coaxial cable, both of the bridge type and the directional-coupler version. But the user of 300-ohm twin-lead has been neglected when it comes to accurate measurement of SWR. Although measuring twin-lead SWR through a balun is possible, two problems are usually associated with such an approach. Unless the balun is perfect, it will introduce some reflection of its own, which may add to or subtract from the reflection from the load, and thereby give a misleading result. Second, most baluns have a 4:1 transformation ratio, whereas a transformation from 300 to 50 ohms requires a 6:1 ratio.

The instrument described here is a parallel-wire directional-coupler reflectometer for 300-ohm balanced line. It works on the same principle as the old twin-lamp SWR indicator (Fig. 1A). With a low standing-wave ratio, only the lamp closest to the transmitter would light. If the twin-lamp is replaced with a properly terminated directional coupler, it will be possible to determine standing-wave ratios

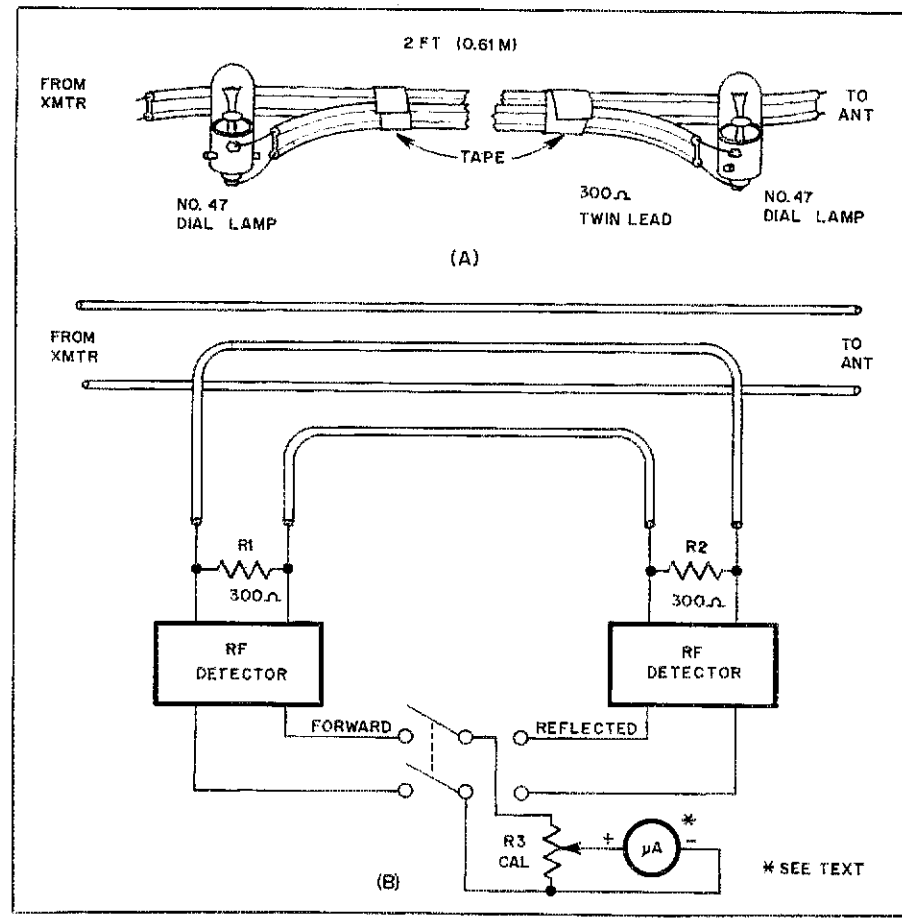


Fig. 1 — The twin-lamp SWR indicator, shown at A, is a crude form of reflectometer. With a high SWR, both lamps will light with equal brightness. With low SWR, only the lamp on the left side will be illuminated. A laboratory-type reflectometer, such as illustrated at B, is similar in principle to the twin-lamp arrangement, but yields accurate, quantitative results. The twin-lead ribbon and dial lamps have been replaced with a properly terminated directional coupler. The meter can be calibrated to read SWR directly.

*1169 Los Corderos, Lake San Marcos, CA 92069

accurately by measuring the rf voltage across the 300-ohm termination (Fig. 1B). If properly constructed, the rf detector on the left will respond only to energy on the transmission line flowing from left to right. The detector on the right will give a dc output proportional to the energy propagating in the opposite direction. If the sensitivity control is adjusted for full scale reading with the switch in the *forward* position, the meter scale can be calibrated to read SWR directly with the switch in the *reverse* position, as with any reflectometer.

The Circuit

The complete schematic diagram is shown in Fig. 2. Originally it was hoped that a completely passive instrument could be built, but the 0 to 100 microammeter did not provide sufficient sensitivity for low-power measurements. Accordingly, a dc amplifier (Q1 and Q2) was incorporated. If a 0 to 10 microammeter is available (they *do* make them), the dc amplifier can be omitted. Fig. 2 shows connections for such an alternative.

In Fig. 2 the forward and reflected signals are detected by D1 and D2, respectively. The resulting dc voltage is transferred through S1 to the 500-kΩ sensitivity control. These two dc voltages are also made available to an external voltmeter by means of test-prod jacks (J1, J2 and J3) located on the side of the cabinet. A digital millivoltmeter will permit measurements with a very small amount of rf power in the transmission line, as little as 50 mW at 10 meters. Furthermore, two external meters, or one external meter in conjunction with the internal meter, will permit simultaneous observation of both forward and reflected power.

C1 and C2 in Fig. 2 are dc blocking capacitors to prevent the dc voltage from D1 reverse biasing D2. Only one of these capacitors is really needed, but two are used to maintain symmetry and balance. The two 150-ohm, quarter-watt resistors (5% tolerance) terminate the coupled line section and transfer the detected dc voltage to the isolating resistors, R1 and R2.

The dc voltage from the sensitivity control is applied to the gate of JFET Q1, a source follower, which drives the base of the common-emitter stage, Q2. This transistor is one arm of a bridge; the other arms are R3, R4 and R5 in conjunction with the three diodes, D6, D7 and D8. The diode strings, D3 through D5 and D6 through D8, are each made up of three germanium diodes in series and are used for temperature compensation. Although the resulting compensation seems nearly perfect, it was deemed prudent to locate the zero-adjustment potentiometer, R5, on the front panel for easy access.

Construction

The directional coupler should be less

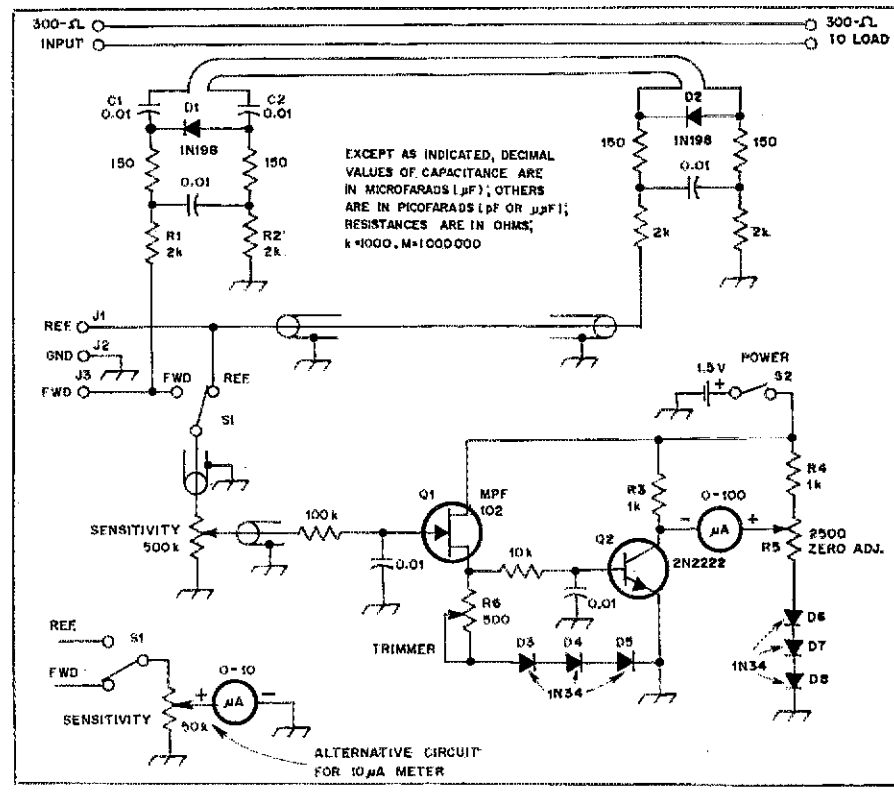


Fig. 2 — Complete circuit of the reflectometer. The dc amplifier (Q1 and Q2) is powered by a single 1.5-V cell. Current drain is about 1 mA. If a 0- to 10-μA meter is available, the dc amplifier can be omitted, as shown at the lower left.

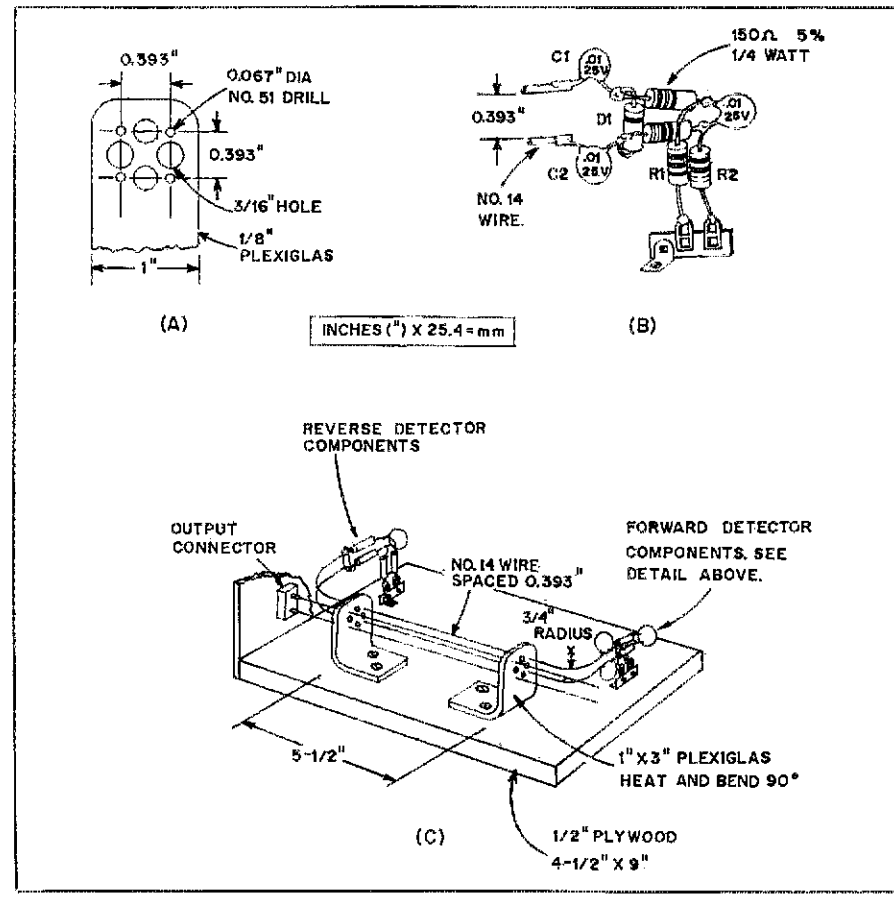


Fig. 3 — Construction details of the parallel-wire directional coupler. Drilling dimensions for the directional coupler wire-holder bracket are at A. Detail of the directional coupler at the "forward" termination end is presented at B. The "reverse" termination is identical, except for the omission of C1 and C2. With the exception of R1 and R2, all components have the shortest possible leads. The drawing at C shows the parts layout.

than a quarter-wavelength long at the highest desired operating frequency. A length of 6 inches permits operation up to 450 MHz, although a longer length would give greater sensitivity at the lower frequencies. Construction details of the directional coupler are given in Fig. 3. A wire spacing of 6.13 times the wire diameter will give the desired 300-ohm impedance. The dimensions shown are correct for no. 14 bare wire (0.064 inch or 1.63 mm dia). The four wires are held in place with brackets formed from 1/8-inch (3.18-mm) Plexiglas. The amount of dielectric material between the wires is reduced by drilling 3/16-inch (4.76-mm) holes midway between the wire holes.

Minimizing stray coupling is important. Therefore, all wiring and components should be kept at least 1 inch (25 mm) away from the directional coupler lines.

For proper termination, the detector components must have the shortest possible leads, as shown in Fig. 3. No tie points are used to mount these components. They are supported in air by the ends of the coupled line section and by resistors R1 and R2. Germanium diodes are said to be subject to damage by soldering temperatures, but the 1N198s suffered no apparent ill effects even though the 1/8-inch leads were soldered without heat sinks.

The base of the instrument is a 4-1/2- × 9-inch (115- × 230-mm) piece of 1/2-inch (13-mm) plywood. The sides and top are cut from 1/8-inch (3-mm) Plexiglas and stuck together with Super Glue. Overall height is 6 inches (152 mm). The dc amplifier components are all mounted on a 2-inch (50-mm) square piece of perfboard.

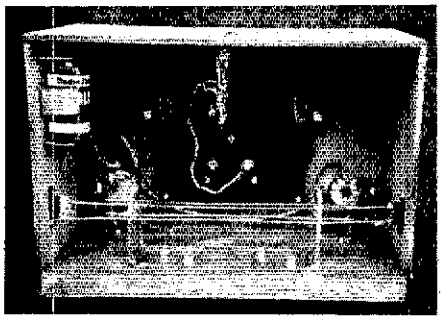
Input and output connectors are Radio Shack no. 274-342. They are not 300-ohm connectors, with the result that there is a slight impedance bump on the line. Reflection is negligible at hf, but not at 450 MHz. Uhf performance can be improved by drilling holes through the plastic between the conductors of these connectors to remove as much dielectric material as possible. A better connector combination would be the James Millen no. 37412 plug and no. 33102 socket, which are compatible with Mosley 300-ohm connectors.

Checkout and Operation

To prevent possible meter damage, a wise precaution is to disconnect the meter when the dc amplifier is first tried. Trimmer potentiometer R6 should be adjusted for a potential (with respect to ground) of about 0.8 volt on the collector of Q2. R5 should then be adjusted to give the same voltage at the wiper that existed before the meter was connected.

If the dc amplifier is working properly, a low-power source of rf can be applied to the 300-ohm input through a suitable balun. The rf coupling to the detectors is directly proportional to frequency, which means that every time the frequency is halved, *four* times as much rf power is required for full-scale deflection. The minimum power requirement per band is as follows: 80 meters, 12 watts; 40 meters, 3 watts; 20 meters, 0.75 watt; 10 meters, 200 milliwatts; and 2 meters, about 10 milliwatts.

With the reflectometer terminated in either an open or short circuit (infinite SWR), practically the same meter reading should be obtained with S1 in either the FORWARD or REVERSE position. A pair of 150-ohm, 2-watt resistors connected in series with short leads will make a fairly good matched load, usable from 40 through 6 meters. With such a load, the reflected meter reading should be less than one tenth the forward reading.



This inside view shows the parallel-wire directional coupler built on the plywood base. The dc amplifier circuit board is located at the top center for easy access. Power for the dc amplifier is provided by the 1.5-V "C" cell held in the clip on the left sidewall. A penlight cell would be entirely adequate.

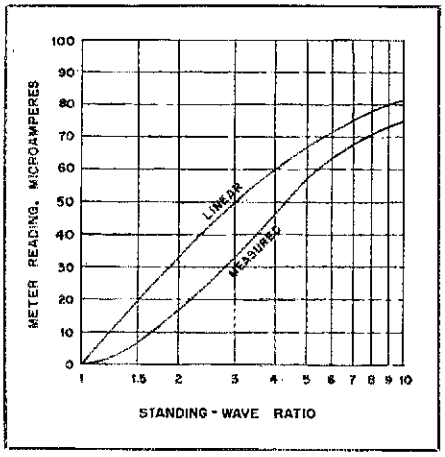


Fig. 4 — Standing-wave ratio vs. meter reading, assuming the sensitivity control is first adjusted for full-scale reading with S1 in the *forward* position. The "measured" curve was determined for the maximum sensitivity setting of the author's unit, which resulted in full-scale deflection with 115 mV dc at J3. The "linear" curve will apply if this dc potential is greater than about 0.5 V.

Linearity

The detector response to rf input voltage will be almost perfectly "square law" for detector outputs below 50 mV dc. This means the dc output will be proportional to the *square* of the rf input voltage. For dc output voltages greater than 0.5 V, the relationship between rf input and dc output will be nearly linear.

Accordingly, to measure SWR accurately, it will be necessary to know whether the detectors are operating in accordance with the square law, linearly or something in between. Usually it will be in between.

In the author's unit, full-scale deflection occurs with a dc input to Q1 of 115 mV (measured at J3). At this level, the detectors are operating near their square-law region.

The graph of Fig. 4 shows the measured value of SWR vs. meter reading for a detected output voltage from the *forward* detector of 115 mV dc. For comparison, a curve of SWR is shown, assuming the detectors are perfectly linear. Where the instrument is operating at less than full gain, the actual SWR will lie somewhere between these two curves. At detector output levels greater than 0.5 V, the linear curve should be quite accurate. The experimental curve should be accurate for a level near 100 to 120 mV, measured at J3. At lower detector output voltages, the actual SWR will be slightly higher than that shown by the experimental curve. QST

RALPH M. HEINTZ, W6RH

☐ *QST* sadly announces the passing of Ralph M. Heintz, W6RH, who was 88 years old when he died in May. The firm of Heintz and (Jack) Kaufman was famous for transmitter design and transmitting vacuum tubes. In its lobby W1AW proudly displays an "H & K" TPTG transmitter, featuring a pair of 204As, that was used at W1MK until a flood messed it up and prompted the building of W1AW in Newington. Heintz and Kaufman were also the founders of the commercial wireless company Globe Wireless.

A leader in the scientific world, Ralph was the genius behind many of the electronic developments we now take for granted. His expert talents, however, were not limited to just radio and electronics — he patented a stratified-charge automobile engine that featured greater gas economy and cleaner combustion. Honda presently uses an engine based on these principles. A keen insight and understanding of the needs of surgeons led him to the development of specialized instruments for use in eye surgery. This outstanding man, with over 200 patents to his credit, was honored in 1976 when the San Francisco Patent Law association named Ralph Heintz "The Inventor of the Year."

Modifications to a Microprocessor-Based Keyboard

Here are some changes and improvements to the original information — other offerings, too.

By John A. Donaldson,* WB5DGQ

After reading Mr. Eubanks' article, I decided to write a similar program for an 8080A-based microprocessor.[1] While studying the flow charts he presented, I discovered some errors and made some changes, which I would like to pass along to others who wish to use the program.

Making It Simple

Use of a debounced keyboard can greatly simplify both the main program and the keyboard routine. That portion of the main program dealing with the programmable timer may be eliminated; this change is shown in Fig. 1. The altered keyboard routine may be seen in Fig. 2.

Five errors exist in the original record routine.

1) No provision is made to decode a period, comma or slant bar while decoding 2X characters.

2) If the 2X character is not \$20 (20_{16}), then \$10 is added to it. This will cause any 2X character (except \$20) to be recorded as a number.

3) Should the 2X character be \$20, \$5 is used instead.

4) No provision is made for special cw characters such as $\overline{SK}$, $\overline{AS}$, $\overline{BT}$, $\overline{CT}$ or the ERROR signal.

5) Finally, the blank block in the record routine should read: SET BRA = BOTTOM OF BUFFER. [A printing goof. — Ed.]

The changes which correct for all of these errors may be seen in Fig. 3 and are summarized below.

1) All characters are used to index the look-up table.

2) If the character is \$20, space bar, the decoded cw character stored at BRA is \$FF, word space, as in the original program.

3) Lower-case letters can be decoded as upper case, thus eliminating the necessity to disable the shift key. This is done by coding the lower-case letters as upper case in the look-up table.

4) Any unused key can be used to decode the special cw characters.

5) All other unused keys are coded as \$00.

6) If the routine decodes a \$00 from the look-up table, it can exit there instead of being stored in the buffer. This avoids unnecessary recording of unused keys.

Buffer-Filled and Speed-Routine Changes

Instead of using the flashing display as a buffer-capacity indicator, I felt that an audible tone would be better. As such, it would be an aid should the keyboard be operated by a blind amateur. I employed a spare output port on the microprocessor to turn an NE555 tone oscillator on and off. The flow diagram for this routine is shown in Fig. 4. Additionally, the speed routine was altered to allow keyboard speed selection by assigning different keys

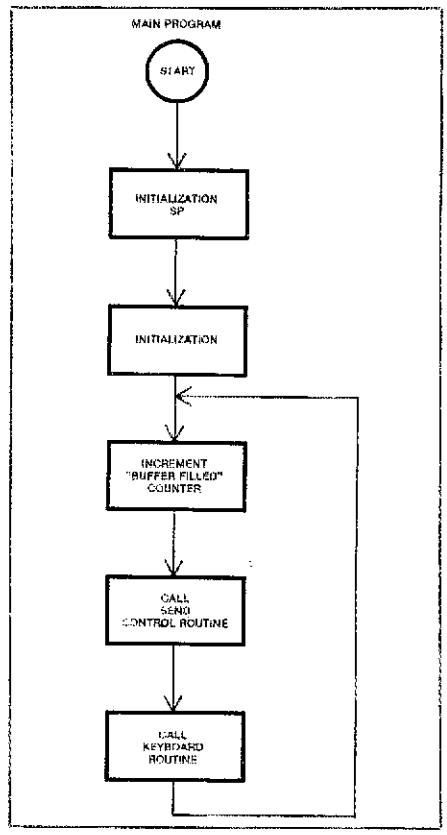


Fig. 1 — The programmable-timer portion of the original main program has been omitted.

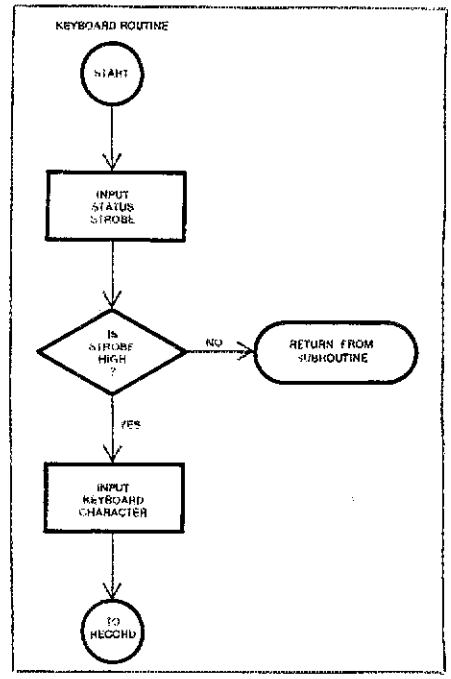


Fig. 2 — The use of a debounced keyboard results in a simplified keyboard routine.

*1808 Cardinal, League City, TX 77573

[1]Notes appear on page 19.

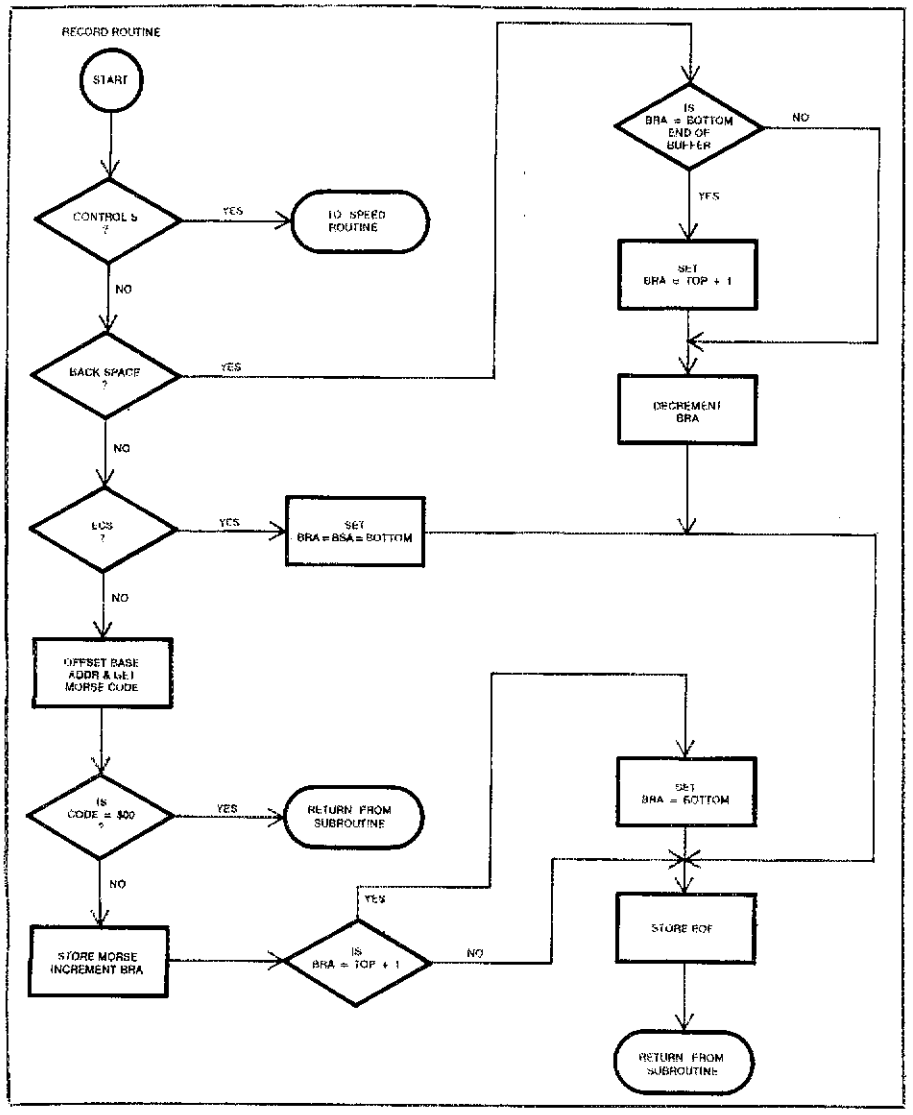


Fig. 3 — The altered and corrected record routine.

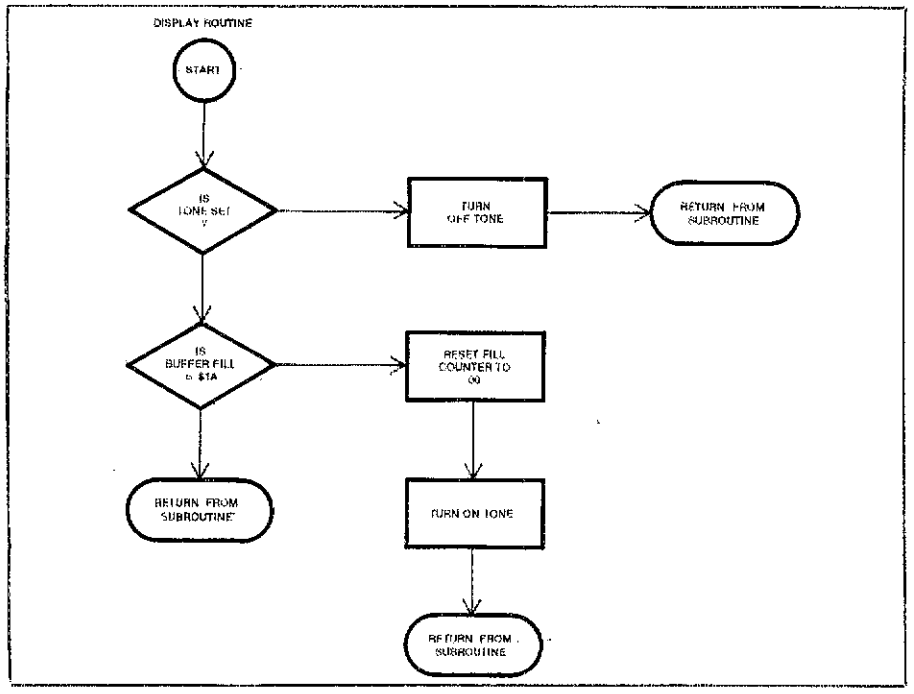


Fig. 4 — The modified display routine is programmed to trigger and reset an audio oscillator instead of a flashing display.

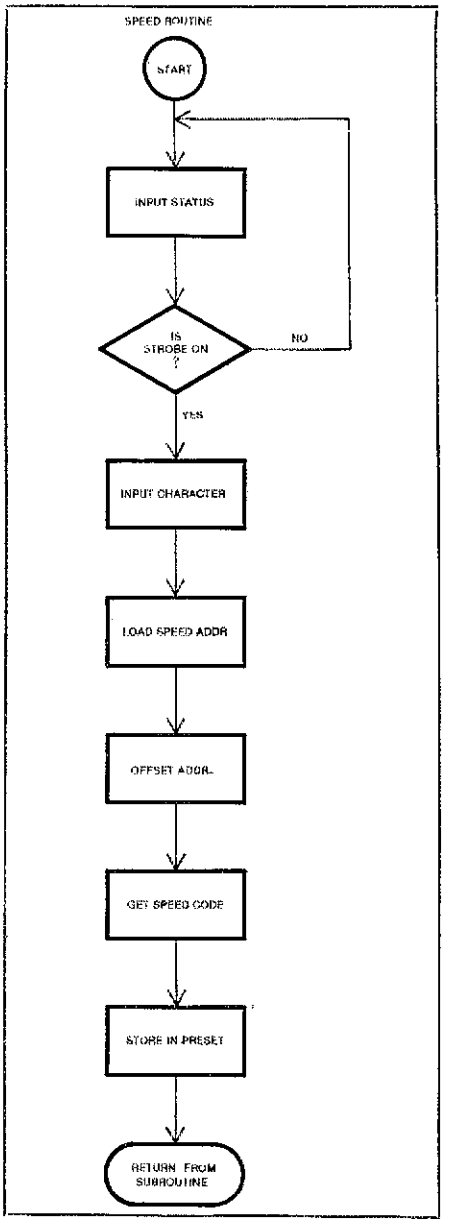


Fig. 5 — This speed routine provides for a more flexible keyboard selection of speed.

for the various speeds. Thus, any number of speed codes can be used. This flow diagram is shown in Fig. 5. No changes were made to either the send-control or letter-preparation routines.

Additional Programs

In my program, I have made other changes as well, but I've mentioned only those I felt were of most importance. Copies of my revised program and flow charts for an 8080A-based microprocessor are available for an s.a.s.e. I also have copies of a simple program and flow chart for those who wish to use the Morse code-to-Alphanumeric Converter that appeared in previous issues of *QST*.[2]

Notes

[1]Eubanks, "A Microprocessor-Based Keyboard," *QST*, October 1979.

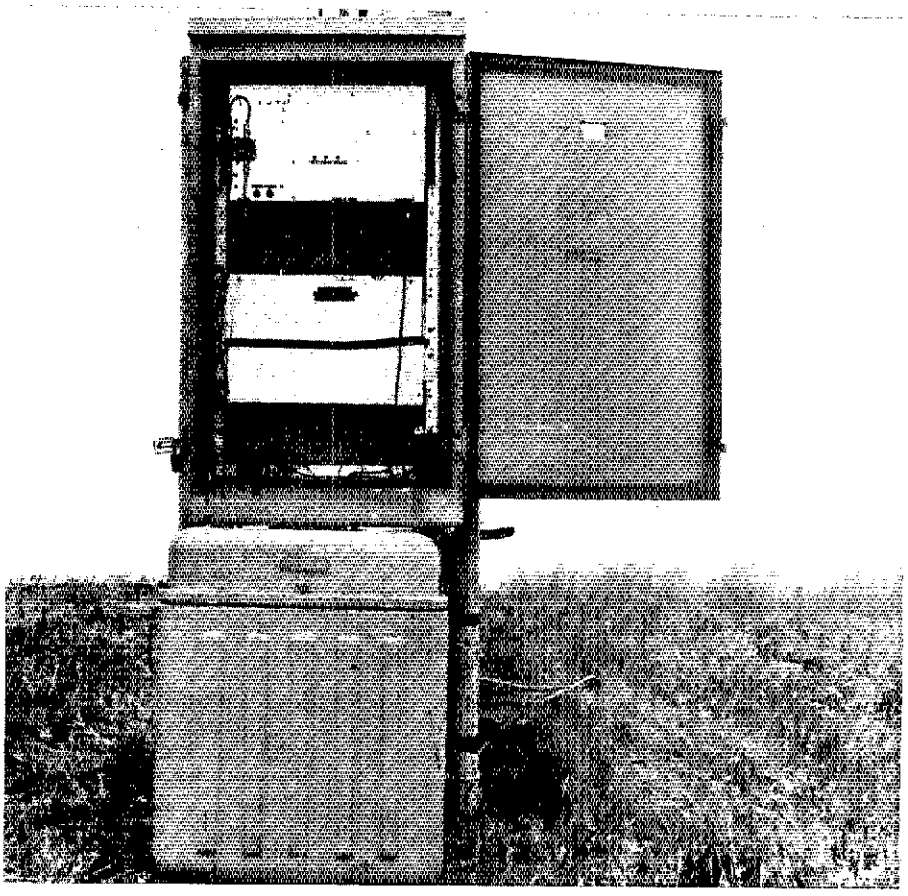
[2]Riley, "A Morse Code to Alphanumeric Converter and Display," *QST*, October, November and December 1975.

A CMOS Command Decoder for Repeaters and Remote Bases

Need a remote-control system for your repeater? Here's a flexible unit that also features power-saving CMOS circuitry.

By M. P. (Jug) Jogoleff,* WA6MBZ

Ever since acquiring an understanding of the TTL command decoder by Bensinger, W5PCX, I had an obsession to build one.[1] I decided to redesign the original presentation using CMOS logic.[2] The many features of this circuit include the following: nanowatt power consumption in the static state (99% of the time), 32 functions (including both on and off for each function), a command sequence that normalizes all the output latches and a power-up reset generator for the output latches. Also employed are anti-falsing integration networks on the reset and execute lines and another network that is used to prevent more than one output latch from changing state per single given command. There's also a pre-addressing strapping network and provision for preventing key audio command tones from being retransmitted by the system. This circuit is intended to be used as part of a radio-operated, remote-control system for a repeater or remote base. The circuitry accepts a series of tone voltages from a Touch-Tone decoder and translates them into latched-logic outputs, which remain at supply voltage (high) or ground (low) levels until commanded to the opposite state. The system is connected to the



The CMOS command decoder installed at the bottom of the repeater cabinet. The unit at the top is the repeater.

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[1]References appear on page 24.

controlled functions via transistors and relays.

Circuit Description

Figs. 1 through 5 show the circuitry of the decoder. Instead of giving a blow-by-blow description of what each IC does, only several of the important aspects will be mentioned. U1, U3 and U5 accept the signals, in sequence, from the Touch-Tone decoder.

The data from U2, U4 and U6 are presented to U7 and U8 in parallel. The output of U7 or U8 provides the clock signals that drive the output latch circuitry, U11 through U26.

The major differences between this circuit and the TTL version mentioned earlier are these: Touch-Tones A, B, C and D drive the pre-addressing network in the CMOS version. Touch-Tone 3 determines which half of the circuit will be activated and Touch-Tone 5 determines whether a function is to be turned off or on. Anti-falsing networks, as well as the audio-muting control, have been added. A normalizing function on the output

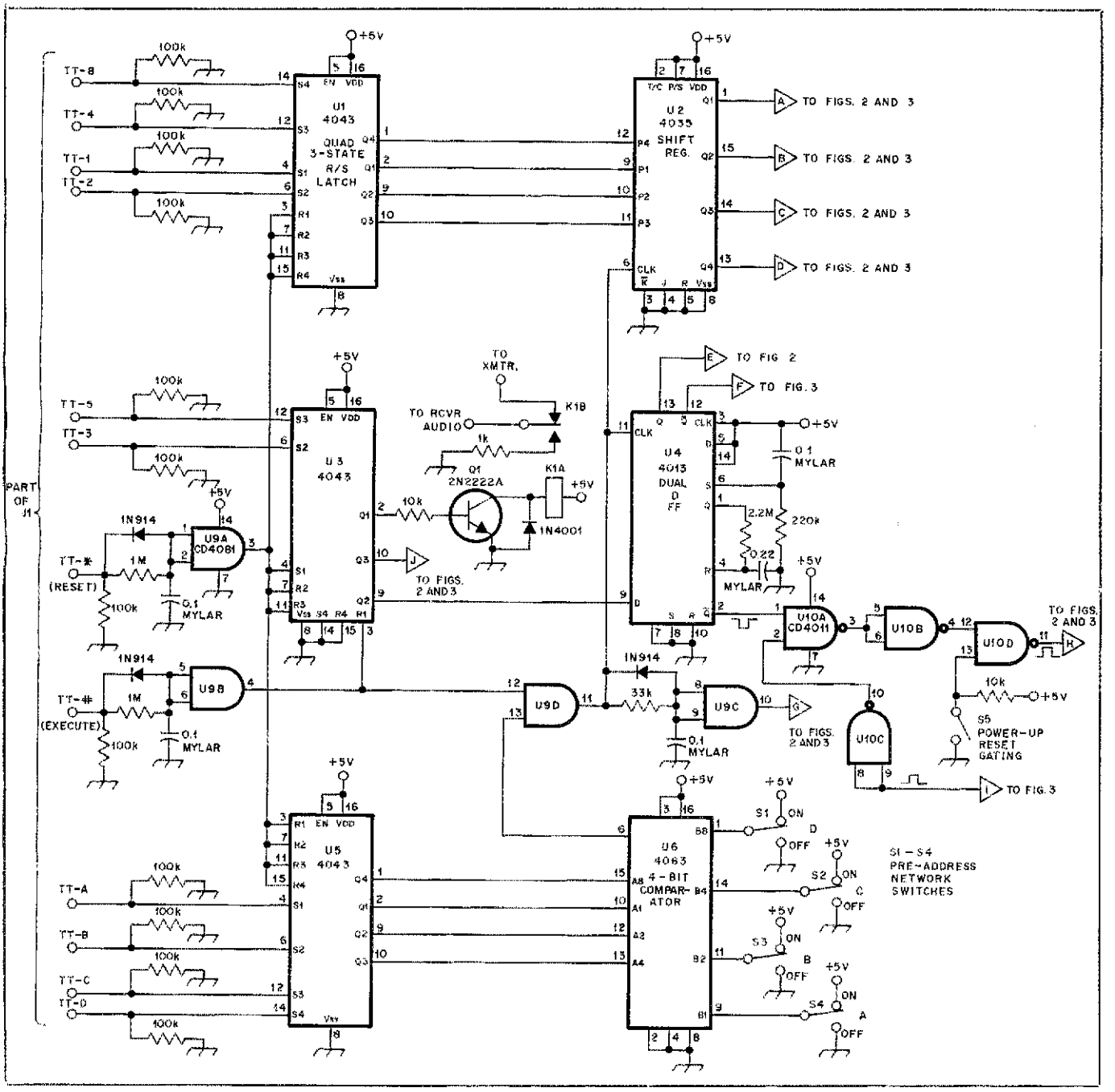


Fig. 1 — The diagram shows the input to the sequential decoder, followed by the clocked logic. Relay K1 is used to prevent the command tones from being transmitted by the repeater. Touch-Tone numbers 7, 9 and Ø are unused. All resistors are 1/4 W. Resistance values are given in ohms; k = 1000; M = 1,000,000.

J1 — 18-lug terminal board.
K1 — 12-V, spdt relay, low-current type.
U1, U3, U5 — CD4043 quad, 3-state R-S latch.
U2 — CD4035 4-stage parallel in/out shift register.
U4 — CD4013 dual D-type flip-flop.
U6 — CD4063 4-bit magnitude comparator.
U9 — CD4081 quad 2-input AND gate.
U10 — CD4011 quad 2-input NAND gate.

latching circuits has also been included.

Power-Saving Output Latch Circuit

Fig. 5 shows a dual-D flip-flop (U25) wired as two monostable circuits and tied to the Q and $\bar{Q}$ of any of the flip-flop output latches. When Q goes high, it triggers the first monostable and closes the coil of the latching relay. When Q goes low, the monostable is reset. But that also means $\bar{Q}$ has been driven high, with the result that the second monostable has been triggered and the other side of the coil energized, thus resetting the latching relay. Power is saved since the coil remains energized only during the active period of either monostable and not continuously while one or the other function is engaged.

A Summary of Command Sequences

Always begin the command sequence with an asterisk (*). If a mistake is made during the process of encoding a command, begin the command sequence again with the asterisk. Choose the command number by keying the proper tones — 1, 2, 4 or 8. Decide if the command is to be a number or its prime (1 or 1′). Tone 3 selects the number and the lack of it provides the prime. Tone 5 gives the output latches D line a sense of direction. The presence of tone 5 forces D high and (eventually) Q high. The absence of tone 5 drives D low and Q low. Next, tones A, B, C or D are inserted as desired to match the data that the toggle switches have encoded on the B line of U6. Finally, activate the pound sign (#), which is the execute signal. If command 1 prime (1′) or 2 (2′) were chosen, tone 6 should be activated. Note that U3, FF1, serves as the audio muting control. When the * tone is keyed, the audio output is removed (via K1) from the repeater transmitter. When the # tone is transmitted, the audio is restored. This

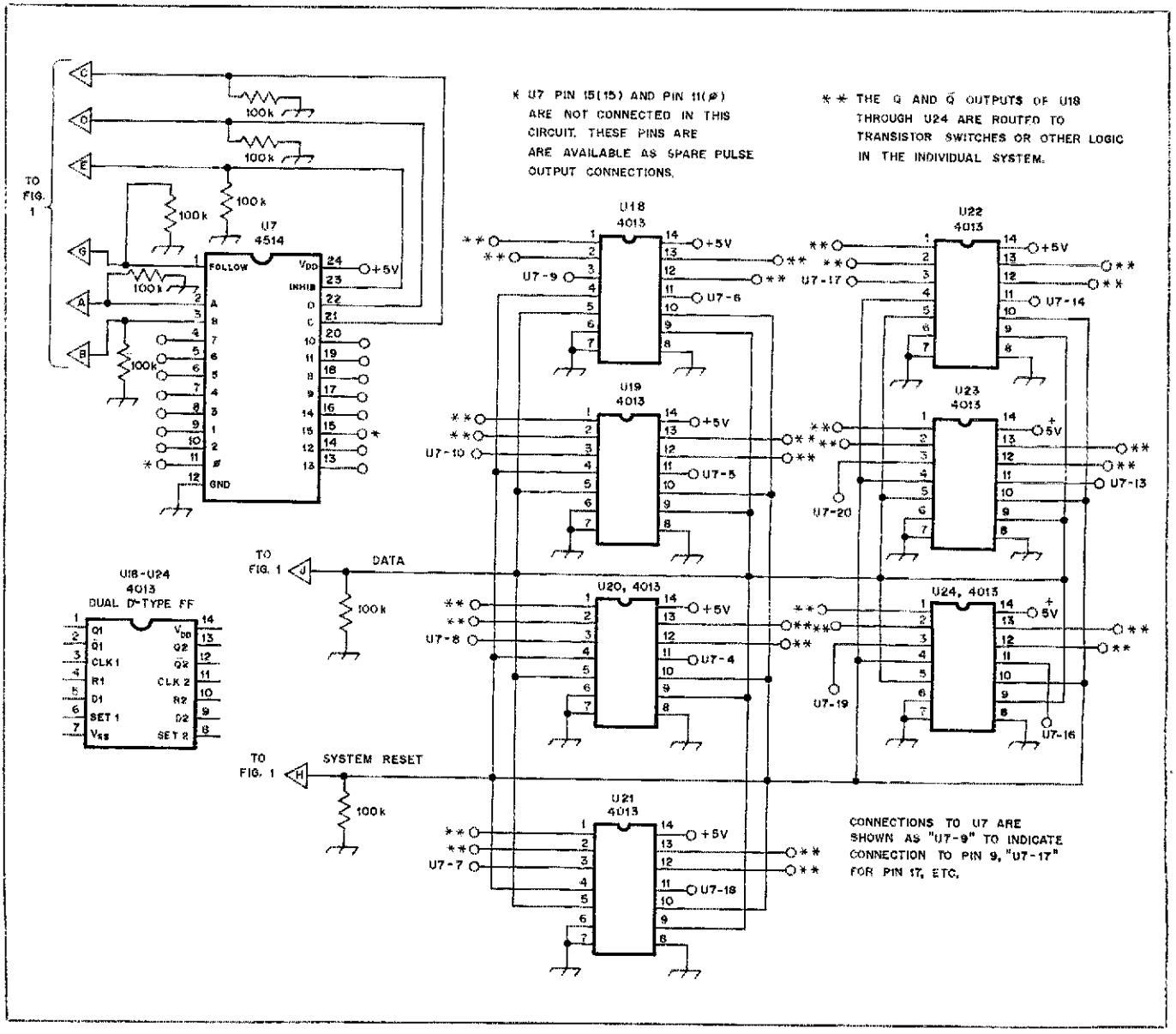


Fig. 2 — A portion of the output-latching circuitry is shown here. U7 provides the clocking signals for U18 through U24, inclusive. Pins 3 and 11 of U18 through U24 are connected to the appropriate pin of U7; e.g., U18 pin 3 connects to U7 pin 9. All resistors are 1/4 W. Resistances are in ohms; k = 1000, M = 1,000,000.

U7 — CD4514 4-bit latch/4-line to 16-line decoder.

U18-U24, incl. — CD4013 dual D-type flip-flop.

means that the only control tones repeated on the air in a valid command sequence would be the *, # and 6.

Toubleshooting

The key to understanding this circuit in theory or practice centers on U7 and U8, the 4-to-16 decoders. In this regard, Table 1 should be of assistance. The command train can be followed easily by tracing the circuit from the inputs toward the Touch-Tone decoder and before the outputs at the output latching. The circuit contains no oscillators, PROMS or RAMS, which would require the use of an oscilloscope for troubleshooting. A high-impedance VTVM and milliammeter, along with several LEDs with 1-kΩ resistors in series, are the only pieces of test equipment necessary for circuit checking. If a low-impedance multimeter is used, ICs may be damaged. If appreciable current is measured (other than the static current of the tone decoder) there's probably a floating input in the circuit.

Construction Notes

It is probably best to lay out the subsystems on separate cards: tone decoder, command decoder (U1 through U6, U9 and U10), first bank of output latches (U13 through U19 and U7), second bank of output latches (U20 through U26 and U8) and last, the other cards for special functions such as those provided for by U11 and U12. When using long runs of wire, bypass the input ports with 100-kΩ resistors to protect the ICs from static charges. Bypass the power supply leads with 0.01-μF disc-ceramic capacitors, using one capacitor for every six ICs or less.

The unit shown in the photograph was built in a metal box 4 in. (102 mm) deep, 17 in. (432 mm) long and 11 in. (279 mm) wide.

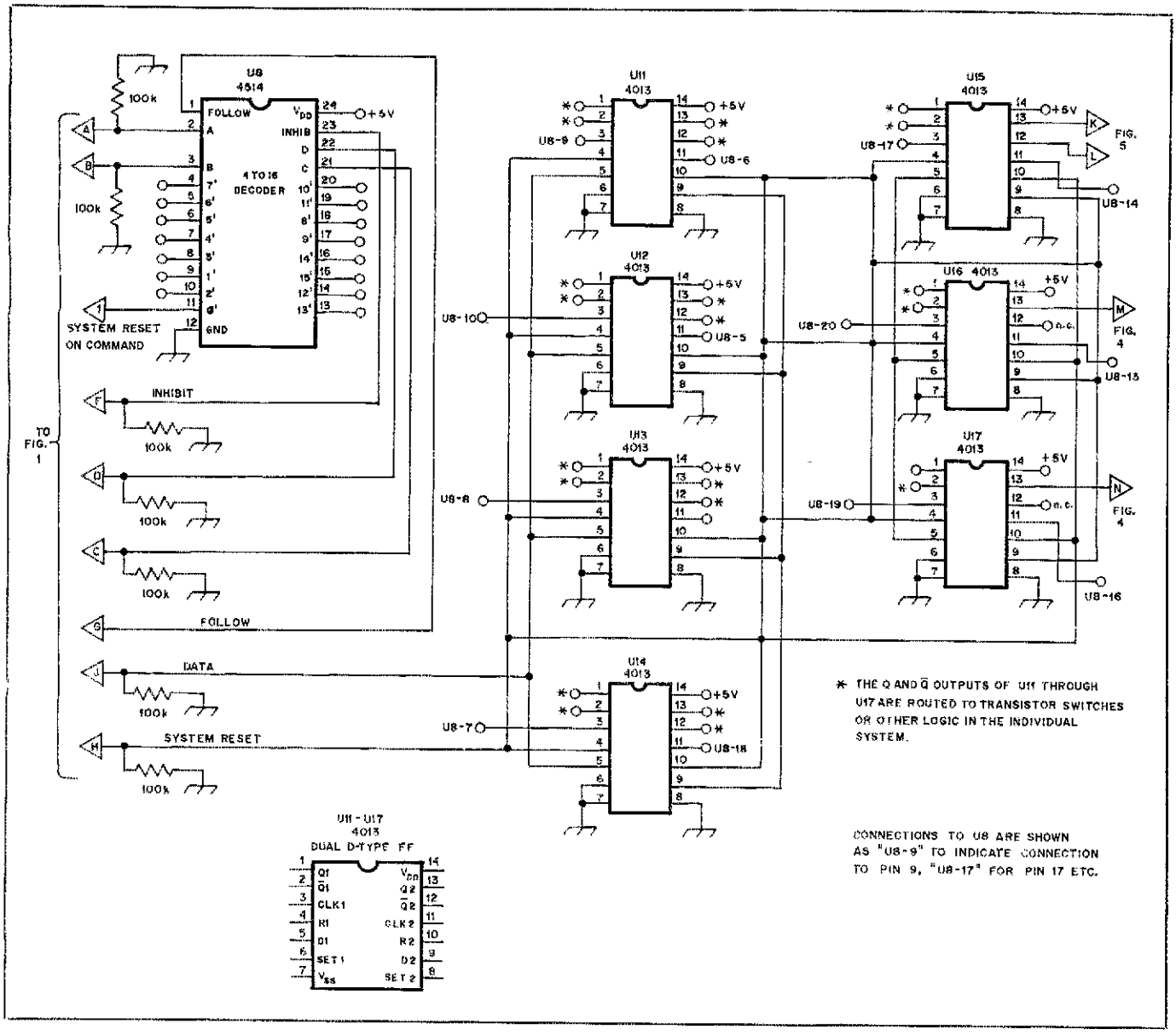


Fig. 3 — The second half of the output-latching circuitry is shown here. U8 provides the clocking signals for U11 through U17 inclusive. Pins 3 and 11 of U11 through U17 are connected to the appropriate pin of U8; e.g., U11 pin 3 connects to U8 pin 9. All resistors are 1/4 W. Resistances are in ohms; k = 1000; M = 1,000,000.

U8 — CD4514 4-bit latch/4-line to 16-line decoder.

U11-U17, incl. — CD4013 dual D-type flip-flop.

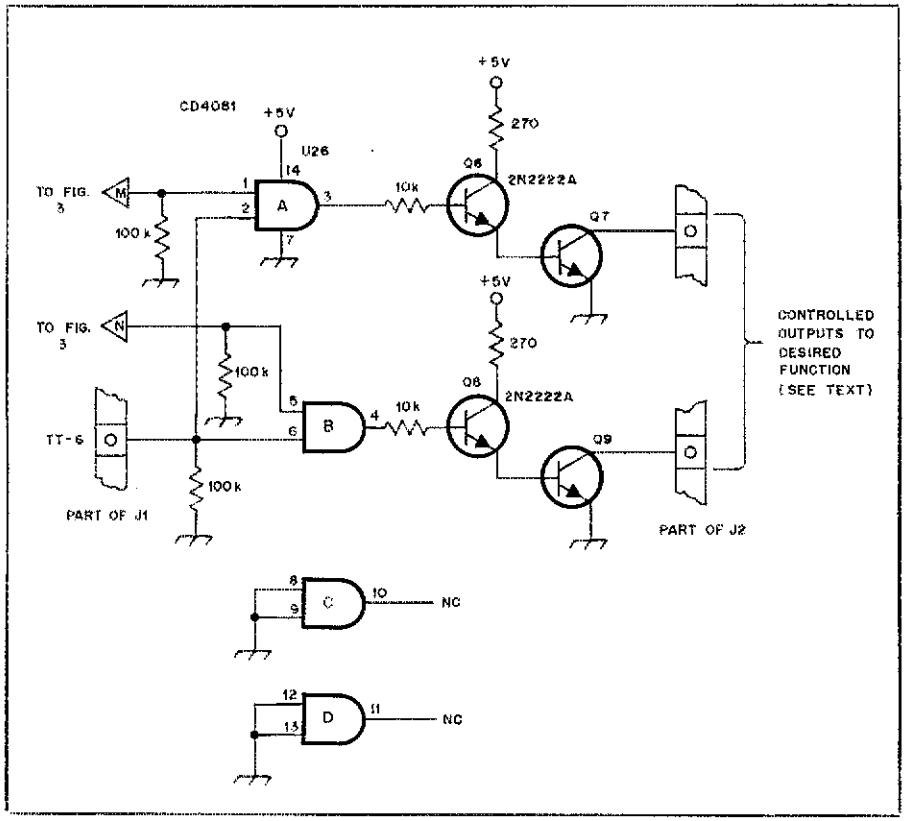


Fig. 4 — These two circuits will provide a controllable function. After being commanded ON through the decoder, the function is ruled by Touch-Tone 6 for any designated purpose. In the original system, it is used to reset the time-out timer. All resistors are 1/4 W. Resistances are given in ohms, k = 1000.
J2 — 18-lug terminal board. U26 — CD4081 quad 2-input AND gate.
Q7, Q9 — Any suitable npn transistor.

Table 1

Truth Table for U7 and U8

Parallel Inputs D C B A	*Serial Output No.*	*Pin No.*
L L L L	Ø	11
L L L H	1	9
L L H L	2	10
L L H H	3	8
L H L L	4	7
L H L H	5	6
L H H L	6	5
L H H H	7	4
H L L L	8	18
H L L H	9	17
H L H L	10	20
H L H H	11	19
H H L L	12	14
H H L H	13	13
H H H L	14	16
H H H H	15	15

The above data assume the *inhibit* line is low and the *follow* line is high. Otherwise, no output will occur.

The completed unit was installed at a repeater site on Santa Cruz Island. As can be seen, either unit is easily removed from the cabinet for transportation back to the mainland for servicing, if necessary.

References

[1]*FM And Repeaters For The Radio Amateur*, ARRL, first edition, pp. 121-125.
[2]Texts recommended by the author are: Lancaster, *CMOS Cookbook*, Howard W. Sams & Co., Inc., 4300 West 62nd St., Indianapolis, IN 46268 and *CMOS Databook*, National Semiconductor Corp., 2900 Semiconductor Dr., Santa Clara, CA 95051.

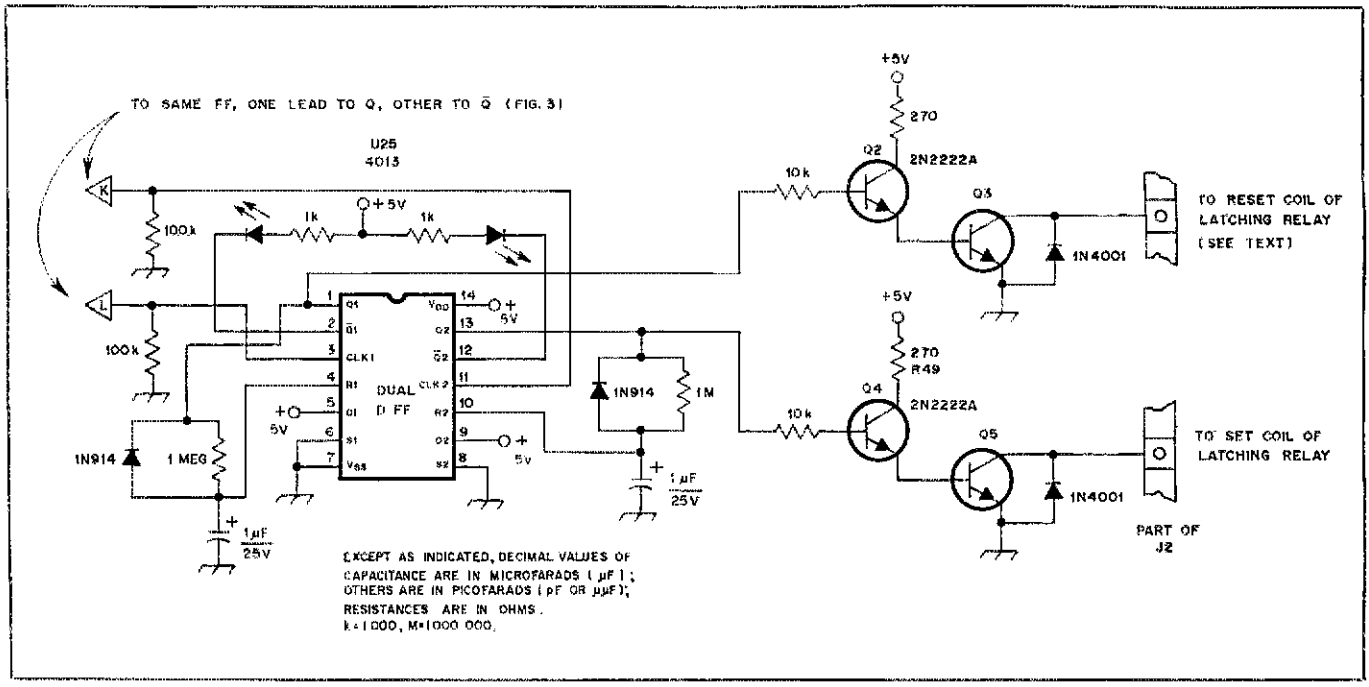


Fig. 5 — Diagram of the power-saving circuit. The latching relay coils are energized only when U25A or B is active and U25 is tied to a flip-flop (to the Q and Q̄ of any one of the output latches). The LEDs are used as monitors of the status of U25. All resistors are 1/4 W. Resistance values are given in ohms, k = 1000; M = 1,000,000.
Q3, Q5 — Any suitable npn transistor. U25 — CD4013 dual D-type flip-flop.

External Paddles for the Heath HD-1410 Keyer

Been yearning to try a different set of paddles with your '1410? It's as simple as one, two, three-circuit jack and plug!

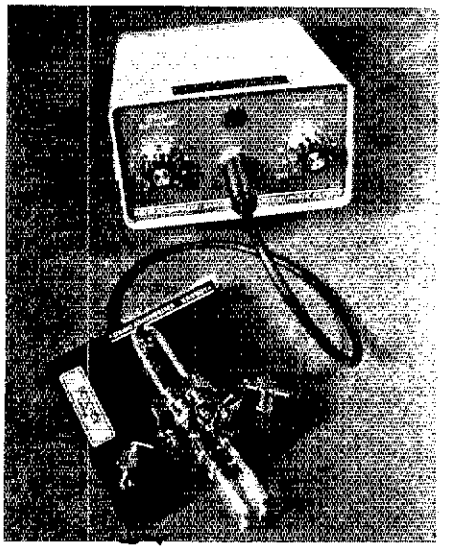
By David L. Ashenfelter,* KA8DDT

The Heath HD-1410 is a popular electronic keyer, but cw purists who own this dandy little gadget sometimes complain about the quality of the internally mounted paddles. I had my heart set on acquiring Bencher paddles for quite a long time, but repeatedly postponed their purchase because I figured I would have to buy a new keyer, too. Then George Bullard, KA8APE, suggested I modify the HD-1410 to accept external paddles. Finding no such existing modification, I devised two simple and inexpensive ways to modify the keyer for that purpose.

All that is needed for the project are a three-circuit (stereo) phone jack, a matching plug, a length of three-conductor cable and a few inches of wire. The three-circuit jack can be mounted in either of two locations: the front panel (by removing the internal paddles and installing a new panel), or on the rear panel, by replacing the existing two-circuit PHONES jack. The latter method will render the PHONES and adjacent RCVR AUDIO jacks useless, but the headphones may just as easily be plugged into the station receiver. Another option that remains is to remove the internal paddles *and* utilize the rear-mounted key jack. This, too, requires installation of a new panel.

Rear-Panel Jack Installation

Disconnect the two brown wires that connect the PHONES jack to the speaker and volume control. Solder these two wires together to remake the speaker connection and insulate the joint with tape or sleeving. Remove the single wire connecting the PHONES jack to the adjacent RCVR AUDIO jack. Remove the PHONES jack and replace it with the three-circuit jack. Refer to Fig. 1. Wire the jack lugs to the internal paddle assembly as follows: The dit wire is connected to circuit board hole A, the dah wire to hole B, and the ground lug to the small nut and screw that fasten the paddle assembly to the circuit board. The screw grounds the paddle assembly to the circuit board and chassis (the nut and screw are labeled H on page 32 of the HD-1410 assembly manual).



The author's modified Heath keyer and favorite set of paddles. Rub-on lettering adds a professional touch to the homemade panel. *(photo by Thomas Harm)*

Internal Paddle Removal

Extracting the internal paddles from the keyer requires removal of the front panel; this exposes the two flathead screws that hold the paddle assembly to the chassis front. Remove these screws. Then loosen — but do not remove — screw H. Cut wires A and B at the paddle terminals. (Don't discard the paddles or hardware. You may need them to restore the keyer to its original state should you decide later to sell the keyer or return it to the factory for repairs.) Removing the paddles results in two unsightly holes being left in the front panel, but this can be remedied by cutting a new panel from a piece of aluminum of similar thickness. Using the original panel as a guide, drill holes for the neon lamp and the speed and volume controls. An additional hole (in the center of the panel) will be required if the external paddles are to be plugged into the front of the keyer. To obtain a truly professional look, spray the new panel with a few coats of paint and apply rub-on lettering. One or two coats of clear acrylic lacquer will protect the lettering and paint.

The Finishing Touches

Connect the three-conductor cable to the three-circuit plug and insert the plug into the key jack. Using an ohmmeter, locate the ground wire, which is connected via the plug and jack to screw H. Attach this wire to the center post of the external paddles. Identify and attach the remaining two wires to the dit and dah paddles. That does it! Happy keying!

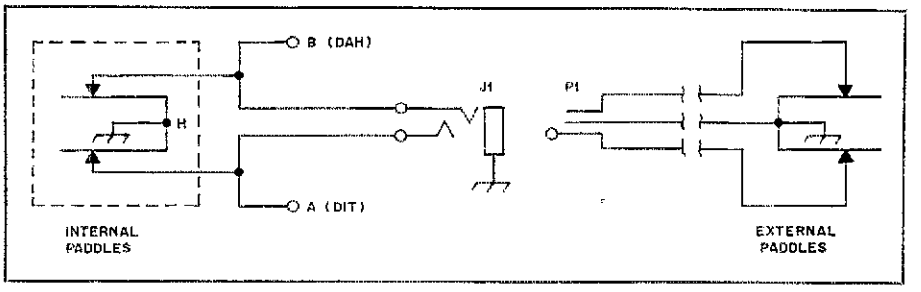


Fig. 1 — The diagram of the wiring modifications to the Heath keyer. The internal paddle assembly (shown in the broken lines) may be removed if desired. J1 and P1 are a three-circuit jack and plug combination.

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A CW ASCII Keyboard

Care to key by ASCII? Let your fingers do the talking with this low-cost keyboard.

By Brooks Carter,* W4FQ

The following presentation is not a step-by-step construction project. Rather, it is a brief description of a simple and inexpensive cw-only ASCII keyboard which was built for use with a microprocessor-based keyer requiring an ASCII-encoded input. Many other uses for such a keyboard will probably come to the reader's mind, too. The basic circuit is derived from portions of the *TTL Cookbook*.[1] The keyboard requires no shift or control keys and costs less than $25 to build. Surplus keyboard assemblies may be purchased from Meshna[2] or elsewhere and the rest of the parts are available from your local Radio Shack outlet.

Circuit Description

The ASCII encoding circuitry and diode matrix are shown in Fig. 1. Initial contact closure of the key is noisy and erratic and might result in skipping a character or doubling it. Therefore, a 10-ms delay is created to allow for firm closure of the contacts. This delay is provided by the combination of C1 and R1, which prevents the timer, U5, from releasing the required positive latch-loading pulse. Following the delay sequence, the latch outputs are fed to the inverting buffers, U3 and U4. Do not attempt to eliminate the buffers by using the inverting outputs of U1 and U2; it won't work.

The Diode Matrix

Table 1 shows the matrix arrangement; the complete matrix requires a total of 161 diodes. It may be necessary to change the special-character diode sequences (such as $\overline{AS}$, $\overline{BT}$) if those in the table do not conform to your requirements. All the other characters use standard ASCII encoding.

You may wish to use the diode/transistor matrix presented in an earlier issue of *QST*.[3] However, the circuit will not operate reliably with a 5-volt supply; a 12- or 15-volt supply would be required and the 74LS175s must be replaced by 40175s. Pinouts for both IC types are given in Fig. 1. The buffers will still require a 5-volt supply to keep their outputs compatible with 5-volt ASCII code-level inputs.

Table 1

Matrix Connections

All diodes are connected from the appropriate character key-switch matrix line to the designated vertical matrix line.

From	*To*	*From*	*To*	*From*	*To*
A	6,Ø	Q	6,4,Ø	7	5,4,2,1,Ø
B	6,1	R	6,4,1	8	5,4,3
C	6,1,Ø	S	6,4,1,Ø	9	5,4,3,Ø
D	6,2	T	6,4,2	Ø	5,4
E	6,2,Ø	U	6,4,2,Ø	$\overline{AS}$	4,3,1,Ø
F	6,2,1	V	6,4,2,1	$\overline{AR}$	1,Ø
G	6,2,1,Ø	W	6,4,2,1,Ø	$\overline{SK}$	2
H	6,3	X	6,4,3	$\overline{KN}$	Ø
I	6,3,Ø	Y	6,4,3,Ø	BK	1
J	6,3,1	Z	6,4,3,1	Space	5
K	6,3,1,Ø	1	5,4,Ø	$\overline{BT}$	5,4,3,2,Ø
L	6,3,2	2	5,4,1	?	5,4,3,2,1,Ø
M	6,3,2,Ø	3	5,4,1,Ø	/	5,3,2,1,Ø
N	6,3,2,1	4	5,4,2	.	5,3,2,1
O	6,3,2,1,Ø	5	5,4,2,Ø	,	5,3,2
P	6,4	6	5,4,2,1		

*Rte. 2, Box 407, Irmo, SC 29063

Notes

[1]Lancaster, *TTL Cookbook*, first edition, Howard W. Sams and Co., Inc.

[2]John J. Meshna, Jr., Inc., P. O. Box 62, 19 Allerton St., E. Lynn, MA 01904.

[3]Isley, "A Static Morse Keyboard," *QST*, January 1980.

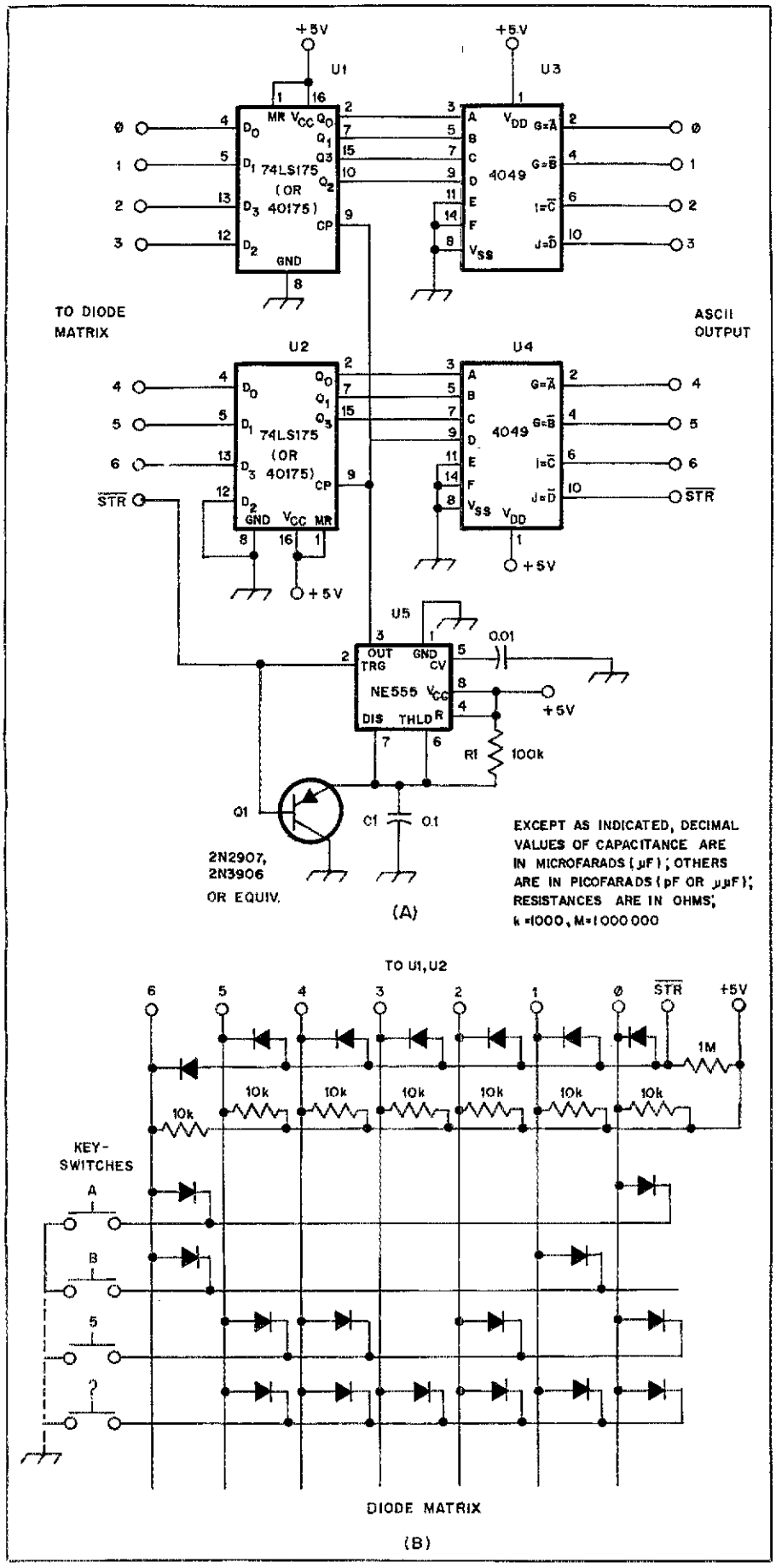


Fig. 1 — Schematic diagram for the ASCII cw keyboard. Only a portion of the diode matrix is shown; all other keyswitch and diode connections may be found in Table 1. All diodes are 1N914 or equivalent; resistors are 1/4-watt, carbon-composition type.

Strays

TA PROFILES

☐ We acknowledge with gratitude the services of Richard K. Olsen, N6NR, who at age 30 is completing his second term as an ARRL Technical Advisor (TA). Rick was one of our first TAs, having been appointed, along with Wes Hayward, W7ZOI, in 1976. His field of expertise is microwave circuits.

Rick was first licensed in 1964 as WN7CNP in Scottsdale, Arizona. He has an Extra Class license. His principal interests in Amateur Radio include being a TA, cw (40-wpm CPA), vhf/uhf weak-signal work and remote bases. Besides being a *QST* author and a life member of the League, Rick is a member of the Point Loma Radio Club, Convair Radio Club, ARES and IEEE.

Employed at the General Dynamics Electronics Division in San Diego, his primary responsibility is that of coordinator of Manufacturing Technology. He also acts as principal investigator of the Microelectronics IR&D program and is the Advanced Manufacturing Technology department staff engineer on microwave theory and techniques. He received a BSBA and MBA from La Jolla University, and is currently working on his Ph.d. in Human Behavior, with emphasis on engineering management. — *Marian Anderson, WB1FSB*

TA Rick Olsen, N6NR, at his operating position. *(photo courtesy of Dronk Radio & TV News Agency)*

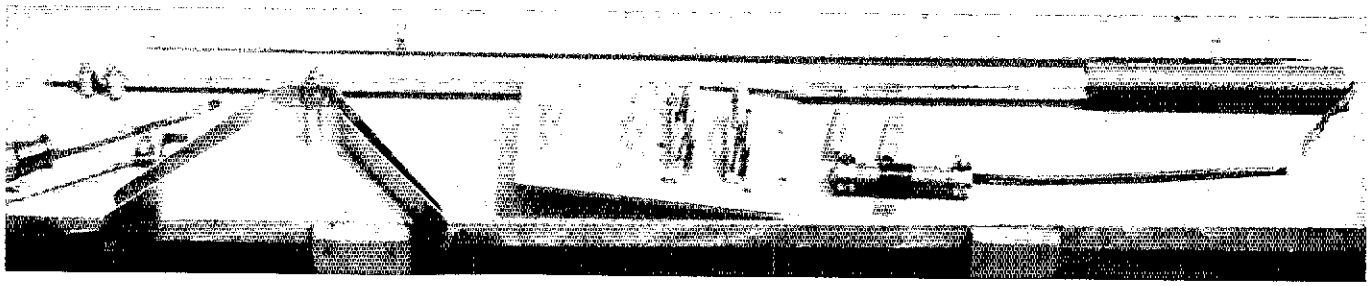
I would like to get in touch with . . .

☐ teenagers interested in forming an ssb Advanced class study group. Greg Whitman, KA1DEU, 165 Woodruff Ave., Watertown, CT 06795, Tel. 203-274-4025.

A Traveling Ham's Trap Vertical

If you're a wayfarer, you should be interested in this two-band trap vertical, which collapses to 39 inches for easy transport.

By Doug DeMaw,* W1FB



The traveling ham's trap vertical ready for final assembly. At the left foreground are two wing-shaped pieces of aluminum used experimentally during development of the antenna; they are not required for the model described in the text.

How effective is a trap type of antenna? That's a question the ARRL staff is asked repeatedly. Unfortunately, there is no simple answer we can offer. This is because the term "effective" is rather subjective. Effectiveness for one operator might mean the ability to work rare DX. Conversely, another amateur might consider the antenna effective if it helped him to break into pileups quickly. Some other operator might think of antenna effectiveness as a quality that would permit maintaining reliable communications over a specified ground-wave path.

Perhaps a better question to ask would be, "How *efficient* is a trap style of antenna?" But even that query is a tough one to address. The efficiency depends on many factors, such as the quality of the ground system, the Q of the traps (minimum losses) and the tuning of the system. The antenna performance also will depend on its height above nearby conductive or absorptive objects.

The best response to questions about trap-antenna performance is probably something like, "In theory, a full-size antenna will perform better than a short antenna with lumped constants." In other words, there is a certain trade-off to be expected in any "compromise" antenna. The performance degradation of a compromise antenna may, in some instances, be so minor that the operator would never recognize the difference between it and a full-size antenna. On the other hand, the performance difference can be startling. An example of the latter was seen during a DXpedition by W8JUY/8P6WM and W1FB/8P6EU. The two stations had equal transmitter power and were situated 100 feet (30.5 m) apart. The antennas of each station were erected over the ocean shore. W8JUY used a 4-band trap vertical at a height of 40 feet (12 m) above the sea shore. A complete radial system (factory specified) was erected for the vertical antenna. W1FB used a center-fed sloping dipole over the sea shore. It was approximately 25 feet (7.6 m) above the shoreline. During 20-meter operation over a two-week period, comparative signal reports from the USA and DX stations revealed that the sloping dipole of W1FB was consistently two to three S units better than the trap vertical. It is fair to say that at another time, and from some new QTH, the situation might be reversed. The inferior performance of the trap vertical did not, however, impair the ability of W8JUY to hold regular schedules or work DX, which brings us to the focal point of this discussion: Irrespective of the actual performance, a trap beam or trap vertical can be (and usually is) a suitable all-around amateur hf-band antenna.

Table 1

Dimensions for Various Frequency Pairings

Tubing (Fig. 1)	*Band (MHz)*	*A*	*B*	*C*	*D*	*E*	*F*	*C1 (pF)***	*L1 (Approx. μH)*
Tubing Length	21/28	25	16	25	25	25	33	18	1.70
(inches)	14/21	38	33	37	37	37	33	25	2.25
	10/14*	42	42	54	54	54	49	39	3.25
Tubing Length	21/28	20	16	21.5	21.5	21.5	33	—	—
at Resonance	14/21	33	33	33	33	33	33	—	—
(approx. inches)***	10/14*	37	37	49.6	49.6	49.6	49	—	—

in. × 25.4 = mm
*New WARC-79 band.
**See text.
***Midband dimensions. X_{C1}, $X_{L1} \approx 300\ \Omega$

*Senior Technical Editor, ARRL

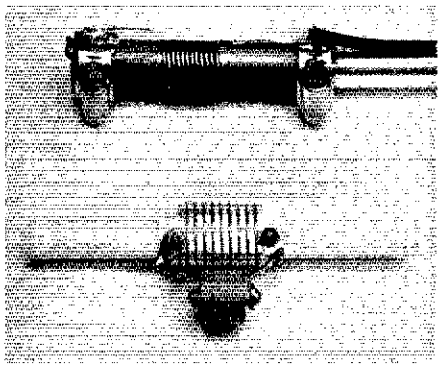


Fig. 1 — Photograph of two styles of traps. PVC tubing is used for the lower one (see text) and Teflon rod is used as the coil form for the other. The ends of the Teflon rod have been reduced on a lathe to fit inside the tubing sections above and below the trap. Teflon is too flexible for large verticals, but phenolic or fiberglass rod would be satisfactory. Miniductor stock comprises the coil in the upper trap. A ceramic transmitting capacitor is used in parallel with the coil.

Separate single-band, full-size vertical antennas would probably work slightly better than a multiband trap vertical, but the latter would cost less, occupy less space, be more convenient and do a pretty good job for the operator.

How do Traps Work?

A *trap* is pretty much what the name implies: It "traps" rf energy by blocking its passage to portions of the antenna that aren't used during operation in a specified band. A trap is a high-impedance device at the selected operating frequency, which enables it to block the passage of rf energy on the band for which it is a parallel-resonant circuit. At some lower frequency it becomes part of the antenna, and responds somewhat as a loading coil. Thus, if we were to build a two-band trap beam or vertical for, say, 40 and 20 meters, the part of the antenna from the feed point to the bottom of the trap would constitute the 20-meter radiator. The trap (tuned for 20 meters) would effectively "divorce" the portion of the antenna above the trap during 20-meter operation. When changing operations to 40 meters, all of the antenna would become a functional part of the system. The trap acts as a loading coil on 40 meters, which results in the overall antenna length being somewhat less than that of a full electrical quarter wavelength.

If the trap antenna were designed for more than two amateur bands, additional traps and antenna sections would be used, but the principle of operation would remain the same. The highest frequency section of the antenna is always nearest the feed point and progresses outward until all of the antenna is used for the lowest operating frequency.

Trap Design

There is no rigid formula for selecting a best L/C ratio for an antenna trap. Generally, the X_L and X_C values can range between 100 and 300 ohms, and since $X_L = X_C$ at resonance, they will be the same value in a trap.[1] We often select a standard capacitor value in that reactance range and "tailor" the coil X_L to equal it.

It is important to keep the trap losses as low as possible (high Q). This requires the use of a coil form with high dielectric quality, such as polystyrene, phenolic, fiberglass, ceramic, Teflon or Plexiglas. The material chosen should be capable of withstanding antenna stress during periods of wind and ice loading. Brittle materials should not be used in cold climates in order to prevent the coil form from shattering under stress.

For power levels below 200 watts dc input to the PA stage of the transmitter, it is okay to use PVC tubing. At high rf-power levels, the PVC may heat, melt and burn. Nylon insulating forms are subject to the same failure, and the condition worsens as the operating frequency is increased.

The coil conductor should be of large cross-sectional area to minimize trap loses. No. 14 AWG or heavier copper wire is recommended. For high-power work, it is helpful to use copper tubing as the coil.

The Q and voltage rating of the trap capacitor also is an important consideration. If a fixed-value capacitor is used, it should be a ceramic transmitting type of capacitor (Centralab 800 series or equivalent). These units are available with working voltages up to 20 kV. This style of capacitor is shown in Fig. 1.

A suitable length of 50- or 75-ohm coaxial cable can be used as a trap capacitor. RG-58/U and RG-59/U cable is suggested for rf power levels below 150 watts. RG-8/U or RG-11/U will handle a few hundred watts without arcing or overheating. The advantage in using coaxial line as the trap capacitor is that the trap can be adjusted to resonance by selecting a length of cable that is too long, then trimming it until the trap is resonant. This is possible because each type of coax exhibits a specific amount of capacitance between the conductors. *The Radio Amateur's Handbook* contains a table that lists the capacitance per foot for popular coaxial cables. For example, RG-58/U has approximately 25 pF per foot, whereas RG-8/U cable has approximately 30 pF per foot. A coax-cable capacitor is also shown in Fig. 1.

Additional Band Capability

Assuming that we have built a trap vertical for two or three bands, what might we do to obtain capability for one additional band without using the trap concept? The simple way to achieve this is to place a coil and capacitance hat on the top of the trap vertical. This is equivalent to "top loading" any vertical antenna. Suppose we had a trap vertical for 20, 15 and 10 meters, but also wanted to use the system on 40 meters. The popular way to do this is to construct a 40-meter loading coil which can be installed as shown in Fig. 2. A number of commercial trap verticals use this technique. The loading coil is called a "resonator" because it makes the complete antenna resonant at the lowest chosen operating frequency (40 meters in our example). The coil turns must be adjusted while the antenna is assembled and installed in its final location. The remainder of the antenna has to be adjusted for proper operation on all of the bands *before* the resonator is trimmed for 40-meter resonance. If the capacitance-hat wires are short (approximately 12 inches or 300 mm), we can assume a capacitance of roughly 10 pF, which gives us an X_C of 2275 ohms. Therefore, the resonator will also have an X_L of 2275 ohms. This becomes 51 μH for operation at 7.1 MHz, since $L_{\mu H} = X_L/2\pi f$. The resonator coil should be wound for roughly 10% more inductance than needed to allow some leeway for trimming it to resonance. Alternatively, the resonator can be wound for 51 μH and the capacitance-hat wires shortened or lengthened until resonance in the selected part of the 40-meter band is achieved.

As was true of the traps, the resonator should be wound on a low-loss form. The

[1][Editor's Note: This is true only for one frequency band. All other dimensions being held equal, the lower the L/C ratio, the higher the resonant frequency will be on a lower frequency band. Of course the length of the outside end section can be adjusted for desired resonance on the lowest frequency band with a fixed L/C ratio.]

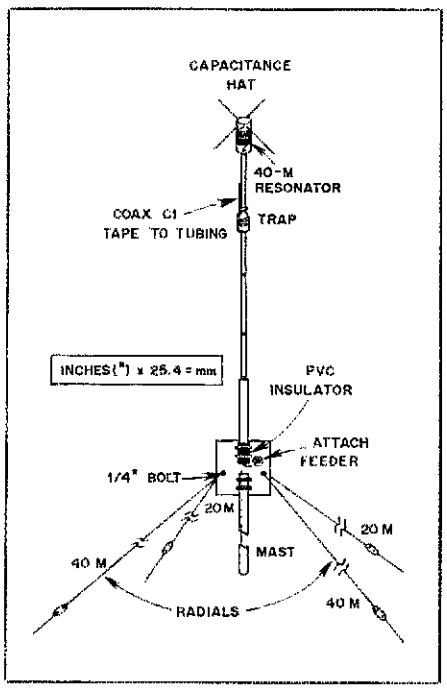


Fig. 2 — The assembled trap vertical, showing how a resonator can be placed at the top of the radiator to provide operation on an additional band (see text).

largest conductor size practical should be used to minimize losses and elevate the power-handling capability of the coil. Details of how a homemade resonator might be built are provided in Fig. 3. The drawing in Fig. 2 shows how the antenna would look with the resonator in place.

A Practical Two-Band Trap Vertical

The author needed a 20/15-meter antenna for use on his RV camper and to carry to the Caribbean for DXpeditions. Therefore, it seemed prudent to design an antenna that could be broken down into a small package for carrying or storage. The best approach seemed to be that of using short lengths of aluminum tubing that would telescope into one another. The longest of these is 39 inches (991 mm).

The ends of the sections are cut with a hacksaw to permit securing the joints by means of stainless-steel hose clamps. The trap is held in place by two hose clamps that compress the PVC coil form and the 1/2-inch (13-mm) tubing sections onto 1/2-inch dowel-rod plugs (Fig. 4). Strips of flashing copper (parts "G" of Fig. 4) slide inside sections B and C of the vertical. The opposite ends are placed under the hose clamps, which compress the PVC coil form. This provides an electrical contact between the trap coil and the tubing sections. The ends of the coil winding are soldered to the copper strips. Silicone grease should be put on the ends of straps "G" where they enter tubing sections B and C. This will retard corrosion. Grease can be applied to all mating surfaces of the telescoping sections for the same reason.

The trap (after final adjustment) should be protected against weather conditions. A plastic drinking glass can be inverted and mounted above the trap, or several coats of high-dielectric glue (Polystyrene Q-Dope) can be applied to the coil winding. If a coaxial-cable trap capacitor is used, it should be sealed at each end by applying noncorrosive RTV compound.

The trap is tuned to resonance prior to installing it in the antenna. It should be resonant in the center of the desired operating range, i.e., at 21,050 kHz if you prefer to operate from 21,000 to 21,100 kHz. Tuning can be done while using an accurately calibrated dip meter. If the dial isn't accurate, locate the dipper signal using a calibrated receiver *while the dipper is coupled to the coil and is set for the dip.*

A word of caution is in order here: Once the trap is installed in the antenna, it will not yield a dip at the same frequency as before. This is because it becomes absorbed in the overall antenna system and will appear to have shifted much lower in frequency. For the 20/15-meter vertical, the apparent resonance will drop some 5 MHz. Ignore this condition and proceed with the installation.

The Tubing Sections

An illustration of the assembled two-band trap vertical is shown in Fig. 5. The tubing diameters indicated are suitable for 15- and 20-meter use. The longer the overall antenna, the larger should be the tubing diameter to ensure adequate strength.

A short length of test-lead wire is used at the base of the antenna to join it to the coaxial connector on the mounting plate. A banana plug is attached to the end of the wire to permit connection to a uhf style of bulkhead connector. This method aids in easy breakdown of the antenna. A piece of PVC tubing slips over the bottom of section "F" to serve as an insulator between the antenna and the mounting plate.

If portable operation isn't planned, fewer tubing sections will be required. Only two sections need be used below the trap, and two sections will be sufficient above the trap. Two telescoping sections are necessary in each half of the antenna to permit resonating the system during final adjustment.

Other Bands

It's unlikely that everyone would want to build this antenna for 20 and 15 meters. Those who are interested in other frequency pairings will find pertinent data in Table 1. We have included information on building a trap vertical for the new 10-MHz WARC-79-sanctioned band, plus 20 meters. One additional band can be accommodated for any of the combinations shown by using a top resonator.

A Universal Mounting Plate

Field operation requires a variety of antenna-mounting schemes such as porch-rail attachment, window-sill mounting,

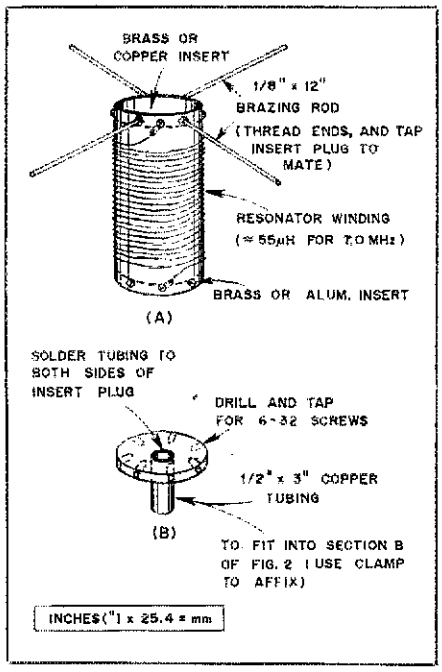


Fig. 3 — Details for building a homemade top-loading coil and capacitance hat. The completed resonator should be protected against the weather to prevent detuning and deterioration.

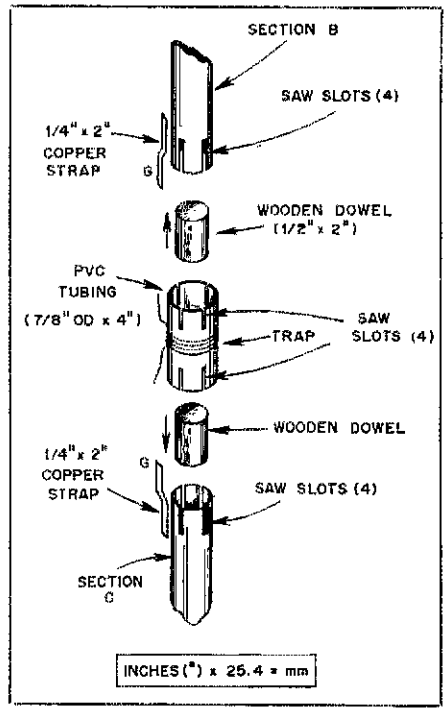


Fig. 4 — Break-down view of the PVC trap. The hose clamps that go on the ends of the PVC coil form are not shown.

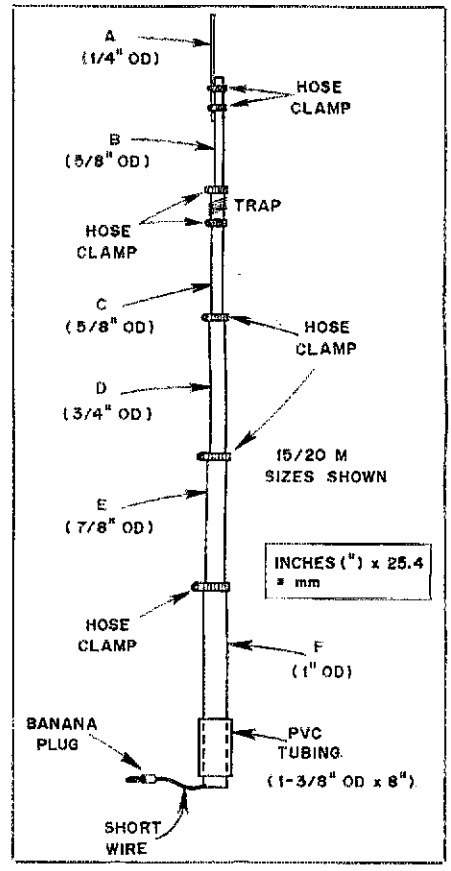


Fig. 5 — Assembly details for the two-band trap vertical. The coaxial-cable trap capacitor is taped to the lower end of section "B."

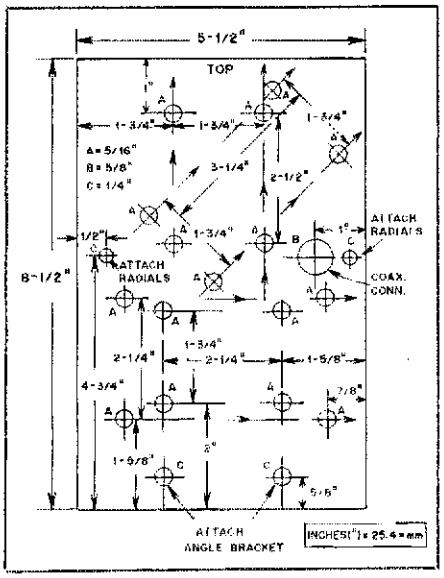


Fig. 6 — Suggested layout for a universal mounting plate. U bolts or muffler clamps can be used to attach the vertical to the plate, and to affix the supporting mast to the antenna. The arrows show the angles at which the antenna and the mast can be mounted to meet a host of mechanical conditions. Hole "B" is for a uhf bulkhead coax connector.

etc. For this reason it is helpful to have a mounting plate which will satisfy many unknown conditions. Fig. 6 shows the layout for a plate that is made from 1/4 inch (6.3 mm) thick aluminum plate. Steel, copper or brass plate is also suitable. The top half of the plate contains two sets of U-bolt holes for mounting the radiator vertically. A second set of holes permits 45-degree mounting from a window sill.

The lower half of the plate has two sets of U-bolt holes for attaching a mast vertically. A second set of holes permits horizontal mast mounting, should that format be necessary.

The bottom two holes in the plate are for attaching a length of angle stock. There is a second piece of angle stock the same length. The angle brackets can be used with a pair of C clamps to attach the antenna to a variety of foundations.

Hole "B" is for the uhf female-to-female coaxial bulkhead connector. Holes "C" at the left and right center of the plate are for attaching the radials by means of large bolts and washers. The holes marked "A" are for the U bolts or muffler clamps. The hole diameters and spacings will depend upon the size and brand of U bolts used. The arrows indicate the mounting angle of the antenna element and the mast. A photograph of the base plate and related hardware is given in Fig. 7.

Ground System

There's nothing as rewarding as a *big* ground system. That is, the more radials the better, up to the point of diminishing returns. Some manufacturers of multiband trap verticals specify two radial wires for each band of operation. Admittedly, an impedance match can be had that way, and performance will be reasonably good. So during temporary operations where space for radial wires is at a premium, use two wires for each band. We prefer a minimum of four wires for each band, and generally use that many. The slope of the wires will affect the feed-point impedance. The greater the downward slope, the higher the impedance. This can be used to advantage when adjusting for the lowest VSWR. When the radials are perfectly horizontal, the feed impedance will be on the order of 30 ohms. This suggests the use of a 1.6:1 broadband transformer at the feed point to assure a good match — assuming horizontal radials must be used in a particular installation.

The radial wires are cut to an electrical quarter wavelength for the band of operation. Some operators argue that making the radials 5% longer will increase the antenna bandwidth. The author has not found this to be true, but did observe some changes in feed-point impedance when that was done.

If the antenna is to be ground-mounted, make certain that the lower end of section "F" is only a few inches above ground. Bury as many radials in the earth as practical, using no less than 20 wires that are the length of the overall vertical antenna, or longer.

Tune-up

An SWR indicator will be necessary when adjusting the antenna. Apply rf energy at the center of the desired operating range of the highest operating band of the antenna. Adjust the length of the section below the trap for the lowest VSWR.

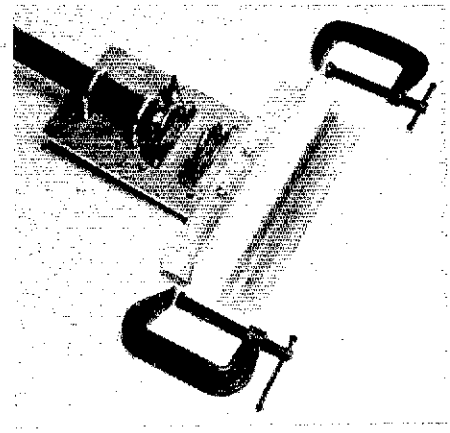


Fig. 7 — Photograph of the mounting plate showing two angle brackets and C clamps, which provide additional mounting possibilities.

Next, set the transmitter for a frequency in the center of the lowest frequency operating range. Adjust the length of the section above the trap for the lowest obtainable VSWR. Repeat both adjustments to compensate for interaction of the adjustments. If a top resonator is used for a third band, it should be adjusted last for the lowest attainable VSWR.

Summary Comments

The antenna can be broken down to form a compact assembly for transport. A heavy-duty cardboard mailing tube, or a 2-inch (51-mm) ID piece of aluminum tubing will serve nicely as a container for shipping or carrying. Iron-pipe thread protectors can be used as plugs for the ends of the carrying tube. The trap, mounting plate and coaxial feed line should fit easily into a suitcase with the operator's personal effects.

If you haven't been a radio-operating wayfarer thus far, perhaps this antenna will inspire you to become one! If you want to hear this antenna in operation, look for W1FB on 20 and 15 meters from the camp site, or from Tortola, British Virgin Islands during late October and early November of 1980.

Strays

NOVICE DX NET

☐ A Novice DX net is being formed. Planned starting date is October 11 at 1430 UTC on 28.103 MHz. Write Al Fetzer, WD9EJE, 1444 Wilmette Ave., Wilmette, IL 60091, for details.

LIBRARY OF CONGRESS WANTS AMATEUR TV PUBLICATION

☐ Henry B. Ruh, K2VCU, assistant chief engineer for Indiana University Radio and Television Services, has been asked to provide a copy of *Amateur Television Magazine*, which he publishes, to the permanent collection of the Library of Congress. Ruh has been publisher of the magazine, which has an international circulation of 2100, since 1975.

I would like to get in touch with . . .

☐ amateurs who practice the Transcendental Meditation technique or who are interested in TM. A net meets on 14.340 MHz Sundays at 1630 UTC, or contact Barbara Sweet, WA2KCL.

☐ anyone who could donate some old DX *Callbooks*, dating back to 1945. Carl Mitchell, K1JDJ, Box 1003, Fairfield, CT 06430.

• *Basic Amateur Radio*

Designing and Bending Metal Enclosures

Do you get all bent out of shape when bending metal? Do lids that don't fit give you fits? This article will help you gain an understanding of metal bending — without fatigue!

By Dave Smith,* K3LHD

Home construction is still the name of the game for many amateurs. Most devotees build the electronic part of a project and then put it into a manufactured enclosure so it doesn't look so homemade. Unfortunately, these enclosures are becoming increasingly expensive.

Many who do try to make their own enclosures are usually less than satisfied with the results. My own experiences produced enclosures that just didn't come out right, no matter how carefully I measured the pieces. Usually I had to trim edges or put up with wide gaps where the lid and bottom joined together. It was only after I got into metal aircraft building that I learned a few simple tricks to ensure that my parts came out to be the correct size after bending.

A Gain Problem

Metal shows gain in one dimension when bent. This unexpected gain was making my earlier pieces come out too large. A piece of metal will gain length in the direction away from the portion held firmly in the brake. This is graphically depicted in Fig. 1.

The amount of gain has to be taken into consideration and allowed for by subtracting from the piece that is to be bent. The amount to be subtracted is called the *bend allowance*. Bend allowances will differ for each brake and for each gauge of metal. Table 1 is provided as an illustration.

Bend allowances can be individually determined for any brake simply by placing a piece of known dimension in the brake, bending it by 90° and measuring the gain. An example is shown in Fig. 2. As you can see from the figure, the bent

Table 1
Bend Allowances for the Author's Brake

Metal Thickness	*Bend Allowance*
0.025 in.	0.10 in.
0.040 in.	0.12 in.
0.063 in.	0.22 in.

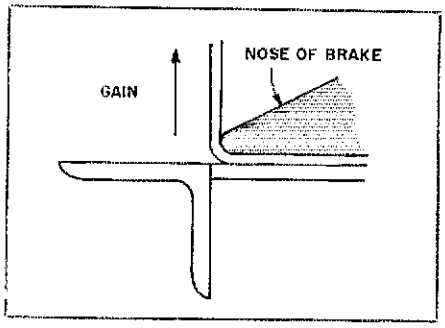


Fig. 1 — Gain occurs in the portion not held firmly in the brake or vise.

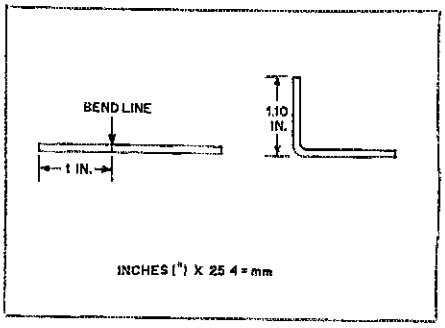


Fig. 2 — Portion not held in the brake gained 0.1 inch in the process of being bent.

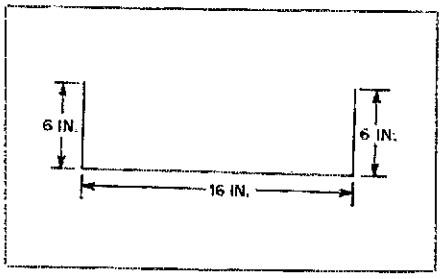


Fig. 3 — The dimensions desired in the finished product.

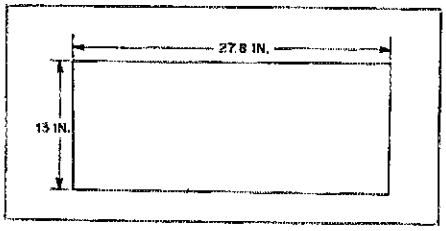


Fig. 4 — After allowing for the gain to be attained during the bending process, these are the dimensions of the piece of metal before bending.

*RD 1, Box 366A, Carlisle, PA 17013

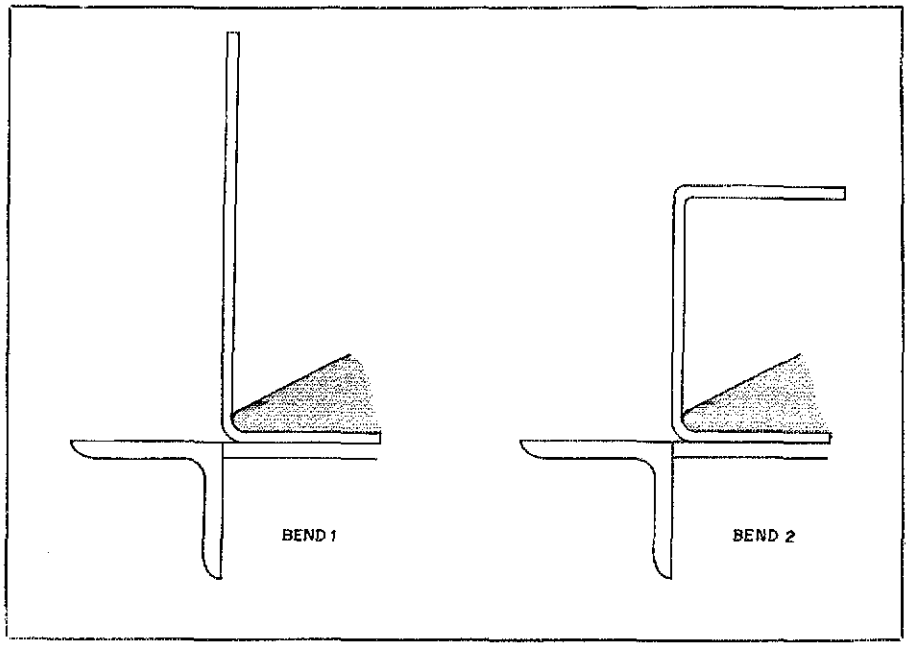


Fig. 5 — Correct bending sequence.

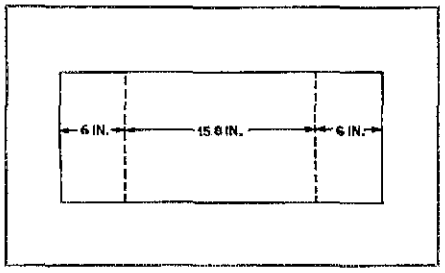


Fig. 6 — Correct position of bend lines.

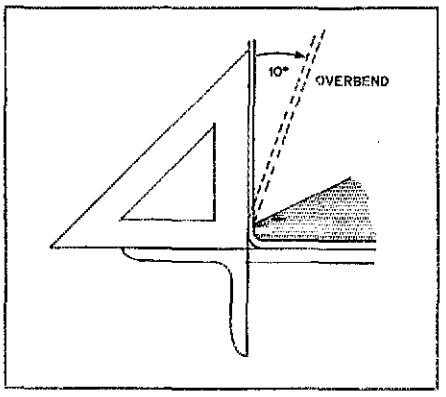


Fig. 7 — Using a protractor to ensure the bend is a perfect 90° angle.

piece has gained 0.10 in., meaning the bend allowance is 0.10. Now let's apply this to the making of a Transmatch chassis bottom, whose dimensions are to be 16 × 13 × 6 inches (406 × 330 × 152 mm) finished.

1) First, calculate the total outer dimensions of the finished channel as shown in Fig. 3. The finished dimension totals 28 inches.

2) Now determine the number of bends, two in this case.

3) Multiply the number of bends times the bend allowance; 2 × 0.10 = 0.20 in. (5 mm). This is the amount that must be subtracted from the total outside dimension for the piece to come out correctly; 28 − 0.20 = 27.8 in. (706 mm). The piece must then measure 13 × 27.8 in. (330 × 706 mm) before bending (Fig. 4).

The next thing to consider is where to draw the bend lines and in what order to make the bends; if you use the wrong bend sequence, more-complicated pieces can come out wrong or get trapped in the brake. Remember, *gain occurs in the free part*, not the held-down part of the piece. Therefore, the U channel should be bent with the sides held firmly in the brake. See Fig. 5 for a pictorial description of the sequence. You can see that the gain will occur in the center and not on the ends, so you simply draw the bend lines 6 in. from the ends, which is the desired finished dimension (Fig. 6).

One other thing that I might mention: Metal has a natural tendency to spring back when bent. So in order to get a 90° bend, you will have to overbend it by about 10° or so. By placing a square or draftsman's triangle on the piece while in the brake, you can finger-work the piece to the angle desired (Fig. 7). When bending to an angle other than 90°, I usually just make a simple cardboard protractor to measure the angle while in the brake.

The same techniques apply to making the top of the unit. With a little ingenuity, tabs can be included or added later to connect the top and bottom. Add components, rubber feet, a fancy paint job and lettering, and you have a homebuilt project in an enclosure that doesn't look homemade. Good luck, and happy bending!

Strays

TA PROFILES

☐ We are grateful for the services rendered by David T. Geiser, WA2ANU, who has been an ARRL Technical Advisor (TA) for vhf/uhf microwave components since 1977. First licensed in 1939 as W3IOA, Dave has held appointments as Assistant EC, OO, OBS and occasional NCS for the Kansas and Massachusetts Phone nets. He received the ARRL Public Service Award for his work in the 1951 floods. Dave's interests in Amateur Radio include experimenting, ragchewing and traffic. He holds a Radiotelephone First Class license with a Radar endorsement. He is a life member of the ARRL and a member of QCWA, the Utica (New York) Amateur Radio Club and the IEEE.

Dave received his BSEE degree from Southern Methodist University in 1947. He has published over 100 articles in amateur and professional journals, and has been granted six patents. Employed as a Components Engineer for one of the larger U.S. companies, Dave professionally writes specifications for these commodities. He lives in New Hartford, New York. — *Marian Anderson, WB1FSB*

TA WA2ANU, with one of his homemade projects in hand.

ATTENTION AFFILIATED CLUBS

☐ If your club is *actively* affiliated with the ARRL, one of your officers has already received a coupon redeemable for a review copy of the new *ARRL Operating Manual*. If your club has not received a copy of the July *Radio Club News*, you did not receive this coupon. Why not update your club records so that your club can participate in future giveaways? Contact the Club and Training Department at ARRL hq. for the status of your club. — *Sally O'Dell, AE8P, Club Programs Manager*

• *Basic Amateur Radio*

Rewinding Transformers

Turned off by the high cost of power supplies? Wouldn't you like to turn a junked transformer into a custom-wound unit in less than two hours? It is easy; here's how.

By Peter O'Dell,* AE8Q and Bob Shriner,** WAØUZO

A few years back Lew McCoy, W1ICP, stated that his motivation for writing an article similar to this was that he was "a noted cheapskate."[1] We believe that such a quality is an admirable characteristic! Laziness may be pretty good, too. Therefore, any resemblance between this article and McCoy's is less than accidental. Our younger readers should take note of this, as it can be of benefit in their formal education. Depending on whether one is taking or giving the course, this process is either referred to as plagiarism or research. Once you have departed the nest of academia, the laws of the real world take over. The one that applies here is, "don't reinvent the wheel."

Winding your own secondary on a transformer can provide several benefits. For instance a quick check of an industrial supply catalog revealed that a 24-V, 12-ampere transformer costs approximately $30. You can rewind the secondary of a discarded transformer for less than $6 (including the cost of the wire). Additionally, suppose that you want to build a 12-V regulated power supply capable of delivering 6 to 8 amperes: You may have to resort to using a 24-V 12-ampere transformer. That would mean that your heat sink and regulator circuit would have to be capable of dissipating nearly 100 W. If you custom design the transformer, you can choose your values such that the heat dissipation is reduced by as much as 75% without any detrimental effects on regulation. Add personal satisfaction to the other benefits and you have a strong mandate for winding your own.

Choosing a Transformer

The first step in this process is selecting a transformer. This can be easier than you think, as the sources are many. Some surplus houses sell transformers that can be rewound without difficulty. Transformers are usually abundant at flea markets. Of course, a popular source has been the carcass of a defunct TV set. There are a few things to be aware of: The primary should be designed for 117 V if you are to avoid the cumbersome task of rewinding it. Some transformers are potted in tar (Fig. 1); most of you will probably want to avoid the mess of removing the tar. Sealed transformers may possibly contain oil that has been impregnated with PCBs — *avoid these*!

The size of the core is the chief limiting factor in the power-handling capability of the transformer. Fig. 2 depicts the "E" and "I" shapes of the laminations and how they are stacked together. Each piece has a thin coating of varnish or glyptol, which acts as an insulator and helps prevent losses in the core. Lamination sizes for U.S. transformers are standardized. For the typical TV transformer, the width and length are commonly 3-3/4 by 4-1/2 inches (95 × 114 mm), with the tongue of the "E" laminations always 1-1/2 inches

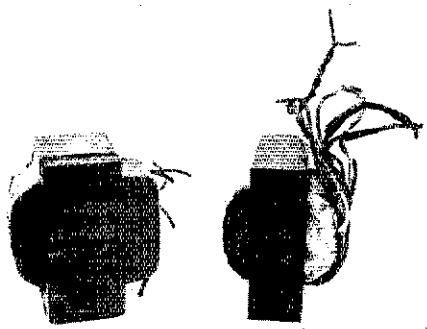


Fig. 1 — Two transformers: One suitable for rewinding, one not. The transformer on the left has been soaked in tar and will prove to be quite messy should you try to remove the windings. Notice the "caked" appearance on the outside of the laminations; this should tip you off before removing the bell housing. This transformer also has a copper strap wrapped around the outside of the laminations. Its function is to shield nearby ac-sensitive circuits from the field of the transformer. For our purposes, this shield may be cut off and discarded. The transformer on the right has not been soaked in tar; however, note that the laminations have been coated with shellac, which gives them a dark appearance and bonds them together. *(all photos courtesy of W1JA)*

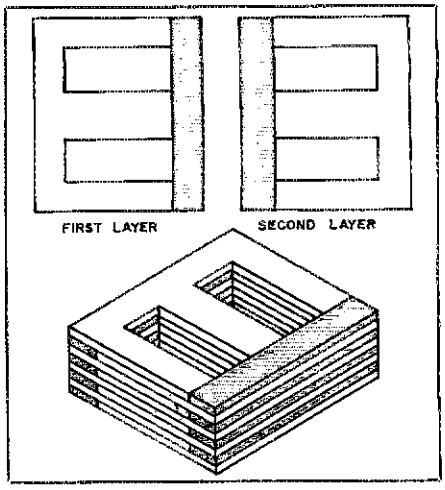


Fig. 2 — How the core is assembled. Alternate layers have the E laminations facing oppositely. Sometimes two or more laminations of the same kind are grouped together and handled as a single lamination to save assembly time.

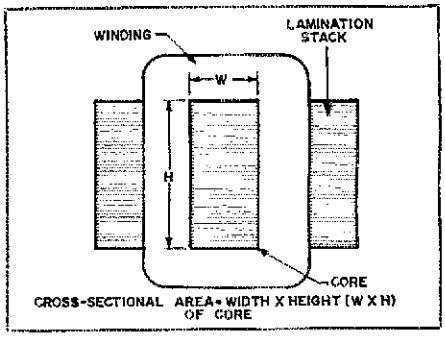


Fig. 3 — This is a cross-sectional drawing of a typical power transformer. The cross-sectional area referred to in Fig. 4 is determined by multiplying the tongue width by the height of the center core.

*Basic Radio Editor
**Box 969, Pueblo, CO 81002

[1]McCoy, "The Ugly Duckling," *QST*, November, 1976, p. 29.

(38 mm) wide. To determine the cross-sectional area, all that is needed is the height of the stack (Fig. 3). Once you have determined the cross-sectional area by multiplying the height by the width of the "E" tongue, refer to the graph in Fig. 4 to determine the power-handling capability. If the transformer is an odd size, we can estimate its capability by using the rule of thumb that it will handle about 40 W for each pound (about 88 W per kg) of iron in the core.

Quite a variety of alloys are employed as core material in transformers. Silicon, cobalt and nickel are the most frequently used additives. These alloys are sold under a wide range of trade names such as Hypersil and Permalloy. If you are dealing with a used transformer, chances are that you will have no idea of the precise composition of the core material. Various core materials display some difference in power-handling capability; therefore, keep in mind that any estimate of power-handling capability based on mass is just that — an estimate. For instance, some of the imported transformers sold in popular consumer-oriented electronic parts stores have enough mass *to suggest* to the casual observer that their power-ratings are reasonable. These transformers tend to "run hot," however, even under a no-load condition, indicating an inferior core material.

The power-handling capability needed can be determined by multiplying the highest current to be drawn from the supply times the maximum voltage across the secondary under full load. If we wanted to build a 13.8-V regulated supply capable of delivering 20 amperes, we would calculate the needed capability as follows. To function properly most regulator circuits require more voltage (2 V or greater) at the input of the regulator than that which is to be delivered at the output. To be on the safe side, we will add another volt to this figure for a total of 17 V. (Since we are custom-winding the transformer, we will make sure that the voltage does not go any higher, because increased input voltage beyond this point means increased heat dissipation and decreased efficiency.) We multiply 17 V times 20 A and get 340 W. Fig. 4 indicates that we need a transformer whose core has a cross-sectional area of about 3.5 square inches (2200 square mm). If we are dealing with a standard size TV transformer, then we are looking for one with a stack at least 2.3 inches (58 mm) high.

Once the transformer has been decided upon, the next step is to measure the voltage of one of the low-voltage windings with an ac voltmeter. If the transformer is being removed from some tube type of equipment, it will probably have a 6.3-V winding. Without a load, this winding will read slightly higher on the meter. Cut off the excess leads from the transformer; make sure that enough of the colored insulation remains to allow identification of the primary and the secondary with the known voltage. If the insulation has "lost its color" over the years, tag the leads to the above-mentioned windings with different types of tape. If it has not already been done, remove the nuts, bolts and bell housing.

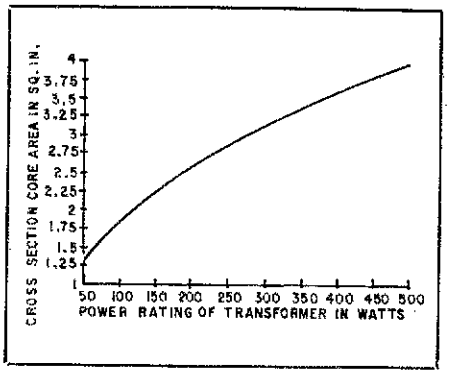


Fig. 4 — This graph provides a simple means for determining the power capabilities of an unknown transformer. First determine the cross-sectional area of the core. Find your cross-sectional area figure on the vertical axis and then go across the graph to the curve. Drop from intersection point vertically to the bottom of the chart to find the power in watts.

Fig. 5 — Old windings with pile of laminations next to it. After you remove the laminations from the windings, you may doubt that you will ever get them back in. Fear not; they usually go back in much easier than they came out.

Fig. 6 — Old winding stripped down to the original primary, which was then wrapped with fiberglass-reinforced tape. If the enamel insulation of the wire has been damaged during the process of removing the other windings, use a small amount of Q-dope or fast-setting epoxy to restore the integrity of the winding before wrapping with the tape.

Sack the Stack

If you examine the winding and the core closely, you may find a small piece of wood wedged between the windings and the core. If so, remove this wedge and save it for reassembly. Place a knife blade in the groove between the first and second laminations at one end. Gently tap the knife blade with a hammer until it separates the two laminations. Using the same method, work your way around the core until the first and second laminations are completely separated. With a small flat-bladed screw driver or similar device, tap the E lamination out of the winding. This is usually the hardest lamination to get out. Proceed in a similar manner with the remaining laminations. To simplify things, if you notice that there are some substacks (two or three Es in a row oriented in the same direction), just remove the subassembly without breaking it into individual laminations. When you are finished you will have a pile similar to that shown in Fig. 5.

Carefully remove the brittle paper that surrounds the windings. If the secondary winding that was measured earlier is the outermost winding, unwind it and count the turns. It is important that you count the number of turns precisely to be able to calculate the amount of wire needed for the new secondary. If the known-value secondary is not the outermost, remove the outer secondaries down to the known-value one and then count the turns. Write down the number of turns and the voltage for future reference. Remove the other secondaries. We have assumed that the primary is the innermost winding; this may not always be the case, but the chances seem remote that you would find it otherwise. If, in fact, the primary is not the innermost winding you have some options: (1) you may want to rewind the whole transformer, including the primary, (2) you could cut and tape the ends of any secondaries that lie beneath the primary and wind the new secondaries around the primary, or (3) you may elect to find another transformer and start over. If you have the transformers available, starting from scratch may be the best course. Whatever, the final product of this stage should appear similar to the winding shown in Fig. 6.

One Good Turn Deserves Another

Using the known-value secondary voltage and number of turns, calculate the turns-per-volt ratio by dividing the number of turns by the known voltage of

the secondary. For example, suppose we have measured one of the secondaries and found that it produces an ac voltmeter indication of 6.5 under no-load conditions. We will assume that it is, in fact, a 6.3-V winding. Suppose we count the turns and find that this secondary has 19 turns. Dividing 19 turns by 6.3 volts, we find that we have a 3 to 1 turns-per-volt ratio, three turns for every volt at the secondary output. Now multiply the desired secondary voltage by the turns-per-volt ratio to find out how many turns you will need. Next, measure the circumference of the winding and multiply that times the number of turns needed in the secondary to find out how much wire is needed for this winding. It is wise to allow some additional footage for "slop" — say 10% to 25% depending on your confidence in your ability to wind. Refer to charts in *The Radio Amateur's Handbook* or *ARRL Electronics Data Book* giving information on the current-carrying capability of various-size wires and determine the gauge of wire needed for the new secondary. If you do not have wire large enough to carry the desired current, you may parallel two or more smaller gauge pieces to provide a larger effective cross-sectional area. The limiting factor is keeping the windings thin enough so that the core can be reassembled.

Before going further, the choice of insulation between layers of the winding should be explained. The industry standard is varnished cambric, but we can not recommend any source for it. McCoy was fond of using wax paper for this purpose, but it is prone to sliding around. At times we have heard others suggest plastic electrical tape. Most tapes have a tendency to separate from their sticky backing and unravel after a few months. We prefer masking tape, which does not separate from the backing and tends to mold itself to the shape of whatever it is attached to after a few months.

Masking tape is perfectly adequate for a low-voltage transformer that will *not* be running hot. If you decide to rewind a high-voltage transformer that will be operating close to its power-handling-capability limits, then some other material should be used. Commercially oriented electronics distributors usually stock cloth based, fiberglass tape that is both heat and shrink resistant; it should be acceptable for the more demanding applications. (It is more expensive, too.) One further note is that we are using ordinary fiberglass-reinforced packing tape (because of its strength) to hold the end windings in place on each layer.

Once the desired length of wire has been determined, measure and cut it (including the amount as a safety factor). If you are doing this as a one-person job, secure one end in a vise. Cut off five pieces of fiberglass-reinforced tape, each about 10 inches (250 mm) long. Place one end of one piece of tape on the center of the windings (parallel to the wire in the winding). Making sure that the end of the tape is sticking to the winding, place another piece of the tape at the first corner, perpendicular to the first piece of tape, with the *sticky side of the tape facing out.* Press the first piece of tape down over the second and move on to the next corner. Repeat the process until you have one piece of tape at each of the four corners, with the sticky side out (see Fig. 7).

Position the free end of the previously prepared wire so it will exit the winding properly when the transformer is reassembled. Carefully start the first turn of the secondary near the edge of the primary. As you wrap the wire around the first corner of the windings, fold that end piece of tape back over the wire and cut off the excess (see Fig. 7).

Repeat this process at each corner of the first turn of the secondary until the turn is tightly secured to the windings. The four unused ends of tape will be used in a similar manner for the last turn of the first layer. As you wrap the other turns on the first layer keep the wire taut; this will ensure that the turns are straight and that you get a maximum number of turns per layer. Also keep track of the number of turns. Once the last turn of the first layer has been secured with the four pieces of tape, it will be necessary to add a layer of insulation before winding the next layer of the secondary (Fig. 8).

After you have finished the first layer, repeat the process if more turns are needed. First, prepare five strips of the fiberglass-reinforced tape. Use one strip

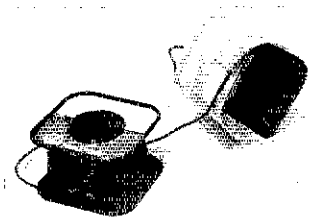


Fig. 7 — The first turn of the new secondary. Notice that the end of the wire making up the secondary has been positioned such that it will be properly aligned when the transformer housing is put back together. Note also that one end of each piece of tape is now folded over. The other four ends will be used on the last turn of this layer.

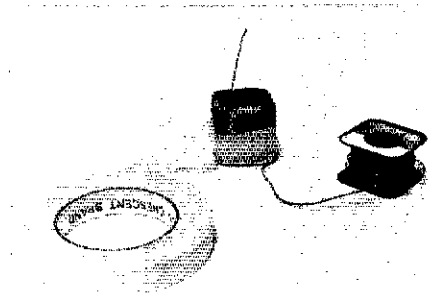


Fig. 8 — Masking tape is applied between layers of the secondary.

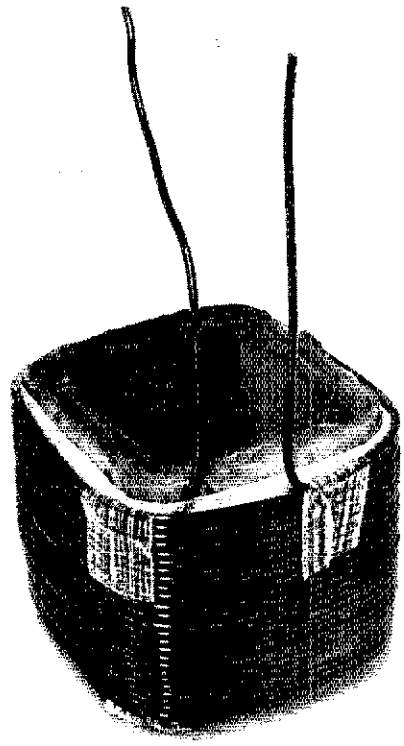


Fig. 9 — Completed windings. Notice that the secondary leads enter and exit on the same side as the primary leads (which have been folded inside the windings out of the way).

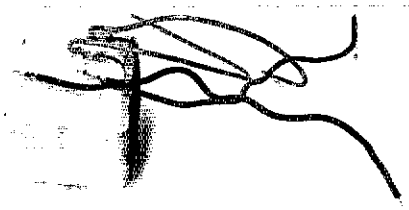


Fig. 10 — Completed windings ready for reassembly of the core. Color-coded-insulated wires have been attached to the leads from the windings. Electrical tape or heat-shrink tubing may be added to the solder joints or any other place that might need the added protection.

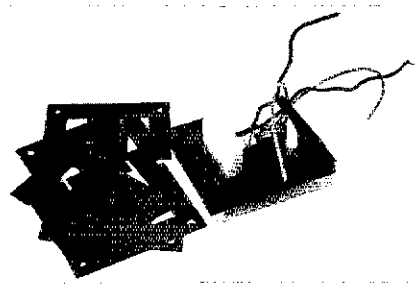


Fig. 11 — Partially reassembled core. Reassembly can usually be accomplished quite a bit quicker than disassembly. If it is likely that enough shellac was scraped off during disassembly to cause shorting between laminations, add a thin coat of shellac or glyptol as you put the core back together again.

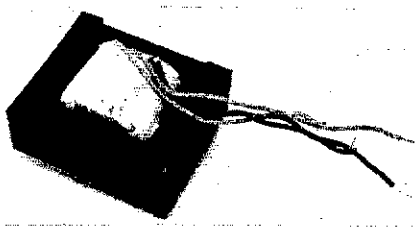


Fig. 12 — Transformer reassembled and awaiting the bell housing.

to attach the other four (sticky side out) to the windings, as you did for the first layer. Bring the wire up onto the edge of the masking tape from the position where it exited the first layer. Wind and secure the first turn of the second layer. Repeat the other steps until the desired number of turns have been wound. If additional layers are required, repeat the "between-layers" process until the desired number of turns has been wound. When the secondary is completed, it should look something like the one pictured in Fig. 9. Make sure that the leads are oriented properly for reassembly of the transformer.

Final Wrap-Up

Wrap the windings with a few layers of masking tape. Cut off the excess leads and solder color-coded insulated leads (adequate gauge to handle current available) to the primary and secondary (Fig. 10). Position the leads as necessary for the reassembly of the unit. Reassemble the laminations into and around the windings. It is probably best to start with any "sub-assemblies" of more than one lamination that were removed as one piece earlier. Make sure that each "E" is matched with an "I" and that the holes are aligned. Fig. 11 shows a transformer with the laminations partially reassembled. Once the laminations have all been reinstalled and aligned, use a small hammer to tap the wooden wedge back between the windings and the laminations. The wedge will prevent vibration and noise when the transformer is operating. If disassembly required a great deal of scraping and prying, there may be danger of one lamination shorting to another. Should this seem possible, it might be wise to give each lamination a thin coating of varnish or glyptol as the core is being reassembled. If it is not likely that bare metal will be touching bare metal, however, this is a bit messy and probably isn't worth the effort.

The only thing left to do is to reassemble the bell housing and tighten the nuts and bolts. Your custom-wound transformer is now ready for use in your power supply. You may not relish the idea of referring to yourself as a "cheapskate"; you may not wish to engage in plagiarism. But isn't it nice to save money on that power supply by doing a little "research" while avoiding reinventing the wheel?

Strays

LOW-COST CODE-PRACTICE RECEIVER

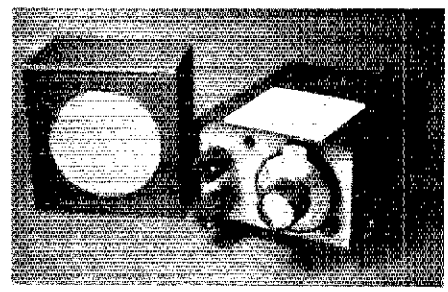
☐ Dick McIntyre, K4BNI, who has distinguished himself over the years as an inveterate builder of neat ham gear, was stimulated recently by K4MD concerning the building of a simple, inexpensive receiver for beginners. The challenge was to build a code receiver that would enable the beginner or would-be amateur to practice copying cw, or to become familiar with the amateur bands and operating procedures.

The end product is shown in the accompanying photograph. Dick chose the Radio Shack no. 28-222 a-m radio kit as the foundation. He obtained the kit, a cabinet and some assorted hardware for approximately $20. The vernier dial and tuning capacitor were already on hand in his parts cache at home.

A simple BFO (455 kHz) was added to the a-m detector, and a "bare bones" 40-meter converter was built and connected to the input of the a-m receiver. Coverage of the entire 40-meter band allows reception in the cw and ssb segments. Stability and sensitivity are good, but Dick says, "Admittedly, the receiver does not match the latest factory job's dynamic range."

The speaker is from the a-m radio kit. It is housed in a homemade enclosure that he made from scraps of "framing cardboard." These were obtained from a local frame shop for 25 cents a bundle!

A project of this type seems worthwhile for club groups as part of a training program. There is no reason why a factory-built pocket-size a-m radio could not be used as the heart of such a receiver. Used radios of that type are commonly found at yard sales and flea markets for two or three dollars! — *Doug DeMaw, W1FB*



This neat little package is the latest from Dick McIntyre, K4BNI, of Cape Coral, Florida. A Radio Shack a-m radio kit, cabinet and some inexpensive parts were the basis for this beginners project.

Harry A. "Connie Mac" McConaghy, W3SW (center), was recently presented an album of signatures and pictures as a token of appreciation for his long service as ARRL Atlantic Division Director. The presentation was made by Tony Maugeri, W2SDO, at a Delaware Valley Chapter QCWA luncheon. Current Atlantic Division Director Jesse Bieberman, W3KT, looks on.

RADIO ASTRONOMY NET

☐ The International Union of Radio Astronomers has an active Radio Astronomy Commission which offers a forum to exchange ideas, data and computer information. An Amateur Radio net is being formed and check ins are welcome. For more information send an s.a.s.e. to Communications Net Officer Jack Chancellor, W9SON, RR 1, Box 23, Timber Ridge, Freeport, IL 61032. — *Bob Patterson, K5DZE, North Little Rock, Arkansas*

VERY LARGE ARRAY OPERATION

☐ A special event station will be activated at the National Radio Astronomy Observatory's Very Large Array (VLA) project on Saturday, October 25, to commemorate the dedication and open house of the world's largest radio telescope. The VLA is located about 50 miles west of Socorro, New Mexico, and consists of 28 dish antennas, each having a diameter of 82 feet and weighing 215 tons. Listen for W5FZ and W7LHO on ssb in the lower portion of the General phone bands, and KA5CNE on cw 30 kHz up from the band edges and on some Novice frequencies calling CQ VLA. Other calls may be used also. Special event QSL cards for s.a.s.e. to NRAO, VLA Project, c/o Paul Harden, KA5CNE, P. O. Box O, Socorro, NM 87801.

A Deluxe RV 5-Band Antenna

Better'n ham and eggs . . . ham and RV!

By Charles W. Schecter,* W8UCG

The development of this RV[1] antenna system came about from my desire to "marry" two hobbies I've enjoyed for 40 years — hamming and RVing. My antenna requirements called for a 5-band system that could be raised to a vertical operating position in just a few seconds, exhibit extremely low VSWR (below 1.5:1 on all bands), cover the individual bands entirely without tuning, and require no radials or ground systems other than the RV itself. The antenna must also present a neat appearance whether raised or lowered, so as not to detract from the RV appearance (or cause the XYL concern), and yet be able to withstand winds of reasonable force.

Although my RV is a 31-ft. (9.4-m) Airstream, the same basic design may be applied to any RV by changing some of the dimensions. The installation involves the use of a Hustler 4BTV vertical with the normal installation dimensions radically changed. See Fig. 1. This particular antenna is rugged, neat in appearance and well suited for the required application. The modified antenna is mounted on a special mast that is hinged near the top to allow it to rest on the RV roof during travel. In the traveling position, the raising handle is removed and stored. This makes for a neater package, thwarts the curiosity of onlookers and prevents unauthorized use.

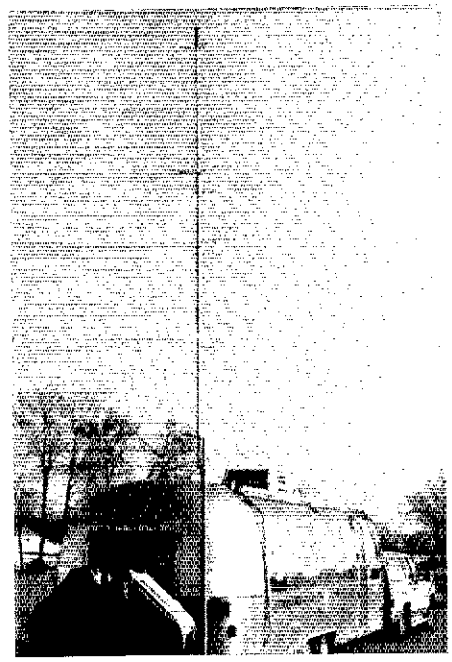
From the Bottom Up

The secret of the neat appearance of this installation is the unusual mast material used to support the antenna. Commonly known as Unistrut, it is often used by electrical contractors to build switching and control panels for industrial and commercial installations. The size selected is 1-5/8 in. (41 mm) square 12-gauge U channel. The open edges of the U are folded in for greater strength; the material is an extremely tough steel which resists bending (as well as drilling and cutting!). The U channel is available with a zinc-plated, galvanized or painted finish to prevent rust and corrosion; it may be repainted to match any RV color scheme.

The supporting mast is secured to the rear frame or bumper of the RV by means of 3/8-in. (10-mm) diameter bolts. Although the mast is actually strong enough to be self-supporting, I have attached a 3/4-in. (19 mm) wrap-around strap at the RV center trim line. Any brackets mounted higher detract from the neat appearance and will necessitate a complete change of dimensions for proper tuning. I chose to have my particular installation located on the curb side of the vehicle to hide the lowered antenna behind the awning and provide greater safety to the person raising the antenna. This precaution is taken primarily for situations involving stopping alongside a highway to meet a schedule. (Caution — beware of overhead power lines!)

Mounting the Hustler

The 4BTV base is U bolted to a 19-in.



Ready to go! The W8UCG deluxe RV antenna is shown mounted at the rear of the author's 31-ft. (9.4-m) Airstream.

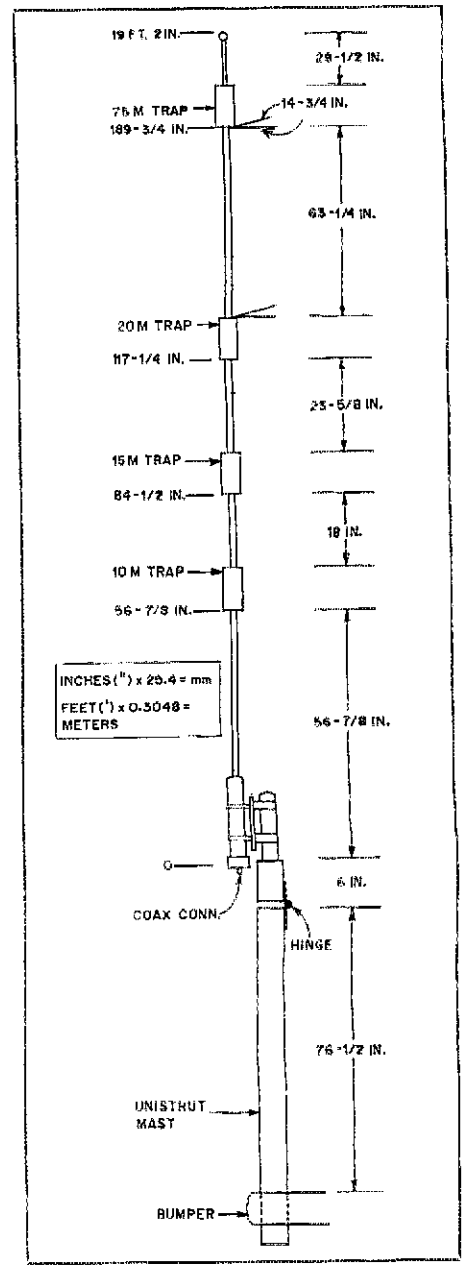
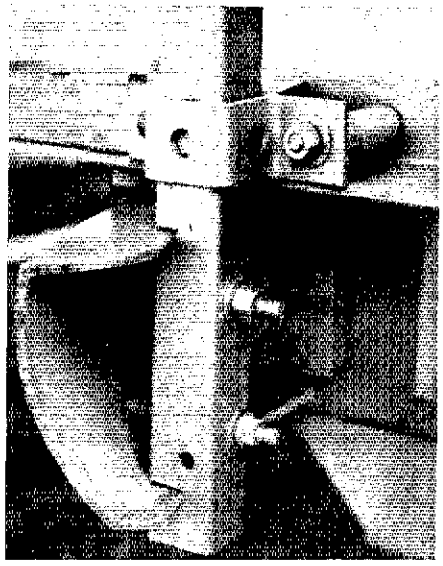


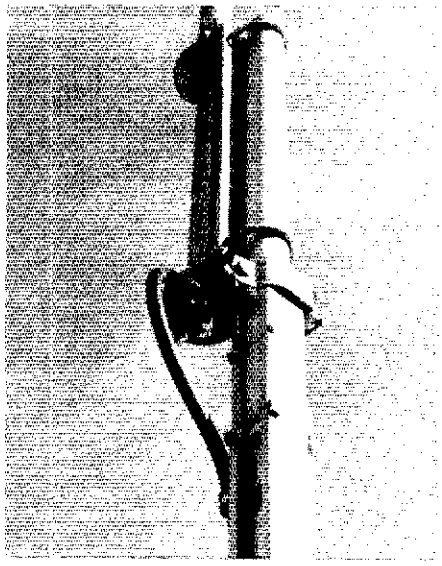
Fig. 1 — The dimensions of the modified Hustler 4BTV antenna as used by the author on his RV. Table 1 shows the resultant SWR vs. frequency figures obtained with the antenna. Refer to the text concerning the SWR bandwidth of the antenna on 75 meters.

*630 Glenwood Ave., Muskegon, MI 49445

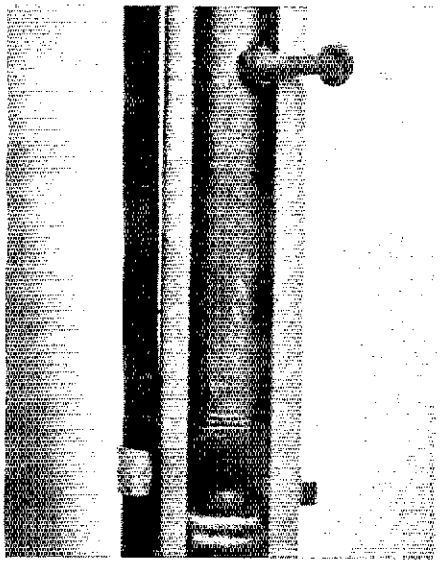
[1]Recreational vehicle.



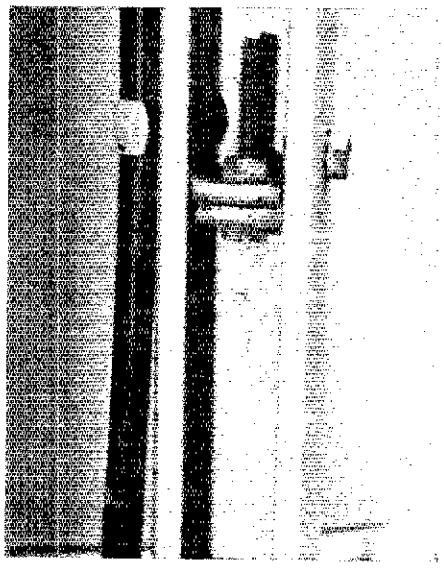
Sturdy looking, isn't it? The supporting mast is secured to the rear frame of the RV by means of 3/8-in. (10-mm) diameter bolts.



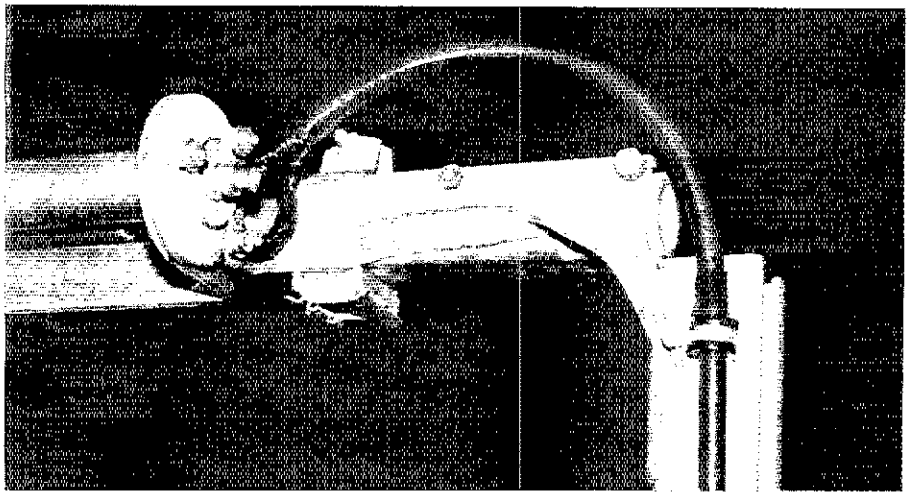
A close-up photo of the mounting arrangement of the Hustler 4BTV vertical antenna. The clamp and bolt in the photo were subsequently replaced by a weld.



The handle and raising fixture, seated on the lock pin.



In this photo the open edges of the Unistrut channel are facing the viewer. The lock pin may be seen in the middle of the channel.



Heavy braid is used to ensure a good ground connection across the hinge section of the antenna support.

(480-mm) piece of 1-5/16 in. (33-mm) OD galvanized steel pipe (1-in. water pipe). This is inserted into and welded along the edges of a short piece of Unistrut, which is attached to the lower portion of the mast by means of a heavy-duty, welded-on hinge. It is not feasible to bolt these pieces together, as the inside of the pipe must be completely clear to accept the end of a 54-in. (1.37-m) piece of 1/2-in. water pipe (7/8 in. or 22 mm OD) that is used as a removable raising fixture and handle. This handle is wrapped with vinyl tape at the top end and also about 12 inches (300 mm) back to form a loose-fitting shim that provides a better fit inside the 1-in. water pipe. At 15 inches (380 mm) from the top end, a thicker wrap of tape acts as a stop to allow the handle to be inserted the same distance into the base support pipe in every instance. A short projecting bolt near the bottom end of the handle provides a means of lifting it off the lock pin (a bolt) which is mounted inside the Unistrut on an L-shaped bracket.

The top-hat spider rods should be installed only on one side of the antenna so as not to poke holes in the top of the trailer. No effect on antenna performance will be noted. Bring the coaxial cable into the trailer at a point close to the antenna. This is preferable to running it beneath the trailer, where it can be more easily damaged and where ground-loop paths for rf current may be created. RG-8X cable is easy to install. Be sure to use drip loops both at the antenna and at the point of entry into the RV. Silicone rubber sealant should be used at the outside connector end and at the RV entry hole. Clear acrylic spray will provide corrosion protection for any hardware used. Lock washers and locknuts should be used on all bolts; good workmanship will result in first-class appearance and long, trouble-free service.

To ensure optimum results, great care should be taken to obtain an extremely good ground return from the antenna all the way back to the transceiver. Clean, tight connections, together with heavy-duty tinned copper braid, should be used across the mast hinge, the mast-to-RV frame and to bond the frame to the equipment chassis. This is a *must* if the vertical quarter-wave antenna is to work properly. With such connections, this installation requires no radials or ground connections of any kind!

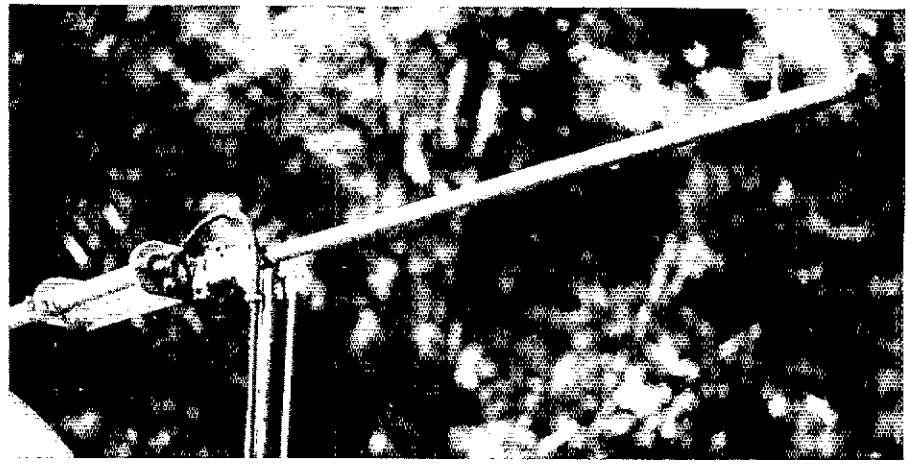
Antenna Pruning and Tuning

The antenna must be carefully tuned to resonance on each band starting with 10 meters. The most radical departure from the manufacturer's antenna dimensions (for home use) takes place with the 10-meter section. There, 30 in. (760 mm) of tubing is cut off. Only 3 in. (76 mm) need be removed from the 15-meter section. The 40-meter (top) section has to be lengthened, however, because of the

Table 1

SWR Chart

Freq., kHz	*SWR*
3990	1.0:1
7000	1.0
7150	1.0
7200	1.1
7250	1.2
7300	1.35
14,150	1.0
14,250	1.0
14,300	1.05
14,350	1.15
21,270	1.0
21,350	1.1
21,400	1.3
21,450	1.6
28,000	1.1
28,500	1.05
29,000	1.1
29,500	1.9



The lifting handle has been placed into position prior to erecting the antenna. During travel, this handle is removed and stored in a convenient place.

radical shortening of the 10-meter section. The easiest way to do this, short of buying a longer piece of 1-1/4-in. (32-mm) OD aluminum tubing, is merely to lengthen one of the top-hat spider rods. A 15-1/2-in. length (394-mm) of 1/2-in. (13-mm) diameter aluminum tubing (with one end flattened and properly drilled) can be held in place under the RM-75S resonator. It is a good idea to start with a longer piece of tubing and trim as necessary to obtain resonance at 7150 kHz.

The described method of installation, grounding and tuning of the antenna resulted in an SWR of 1.0:1 at resonance on the 75-, 40-, 20- and 15-meter bands. At the lower end of the 10-meter band, the SWR is 1.05:1. These low SWR values remain exactly the same regardless of the length of coax used and whether or not the RV is grounded externally.

This system design also provides full band coverage on the 40- through 10-meter bands with an SWR of less than 2:1. (My antenna was adjusted to favor the low ends of the 10-, 15- and 40-meter bands, but it can as easily be tuned for the high ends of the bands if desired.) Band coverage on 75 meters is limited to approximately 100 kHz because of the short overall length of the resonator coil/whip. The tip rod is adjustable to enable you to select your favorite 100-kHz band segment.

Proof of the Pudding

On-the-air signal reports have been phenomenal, even though the output power was generally between 25 and 50 watts, and never exceeded 100 watts. No antenna matching network is needed, nor has one ever been used. In fact, the rig I use (a Ten-Tec Triton IV) does not even have any tuning or loading controls! A regular schedule with our home (in Michigan) was maintained each day during a 10-week, 7500-mile trip through the South — often from the side of the road — using whatever band was required at the time. These schedules, including many phone patches, were maintained in spite of the competition from many DX chasers using high-powered transmitters and large antennas. Casual contacts were also made easily with Hawaii and Australia. Hamming from an RV can be great fun — with a good antenna system!

Strays

DAVID CROCKETT TAVERN OPERATION

☐ The Lakeway ARC will operate from the David Crockett Tavern in Morristown, Tennessee, on Saturday, November 1, from 1300 until 2200 UTC. This tavern is the boyhood home of Davy Crockett, pioneer, frontiersman and congressman. The call sign WD4PEQ will be used for ssb-only operation on 7.235, 14.280, 21.360 and 28.560 MHz, plus or minus QRM. A handsome commemorative certificate will be available for $1 or 3 IRCs plus a legal-size s.a.s.e., from Davy Crockett DXpedition, Rte. 11, Box 28, Morristown, TN 37814. Visitors are invited to visit the Tavern and site during regular operating hours, weekdays 9 A.M. to 5 P.M. and Sundays 2 to 5 P.M.

Michigan Governor William G. Milliken (seated) recently signed an executive declaration in observance of Michigan Amateur Radio Weeks, June 15 to 29. Also at the signing were (left to right) Senator James DeSana, Jack Kesterman, K8OLG and Great Lakes Division Director Leonard M. Nathanson, W8RC.

QST congratulates . . .

☐ Charles Dibrell, W5BLW, of Ardmore, Oklahoma, who was recently honored by Ardmore area amateurs for his more than 50 years of outstanding service to Amateur Radio.

I would like to get in touch with . . .

☐ hams in Long Island interested in working in the 10-GHz band. Charles M. Doby, WA2EUS, 110 Lafayette St., Copiague, NY 11726.

☐ other severely disabled war veterans to form a group to discuss common interests and problems. Robert Hibberd, 21 War-Memorial-Homes, Castle-Lane, Bournemouth, Dorsett BH8 9TP, England.

Technical Correspondence

Conducted By
John C. Pelham, W1JA

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

IMPROVING THE "BASIC RADIO" POWER SUPPLY

☐ Doug DeMaw (W1FB) and Bob Shriner (WAØUZO) did an excellent job with "Basic Power Supplies" in the November 1979 issue of *QST*. However, I suggest C2 (10 μF) should be at the output with C3. In its present location across R1 it will slow down the transient response. Since R1 is part of a divider that senses any output voltage change and compares it with an internal reference, the R-C time constant will slow down the response. Across the output, C2 will support transient loads. — *Walt Omdal, WB3GHS, 24 Old Orchard Ct., Cedar Grove, NJ 07009*

A 4:1 "UNUN"

☐ Doug DeMaw's article in April 1979 *QST*, "The Whys and Hows of Bifilar Filament Chokes," arrived just in time when I was constructing an 811A grounded-grid linear amplifier. What interested me was the 1:4 broadband input matching transformer shown in Fig. 2 of Doug's article ("Feedback," May 1979 *QST*). This simple device, used to match the 50-ohm output impedance of a typical grounded-grid linear amplifier, had totally escaped my attention until I noticed it in W1FB's article. I immediately set about designing this black box. Since I could not obtain a toroid core, I decided to stay with a ferrite rod.

My broadband 1:4 matching transformer follows the same design pattern as DeMaw's bifilar filament choke except that it uses no. 14 AWG wire. This should be more than adequate to handle 100-watt transceivers. See Fig. 1A. The "rule of four" was applied; each leg of the bifilar winding should have a reactance of 4 × 50 or 200 ohms. At 1.8 MHz this works out to an inductance of 17.7 μH.

I had a 10-mm (0.39-in.) diameter × 7-inch (178-mm) long ferrite rod at hand which was rated for 2 to 30 MHz. Onto it I wound 23 bifilar turns of wire. Centered on the rod, each leg of the winding measured 18.5 μH. Since my own amplifier was designed to operate no lower in frequency than 3.5 MHz, I could probably have made the grade with a five-inch (127-m) rod (only 9.1 μH is required at 3.5 MHz) and walked away with a more compact unit. I have called this device an "unun" (*un*balanced to *un*balanced). A thin coating of moisture-resistant varnish secured the turns in place.

I wondered whether a ferrite rod originally intended for use as a transistor-radio antenna could handle 100 watts of rf power. To test this, the transmitter was connected to the 50-ohm input of the unun, and a 100-watt lamp was connected to the 200-ohm terminals. Lo and behold, after I tuned the transmitter, the lamp lighted to full brilliance. For normal cw and ssb input, the ferrite rod was absolutely cool to the touch.

I think the unun, with modifications in connections (see Fig. 3B), can also be used as a low-power 4:1 balun either for feeding a beam antenna or with a homemade antenna tuner. High-frequency toroid cores are hard to get in this area, whereas the 10-mm receiving-type ferrite rod can be had 'round the corner. It is indeed an efficient poor man's impedance matcher. It also matches the very low impedance of his pocket. — *Vasant Bhatt, VU2RX, 5 B, Suresh Colony, Swami Vivekanand Road, Vile Parle (West), Bombay 400 056, India*

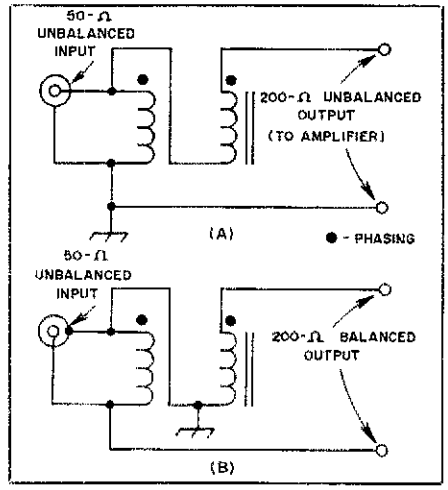


Fig. 1 — The schematic diagram of the "unun" is shown at A. At B, the connections to the unun can be changed to the more familiar balun configuration.

MORE ON COUPLING TWO LOW-VOLTAGE POWER SUPPLIES

☐ The following refers to the "Hints and Kinks" entry by W2DKH in January 1980 *QST*. These points may help some amateurs get that circuit working.

The author apparently did not take into account the forward-voltage drop across D1 and D2, which will vary with both forward current and junction temperature. I have successfully paralleled regulated power supplies for various applications for years and found that the diodes must be identical to ensure true "sharing" operation, since the current density through the silicon junctions will vary from one diode design to another.

Proper procedure, therefore, would be to adjust supply A and supply B for a higher voltage than actually desired (before the load is applied), since the forward voltage drop (V_F) of any silicon junction is a function of current density, or I_O. For example, if one desired to set up the paralleled supplies to deliver 13.8 V dc, such as is required by most mobile transceivers, the correct output voltage setting for each supply before the load is applied would be 13.8 V + V_F, where V_F is the forward drop per diode. V_F at load current can either be measured via individual bench test or estimated by studying the rectifier manufacturer's data sheet plotting V_F vs. I_O. For high-current applications, V_F can be as high as 1.5 V for many diode designs. V_F will be much lower at reduced load current, dramatically affecting the dynamic regulation of the system. If this parameter is taken into account, however, and the system is designed to accommodate the unique properties of the silicon junction, the experimenter is less likely to be upset by the results obtained.

A significant improvement in dynamic regulation may be obtained by the use of power rectifiers which are rated for considerably higher forward current than will ever be drawn through them; e.g., use a 50-A rectifier for 5-A application. This will keep V_F reasonably low while helping to assure long operating life via lower junction temperatures.

I mention this primarily to alert experimenters to the pitfalls of operating power supplies in parallel. While many mobile transceivers would not be adversely affected by a change of plus or minus 1.5 V in the supplied voltage, TTL or ECL systems might be. — *Steven D. Katz, WB2WIK, 24 Louis Dr., Budd Lake, NJ 07828.*

ASCII STANDARDS PROPOSAL

☐ Now that ASCII has been legalized for use on the amateur bands, I believe many amateurs like myself are interested in using ASCII for computer communications. Unfortunately, there are currently no standards for using ASCII on the amateur bands, which makes it difficult for people to get started using this new mode. The purpose of this letter is to propose a set of preliminary standards for ASCII communications on the low-frequency bands to facilitate using this new mode.

What I propose is that we adopt standard Bell 103 modem signaling frequencies and format for use on 80 through 10 meters. Specifically, I recommend using the high-group frequencies of 2025 Hz for space and 2225 Hz for mark at standard rates of 110 and 300 baud. Adopting the above standards will have the following significant advantages:

1) Availability of equipment. Standard Bell 103 style modems and circuits are widely available both new and surplus at reasonable prices.

2) Ease of implementation. Standard answer/originate modems could be connected directly to the microphone input and speaker output of most typical ssb equipment to transmit and receive afsk. The only additional equipment required for a minimal system would be circuits for matching the impedance and output levels.

3) Narrow bandwidth. 200-Hz narrow shift keeps the bandwidth requirements small and facilitates using the narrow-bandwidth cw filters available on many rigs. Also, the 200-Hz shift could be made compatible with the 170-Hz shift used on conventional RTTY equipment.

4) Compatibility with computer communications. Many personal-computer users will already have all the equipment necessary. The same terminal and modem used for time sharing can also be used for Amateur Radio.

Personally, I prefer 300 baud because it is the maximum speed allowed and is more compatible with computer-to-computer data communications. I would also like to suggest using

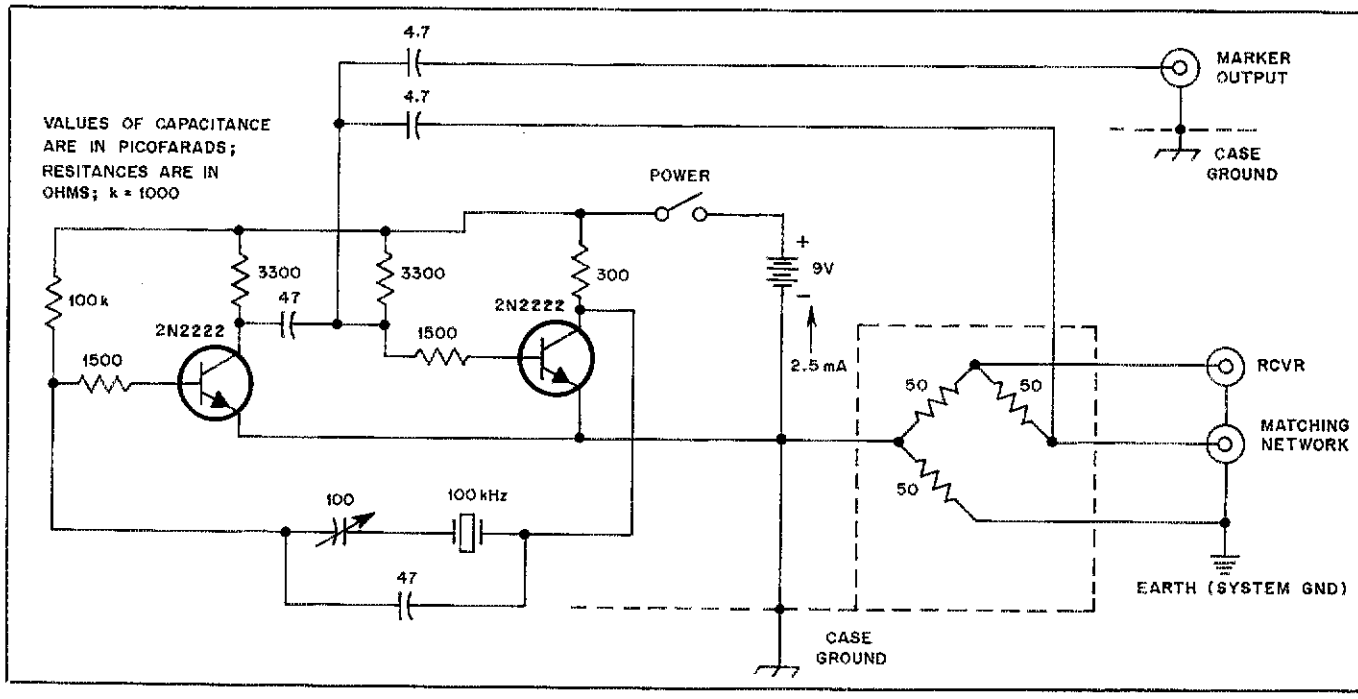


Fig. 2 — The "QRT" antenna-impedance matching instrument of N3BEK.

between 90 and 100 kHz above the bottom of each band as standard calling frequencies. There should be no difficulty distinguishing 300-baud ASCII for conventional RTTY, because it sounds quite different to the ear.

If you are interested in this standard, feel free to contact me. Any comments or suggestions will be welcome. I'll be looking for people to talk to using 300-baud ASCII on 7090 kHz in the near future. — *Peter Sichel, W8PS, 1517 Morton Ave., Ann Arbor, MI 48104*

"QRT" ANTENNA IMPEDANCE MATCHING

I.1 Recently a number of approaches for off-the-air Transmatch or antenna tuning have been publicized. These procedures use some method of detecting the null on a 50-ohm rf bridge in which one leg is the input of the antenna-matching network.

Here is a simple bridge-nulling procedure that I have found effective. It makes a simple 100-kHz crystal calibrator do double duty as a signal generator to excite the bridge. The S meter of a receiver connected across the bridge is used as the null detector.

The schematic diagram of the combined marker generator/rf bridge is shown in Fig. 2. In my design, the entire unit is housed in a single pc-board enclosure; the bridge is shielded from the generator. Note that the generator ground and case are isolated from the bridge, and that the bridge ground is connected to the antenna-system ground. While not essential, a separate marker output has been included to provide a strong marker signal for other uses.

The generator is a free-running multivibrator which is frequency locked to a crystal reference. It is similar to one shown in the 1980 ARRL *Handbook*. It provides a strong signal at 100-kHz intervals through and beyond the 10-meter band. The three legs of the bridge are matched 50-ohm, 1/4-watt resistors.

The manner in which the receiver is used to detect a null is shown in Fig. 3. The marker generator excites the bridge with a signal every 100 kHz throughout the hf bands. When the receiver is tuned to one of the 100-kHz markers, the S meter is deflected. The capacitors and inductor of the matching network are then adjusted to provide a minimum S-meter reading — the bridge null. The null indicates that the bridge is balanced and the input impedance of the matching network is 50 ohms. It now can be connected to the transmitter. The SWR should be first checked on low power, and then fine tuned at operating power if necessary. After the fine-tuned settings are recorded, the transmitter can then be put on the air with the matching network preset.

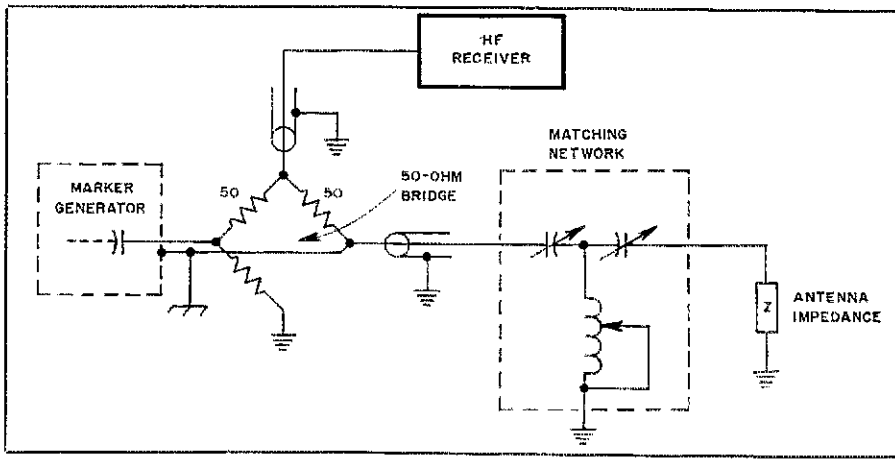


Fig. 3 — This simplified drawing illustrates how the marker generator, receiver and matching network are connected to the bridge. See text for details.

With this procedure, the receiver can be tuned through each band, with a matching-network adjustment being made and recorded at each 100-kHz marker. A chart of settings will allow the matching network to be preset before transmitting.

There is a disadvantage to the above technique: It is difficult to determine a deep null in the presence of rf noise, and may be impossible if a signal is on the marker frequency. Hence, some patience is required to obtain a complete matching-network chart. (The whole operation is made easier and more precise by observing the audio output of the receiver on an oscilloscope.) The effort will, however, certainly be worthwhile in saving the "strain" on the transmitter and in the satisfaction of not being an on-air "tuner upper." — *Jack Geist, N3BEK, 2205 Henderson Ave., Silver Spring, MD 20902*

Feedback

☐ In Fig. 1 of "IMUS Control," July 1980 *QST*, the identity of U1 was omitted. U1 is a 1458 dual op amp (Radio Shack part number 276-038).

☐ Vincent Luciani, K2VJ, who provided the TS-820 crystal-filter switching modification for the July *QST* "Hints and Kinks" advises that in performing step four, the two leads removed from S2 *must* be soldered together before taping and tucking them aside. If these two leads are not tied together after removal, the RIT will not work.

Product Review

Conducted By Paul K. Pagel,* N1FB

The AEA MorseMatic MM-1 and MK-1 Keyers

How many functions and features can be built into one keyer? Advanced Electronic Applications, Inc., of Lynnwood, Washington, seems to have put just about everything you can think of in their MorseMatic Model MM-1 computerized keyer. The MM-1 can operate as a Morse trainer, a memory keyer, a beacon-transmitter controller or simply as a keyer. To provide all of these functions, each of which we will look at in detail, the MM-1 uses two 3870 single-chip microcomputers. Each 3870 is a complete computer system, containing an 8-bit processor, RAM, 2 kilobytes of mask-programmed ROM and all the logic required for clock generation, control and I/O functions. In addition to the 3870s, the MM-1 contains only two other ICs and 11 transistors. One of the ICs is a 1024-by-4-bit 2114 RAM used to store the Morse messages.

Now let's look at each of the four operating modes of the MM-1. First, in the KEYER/MEMORY send mode the MM-1 provides the following features: speeds from 2 to 99 wpm in 1-wpm steps, selectable dit and dah memories, adjustable dit/space and dah/space ratios, semi-automatic (bug) operation and 10 memories. When used with a dual-lever paddle, keying is iambic. The only option not included is automatic character spacing. Compared to other keyers, the MM-1 produces code as well as the best of them. The operator timing requirements are not overly critical and the feel is very much like an Accu-keyer. The memory has space for a total of about 500 Morse characters, which can be divided in any desired manner between the 10 messages. The memory can be expanded to approximately 2000 characters with the optional ME-1 memory-expansion unit.

A feature of the MEMORY SEND mode that contest operators will like is the automatic serial number. A serial number can be placed at any point in any of the 10 messages and is automatically incremented after the message is sent. As the number is not changed until the message is over, it may be placed in the message more than once. The serial number can be changed to a new value at any time, or it can be decremented by one should you fail to complete a contact. By using one of the memories, the current number can be repeated should the station you are working request a repeat of the number only. This requires pressing three keys on the keypad. After a message is started, the operator can interrupt it by pressing a key on the keypad or simply by tapping the paddle. At that point, the message can either be restarted from the beginning or from the point of interruption.

To make use of the memories, you must load your messages into them beforehand. This is done in the MEMORY LOAD mode. Characters can be keyed into the memory from the paddles in one of two ways. The AUTOMATIC mode controls the spacing between words and characters for you, while the REAL TIME mode records the spacing just as it is sent. The AUTOMATIC mode does have provisions for creating pauses in a message by entering word and character spaces directly from the keypad. Should an error be made in loading a message it can be corrected by playing the message up to the point of the error, stopping the message and then continuing to load the correct characters. For the "long-winded," the MM-1 has an LED indicator to warn the operator when he nears the end of the memory space. The indicator lights when approximately 22 character spaces remain. This is important because, should the memory be overrun, all of the messages will be lost!

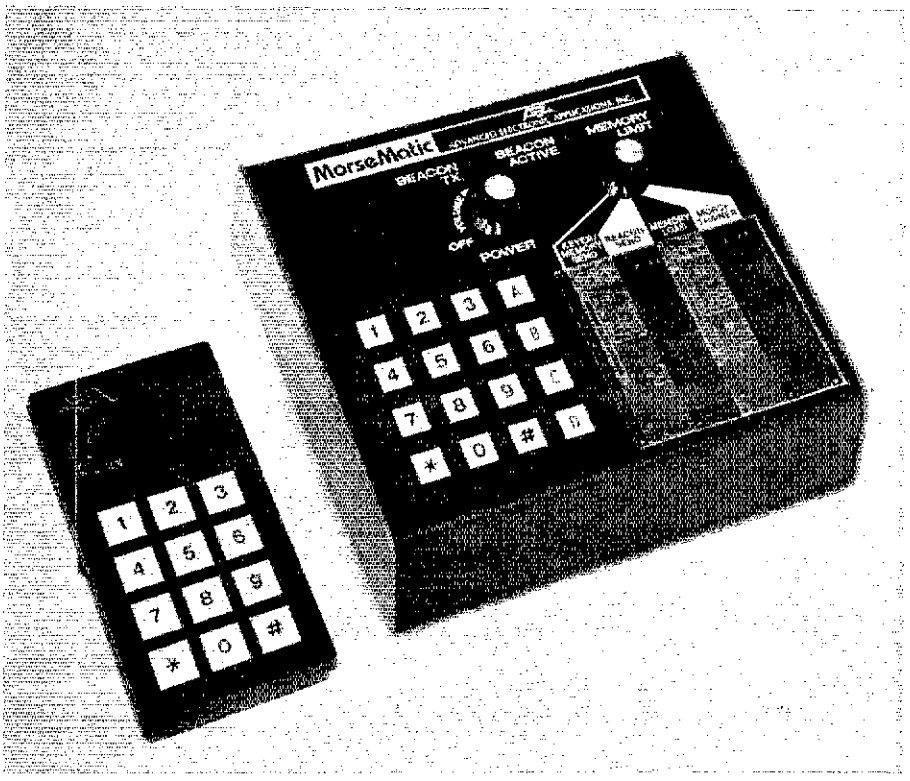


Fig. 1 — Microcomputer controlled, the MM-1 and MK-1 provide a multitude of features which should satisfy any cw operator.

Those of us that feel our cw copying ability is not quite ready for a contest should find the MORSE TRAINER mode of the MM-1 most useful. The Trainer will send perfectly formed characters at speeds of 2 to 99 wpm, and you can even program it to increase the speed as it is sending. Both the start and finish speeds are programmable, as is the time duration of the speed increase.

It is often found, particularly at low speeds, that the Farnsworth or slow-code method is helpful in increasing one's receiving speed. In this method, each character is sent at a relatively high speed, but the spaces between characters is increased so that the overall code speed is low. For example, 5-wpm code might be sent with each character at 18 wpm but with the spacing adjusted such that the word rate is 5 wpm. This is the method used for the W1AW code-practice transmissions up to 10 wpm. The MM-1 offers a choice between the Farnsworth method and standard code. One of two different character sets can be selected, the common set including the letters, numbers and most common punctuation marks, or the advanced set which adds a number of less commonly used punctuation marks and procedural signals such as parentheses and end of message (AR). While not often used, at least by this reviewer, the hyphen has been included in the set of common characters. At first this caused some difficulty, but the character was soon learned and was no longer a problem. Also, the parentheses in the advanced set is coded incorrectly. Again, a relatively minor point, and, as pointed out in the instruction manual, it should not cause anyone difficulty. The character sequence sent by the MM-1 can be any one of 10 fixed strings or a random character string.

The remaining mode of operation of the MM-1 is the BEACON SEND mode. This mode allows a message loaded into one of the 10 memories to be transmitted, repeatedly, at a fixed time interval. Both the transmitter on and off times are programmable from the keypad. The speed at which the message is sent is automatically adjusted so that the message will

*Assistant Technical Editor

fill the transmitter on time. The message can include a serial number that is automatically incremented each time it is sent. That pretty well covers the four operating modes of the MM-1, but we can still find a few more features, such as remote control and positive or negative keying outputs!

Message memories 0 and 1 can be recalled by momentarily grounding one of two pads on the circuit board. Two auxiliary jacks are provided on the back panel of the case. These jacks can be connected to the two pads and then used to activate the remote memory recall. Also located on the back panel are the jacks for headphones, keyed output (a jack for each polarity), paddles and the 9- to 16-volt dc input. A mounting hole for the memory expansion selector switch is also provided on the rear panel. All other controls are located on the top of the unit. Most of the control functions are handled by the 16-key keypad. The power switch is combined with the sidetone volume control, and a four-position rotary switch is used to select the mode of operation. These can be seen in the photograph.

"With all the various functions, features and modes, how can anyone remember how to operate the MM-1?" That was a common comment when other operators saw the MorseMatic, and the same question crossed my mind when I first used the MM-1. The fact is that once the commands used to control the MM-1 are learned, its operation is simple. The commonly used functions are quickly learned, and those functions that are not used often can be found on the reference chart located next to the keypad.

During use at home, the most outstanding feature I found was being able to select the exact sending speed I wanted. After using the MM-1 for a short time, I could match the speed of a station I wished to work without having to "try out" the speed setting as I have had to with other keyers. After using the MorseMatic for about a week, the 2114 memory IC failed and refused to load. Replacement of the 2114 IC solved the problem and no further difficulties were encountered.

All errors in operation of the unit were caused by either pressing the wrong key or not pressing the right keys hard enough. The MM-1 sounds a tone from the sidetone speaker (slightly lower in tone than the normal sidetone) each time a key is pressed. This would eliminate the problem of not pressing the keys hard enough, except that I like to use headphones and listen to the sidetone in my rig. If the sidetone volume of the MM-1 is turned down, you no longer have the auditory feedback when a key is pressed. This caused me to become very careful when changing speeds; if you make a mistake you may not know it until you hit the paddle and nothing happens!

The instruction manual supplied with the MorseMatic was complete and easy to read. The examples shown for programming each mode made it very easy to understand how to operate the MM-1. The optional AC-2 wall-transformer type power supply was used to power the unit during testing. Two C cells were used to maintain the memory in case of a short-term power failure. The cells can maintain the memory for about three hours.

So have you been counting all the features? I gave up, for each time I tried, I found a new one! No matter what the count, any practitioner of the cw art should find that the MorseMatic MM-1 fills his or her needs for a home-station keyer. Oh yes! The MM-1 has a little brother. It's the Model MK-1, and has most of the features of the keyer section of the MM-1. It does not have the memory, beacon or trainer modes and, as shown in the photograph, is much smaller than the MM-1. This makes it a nice unit to carry along on those portable operations. Other differences are that it provides only one keying polarity, a positive voltage to ground. My transmitter requires a negative voltage to ground so I added a single transistor inside the case of the unit. No other parts or changes are required. The connector used for the paddles is a four-pin microphone jack, as there is not enough room in the small case for the standard 1/4-inch phone jack.

The price classes for the MM-1 and MK-1 are $200 and $70, respectively. The ME-1 memory expansion is $60 and the AC-2 power supply for the MM-1 without expanded memory is $10. The AC-1 supply for use with the MM-1 with memory expansion is in the $15 price class. Additional information on these and other products can be obtained from AEA, Inc., P. O. Box 2160, Lynnwood, WA 98036. *— George Collins, AD0W*

CLEGG AB-144 ALL-BANDER RECEIVING CONVERTER

It's said, "Good things come in small packages." Well, there is a whole world of entertainment waiting for you when you hook up the All-Bander. Its small size is no indication of its performance. If you own an all-mode, 2-meter transceiver or receiver, the All-Bander will convert it to a deluxe shortwave receiver. The performance is limited only by the features of your 2-meter receiver. Simply hook an hf antenna to the All-Bander antenna jack, plug in the 12-V dc power supply that comes with the unit, connect a jumper to your 2-meter antenna input jack, and the whole spectrum from 100 kHz to 30 MHz is at your fingertips.

Clegg AB-144 All-Bander Receiving Converter

Specifications

Size (HWD): 2-3/8 × 5-1/4 × 5-3/4 in (60 × 133 × 146 mm).
Weight: 1-1/4 lbs (0.57 kg).
Color: Walnut grain with white front panel.
Power requirements: 10 to 15 V dc @ 30 mA (min); 110 V ac to 12 V dc converter included.
Frequency range: 100 kHz to 30 MHz.
Price class: $130.
Manufacturer: Clegg Communications Corp., 1911 Old Homestead La., Greenfield Industrial Park East, Lancaster, PA 17601, Tel. 717-229-7221.

The All-Bander receiving converter is completely solid state, using separate crystals for each oscillator position. Switching is done with an eight-position bandswitch, each position covering four MHz. All tuning and mode selection is performed by the controls on your two-meter receiver. A Schottky-diode doubly balanced mixer is used for improved dynamic range. The hf signals are "up converted" to the 144- to 148-MHz intermediate frequency.

For most situations, a random-wire antenna will suffice, but a multiple dipole or separate dipoles cut for the frequency of operation will improve reception. If your transceiver has a separate antenna input jack, it is recommended that you use it. You can hook the All-Bander directly to the transceiver antenna jack if necessary, but disconnect the microphone and key to prevent accidental transmission into the All-Bander. Although input protection has been provided, this extra precaution may prevent damage to the All-Bander, the transceiver, or both.

One of the most useful aspects of this con-

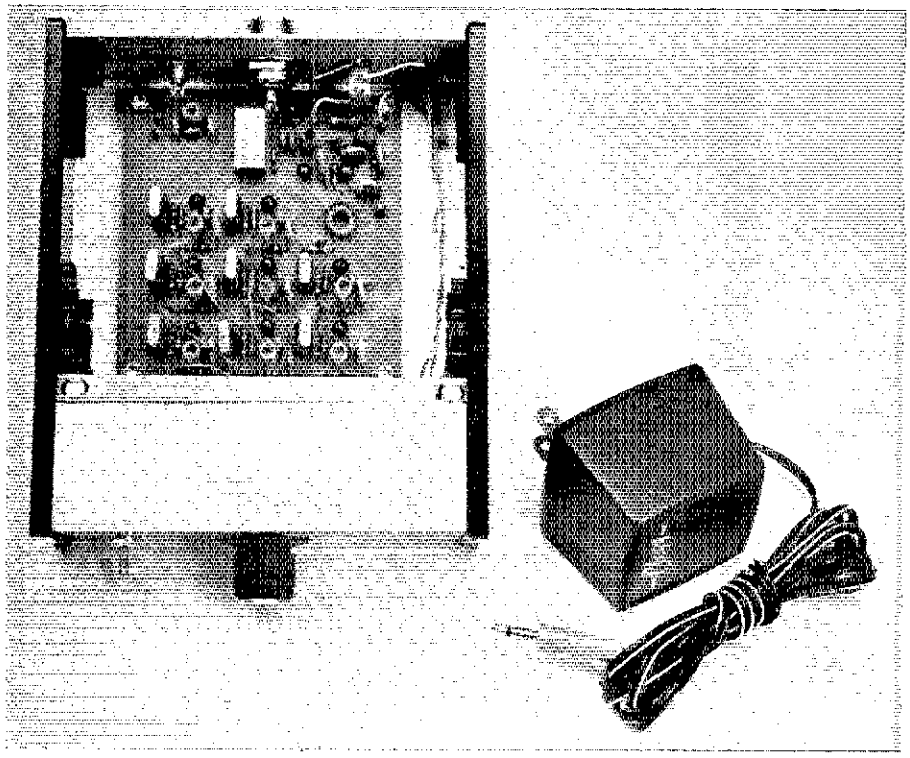


Fig. 2 — The Clegg AB-144 All-Bander and ac converter. The rectangular module close to the rear panel SO-239 connector is the doubly balanced mixer.

verter is using it as a ham-band receiver with your station receiver to check or monitor another portion of the band; it provides dual-frequency operation. The converter was useful for monitoring the frequencies of two nets that were operating at the same time. The shortwave-coverage feature is really a pleasure to use. Many pleasant hours were spent scanning the foreign broadcasts. With continuous coverage, the All-Bander is a valuable addition to your station. Making multiple use of your expensive 2-meter, all-mode receiver gives further justification to owning a Clegg All-Bander. — *Bernie Glassmeyer, W9KDR*

Z.R.C. COLD GALVANIZING COMPOUND

☐ Do you have a steel mast, roof tripod or tower that is showing signs of rust through the once-protective coating of galvanized material? If so, you may be interested in Z.R.C. cold galvanizing compound. This substance should be of considerable value to those who use iron water piping as masting for beam antennas (if the pipe has not been galvanized to protect it from corrosion).

A badly rusted tower or mast can be restored to almost new condition by applying Z.R.C. with a brush after the rust has been removed. The success of the treatment is highly dependent upon cleaning the old metal thoroughly with sandpaper or a wire brush — preferably a brush that can be used with a drill motor. All oil and old paint must be removed before the Z.R.C. compound is applied. The manufacturer can provide a special cleaning fluid (metal conditioner) for the purpose, although any good degreaser should be suitable.

Once the work is ready to be treated you can apply the Z.R.C compound with a paint brush. It has the consistency of paint, and is a slate-gray color. Two coats are suggested to ensure good coverage of the metal. The finished product, after drying, has a bluish-gray nongloss coat. The protectant dries to the touch in 30 minutes and is sufficiently aged to permit application of a second coat in 24 hours. Proper application is realized when the compound has a dry thickness of 3 mils (0.08 mm). This is comparable to a hot-dip galvanize treatment.

A 24-pound (10.8-kg) container of Z.R.C. compound will cover 400 to 500 square feet (37 to 46 sq. meters) of surface at a 1.5-mil (0.04-mm) dry thickness. It can be applied with a brush or by means of a paint sprayer. Accelerated drying is possible by placing the coated work in an oven.

The compound consists of 95% pure zinc metal. It is flammable because it contains petroleum distillate. Since this material should not be ingested, and because the fumes should not be inhaled, it must be handled with care. It should be kept out of the reach of children.

Our sample was shipped in a 1-1/2-pound (680-g) can. Other quantities are available. We cannot attest to the longevity of the protective coating, since this review would have to be delayed 5 or 10 years as we watched for signs of deterioration. The steel pipe to which this material was applied certainly looks nice, and the coating appears to be tough and durable. The manufacturer is Z.R.C. Chemical Products Co., Quincy, MA 02171. A letter of inquiry will be answered with the name of the nearest distributor. Price class for the 1-1/2-pound (680-g) can is $5; the metal conditioner is $8.25 per gallon (3.8 liters). — *Doug DeMaw, W1FB*

BENCHER ZA-1 AND ZA-2 BALUNS

☐ The *QST* ad reads, "The Ultimate 1:1 Balun," in a manner similar to Lew McCoy's July 1970 *QST* article title, "The Ultimate Transmatch." Just how *ultimate* any product or circuit design might be is a matter for the beholder to judge. Some may settle for the term "penultimate" (next to the last word), since there is probably no product on earth that can't be improved upon in some manner! Nonetheless, the Bencher baluns have the desired attributes to make them superior to some other baluns — under specific operating conditions.

Both balun models are devoid of magnetic core material. This means that the core is air rather than a ferrite rod or toroid. Each unit has a trifilar winding of heavy-gauge enameled copper wire. The transformer is wound on a 1-inch (25-mm) tubular coil form to represent the circuit shown in Fig. 3. This is the standard 1:1 balun configuration that appears in the transmitting chapter of recent ARRL *Handbooks*. So, there is nothing magical about the transformer concept. But, the absence of a magnetic core is an item of interest, since without a core the transformer will not saturate when subjected to high levels of rf power, or when a serious mismatch occurs. When a magnetic-core transformer saturates, square waves develop, and they can cause TVI through the presence of strong harmonic currents. In fact, if you've been experiencing a TVI problem that defies resolution after trying all of the usual cures, try removing the balun from your antenna. Chances are that the TVI will vanish after you remove the potential source of the problem.

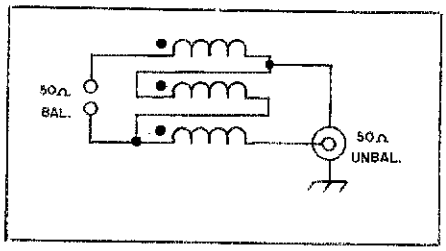


Fig. 3 — Schematic diagram of a 1:1 balun transformer. The black dots indicate the polarity of the windings.

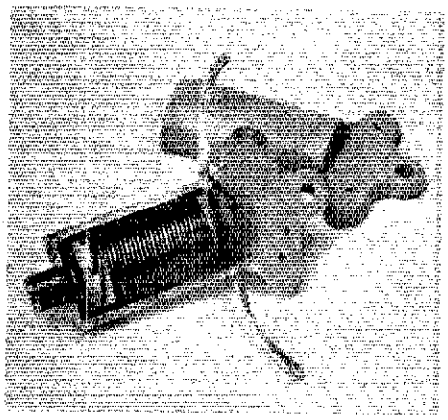


Fig. 4 — Photographic view of the Bencher ZA-1 balun, showing the interior of the assembly. Half of the molded-plastic case was removed for this picture, thereby breaking the weather seal.

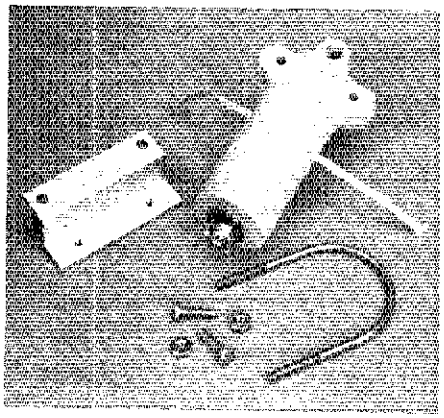


Fig. 5 — The Bencher ZA-2 balun is designed for use with mono- or triband beams and is supplied with mounting hardware.

The foregoing is by no means an indictment of the magnetic-core balun you bought or built. Rather, it may suggest that your antenna system is poorly matched to the feed line, that the ferrite core is too small in cross-sectional area, or that you're running more power than the balun is rated for (shame!).

The model ZA-1 is designed for use from 3.5 to 30 MHz. A typical application would be at the feed point of, say, a 40-meter dipole. This would provide a balanced-to-unbalanced transformation between the dipole and a 75-ohm coaxial transmission line. The plastic housing is built to accommodate dipoles and has a center-support hole at the top, which makes it ideal for use in supporting inverted-V antennas. Silver-plated shield braid emerges from each side of the assembly for making connection to the halves of the dipole. An interior view of the ZA-1 is shown in Fig. 4. The SO-239 style of coax connector at the bottom of the balun is equipped with an "O" ring to provide a seal against dust and moisture when the feeder is attached.

For those wishing to use a 1:1 balun on single-band or triband 50- or 75-ohm beam antennas, the model ZA-2 can be employed. It is similar to the ZA-1, but has fewer coil turns and comes with appropriate boom-mount (2-inch or 51-mm OD) hardware (see Fig. 5).

Among the claims made by Bencher is that the baluns will handle 5 kW of peak power. We were unable to verify this claim in the ARRL lab because we have no means by which to generate more than 1 kW of rf power. At the 1-kW continuous level, into a 50-ohm balanced load, no heating of the coil was observed at 14 MHz. The VSWR from 3.5 to 29 MHz under this condition (ZA-1) was less than 1.5:1, with the worst-case reading at 3.5 MHz. The ZA-2 showed a VSWR of less than 1.5:1 on 14, 21 and 29 MHz. Return-loss measurements with a Hewlett-Packard spectrum analyzer verified this set of conditions and showed the power loss to be substantially less than 1 dB.

Because of the type of winding the transformer has (see Fig. 3), the antenna is effectively grounded at dc. This is a useful feature in the event of rain-static buildup or voltages induced by lightning strokes in the area.

The ZA-1 sells for a price class of $16 and the ZA-2 for $18. The manufacturer is Bencher, Inc., 333 West Lake St., Chicago, IL 60606, Tel. 312-263-1808. — *Doug DeMaw, W1FB*

E-TEK FR-4TR FREQUENCY READOUT/COUNTER

What can one say about a frequency display? Yes, it displays frequencies — to six places (to the nearest 100 Hz) and the 3-inch (76 mm) digits are bright red, perfect for overtaxed eyes. But be advised: This product is essentially a digital dial; don't expect to see the unit register 75- or 100-Hz shift when operating cw. The manufacturer states that the calibration has been adjusted to within ±2 ppm. A front-panel 3-position toggle switch serves as the band selector — 80, 20 and normal (40, 15, 10 meters). The decor matches the Drake styling.[1]

Installation of the E-Tek unit requires connection to V1 of the TR-4CW transceiver (premixer/crystal oscillator) and to one circuit board. Accomplishing this was fairly simple, although, being a dedicated appliance operator, I looked upon probing into the entrails of the rig with as much enthusiasm as, say, spending the weekend in the Sahara Desert. A sigh of relief was heard upon completion of the minor surgery. Unfortunately, everything was not copacetic.

Bizarre (and incorrect) frequencies were being displayed on 10 and 15 meters. A call to E-Tek indicated that tweaking up the injection crystal oscillator would alleviate the problem (this procedure is outlined in section 5-10, page 5-2, of the TR-4CW instruction manual). With that completed, we thought we were "golden." The unit, however, was still unstable on 10 meters when the RV-4C external VFO was being used.

Another call to E-Tek and we received a modification kit which consisted of a 100-ohm resistor and an L-C network. Salvation at last! Well, not quite. The 33-pF capacitor that E-Tek sent disintegrated upon touch. The ARRL hq. lab supplied a replacement, and this modification concluded on a successful note. The FR-4tr then functioned properly on all five bands, regardless of which VFO was being employed.

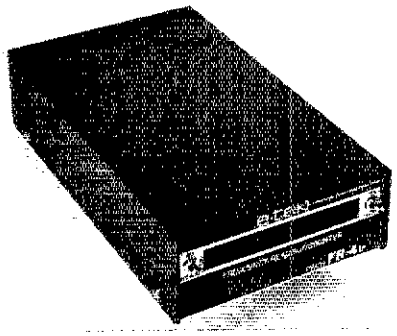
I enjoyed using this product and would recommend it to any active ham. It's great for split-frequency DX chasing as well as pinpointing a net or sked frequency. Nevertheless, an item with this price tag should already contain the appropriate refinements. E-Tek has indicated that all future runs will include the modification and that the FR-4tr instruction book will contain the injection crystal oscillator information.

There is one piece of bad news to report. The unit generates spurious signals. The spurs are practically inaudible when an antenna is connected. With one's skyhook removed, however, a continual "beep beep beep" is quite evident. This was first discovered on the 20-meter band, at approximately every 28 kHz. Further investigation revealed an equivalent on the 80-meter band. No spurious signals were discovered on the other three bands. Table 1 lists the spurious signals found on 20 and 80 meters. (Note: Because of the design of the transceiver, 20-meter tuning is right to left using the bottom scale of the linear dial, while all other bands tune from left to right per the top scale.) — *Robert Halprin, K1XA*

Table 1

FR-4tr Spurious Signals

20 meters		*80 meters*	
14.0004	14.2637	3.9996	3.7363
14.0284	14.2945	3.9716	3.7055
14.0566	14.3258	3.9434	3.6742
14.0852	14.3575	3.9148	3.6425
14.1142	14.3895	3.8858	3.6103
14.1433	14.4221	3.8567	3.5779
14.2729	14.4549	3.8272	3.5451
14.2028	14.4882	3.7972	3.5118
14.2331	14.5219	3.7670	3.4781



The FR4tr is designed to provide a digital frequency readout for the TR3/TR4 series of Drake transceivers.[1]

E-Tek FR-4tr Frequency Readout/Counter

Dimensions (HWD): 3-3/8 × 5 × 8-3/4 inches (60 × 127 × 222 mm).
Weight: 4.5 pounds (2 kg).
Power requirements: 105 to 130 V ac, 60 Hz.
Price class: $170.
Distributor: E-Tek, 1028 Greene St., Marietta, OH 45750.

MSL DIGITAL QSK KIT

The Micro Systems Labs Digital QSK board provides a cw QSK type of operation at moderate code speeds for ssb/cw transceivers (or with separate receivers and transmitters) that employ VOX-keyed cw transmission systems. The kit I received and assembled was tested with my Yaesu FT-101ZD transceiver and later with the Kenwood Twins, the R599D/T599D combination.

The MSL Digital QSK system uses a delay timer, shift register and sidetone oscillator. When the cw key is closed, the transceiver PTT line is closed, the delay timer started and the sidetone oscillator triggered. The keyed code is entered into the shift register, where it is sampled and delayed approximately 50 ms to allow the T-R relays to switch before rf is generated. (The normal 50-ms delay time may be extended to 100 ms if desired by the addition of another shift register.) When sending ceases for 60 ms or more, the shift register empties and the timed delay runs out, placing the station in the receive mode again. The switching delay between transmit and receive can be made adjustable by means of a potentiometer.

Instructions are provided to permit the MSL board to key both positive and negative PTT and keying lines. An instructional wiring error involving Q4 was discovered during assembly of the unit. The positive keying line modification (which involves installing different jumper wires) left the base of the keying transistor "floating." The correct jumper installation should have the base of Q4 connected to resistor R11.[2]

It was noted that the diode junction voltage drop of the keying-line polarity-protection diode (D3) was sufficient to prevent the internal audio oscillator of the '101ZD from being keyed. If the diode is placed between the collector of Q4 and ground, protection will still be afforded and the oscillator can be keyed.[2]

Basically, the MSL circuitry produces a keyed relay type of QSK system, which means that the effectiveness of the system depends upon the shift-register delay and the speed with which the T-R relays actuate. (Most vacuum relays used in other QSK systems operate at speeds of less than 10 ms.) If an average keying speed of 24 wpm is assumed, one dit will occupy a time period of 100 ms.[2] At a speed of 48 wpm, the dit will occupy the same time span as that offered by the shift register and the drop out time delay, 50 ms. The relationship between relay transfer time and keying speed becomes quite obvious.

No adverse keying characteristics were introduced when the system was in use. The MSL system does definitely eliminate the truncation of the initial dit or dah experienced with normal keyed-VOX circuits; the T-R relays are switched "cold." On-the-air testing proved that a breaking station could be heard without difficulty at most speeds normally encountered. At keying speeds of approximately 12 wpm or less, the MSL system will transfer between code elements; at higher speeds this transfer occurs between code groups.

In reality, most operators will not find the MSL onboard audio oscillator necessary. It will be virtually impossible for the operator to discern the 50 ms delay between key closure and the generation of the sidetone at most keying speeds.

When using the system I was bothered by the constant cycling of the transceiver or receiver/transmitter T-R relays and the accompanying noise. By using headphones, noise disturbances were reduced to a tolerable level, but the T-R relays are nevertheless still operating much more frequently than they would be under normal operating conditions. When the MSL unit was used with my '101ZD, I experienced popping in the receiver during the relay transfer, which also disturbed me. Another staffer tried the unit with a Yaesu FT-101E and found similar difficulties. Additionally, at speeds above 35 wpm, QSK was no longer possible and the '101E operated much like a VOX-keyed rig.

I can understand the possibility of transceiver owners using such a system for QSK operation, but I would personally prefer to use a faster, quieter system with separate receiver/transmitter combinations. A singular exception to this rule would be to utilize the board solely to eliminate the initial dit or dah truncation. The drop-out delay time may be lengthened, as mentioned earlier, thus avoiding the constant cycling of the T-R relays.

The MSL QSK system is available from Micro Systems Laboratory, 1429 Oak Grove Circle, Santa Ana, CA 92705. Pc board and instructions, $4; parts kit (includes board), $20; assembled and tested board, $40. — *Paul K. Pagel, N1FB*

[1]A model is also available for the Drake Twins. It requires no modification and no bandswitching.

[2]The manufacturer was informed of these findings and has taken steps to correct them.

[2]*The 1980 Radio Amateur's Handbook*, 57th edition, p. 11-6.

Hints and Kinks

Conducted By Stuart Leland,* W1JEC

SIMPLE CORELESS BALUNS

☐ A *balun* (not "bay-lun") transformer is used to change a *bal*anced condition to an *un*balanced one, or vice versa. The most common amateur application is in antenna work, where a balanced 50-ohm feed is changed to an unbalanced 50-ohm status to permit the use of coaxial feed line. This would be a 1:1 type of balun application. Baluns are also used to convert a 300-ohm balanced condition to a 75-ohm unbalanced one (4:1 type of balun), or to change 200 ohms balanced to 50 ohms unbalanced. In this manner, a 300-ohm folded dipole could be used with a 75-ohm coaxial feeder without disturbing the radiation pattern (balance) of the antenna.

Most commercial baluns contain ferrite cores, which, if the core material is of sufficient cross-sectional area to prevent saturation, do an excellent job. TVI problems have been traced to balun-core saturation at the higher power levels, however, when too small a core was used. The TVI is caused by harmonic generation that results from core saturation.

Bencher, Inc. (of keyer-paddle fame) recently solved the problem by introducing two 1:1 baluns that use air cores. The winding format is identical to that used on toroid or rod cores, and this is shown in Fig. 1. The dots indicate the polarity of the windings. An effective 1:1 air-core balun for 3.5 to 30 MHz can be fashioned inexpensively by placing 12 trifilar (three wires of identical length in parallel) turns of no. 12 or 14 enameled wire, closewound, on a 1-inch (25-mm) OD coil form. The leads that connect the ends of the windings are routed along the inner wall of the coil form. Phenolic or fiberglass tubing is suggested for the coil-form material, but PVC tubing can be used if the SWR in the system is maintained below 2:1 at the higher power levels. PVC tubing will heat and burn when subjected to high values of rf voltage in the hf spectrum.

Fig. 2 shows a photograph of a large balun that was built for use from 160 through 40 meters at W1FB. Above 40 meters it is unsuitable because of excessive inductance and distributed capacitance. It is wound on a 5-inch (125-mm) length of 2-inch (51-mm) OD PVC pipe. There are 13 trifilar turns of no. 18 insulated hookup wire on the form. Each wire is a different color to help identify the ends of the windings during final assembly. A U-shaped aluminum bracket is attached to each end of the coil form, using two no. 6 sheet-metal screws for each bracket. An SO-239 coaxial jack is affixed to the "unbalanced end" of the form, and a pair of binding posts is used on the opposite bracket to permit connection of the balanced load or source. Assuming an SWR of 1:1, and matching 50 ohms to 50 ohms, the developed rms ac voltage will not exceed 224 at 1000 watts of transmitter output power. Since most amplifiers are approximately 60-percent efficient, the operating power in the balun (at 1-kW dc input) will be roughly 600 watts, yielding 173 rms volts. The PVC tubing can handle this easily, even at 29 MHz.

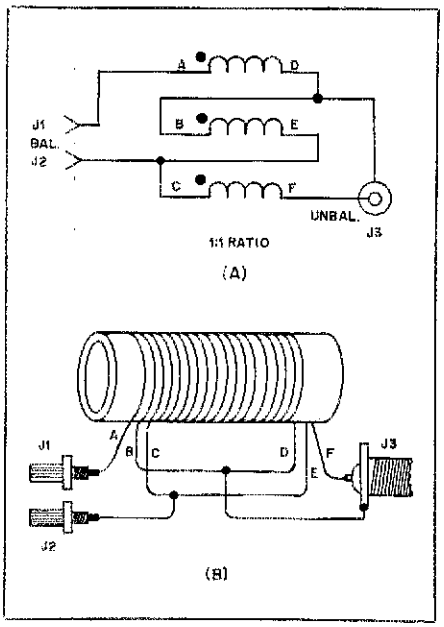


Fig. 1 — Schematic diagram of a 1:1 balun. At A, the winding polarity is indicated by the black dots. A pictorial view is shown at B.

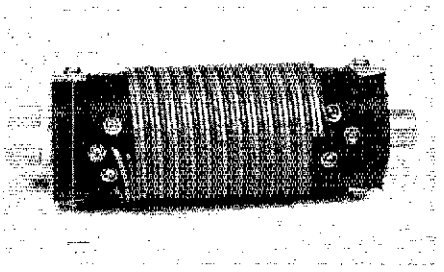


Fig. 2 — Photograph of a homemade coreless balun for 1.8-7.3 MHz. It will handle 600 watts of rf power safely if the system SWR is less than 2:1.

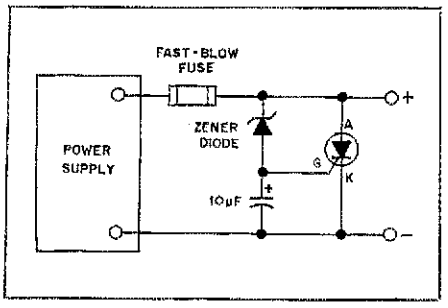


Fig. 3 — Schematic diagram of Pelham's crowbar overvoltage protection circuit.

The ends of the windings are held in place by means of six no. 6 machine screws, solder lugs and nuts. All wiring is inside the coil form. If the balun is to be used out of doors, it should be protected from the weather. A plastic refrigerator box can be used for that purpose. — *Doug DeMaw, W1FB*

POWER-SUPPLY CROWBAR OVERVOLTAGE PROTECTION

☐ I use a high-current 12-volt supply to power my 200-watt hf solid-state transceiver and 150-watt vhf amplifier. One day while I was on the air, a series regulator transistor shorted, applying the full unregulated supply-rail potential of 26 volts to my equipment. Luckily, only one device (the first mixer FET in the ht transceiver) failed, but the spectre of what could happen, should the supply fail again, has moved me to incorporate a simple overvoltage protection circuit in the supply. This general technique is applicable to most any power supply.

The circuit shown in Fig. 3, uses only four components — a capacitor, a Zener diode, an SCR and a fast-blow fuse. Most supplies already have a fuse, reducing the number of needed components to three! The voltage rating of the Zener diode is chosen so that when the supply output voltage exceeds its normal value, the SCR is triggered, conducts heavily and blows the fuse. The current and voltage rating of the SCR and the fuse size depend on the characteristics of the supply. The voltage rating of the SCR must be higher than the output voltage of the power supply. The current rating of the SCR must be higher than the maximum output-current capability of the supply. The fuse must be capable of passing the load current, but must have current rating low enough to open when the SCR conducts. I have a 20-ampere supply; I used a 20-A fuse and an SCR rated at 35 A. The terminal potential of the supply is 13.8 volts, so I chose a 15-volt Zener diode.

If this modification is added to a high-current supply, it is essential that low-resistance connections be made from the supply to the anode and cathode of the SCR. If this isn't done, the wiring may act as the fuse, instead of the fuse itself! — *John C. Pelham, W1JA*

[Editor's Note: A crowbar circuit such as this is valuable for avoiding *prolonged* overvoltage application to the equipment being powered. Because there is some finite delay time in blowing even a "fast-blow" fuse and because the overvoltage *must* occur in order for the SCR to operate, this circuit may not prevent destruction of the devices being powered.]

ADDITIONAL SAFETY FOR THE FIELD DAY OVERVOLTAGE PROTECTION CIRCUIT

☐ The circuit for the Field Day overvoltage protection circuit shown in March "Hints and Kinks" will not allow K2 to be properly energized. The connections for the coil of K2 and lamp DS1 (open circuit) should be on the input (left) side of the K2 contacts. The only way K2 could energize would be either to backfeed 117 V into the outlet (inadvisable) or to reach into the enclosure and pull in K2 manually (likewise inadvisable!).

I'd feel a little safer if power were applied to the normally open contacts so that the arms are only "hot" when K2 is energized. One advantage of this is that if a dpdt relay is used, the two normally closed contacts could be tied together and grounded externally (not just to

*Assistant Technical Editor, *QST*

the enclosure.) This would minimize the chances of electrical damage to equipment or harm to the operator, whether overvoltage was caused by generator runaway or nearby lightning strikes. Common sense would tell us to avoid operating during a thunderstorm but we could be caught by stretching a QSO as a storm approaches or by neglecting to watch the sky. That first bolt has to land somewhere!

If I were building the AA5C circuit (and I may), I would probably add three instantaneously operating metal-oxide varistors (MOVs). These little gems are voltage-transient protectors for use across the 117-V ac lines. They are available from most radio supply houses. The accompanying circuit not only offers the advantage of the MOVs, but also provides for fuses and an improved ground circuit. Additionally, these modifications will prevent any surges above 180 V, either between lines or line-to-ground. As shown in the diagram, the equipment side of the ac line is grounded when the power is off. This arrangement would be a good idea for the home station, but can be a real safety factor for Field Day.

Don't forget to provide a solid ground, preferably with the use of ground rods at the generator and equipment. Also, the ground circuit should be bonded to all towers. A nonmetallic box would be preferable for this project. Also the use of a neon lamp for DS1 is desirable so that the amount of current drawn will not be enough to pull in K2! (They are in series!) — *"Ivy" Iverson, WDØBZK, Waterloo, Iowa*

☐ I wish to suggest that *QST* readers make the following correction in the overvoltage protection circuit I described in the March 1980 "Hints and Kinks": Wire R10 to pin 3 of U1. This change will permit K2 to operate as intended and Q1 can be turned on. — *Greg McIntire, AA5C, Lewisville, Texas*

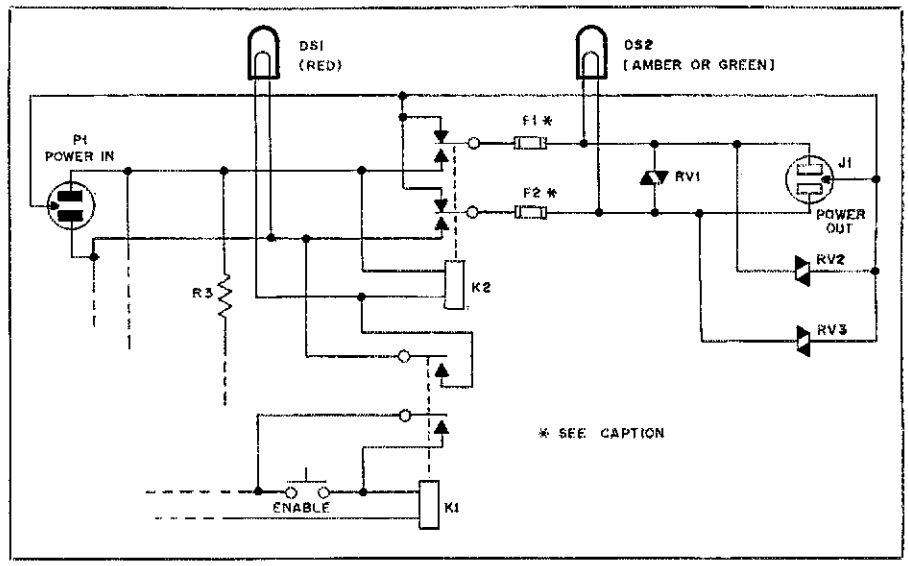


Fig. 4 — Additional protection for the overvoltage protective circuit described in March 1980 "Hints and Kinks" is provided by the modification suggested by "Ivy" Iverson, WDØBZK. Fuse-current rating should equal that of the contacts of K2 or the generator output rating (intermittent). Select the lower rating. The MOVs, RV1-RV3, incl., are made by General Electric.

SMOOTH AND NO-SLIP DRIVE FOR HEATH VFOS

☐ Slippage, which pesters Heath no. 100-450 VFO drive assemblies, can be cured in a very easy manner that also leaves the drive smooth and light to turn. Locate a piece of spring that fits into the elliptical hole of the dial escutcheon and above the drive-shaft bushing. See the drawing. Find a nut that fits on the shaft bushing to accompany the existing nut. Tighten the two nuts on the bushing, leaving enough leeway to allow the bushing (with the shaft in it) to move slightly against the spring.

I performed this modification about five years ago. It still is working fine; no readjustments have been necessary since. — *Hannu Häili, OH6KP, Jyväskylä, Finland*

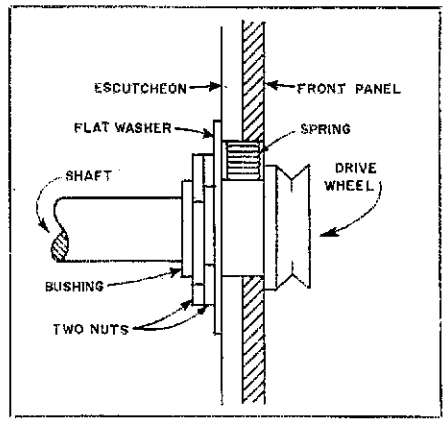


Fig. 5 — Hannu Häili, OH6KP, suggests the insertion of a spring, as shown above, to provide a no-slip drive for Heath VFOs. See text.

OILERS FOR MECHANICAL PARTS

☐ An alternative to the device for oiling mechanical parts suggested by W8WX in January *QST*, page 53, is a comparable lubricating aid, the Chem-O-Jector, sold by G-C Electronics. It is available at many electronic supply stores. Olson Electronics of Akron, Ohio, likewise offers a similar syringe for injecting oil into mechanical parts that are difficult to reach. Additionally, G-C sells a useful leakproof pocket-style oiler resembling a fountain pen.

Acquisition of one of these tools, rather than the medical syringe mentioned in the January "Hints and Kinks" might, in some areas, avoid possible legal embarrassment. Regulatory efforts are being made to restrict the use of the medical instrument to authorized medical purposes. Thanks to the many *QST* readers who volunteered the above information. — *Stu Leland, W1JEC*

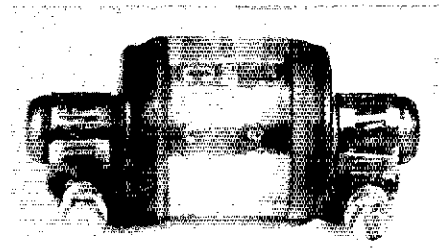


Fig. 6 — Photograph of a surplus 50-pF vacuum capacitor from the antenna relay box of a Command transmitter. Hose clamps are used to attach the trap to the antenna wire. The trap coil can be wound over the glass part of the capacitor.

VACUUM CAPACITOR FOR ANTENNA TRAP

☐ Some of us "not so young" amateurs are familiar with the 50-pF fixed-value vacuum capacitors which still appear as surplus after WW II. These capacitors were contained in the antenna relay boxes that were used with Command transmitters. In addition to the vacuum capacitor and 28-volt relay, there was an rf ammeter. The capacitor is rated at 5 kV. A 5-ampere rf current flow is specified as maximum. These are conservative ratings, owing to military specifications. For amateur work the capacitors can handle full legal power, with plenty of safety factor.

The capacitors are constructed ideally for use in antenna traps. The trap coil can be wound over the glass portion of the capacitor body, with the ends of the windings soldered to the metal end posts. The photograph (Fig. 6) shows how 0.5-inch (13-mm) stainless-steel hose clamps can be used to provide electrical and physical contact to the antenna wire. These vacuum capacitors are relatively immune to changes in value with variations in temperature. Furthermore, they exhibit high Q.

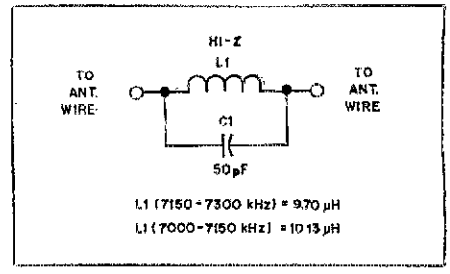


Fig. 7 — Circuit for a 40-meter antenna trap with inductance details for the phone and cw portions of the band. C1 is the surplus vacuum capacitor appearing in the photograph.

The L/C ratio of an antenna trap is not especially critical. It should be tuned by means of a dip meter before it is installed in the antenna. Resonance should be in the center of the planned operating range of the antenna. Fig. 7 shows the circuit for a 40-meter tap which could be built around the surplus vacuum capacitor. Watch the flea markets for these capacitors. They are often available for as little as 50 cents! — *Doug DeMaw, W1FB*

Meet Your ARRL Officers

By Andrew Tripp*

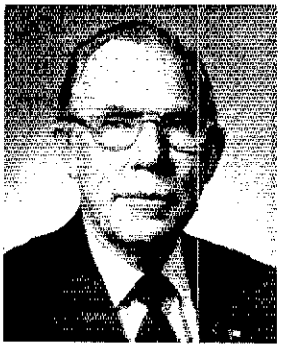
According to ARRL bylaws, your officers are elected for two-year terms by the Board of Directors at their semiannual meetings. The officers' names are probably familiar — they are listed on page 9 of every issue of *QST* — but the faces may not be. So, here's an opportunity to get better acquainted with your elected officials.

*Public Information Officer, ARRL

Harry J. Dannals, W2HD, President

Reelected to the post he has held since 1972, President Dannals was Hudson Division director, 1965 to '71; vice director, 1961 to '64; assistant director, 1958 to '61 and New York City SCM, 1955 to '61. A senior engineer with Sperry Corporation, President Dannals is also a life member of the Quarter Century Wireless Association.

Carl L. Smith, WØBWJ, First Vice President

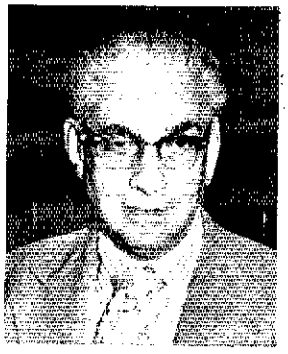


An ARRL vice president since 1971, First Vice President Smith is also the new IARU vice president. A member of the WARC-79 team, Smith served as Rocky Mountain Division director, 1961 to '70; vice director, 1957 to '58; assistant director, 1955 to '56 and Colorado SCM, 1959 to '60.

Larry E. Price, W4RA, Vice President

Southeastern Division director from 1973 to '79, Vice President Price was vice director in 1972 and assistant director in 1970 and '71. A founding director of the ARRL Foundation, Price is currently chairman of the Department of Finance and Law at Georgia Southern College in Statesboro.

Max Arnold, W4WHN, Vice President



From 1970 to '79 Vice President Arnold was Delta Division director. Prior to that he served as that division's vice director from 1966 to '70. A vice president with a woodworking firm in Nashville, Tennessee, Arnold teaches Amateur Radio classes in his spare time and has more than 1000 graduates to his credit.

Noel B. Eaton, VE3CJ, International Affairs Vice President

Elected to this newly formed office last January, Vice President Eaton is also IARU's president, a post he has held since 1974. An IARU representative to WARC-79, Eaton served as ARRL vice president from 1974 to '79 and as CRRL director from 1960 to '73.

Richard L. Baldwin, W1RU, Secretary

Elected to a third consecutive term, Mr. Baldwin has served as secretary of ARRL and IARU since 1976. He has also been ARRL general manager and editor of *QST* since 1975. Prior to that he was assistant general manager from 1963 to '74 and *QST* managing editor from 1956 to '65. Mr. Baldwin's career with ARRL began in 1948 as an assistant secretary.

James E. McCobb, Jr., K1LLU, Treasurer

Along with a B.S. degree in Accounting from Bentley College in Waltham, Massachusetts, Treasurer McCobb brings more than 12 years of banking experience to the position. An active ARRL member for more than 20 years, McCobb is currently treasurer at the Lynn (Massachusetts) Five Cents Savings Bank.

Red Cross Division Emergency Communications

Success in emergency situations depends on experience, planning and coordination.

By Malcolm C. Mallette,* WA9BVS

A flash flood struck the small towns of English and Marengo, Indiana, on July 26, 1979. Telephone lines fell victim to the flood waters; the communities were isolated. The Indiana Division of the Red Cross sent volunteers and staff from both the Division and Chapter levels. Nearby Amateur Radio operators were contacted, and within two hours a communications team, led by Roscoe Davis, WA9TJS, and Clark County emergency coordinator (EC) Terry Edlin, K9TE, arrived at the Red Cross center in the disaster area. Carl Call, WB9JHD, EC of Warrick County also assisted. For three days, amateurs provided vhf communications within the affected region, as well as 80-meter contact with Division headquarters, 100 miles distant (see January 1980 *QST*, page 86).

The Indiana Division of the Red Cross maintains records of amateurs enrolled with their 46 chapters that have established an active cooperative agreement with amateurs. In this emergency, Red Cross officials were able to determine immediately that amateurs affiliated with the Clark County Chapter were closest to the disaster scene; they were dispatched quickly and efficiently. This article presents suggestions for Red Cross and League officials who wish to implement a similar emergency communications program.

Red Cross Needs Communications

The American National Red Cross carries on a nationwide program of disaster relief. All Red Cross disaster assistance is a gift, never a loan, made possible by the voluntary contributions of American citizens. The Red Cross relies on volunteers for most of the work, and it is work, needed to deliver the assistance to the disaster victims. From the advent of radio, hams have assisted the American Red Cross. Organization of the amateurs' efforts, in cooperation with the ARRL and local radio clubs, is helpful to the Red Cross, the amateurs and the public.

Phil Pash, WD9ICJ, at Red Cross Radio Club Station, WA9LGQ, in Indianapolis. This station provided communications with shelters set up in Crawford County during flash floods in July 1979. *(photo by Dee Bond, American Red Cross)*

The first focus of Red Cross disaster assistance is providing immediate emergency assistance. That means acting immediately after the disaster occurs when telephone facilities often are not available.

The American Red Cross has been organized in Divisions to facilitate the administration of prompt disaster relief. The Division concept cannot smooth the way for immediate disaster relief if there is no communication between a Division headquarters and its Chapters during the period immediately after the disaster. The Red Cross Indiana Division, which has its headquarters at Indianapolis, includes most of the Red Cross Chapters in Indiana. In the Indiana Division, large disasters are primarily caused by tornadoes that destroy telephone communications. The Indiana Division has adopted a program of Amateur Radio emergency communications to serve the Division when the telephone facilities do not work.

Amateur Radio was chosen because a wide choice of frequencies has been allocated to this Service; there are medium- and long-range bands as well as vhf repeaters, and the hams are competent. The short range of and interference on the Citizens Radio Service channels make it impossible to use CB for Division communications. The Red Cross Special Public Safety Radio Service frequency at 47 MHz is limited to short-range communications.

Surprisingly, administration of the Indiana program required only one volunteer at the Indiana Division headquarters. Setting up the program required about 40 hours of that volunteer's time spread over a period of several months. Other Red Cross Divisions may want to implement a communications program. The following procedures are suggested

*Communications Coordinator, Indiana Division, 7272 North Pennsylvania St., Indianapolis, IN 46240.

Indiana Division Disaster Director Max Galloway, K9OXA, is one of the Red Cross volunteers who makes the system work. *(photo by Dee Bond, American Red Cross)*

Volunteers like WA9TJS (left) and WB9LIF are necessary to ensure successful communications during disasters. These two amateurs were on duty at Red Cross flood headquarters in English, Indiana, during the July 1979 emergency. *(photo by John Shean, N9TV)*

for creating a Red Cross Division Amateur Radio emergency communications system.

Needs at Division Level

First, the Division headquarters must have a reliable Amateur Radio station capable of operating on 2-meter fm for short-range communications, and 80 and 40 meter ssb/cw for long-range communications. If there is no station at the Division headquarters, the Chapters will have no one to communicate with. Reliance on personal stations is to be avoided at the Division headquarters level because the radio operators at the Division need immediate access to the Division staff and the station will often be on the air 24 hours a day. In many instances the staff at the Division headquarters will wish to talk direct by radio to Red Cross personnel at the disaster scene. In addition, Division headquarters locations normally have emergency power, which is a prerequisite for a station that is to handle all the traffic of the Division. If a Division headquarters has no amateur communications equipment whatsoever, such an investment would be very worthwhile. As an alternative, until funds for an amateur station can be obtained or equipment is donated, antennas may be provided by the Red Cross and arrangements made with a local club to bring in their own equipment in an emergency. Of course, a group of amateurs or club must be recruited to maintain and operate such equipment at the Division headquarters. It is important that such amateurs have *no* disaster responsibility other than responding to the needs of the Red Cross Division. The Indianapolis Area Chapter has its own Amateur Radio Club Station, WA9LGQ, which is also used as a headquarters station by the Indiana Division.

After the Division has an Amateur Radio station and a competent group of volunteers whose disaster responsibility will be to man that station, the next step is the selection by the Division Disaster Director of an Amateur Radio coordinator for the Division. This volunteer must reside where the Division headquarters is located and be a part of the group that operates the Division headquarters station. The Division communications coordinator must hold a General class or higher license and be familiar with traffic handling. He or she must be willing to devote 30 or 40 hours to establish the system and devote at least 20 hours every year thereafter to keep things going. The coordinator should be prepared to cooperate with the ARRL section emergency coordinator (SEC).

The League recently added the District Emergency Coordinator appointment to its structure of field organization leadership officials. The DEC appointment may be ideally suited to the functions of the Red Cross Division coordinator, should the SEC and SCM (section communications manager) deem it appropriate. In this way, direct involvement with the ARRL Amateur Radio Emergency Service (ARES) can be enhanced. Of course, the Red Cross Division staff should choose the Red Cross Division communications coordinator who will act for the Red Cross Division. There is a cooperative national understanding between the American Red Cross and ARRL. The Division staff will be required to spend very little time with respect to the Amateur Radio emergency communications system because the coordinator should be able to handle virtually everything. The sole expense will involve postage and perhaps a rare long-distance telephone call.

After being appointed, the Division communications coordinator must choose the frequencies on which the disaster communications between the Chapters and the Division headquarters will take place. It is strongly suggested that the Red Cross Division not attempt to set up its own radio network, because on a day-to-day basis (when there is no disaster) the Red Cross will have no traffic for such a net to handle and the members will lose interest. Virtually every state has a well-organized traffic net that meets every day. Rather than create its own net, the Division should operate on the traffic net of the state it serves, with the cooperation and approval of the net manager. If the Division serves more than one state, it should make arrangements to operate on both state traffic nets. In addition to facilitating the communications of the Division, the presence of a station at Division headquarters on the state traffic net permits the easy exchange of communications with other agencies.

Needs at Chapter Level

After the communications coordinator has determined the frequencies and the traffic nets in which the Division-wide traffic will be carried, the coordinator should then proceed to send a letter to the executive director or chairman of each Chapter in the Division, explaining the program and asking the Chapter to recruit amateurs to serve the Chapter. At this point it is important that the staff of the Division give their full moral support to the communications coordinator. The Indiana Division program would not have been possible without the strong support of John Russell, division manager, and Max Galloway, K9OXA, division disaster director. If the Division is to maintain communications with all its Chapters during a disaster, all Chapters must have emergency communications. The Division communications coordinator must be in a position to specify how such communications will be carried on, including the particular frequency to be used. Obviously it does no good to have a Chapter's amateur station on a different frequency than the station at the Division headquarters. It is important that each Chapter provide the Division headquarters with information as to the amateurs it has recruited and as to the local vhf frequencies that will be used within each Chapter for local communications. Such information is vital if there is an emergency where there is no communications team and a team is to be sent to the disaster area.

The creation of the system is much easier to accomplish than to describe. When the system was begun in Indiana, a

form letter explaining the program was sent to each Chapter in the Indiana Division together with two copies of a communications information form. Each Chapter was required to complete and return the information form to the Indiana Division. The information form requested the names, addresses, call signs and telephone numbers of the amateurs serving the Chapter and the vhf frequencies used. Copies of the form and the form letter are available from the Indiana Division.

The communications coordinator will find that some Chapters send back the communications information form immediately, while others do not. The communications coordinator must follow up. If nothing is received from a Chapter, the communications coordinator should initiate a message by Amateur Radio, using the state traffic net, to the executive directors of the nonresponsive Chapters asking the directors to respond to the original letter. Next, the coordinator should send a follow-up letter (enclosing an extra copy of the original letter and two copies of the form) asking the executive director of the Chapter whether or not the response has been lost in the mail. As soon as the active Chapters understand that Division headquarters really considers it important that they have emergency communications, they will comply with the program. It does not take much time for a Chapter executive director or disaster chairman to contact local amateurs and recruit them.

Occasionally a Chapter executive director will advise the Division office that the Chapter does not know of any amateurs willing to assist the Red Cross. In that event the communications coordinator should contact the ARRL SEC to obtain the name of the local EC for that community. The Chapter executive director should be given the name of the local EC for assistance.

In the Indiana Division, most, but not all, of the Chapters have their communications problems handled by the ARES. However, it is important that Amateur Radio operators be directly assigned to the Red Cross and enrolled by the local Chapter as Red Cross volunteers. The normal format is for the EC to appoint an assistant emergency coordinator to be responsible to the Chapter. This person, together with those who will serve the Red Cross directly, become Red Cross volunteers. Vague assurances by the EC that he will handle everything are to be avoided, unless he has been specifically designated by the SEC/SCM to perform this function only.

It is up to the individual Chapter to choose the amateurs who will serve that Chapter. In some cases, a local radio club meets at the Chapter, has a station owned by the club at the Chapter, and, as a club, provides emergency communications for the Chapter. Any arrangement chosen by a particular Chapter is fine so long as it results in the recruitment of those responsible to the Red Cross who will handle Red Cross communications.

Of course, the hams must remember that they are communicators handling traffic for Red Cross officials. The amateurs are not trained to run the disaster operation, and must stick to handling messages. Amateurs and Red Cross officials must realize that everyone makes mistakes and neither the hams nor the Red Cross staff are likely to be candidates for immediate sainthood.

Practice Makes Perfect

To give everyone practice in working together, the Indiana Divisions participate in the ARRL Simulated Emergency test in October (see September *QST*, page 78). Each Chapter in the Division is asked to send a message to Division Headquarters, reporting on the effect of a specific simulated disaster on that Chapter using Red Cross Form 2066. The Chapters gain experience in reporting to the Division, and the radio operators have a realistic test.

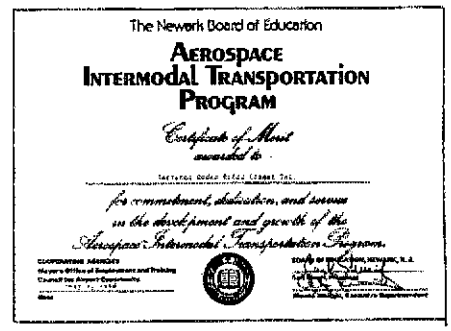
After extensive followup, the communications coordinator will have information from virtually every Chapter in the Division that has an active disaster program. Therefore, each active Chapter will have emergency communications. The followup by the communications coordinator cannot be over-stressed. He must maintain lists of Chapters that have returned the form and Chapters that have not. The information should be updated every two years. If the communications coordinator encounters problems with a particular Chapter, the Division staff should use the field representatives of the Division to contact that Chapter and determine what the problem is.

The last step is for the communications coordinator to organize in a looseleaf book all the communications information forms. In addition, it is helpful to prepare a map showing the location of each amateur communications group throughout the Division. In a disaster, quick reference to the map and the book will permit the communications coordinator, after consultation with the disaster staff, to move communications assistance to wherever it is needed by the Red Cross.

As the program in the Indiana Red Cross Division has shown, implementation of an Amateur Radio emergency communications system for a Division can be done with virtually no expense and with one volunteer coordinator. In an emergency it really works.

The author is Communications Coordinator of the Indiana Red Cross Division, Disaster Chairman of the Indianapolis Area Chapter and is active in phone traffic handling.

Strays


The Newark Board of Education

AEROSPACE INTERMODAL TRANSPORTATION PROGRAM

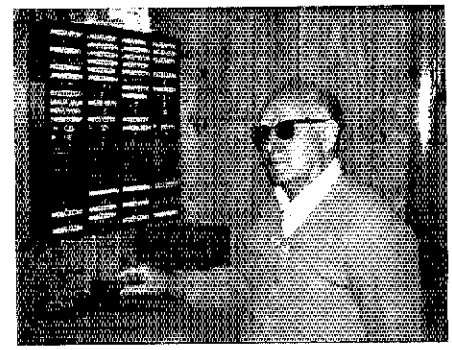
Certificate of Merit awarded to

for commitment, dedication, and success in the development and growth of the Aerospace Intermodal Transportation Program.

Earlier this year the Newark (New Jersey) Board of Education awarded this certificate of merit to the ARRL for assisting in the Aerospace Intermodal Transportation Program, a program that uses Amateur Radio in a special curriculum offering for students in the Newark area. Accepting for the ARRL was Hudson Division Vice Director George Diehl, W2IHA, who for several years has served as the ARRL representative to the program. Also acknowledged in the award were Ed Bizub, WA2CCB, formerly of AMSAT; the New Jersey Institute of Technology Radio Club, K2MFF, and the Barringer High School ARC, both ARRL-affiliated clubs; and Steve Place, WB1EYI, then OSCAR Education Program Manager at ARRL hq.

63 AND STILL CLIMBING

☐ Claude Bass, W4EX, was known for many years to DXers all over the world as W4DQH. Several years ago Claude was involved in a serious accident that permanently blinded him and required some 50 operations to repair the damage to his face. With the aid of his wife Allie, W4DMN, Claude rallied from this catastrophe to relocate his home to the Smoky Mountain region of eastern Tennessee, rebuild his station, erect his 100-foot tower and impressive directional arrays, and even install and operate his own 2-meter repeater. Claude is 63 years of age and does all of his own tower climbing. And you say that you have problems that keep you off the air? — *Vic Clark, W4KFC*



Shown with his hand on an antique telegraph key is Claude W. Bass, W4EX, of Crossville Tennessee. His neat file of *QST* tapes, each labelled in Braille for quick and ready reference, is on the wall.

• *Basic Amateur Radio*

So — You Want to Work DX

There's probably no other phase of Amateur Radio that can match the excitement of working a new country. Try DXing — you're bound to like it.

By Fred Cruciger,* KB4QB

Whether you're an oldtimer or a newcomer to Amateur Radio, the thrill of talking to someone in a faraway land may be one of the most rewarding aspects of communication. Without ever leaving the comfort and security of your own shack, you can visit with hams from many parts of the globe. Your latest contact may be located anywhere from an exotic South Pacific island to a polar ice cap.

DX is the standard abbreviation for long-distance radio transmissions. How simple, right? Wrong! These two letters can carry an incredibly complex definition. The purists will claim, and correctly so, that DX means different things to a 20-meter enthusiast, a 70-centimeter buff or a 160-meter operator. For the purpose of this article I am confining my definition of DXing to working stations outside the U.S., primarily on 10, 15 or 20 meters.

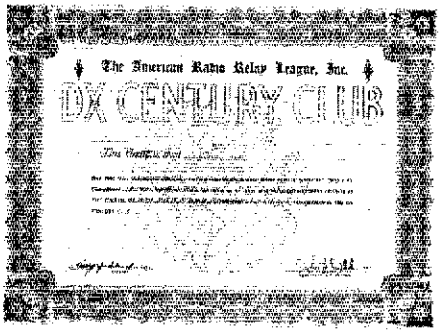
If you have never worked much DX, you are missing a matchless part of being an amateur. Many have spent at least a portion of their operating time chasing DX, but for one reason or another have given up the pursuit for other interests. Maybe they found their own niche in OSCAR, county hunting or RTTY. The point is that if you aren't presently involved in DX, now is a perfect time to do so. All the ingredients are present: Conditions are ideal, scores of "rare" countries are available and the state of the equipment art is such that almost everyone can work DX.

Set Some Goals

Just as you set goals to become a ham, you need to set DX goals. After you became aware of Amateur Radio, you set goals to get a license. First you had to learn the code. Then you probably addressed yourself to the theory. Once you got your license, you may have decided to upgrade — another goal. Now it is time to set a goal for DX.

Don't begin your efforts by setting a goal to work 250 countries. That takes too long for those of us who, because of job, family or other activities, have a limited amount of time to devote to ham radio. Because of the current favorable propagation conditions resulting from sunspot cycle 21, now is a perfect time to get started in DX. By doing so now, as cycle 21 begins to decline, you will have had a sufficient amount of time to accumulate a respectable DXCC total, so that the lean years between cycles will not be too painful to endure. Then, when cyclic good propagation conditions occur, you will be in the catbird seat and be able to be very selective in seeking out needed countries.

My suggestion is to set an initial goal of reaching 100 countries and DXCC. If you're a Novice, this will be a challenge — and good impetus to upgrade to General. Beyond that, goals in increments of 25 up to a total of 175 countries, worked well for me. Since that time I have set a goal of one new country per week. Some weeks I am able to work as many as three, and other weeks none. Until I had worked 150 countries I still did not have my Advanced class license. Then I got bit hard by the DX bug and realized that to continue to add countries would almost certainly require the Advanced class license. Another goal!



The DX Century Club (DXCC) certificate is awarded to amateurs who submit written confirmation for contacts with 100 or more countries on the official ARRL DXCC countries list. Separate DXCC awards are available for mixed modes, all phone, all cw, RTTY, satellite, 160 meters and DXCC on five bands (5BDXCC). Before applying, familiarize yourself with full information. Application forms (CD-164) and the ARRL DXCC countries list (with details of rules) may be obtained from ARRL hq. (s.a.s.e. please).

Where Are They?

An analysis of my first 150 countries worked shows that 99% of them were on 10, 15 and 20 meters. My experience may not be typical, but I strongly suggest the the beginning DXer focus on these bands as the best place to get a good start.

I have often heard the comment that it is necessary to have the capability for split operation to work DX. In split-frequency operation the DX station transmits on one frequency and receives on another. While it is true that some DX stations, particularly formalized expeditions, operate split, the vast majority do not. [Editor's Note: See "DX Operating Procedures and Guidelines," September 1979 *QST*, page 89, for a discussion of split-frequency and list operations.]

Recently there has been a great deal of attention focused on the various nets for working DX. They all serve a purpose, but a suggestion to any new DXer is not to get overly involved in them. The reasoning is quite simple: You can spend many hours just waiting for one contact. It becomes more a matter of endurance rather than an adventure. Think how many new countries you might come across and work while you are patiently waiting for a new country through a net. After you have reached 150 or so

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countries and the new ones get tougher to find, then it may make logical sense to get involved in nets. There are many nets that one may check into. Since much has been written on them already, I simply urge you to go over the back issues of the various amateur periodicals or *The ARRL Operating Manual* to learn about DX nets.

There is no magic way to penetrate a pile-up. Talk to 20 active DXers and you will probably hear 20 different techniques. My approach is quite simple — I listen! After I hear a DX station respond to several stations, I try to figure out which technique the DX operator prefers. Does he prefer to work stations who call immediately after his last contact (tailending)? Does he answer stations who are operating a few hertz higher or lower in frequency, or those who are waiting 5 or 10 seconds before calling? Whatever the technique, it certainly makes sense to listen a bit before jumping into the pile-up and adding to the confusion. Listening can improve your odds of getting through.

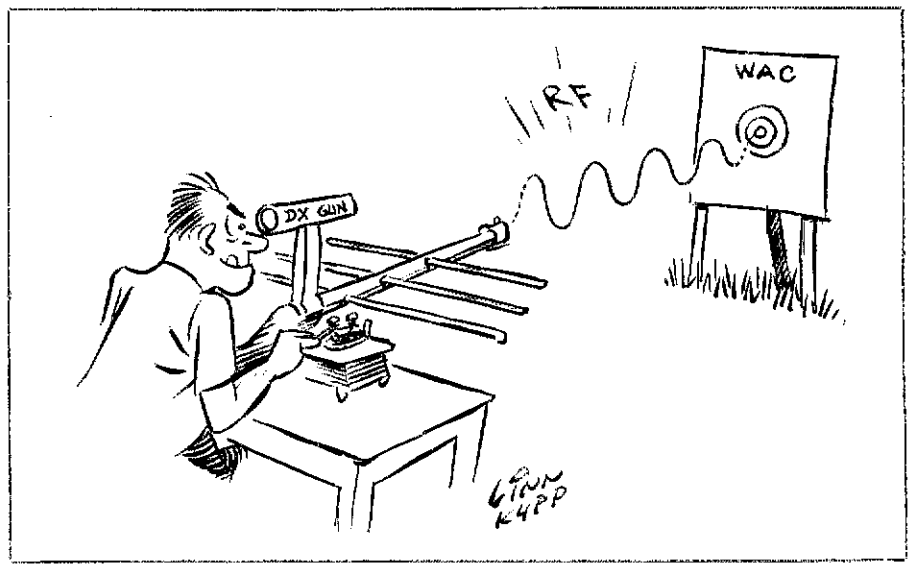
In locating DX, a plus for me has been the use of a vertical antenna for listening. I use it to hear where the strongest signals emanate from. I then switch to my beam antenna, rotate it in that direction, and there it stays. If signals are strongest from the west and I hear someone a few hundred miles away working to the east, that doesn't influence me because I know that propagation at my QTH may be different than that which might exist even a few hundred miles away.

Recently I heard the strongest signals coming from the west. At the same time I came across a station in North Carolina working an African station that would be a new country for me. Rotating my beam toward the African station resulted in only marginal copy. He proceeded to work seven U.S. stations and every one gave him an S-7 or better. He didn't move the meter at my Florida QTH at all. The interesting part of the episode was that six of the seven stations he worked were in North Carolina. This may be an extreme example, but nevertheless it does show that propagation can be substantially different in two places that are relatively close together.

It's fun — and very informative — to read the various DX bulletins. But since they are geared to the more serious and advanced DXer, a new DXer should be cautious about subscribing to a whole batch of them. I found them to be most beneficial after I had reached a total of 175 countries.

How About QSLs?

The nemesis of many DXers is the exchanging of QSLs. Nearly everyone who works a new country would gladly trade away a 6146 for the chance to see the QSL card arrive in the mail the next day. Well, it just won't happen, so resign yourself to a long wait. If you are lucky enough to work a station who has a stateside QSL manager, the chances are good that you can get a card quickly. Please remember to put an s.a.s.e. (self-addressed stamped envelope) inside the outer envelope, along with your QSL card.



Many new hams set their sights on an IARU Worked All Continents (WAC) award.

Also make certain that you use UTC (Coordinated Universal Time) and that it is accurate. Since many DX stations work several stations each minute when they get cranked up, if you are three or four minutes off on the QSO time that you put on your card it may be returned to you with a notation that you were not in the log. If you happen to be four minutes off, and the station works four stations per minute, there could easily be 16 QSOs between the time you put on your card and the time the DX station puts in his log. If he is off by four minutes in the opposite direction you could end up being 32 QSOs apart. As in so many things, accuracy counts. I use a digital clock and reset it to WWV at least once a week.

There is another courtesy, one that I appreciated when I was a QSL manager. It helps if you put the call of the station you worked in the lower left-hand corner or on the back of the envelope. Sometimes I would not open the incoming mail right away. If the DX call sign was on the outside of the envelope I would at least know which pile to put it in.

IRCs (international reply coupons) are expensive, but they are a must for most DX direct QSL returns. They currently cost 42 cents each — and it takes at least two for air mail postage and one for surface mail in most foreign countries. See a current *Callbook* for details. Include an addressed return envelope, even if you send IRCs. [It is dangerous, a criminal offense in many countries, to possess foreign currency — do not send "green stamps." — Ed.]

The inclusion of IRCs or currency for stateside QSL managers is a nice touch, but it should not be used to replace the s.a.s.e. IRCs do help the QSL manager but do not to anything to speed up the QSL process. Do not feel obligated to include IRCs or currency. QSL managers "do their thing" because they enjoy it, not for any financial rewards.

Another efficient and economical way to exchange cards is through the ARRL Overseas QSL Bureau. But, if you use this method, be prepared for a longer wait. Here is a step-by-step explanation of how it works:

1) You send your cards to the ARRL-Membership Overseas QSL Bureau according to the methods it requires. (See "QSL Corner" every other month in *QST*.)

2) The ARRL bureau sends the cards, weekly, to the various overseas bureaus.

3) The overseas bureau then forwards the cards to the specific DX station.

4) The DX station fills out his cards and sends them to *his* outgoing bureau, if he has one.

5) The DX station's bureau sends the cards either to the specific U.S. call-area bureaus or to ARRL hq. for forwarding to the call-area bureaus.

6) The call-area bureaus then send the cards to you, providing you have kept a current s.a.s.e. on file with them.

This procedure is a time-consuming one, as you can see. For example, I sent 500 cards to the ARRL bureau in February 1978 and got my first batch of returns in April 1979. Returns, so far, are only 15 cards from the 500 sent. The advantage of this system is that it is cheap.

I almost always go direct when I work a new country — but it's expensive. If you assume 10 cents for your card, an s.a.e. and the outer envelope; $1.05 for 2-1/2 IRCs (about the average you will use per mailing); and 31 cents for postage to get

your letter to the DX station, you will invest about $1.46 to get his card. If you do that for each new country, DXCC will cost you $146 — assuming that the operator in each new country you work will QSL. Most will, but some will not.

Just imagine the costs that hams faced before the ARRL began their service a few years back. Think of it — for less than the cost of sending 15 DX QSL cards, you save enough to pay for your ARRL membership. That's quite a bargain.

How About Times and Equipment?

Your best bet is to follow the propagation charts in *QST*, as a start. But as useful as the charts are, I've found that I have the best luck by trying whenever time is available, and by just getting familiar with what comes in and when and on which band. Conditions on each band will change with the seasons and with solar activity. The time of the year and your QTH will surely provide useful information. I urge you to discover what general guidelines hold true for your area and to set your operating schedule accordingly.

In terms of gear, the old adage "the better the equipment, the better the DX," says a lot. Certainly that is true, but most of us fall quite short of the ultimate DX station. In addition to a transceiver or a transmitter-receiver combination, a directional antenna is what it takes. In addition, you'll find a properly adjusted speech processor or keyer are useful accessories. A linear amplifier doesn't hurt, either. Plenty of DX has been worked with less than a kilowatt, so don't be discouraged if you fall short of the ultimate. A thorough knowledge of the best frequency, at the best time, in the right direction, with good operating practices, will go a long way toward compensating for any equipment deficiencies. If you don't believe that, just take note of the low-power enthusiasts who have earned DXCC.

As long as you have a transmitter, receiver and an antenna, the rest is easily learned by getting involved and becoming aware of how DX is worked. You have all the tools to give it a good try.

Working DX is Fun

One of the greatest pleasures of working DX is getting to know DX operators from around the world. After several contacts with overseas hams, you can begin to learn about their personal lives and customs, and the geography of their locations. You will also quickly put yourself in the position of becoming an expert on geography. How many non-hams have any concept of where some of the exotic countries or islands are actually located? With the current ARRL listing of 319 countries, you will quickly become quite knowledgeable about the location of many of them.

Numerous awards are available for various levels of achievement. Worked All Continents (WAC) is probably the easiest to achieve. Others you may wish to pursue are *CQ* magazine's Worked All Prefixes (WPX) and Worked All Zones (WAZ), and the ARRL's DXCC, probably the most prestigious award in the DX world. Publications are available that list the many awards offered. [*The ARRL Operating Manual*, available from the ARRL or your local dealer ($5), is one — Ed.]

A good way to add to your country total is by operating during the many contests sponsored by various groups each year. You don't have to enter the contest officially to take advantage of the many countries available during these contest periods. It sure is a good opportunity to work DX. Many DXpeditions use these contest periods to schedule their expedition activities. See "Contest Corral" for the latest contest information.

If you have read this far, you have probably begun to build your country total, or are just ready to start. In either case, I hope that my experiences at least give you some ideas. Most likely, in a matter of just a few weeks of DXing you will develop your own theories and be on your way to DXCC. I hope so.

Licensed since 1952, the author did not become intrigued with DX until 1973. Within a year he had earned DXCC as K4FCZ. Following three years in Michigan (W8KMG), he moved to Orlando, Florida, with a country total of 133. Since that time he has managed to raise his country total to 275.

W1AW DX Bulletin Schedule

Ssb — 0130/0430 UTC Friday (Thursday P.M. USA)
Cw — 0000/0300 UTC Friday (Thursday P.M. USA)
RTTY — 0100 UTC Friday (Thursday P.M. USA)

Frequencies:

Ssb — 1835, 3990, 7290, 14,290, 21,390, 28,590 kHz
Cw — 1835, 3580, 7080, 14,080, 21,080, 28,080 kHz
RTTY — 3625, 7095, 14,095, 21,095, 28,095 kHz
Cw is at 18 wpm; RTTY 60 wpm/170 Hz
DX information courtesy Southern New England DX Association.

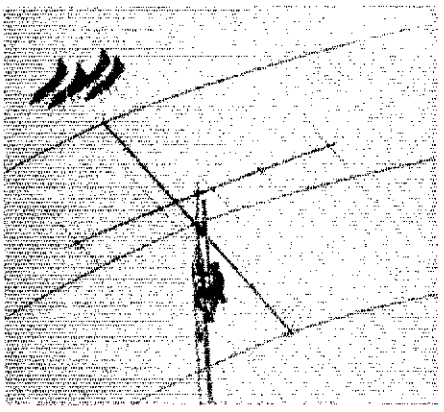
Strays

DX HEAT RASH: NO CURE YET

☐ A physician's column in a recent issue of *The South Bend* (Indiana) *Tribune* contained a letter from a 79-year-old man. The man's doctor had told him that his rash was "DX heat rash." "Is there any cure for this kind of rash?" asked the old man.

Dr. Donohue replied that "The initials 'DX' are medical shorthand for 'diagnosis.' It should subside in time."

QST reader Charles O'Brien, W2EQS, of Mishawaka, Indiana, says, "Gosh, I get a 'DX heat rash' but find there is no cure for it even though this doctor says 'it should subside in time.' Well, I've been hamming for nearly 48 years and it hasn't subsided one iota."



That's Randy Thompson, K5ZD, with a birdseye view of Armed Forces Day celebrations at Ellington Air Force Base, Texas. As the Blue Angels prepare to land on the director of the 40-meter beam, Randy is perhaps wondering what he is doing 140 feet in the air. This photograph was taken at the K5RC multioperator contest station, located 9000 feet from the Air Force Base. *(photo courtesy K5RC)*

DOTS AND DASHES

☐ If you enjoy telegraphy, be it American Morse (landline) or continental (international) radio code, you might find the Morse Telegraph Club of interest. A quarterly publication, "Dots and Dashes," edited by Cecil Combs, WØVZH, is sent to all members. The publication covers news of interest to code operators and has an Amateur Radio section. For more information write Mr. A. J. Long, Secretary, Morse Telegraph Club, Inc., 520 W. Schwartz St., Salem, IL 62881. — *Jim Romelfanger, K9ZZ, Baraboo, Wisconsin*

I would like to get in touch with . . .

☐ teenagers who operate RTTY, to become pen pals and possibly form an international teenage cw friendship net. Steven L. Myers, LU8EAR, Los Ceibos 120, El Palomar 1684, Buenos Aires, Argentina.

Moved and Seconded...

MINUTES OF EXECUTIVE COMMITTEE
MEETING No. 381
July 22, 1980

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc., met at 3:05 P.M. on Tuesday, July 22, 1980, at the Red Lion Inn, Seattle, Washington. Present were President Harry J. Dannals, W2HD, in the Chair; First Vice President Carl T. Smith, WØBWJ; Directors Gar Anderson, KØGA, William J. Stevens, W6ZM, L. Phil Wicker, W4ACY, and Stan Zak, K2SJO; and General Manager Richard L. Baldwin, W1RU. Also present as observers were Vice Presidents Larry E. Price, W4RA, Max Arnold, W4WHN, and Noel B. Eaton, VE3CJ; Directors Jesse Bieberman, W3KT, Maurice Carpenter, KØHRZ, Paul Grauer, WØFIR, Frank Butler, W4RH, Don Miller, W9NTP, Leonard Nathanson, W8RC, Mitch Powell, VE3OT, Jay Holladay, W6EJJ, John Sullivan, W1HHR, Lionel Oubre, K5DPG, and Ray Wangler, W5EDZ; Vice Directors George Diehl, W2IHA, Gay Milius, W4UG, Hugh Turnbull, W3ABC, Peter Matthews, WB6UIA, Thomas Comstock, N5TC, Evelyn Gauzens, W4WYR, O. D. Keaton, WA4GLS, and Robert Smithwick, W6JZU; Honorary Vice Presidents Victor C. Clark, W4KFC and Jean A. "Doc" Gmelin, W6ZRJ; Assistant General Manager David Sumner, K1ZZ; Communications Manager John Lindholm, W1XX; Washington Area Coordinator Perry F. Williams, W1UFD; Treasurer John Huntoon, W1RW; and General Counsel Robert M. Booth, W3PS.

Mr. Dannals introduced Attorney Richard Siefert of the law firm of Lane, Powell, Moss, and Miller, who described the schedule of deposition set for Friday in connection with the law suit by Mrs. Mary Lewis. Mr. Siefert briefly outlined the probable manner in which the depositions would be taken and indicated to those to be deposed what his role would be during the process. Mr. Siefert left the meeting at 3:35 P.M.

On motion of Mr. Anderson, the Committee recognized the names of 275 members who had recently been elected to Life Membership, and directed the General Manager to list their names in *QST*.

On motion of Mr. Wicker, the affiliation of the following clubs was approved: Amateur Radio Club of Mr. Pleasant High School, Mt. Pleasant, TX; Ancient City Amateur Radio Club, St. Augustine, FL; Boonville Amateur Radio Club, Glenfield, NY; California Polytechnic State Univ. ARC, San Luis Obispo, CA; *CHARRO, Brownsville, TX; Cobweb City Contest Group, Riverdale, NJ; Electronic Technology Society of New Jersey, Edison, NJ; Lawrence County Amateur Radio Association, New Castle, PA; Minnesota Valley Repeater Association, Mankato, MN; Mountain State Transmitters Inc., Elkins, WV; Pioneer Amateur Radio Club, Fremont, NE; Pumasens Amateur Radio Club, APO NY; Plateau Amateur Radio Association, Fayetteville, WV; QSO Club, Pasadena Community College, Pasadena, CA; Shasta Cascade ARS, Anderson, CA; Spartan ARC of Corvallis High School, Corvallis, OR; Stephen F. Austin State University ARC, Nacogdoches, TX; Taara Radio Club, Tamaqua, PA; Zephyrhills Area ARC, Zephyrhills, FL.

(With the above action, the League now has 1890 Class I affiliated clubs, 8 Class II clubs, and 352 Class III clubs.)

On motion of Mr. Stevens, approval was granted for the holding of the following ARRL conventions: Northwestern Division, June 5-7, 1981, Seaside, OR; Missouri State, April 11-12, 1981, Kansas City, MO; Delta Division, August 1-2, 1981, Shreveport, LA.

The Committee was in receipt of information from Director Grauer that it has been necessary to cancel plans for the proposed Midwest Division Convention originally scheduled for October 3-4, 1981.

The General Manager reported on compliance with action taken at the January meeting, updating his report of May 18, 1980. Action on Minutes 42 and 44 has been completed, while action on Minutes 43, 66, and 89 is in progress.

The Committee, without formal action, reaffirmed its long-standing policies concerning the nonrefundability of Life Membership dues payments.

After discussion, the date of the next meeting of the Executive Committee was set for Saturday, September 13, 1980, at the Headquarters office in Newington.

There being no further business, the meeting was adjourned at 4:06 P.M.

Respectfully submitted,
Richard L. Baldwin, W1RU
Secretary

*This club was approved by mail vote.

LIFE MEMBER APPLICANTS
July 22, 1980

Roger W. Adair, AG4O; James Allcorn, WBØOLE; Paul D. Anderson, KZ5PD; Edward D. Andrus, WB4PZL; Paul F. Andrus, W4LFP; Grant C. Armstrong, KA1AM; Peter H. Asp, WD9AOC; Richard H. Aubin, WA1TRY; Leonard A. Audet, K1LA; James J. Auxier, WA9TNC; Tim Bair, WD8PMD; Mitchell B. Baker, KØKA; Lloyd K. Barnett, WB4RFZ; Dennis E. Barrow, WB4GQX; John J. Bartko, WB3KTH; David M. Barton, AF6S; Philip E. Bauer, K6RUF; Thomas E. Berry, AA4VV; Paul A. Berthinet, AE3U; Donald B. Best, N6ALD; George W. Birdwell, WA6HQ; Joe C. Birdwell, WB9VVH; Robert M. Blechman, WB3KDH; Robert G. Blumberg, AA4U; Bob Boehm, WD8PKE; Harry Booth; Frederick R. Brack, N3AMR; Garland G. Braniger, WB8TKU; Albert C. Brasher, WB4VPC; Robert L. Bright, WA6AQQ; James E. Brogren, WD4RMD; Joe Bronson, WA7HOP; Loal J. Broulette, WB9RBD; James Y. Bryce, W5HFS; Michael Buck, KL7IYN; Steven R. Buerg, WA6PGB; Orville Burg, II, K5VWW; Dennis J. Burger, WB8JCZ; Guy H. Cain, Jr., WD6FSG; W. A. "Billy" Callanan, Jr., WB4FTA; Norman H. Ceaglske, Jr., WØSYC; Robert Christiansen, KB2EF; Robert B. Clark, IV, WB4WAJ; James W. Clelland, VE5WU; Wyland Dale Clift, WA3NLO; John M. Cochrane, W8ILH; Dwight R. Cokain, WA6SIG; Charles B. Cohn, KA6EVN; James Michael Cooper, WA4UBE; David M. Cornfola, K6SZK; Samuel D. Cox, WA3IUH; Michael D. Crawford, WA2VUN; Robert R. Creason, W5XR; Richard W. Critz, Jr., KB4N; Roger W. Croswell, WB3AIV; James D. Curtan, WD4RCO; Gary M. Danelius, WBØLJC; John H. Davis, WD4BHD; Luis E. DeJesus, KP4ED; Merrill C. Dean, K6OXU; Karel Debrouwere, ON5BV; Raymond Deyette, WB2TNR; Paul W. Deyo, WA4ZMM; Vincent F. DiMalta, WB3LJQ; Harley L. Dillon, Jr., N5HB; Thomas Downs, WA6BZU; Kevin Drost, WA8ZDT; James D. Duffer, WD4AIR; James F. Dumond, WB4IAP; John W. Eddleman, Jr., WD5GMX; David G. Edson, WB8LWS; Robert R. Falls, WD8MDM; Albert R. Farrant, WA8WLI; Eldean M. Feiler, KA4BBA; Brian L. Felps, K4NAN; Edward J. Fernandez, WB5ONB; Raymond L. Ficht; Thomas J. Fifer, K8BKI; Richard G. Finkbeiner, W6AQI; Joseph E. Fleagle, WØFY; Eugene W. Fodor, KA2ABY; William T. Foster, WD8RIT; Howard Lee Fouts, K7MBJ; R. T. Frazier, WB5HPD; Melvin D. Freiking, WB4MQ; Sheryl A. Garrison, NØACB; Eric L. F. Gebhardt, VE1APY; Richard Carl Gibbs, KA7AEF; Larry Gilbreath, WD4BMN; Paul E. Gilka, WD4BIT; David G. Glass, VE5MG; David K. Gordon, WB2YUJ; Robert S. Gordon, KA4JXT; Richard Allyn Gray, WA6HQO; E. Dale Grimmett, K8KW; Jerome C. Grokowsky, WA9HCZ; Jonathan D. Grout, WA1ZEL; Alex Gundry, WA4JWC; Russell J. Gunn, WAØUVW; Ricardo C. Gutierrez; J. L. Hackman, WB4VVA/WB8QPF; Harold C. Hageman, WA5FCV; Floyd C. Halstead, Jr., W7JQD; Daniel T. Harahus, WA2PHA; Donald L. Hargis, WD4ONP; Nancy L. Harpold, WBØJXZ; A. S. Hart, W8VR; Tommy Haynes, WA5SWT; Richard L. Hecht, WA1ZZP; Donald Heise, N8ALE; Robert M. Henderson, WBØNRV; Glenn B. Hickman, KH6EVY; Ruth M. Hills, WB7ROL; Charles W. Hodge, WD6ELT; Charles C. Holland, Jr., WD6BCX; Theodore J. Homan, III, WB8WFG; Elvy R. Hopkins, WB6TQH; Curtis M. Hopson, WA5UUQ; Keith A. Hornyak, AA4NA; Wayne R. Hudson, K5JZN; Phillip T. Hughes, KN4U; John R. Hunley, WD4OEH; Donald D. Hussey, WA8MIE; Doris E. Huvar, WA6HXB; Robert A. Hyman, WØRSB; Donald Ide, WB4HYT; Terry S. Isenhour, WA4OPO; Daniel Jackson, NØAKL; Kenneth R. Jaskowiak, WD6FVT; Tom Jeffers, WD9EAJ; Brian Paul Jones, WAØVQH; John Paul Jones, WA8CAE; W. M. Kaldem, WB5PYP; Kinji Kanazawa, KH6JDS; Robert M. Kares, K3SUH; Daniel A. Karg, WBØGDB; Julian F. Kaufman, Jr., WA4ONQ; Edward J. Keogh, WB6ETN; LouAnn M. Keogh, KB6HP; Samuel M. Kilberg, WA2KLI; Thomas P. Kinsella, KL7IWE; Harold S. Kost, K1HK; George W. Kreps, Jr., WD4LBW; Michael H. Kwiatkowski, N8MK; Paul Ivan Labelle, VE2DSV; Robert N. Lambeck, WD8IWT; Robert W. Lankston, WA7TZP; Ronald J. Lanoux, WD5CGC; Steven A. Larson, N3SL; James F. Leaven, WBØRJA; Wilfred Lierheimer, K2MJO; William W. Lipscomb, WA8VLY; John T. Little, NØACG; Jim R. Logsdon, WD4GYO; Lido Lucietto, WB9TZX; David Lunder, WBØYGW; Daniel R. Lunin, K4HPZ; George J. Maczali, K5STR; Ivan Makovec, W9AFW; Frank J. Malczewski, WD8SDX; Robert C. Martin, WA4HHQ; Joseph Dalton McCrary, WA4WUQ; Carl Howard McGarry, VE3JTV; Robert McKinnie, AL7AW; Glenn McLeod, VO1DV; John A. Melby, W3LJS; Robert C. Metz, WD4BBX; Douglas E. Meyers, K8PF; Tracy N. Michael, AA9Z; Bruce C. Mitchell, WB3COZ; Donald F. Molford, WA1WDQ; Marvin D. Monaghan, K5RAB; William J. Montgomery; Jackie H. Moon, N4AIF; Keith J. Morehouse, WB9TIY; Richard L. Morrison, WA8HME; Harold E. Myers, AB8M; Herbert T. Nimmo, WBØQLA; Ronald J. Nutter, KA4KYI; Ivan E. Nyberg, WDØFZL; Stewart O'Dell, K5VHH; Marion B. O'Neal, K5QMC; Glenn W. Ollila; Robert J. Oppen, WB2IUI; Carolyn M. Oubre, KA5JIU; Christopher N. Papas, KL7I; Ellis Parker, K7TE; Russell J. Pastuch, VE3FSN; Robert G. Peasler, WB9UTM; Thomas F. Peluso, WB3JGD; William R. Perry, WB1DOI; Raymond F. Peters, KB5EG; Gary L. Petersen, AD5H; Karl J. Peterson, WA7RUB; Walter C. Pleasants, KA4KAU; Gary L. Poague, WBØSCV; David Vaughn Posey, N4COM; John T. Poster, N2ATE; William Priven, WD4CAZ; John G. Pronko, W6XN; Roger B. Rehr, WA3JYM; Ralph D. Reynolds, WB1FIU; William A. Richards, II, WB5ZAM; Wesley A. Riedel, WBØOTX; Roland Vern Robinson, WB7STI; Paul J. Roch, WB5ACC; Ralph W. Roehrich, WA2NFB; Cary Rubenfeld, VE4EA; J. Dennis Russell; Dominic A. Sacca, Jr., WA2DWT; Michael C. Salem, N5MS; Carl W. Sandrock, WA6OZD; Y. Sam Santanu, YB2NL; Charles A. Seaman, WB6FBO; Rudolph B. Schroeder, W7FCB; Andre Sheyka, VE4RM; Michael R. Short, WB2TGM; Donald K. Sigley, KA3BOJ; Joseph A. Silveira, WA1CSO; James Skoog, WDØEEL; Carlos C. Smith, K4CWS; Charles A. Smith, W4DOI; David P. Smith, WB6RDK; Doyle A. Smith, WB4NVO; Ruth H. Smith, WB8VLR; Larry G. Standley, WA4SWY; Stanley R. Starr, KY4Q; Everitt P. Stay, WD8ARN; Ed Stephenson, AB4S; Martin Stern, WA4QXA; George H. Stokes, Jr., WA4MZL; Robert L. Sutton, Jr. WD4RQM; Neil Swanson, WAØWCU; Larry W. Tapp, WB9RVL; Lynn W. Taylor, WB6UUT; R. S. Teaney, WD4JEQ; Gerard Thomas, Richard F. Thompson, WB9TSZ; Larry Tiernan, WD8ORA; Jessie C. Tilghman, WB5JZQ; Emil J. Tillona, WB1ARC; John E. Tipton, WDØEMQ; Lew Tokarick, Jr., WB3IRZ; James H. Tolbert, KA2ANX; Richard F. Torrey, AI1Q; Patricia A. Torrey, WB1EEN; Douglas P. Totel, W9NJM; Thomas H. Tozer, WD8KZS; Bruce E. Turner, KA6I; John S. Underwood, K9IIB; Herbert Upham, WD6FMG; Joseph J. Urbanovich, WA1GGJ; Clyde W. Valentine, AK6A; Donald Van De Water, WBØZWE; James T. Wade, VE1DH; Thomas H. Wade, WD4CJV; Roger L. Waggoner, WB9YAA; Robert T. Wahl, Jr., KB3AQ; Donald C. Wallis, WØROQ; Dana C. Warburton, K1BOT; Thomas K. Warnock, WB8WIV; Mary J. Watkins, KAØFGT; Richard M. Weber, K5IU; Andrew P. Weise, N1XN; Thomas M. Welch, KB5KQ; David A. Westerby, N7IM; Jan Alan Wheeler, WD4ALH; William E. Wilder, WB4YMV; Larry A. Wiles, WB5ORN; Gustave F. Williams, Jr., Leslie R. Williams, WA4KNT; William T. Willis, K4STR; Richard Wilson, WØKT; Marion A. Wise, W4PRO; Mike Wright, KA7CWM.

Happenings

Conducted By W. Dale Clift,* WA3NLO

League Asks FCC to Lift 160-Meter Band Restrictions

ARRL has filed a Request for Agency Action asking the FCC to delete the restrictions presently in force for the amateur frequencies 1800 to 2000 kHz at the earliest possible opportunity. Under the present rules, operation must be in accordance with a chart of frequency and power limitations for each state and U.S. territory or possession. (See Section 97.61[b] of the Rules.)

The 160-meter band is the oldest Amateur Radio band. During World War II, however, a new, long-range aid to radio navigation, now known as LORAN-A, was developed and placed in the band 1800 to 2000 kHz in ITU Region 2 (the Americas). Restrictions were placed on amateur operations there to prevent interference. The 1959 World Administrative Radio Conference continued the allocation, but since 1959, the role of LORAN-A has substantially diminished. Informal discussions between ARRL and the U.S. Coast Guard have confirmed that use of LORAN-A within the U.S. has been, or will soon be, terminated. Therefore, the League requests that full use of the 160-meter band be returned to amateurs.

ARRL gave several reasons why the 1800- to 2000-kHz band is vital to the Amateur Service. "Amateur experimentation with shortened antennas, looking especially toward improvement of the efficiency of antennas for long-distance communications, is particularly suited to the 160-meter band, and is an ongoing effort by the amateur community. The observation and study of propagation phenomena in the medium frequency range is uniquely suited to 160-meters, as it is the lowest frequency band which is available to the Amateur Service."

"The 160-meter band also provides uniquely reliable communications over paths of 50 kilometers or thereabouts, when terrain does not permit reliable vhf communications and when atmospheric noise levels are relatively low. The band also allows nighttime communication out to 1000 kilometers or beyond, when a skip zone is present at 3.5 MHz, as often happens during the winter months or during periods of low solar activity."

The League also pointed out that "Amateur activity in the narrow segments of the band which are now available has increased substantially in recent years, in part because of improvements in the effectiveness of short antennas and the increased availability of equipment. The restrictions now in force impose serious limitations on the usefulness of the band for public service communications networks and for long distance experimentation and communications."

AMATEUR RADIO AT BROADCAST STATIONS

An official recommendation by an FCC advisory committee calls for the Commission either to amend or clarify its rules to ensure that Amateur Radio stations are allowed as permanent installations at broadcast stations for use in emergencies. The Amateur Radio Subcommittee of NIAC (National Industry Advisory Committee) also wants there to be no question that Amateur Radio stations can relay information for the use of broadcast stations when that broadcast station is operating under the Emergency Broadcast System (EBS). The subcommittee feels that a broad reading of the present rules might discourage broadcast stations from using amateur communications during emergencies because of the business nature of broadcast stations.

Specifically, NIAC proposes:

1) To add a new subsection to Section 97.107 of the Commission's rules governing Amateur Radio stations so that amateur stations may be installed at broadcast facilities or networks for the limited purpose of supplying emergency information to broadcast stations operating pursuant to an official activation of the EBS.

2) To amend Section 73.1207(c) of the Rules that govern retransmission of point-to-point messages originated by non-broadcast stations, by the addition of a section that would enable a participating broadcast station with Emergency Broadcast System authority to rebroadcast the transmission of emergency information from an amateur station without prior Commission authorization. The conditions under which this would occur are as follows: First, prior informal (i.e. oral) permission from the originating amateur station must be obtained by the amateur at the broadcast station pursuant to Section 97.113 of the Rules; second, such rebroadcast would occur only during official activation of the EBS; and third, authorization would be only for so long as that broadcast station is within the jurisdiction of the EBS activation.

AMATEUR RADIO SCHOLARSHIPS AWARDED

The Foundation for Amateur Radio has announced its 1980 winners of the seven scholarships that it administers. The John W. Gore Memorial Scholarship ($900) — Darryl F. Mihalek, WB4JZT, Charleston, South Carolina. The Richard G. Chichester Memorial Scholarship ($900) — Katherine Hevener, WB8TDA, Franklin, West Virginia. The QCWA Silent Key Memorial Scholarship ($900) — Maureen Porter, KAØBSR, Denver, Colorado. The Radio Club of America, Inc., Scholarship ($500) — Brian D. Miller, KAØDGT, Englewood, Colorado. The Edmund B. Redington Memorial Scholarship ($500) — Gregory Polanchyck, N3GP, Frackville, Pennsylvania. The Edwin S. Van Deusen Memorial Scholarship ($350) — Nicholas A. Ferro, Jr., WA2SFS, Lake Placid, New York. The Young Ladies Radio League (YLRL) Scholarship ($300) — Ann Waines, KA8CSM, Shelby, Ohio.

These scholarships were open to all radio amateurs holding at least an FCC General class license or equivalent. This year's applications were received from 31 states and Denmark. The Foundation is a non-profit organization representing 51 clubs in Maryland, the District of Columbia and northern Virginia. It is devoted exclusively to promoting the interest of Amateur Radio and to the scientific, literary and educational pursuits that advance the purposes of the Amateur Radio Service. Information regarding the scholarships to be awarded next year will appear in the May 1981 issues of the major Amateur Radio publications. — *Foundation for Amateur Radio.*

NEEDED: ADVISORS TO THE ARRL BOARD OF DIRECTORS

Are you active in and familiar with the specialty areas of DX, contests, public relations, emergency preparedness, vhf repeaters or the multimode world of vhf/uhf/shf? If you are, perhaps you belong on one of ARRL's advisory committees, which provide membership input and expertise to the Board of Directors and Headquarters on issues involving these interests.

Nominations are open for five of the six advisory committees. Eleven members serve on each one, representing the 10 U.S. call areas plus Canada. Terms are normally for two years. Later this year, ARRL President Dannals will pick replacements for members whose terms are expiring; he also has the option of reappointing a member for one additional term. The applications of those not chosen this time remain on file, to serve as a bank from which to fill vacancies as they occur. Nomination forms, available from Hq., should be signed by three Full Members of the League.

Each candidate should have been a member of the League for the past two years, licensed as a Technician or higher for the past three years and should be currently active and knowledgeable in the field in which the committee operates. The complete rules governing the advisory committees are found in the same pamphlet with the Articles of Association and Bylaws of the League. (Copy available upon request, accompanied by a self-addressed, stamped envelope.)

In addition to the 11 members of each committee, a Board member and a staff member also serve as liaisons. See Table 1 for a list of current advisory committee members.

*Deputy Manager, Membership Services, ARRL

FCC RETURNS MORE THAN $43 MILLION IN PHASE I OF FEE REFUND PROGRAM

The Commission has returned more than $43 million to eligible broadcasters, common carriers, electronic equipment manufacturers, aviation and marine radio users and certain radio amateurs in Phase I of its Fee Refund Program. Not included in Phase I were Citizens Band licensees and others who paid fees of more than $4 but $20 and less before March 1, 1975. CB licenses that cost $4 — granted March 1, 1975, or later — do *not* qualify for a partial refund.

The refund program was developed in response to four decisions by the U.S. Court of Appeals for the District of Columbia Circuit in December 1976. The court held that fees collected by the FCC between August 1, 1970, and December 31, 1976, were unlawful in that they exceeded Commission costs. The Commission was directed to recalculate those fees and make appropriate refunds.

Approximately 58,500 refund requests totaling about $54 million have been filed. The $43 million paid represents 40,340 requests. Affected licensees under Phase I have until December 1, 1982, to file for a refund. — *FCC News Release*

FCC "CENSURE-Y" CLUB

"Happenings" reports various disciplinary actions taken against persons who have violated FCC rules and regulations under this heading. The title, "FCC Censure-Y Club" is a bit macabre, admittedly. It represents awards *no* amateur would be proud of.

WB2QHC Fined $2000

Steven M. Spicer, WB2QHC, from Niagara Falls, New York, has pleaded guilty in U.S. District Court to charges that he used Amateur Radio airwaves to broadcast obscene and indecent language and to threaten another person with injury. The incidents took place during the months of December 1979 and January 1980. Assistant U.S. Attorney Michael R. Lindburg prosecuted the case for the Government, and U.S. Magistrate Edmund F. Maxwell imposed the $2000 fine. Spicer was found to be in violation of Section 97.116 of the FCC Rules, which states, "The transmission of radiocommunication or messages by an Amateur Radio station for any purpose, or in connection with any activity, which is contrary to Federal, state or local law is prohibited." Under Title 18, U.S.C., §502 (The Communications Act), the maximum penalty is $500 per day for each violation. The investigation of Spicer was handled by the FBI and was made possible through the cooperation of local Amateur Radio operators.

WB6LHB Station License Revoked

In February 1979, Scott Lookholder, WB6LHB, was convicted in U.S. District Court after he pleaded guilty of violating Sections 97.119 (use of obscene, indecent or profane language) and 97.125 (intentional interference) of the Commission's Rules.[1] No appeal has been taken from Lookholder's conviction and the time for filing an appeal has expired.

[1]The Amateur Rules have since been revised and renumbered. The Sections cited were those in effect on the dates of violation.

Table 1
League Advisory Committees and Their Members

Contest Advisory Committee
Bill Myers, K1GQ, Laurel Hill Rd., Hollis, NH 03049.
Lew Thompkins, N2LT, RD 1, Box 246A, Stockton, NJ 08559.
*Bill Olson, W3HQT, Box 356, RD 1, Green Lawn, PA 18054.
*Howard Hoyt, K4PQL, 9458 Fourth Pl., Lorton, VA 22079.
Tom Morrison, K5TM, P. O. Box 817, Round Rock, TX 78664.
Alan Brubaker, K6XO, 34456 Colville Pl., Fremont, CA 94536.
*Rick Niswander, K7GM, 1914 W. Cortez Cir., Chandler, AZ 85224.
*Jim Stahl, K8MR, chairman, 3592 Atherstone Rd., Cleveland Heights, OH 44121.
Howard Huntington, K9KM, 65 South Burr Oak, Lake Zurich, IL 60047.
Ed C. Gray, WØSD, RFD 2, Salem, SD 57058.
Henry Thel, VE7WJ, Box 3112, Langley, BC Canada V3A 4R3.
Tod Olson, KØTO, board liaison, 292 Heather La., Long Lake, MN 55356.
Tom Frenaye, K1KI, Hq. liaison.

DX Advisory Committee (DXAC)
Anthony C. Berg, W1OT, 11 Vanderbelt Rd., Acton, MA 01720.
David Beckwith, W2QM, 151 Whitney Ave., Pompton Lakes, NJ 07442.
*James A. Douglas, W3ZN, 22432 Goshen School Rd., Gaithersburg, MD 20760.
*John C. Kanode, N4MM, RFD 1, Box 73-A, Boyce, VA 22620.
*Sanford E. Hutson, K5YY, chairman, P. O. Box 5299, Little Rock, AR 72215.
James T. Rafferty, N6RJ, 178 Paseo Robles, Anaheim, CA 92807.
*Robert W. Hudson, K7LAY, 29826 24th Pl. So., Federal Way, WA 98003.
Daryl H. Kiebler, WB8EUN, 517 Farmstead La., Lansing, MI 48917.
Norman E. Meyers, N9MM, RR 1, Box 490, Rossville, IN 46065.
*James L. Spencer, WØSR, 3712 Tanager Dr., N.E., Cedar Rapids, IA 52402.
Harold E. Parsons, VE3QA, RR 3, Metcalfe, ON Canada KØA 2PØ
Gay E. Milius, W4UG, board liaison, 1416 Rutland Dr., Virginia Beach, VA 23454.
Don Search, W3AZD, Hq. liaison

Emergency Communications Advisory Committee (ECAC)
Frank Jasinski, W1XA, 42 Saddleback Hill Rd., Bellingham, MA 02019.
*Paul Vydareny, WB2VUK, 250 N. Washington St., North Tarrytown, NY 10591.
Bob Josuweit, WA3PZO, 9 Derwen Dr., Havertown, PA 19083.
*Dr. William Farone, N4NK, chairman, 210 Midfield Rd., Bon Air, VA 23235.
Robert P. Schmidt, W5GHP, 5100 Press Dr., New Orleans, LA 70126.
*Ed Gribi, WB6IZF, 51280 Pine Canyon Rd., King City, CA 93930.
*W. D. Bremmels, WØKL, 40 Rockwood Dr., Ottawa, KS 66067.
John Sullivan, W1HHR, board liaison, Whitney Rd., Columbia, CT 06237.
Robert J. Halprin, K1XA, Hq. liaison.
Note: The 7th, 8th, 9th and VE call areas are open at present.

Public Relations Advisory Committee (PRAC)
Dee Logan, W1HEO, chairman, 175 Fairmont Ter., Fairfield, CT 06432.
Stephen Mendelsohn, WA2DHF, 144-25 33rd Ave., Flushing, NY 11354.
John L. Rouse, KA3DBN, 2703 Bartlett La., Bowie, MD 20715.
Gray Berry, W4MGO, 41 Ellsworth Dr., Ormond Beach, FL 32074.
J. A. Doc Gmelin, W6ZRJ, 10835 Willowbrook Dr., Cupertino, CA 95014.
John H. Brown, W7CKZ, 725 88th Ave., S.W., Olympia, WA 98502.
James J. Apsey, K8JA, P. O. Box 28, Sylvania, OH 43560.
Michele Bartlett, N1AGD/9, 2109 Branch Rd., Champaign, IL 61820.
Thomas B. J. Atkins, VE3CDM, 55 Havenbrook Blvd., Willowdale, ON Canada M2J 1A7.
Stan Zak, K2SJO, board liaison, 13 Jennifer La., Port Chester, NY 10573.
Andrew Tripp, Hq. liaison.
Note: No one will be up for reappointment from this committee because members were appointed in 1979 for two- and three-year terms.

VHF Repeater Advisory Committee (VRAC)
*Lewis D. Collins, W1GXT, 10 Marshall Ter., Wayland, MA 01778.
Charles Harrison, K2MZ, chairman, MR 179, Oyster Bay, NY 11771.
*Thomas B. Carpenter, W3YVV, Post Office, Harmans, MD 21077.
*Charles Durst, WA4WTX, 5508 Hallmark Rd., Durham, NC 27712.
*Ellene G. Spiegel, WA5WDW, 2812 Pritchett, Irving, TX 75061.
Gordon Schlesinger, WA6LBV, 5364 Saxon St., San Diego, CA 92115.
Clay Frienwald, K7CR, 8515 Idelwood Drive, S.W., Tacoma, WA 98498.
John R. Weeks, Jr., K8RT, 773 Andover Rd., Mansfield, OH 44907.
*Jack D. Forbing, K9LSB, 1416 Lakewood Dr., Fort Wayne, IN 46819.
Whitman E. Brown, WBØCJX, 14418 W. Ellsworth Pl., Golden, CO 80401.
*Ronald F. MacKay, VE1AIC, Box 188, Cornwall, PEI Canada CØA 1HØ.
George A. Diehl, W2IHA, board liaison, 20 Wilson Ave., Chatham, NJ 07928.
Peter O'Dell, AE8Q, Hq. liaison.

VHF-UHF Advisory Committee (VUAC)
Joe Reisert, W1JR, 17 Mansfield Dr., Chelmsford, MA 01824.
Richard T. Knadle, Jr., K2RIW, 316 Vanderbilt Pkwy., Dix Hills, NY 11746.
Anthony F. Souza, W3HMU, P. O. Box 169, Ottsville, PA 18942.
*Russel G. Wicker, W4WD, chairman, P. O. Box 347, Salt Lake City, UT 84116.
Roy L. Albright, W5EYB/N5RA, 107 Rosemary, San Antonio, TX 78227.
*Louis N. Anciaux, WB6NMT, P. O. Box 82183, San Diego, CA 92138.
*Randall A. Stegemeyer, W7HR, 2340 E. 18th St., Bremerton, WA 98310.
*Ted E. Hartson, WA8ULG, 2444 W. Halbert Rd., Battle Creek, MI 49017.
*Malcolm M. Bibby, GW3NJY/W9, 990 N. Lake Shore Dr., No. 21C, Chicago, IL 60611.
Clair J. Robinson, KØCJ, 5036 17th Ave. S., Minneapolis, MN 55417.
*J. Leslie Weir, VE3AIB, 42 Cobham Cres., Toronto, ON Canada M4A 1V6.
Jay A. Holladay, W6EJJ, board liaison, 5128 Jessen Dr., La Canada, CA 91011.
Bernie Glassmeyer, W9KDR, Hq. liaison.
*These members are up for reappointment.

ARRL President Harry Dannals, W2HD (left), presented a plaque to Vic Clark, W4KFC, during the QCWA Old Timers' Annual Banquet earlier this year. The plaque honors Vic for his outstanding service to Amateur Radio for more than 40 years. He is a former SCM of Virginia, former ARRL director of the Roanoke Division, and is presently vice president of IARU Region 2 and honorary vice president of ARRL.

Accordingly, the FCC has revoked station WB6LHB. In its decision, the Commission said that "the transmission of radio communications containing certain explicit words (or forms thereof) . . . are patently offensive to listeners. . . . Consequently, these expressions are prohibited by Section 97.119 of the Commission's Rules." The Commission also expressed concern that over 350,000 Amateur Radio licensees, plus shortwave listeners and those studying for an Amateur license, are constantly tuning in and out of the radio bands and are subjected to unexpected contents of the communications. Like the broadcast in the case of *FCC v. Pacifica Foundation*, 438 U.S. 726 (1978), "Lookholder's transmissions were uniquely accessible to children and could have enlarged a child's vocabulary in an instant, unlike written messages."

The Commission also noted that Lookholder's actions have outraged the amateur community. Therefore, it wants to assure the amateur community that it is prepared to act severely when FCC rules and regulations are blatantly disregarded by amateur licensees such as Lookholder. In light of Lookholder's criminal conviction, FCC has concluded that the license of station WB6LHB must be revoked.

Bootlegger Caught

An FCC administrative law judge has denied the application of Albert F. Merrill, of San Jose, California, for an amateur station license and Novice class Amateur Radio operator license. Merrill had been illegally using the call sign of a Commission licensee to identify his unlicensed operation on a local repeater. The holder of the call sign had no knowledge that Merrill was using his call sign.

During the hearing, Merrill asserted that he did not know it was improper to use another person's call sign or to operate without a license. He claimed that he would not have operated illegally if he had been aware of the Commission's rules and regulations.

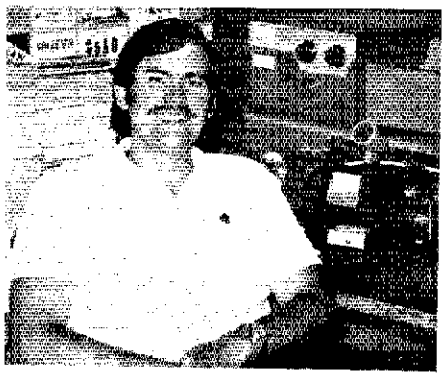
Apparently, the judge was not satisfied with Merrill's explanation. He found that Merrill's willful and intentional unlicensed operation, his repeated misrepresentations of his identity to the Commission, and other actions taken to further his scheme to operate without a license, renders him unfit to hold an Amateur Radio license.

No Amateur Licenses for Illegal CBers

An FCC administrative law judge has revoked the licenses of Robert D. Alfeld of Altadena, California for Citizens Band (CB) station KAUH-8119 and amateur station KA6BJU, suspended his Novice class Amateur Radio operator license and denied his application for a Technician class license. The judge has also revoked Cecilia A. Alfeld's CB station license KAOR-6330 and denied her application for an Amateur Radio station license and General class operator license. Robert Alfeld had operated on frequencies not assigned to either the CB or amateur services and identified his transmissions with either "7400" or "UF 7400," his UF club number, instead of his FCC call signs. According to the FCC news release, UF International is a club that encourages radio operation on unauthorized frequencies. While Cecelia Alfeld's operation was not as extensive as her husband's, the judge said, she was also a member of the UF Club, operated on unauthorized frequencies and identified her transmissions with a UF number instead of her FCC call sign.

STAFF NOTES

The ARRL staff bids welcome to Mark J. Wilson, AA2Z, new OSCAR Education Manager in the Club and Training Department. Mark served his first days at Hq. as Communications Assistant, working with the Public Service Branch. A 1980 graduate of Temple University (BA, Journalism), Mark hails from Pitman, New Jersey, and presently resides in Bloomfield, Connecticut. Mark enjoys motorcycles (a potential recruit for the Headquarters staff motorcycle group that includes W1CUT, K1TD, K1CE, WA1ZUY and K8AXL) and photography. An active amateur, Mark holds DXCC (200 countries), WAS, WAC and WAZ, and enjoys cw and contests. Formerly WB2OSQ, Mark received the Amateur Extra call sign AA2Z in July 1978. As the new OSCAR Education Manager, Mark will be involved with the editing of the *OSCAR in the Classroom* newsletter, developing equipment and lab modules for classroom use, and creating new projects and training materials for the OSCAR satellites. A hearty welcome aboard, Mark! — *Rick Palm, K1CE*



Mark J. Wilson, AA2Z

Another distinguished ham was honored at the QCWA Old Timers' Annual Banquet by the Foundation for Amateur Radio. Shown here is former ARRL Atlantic Division Director Harry A. McConaghy, W3SW (left) receiving a plaque from Stu Meyer, W2GHK, honoring "Connie-Mac" for his outstanding leadership and many years of dedicated service to Amateur Radio.

RADAR "JAMMERS" DECLARED ILLEGAL

Faced with a growing number of inquiries about police radar (used to enforce highway speed limits) and radar detectors, police scanners and radar jammers, FCC has released a statement explaining its jurisdiction over these devices. "Traffic radars used by police to enforce highway speed limits are transmitters," the Commission explained. It regulates them as such by establishing license eligiblity, frequency bands on which they may be operated and technical standards. With regard to technical standards, however, the Commission is more concerned with the police radar's potential for causing interference to other radio services than it is with the device's accuracy in measuring speed. It feels that police radar's performance in accurately measuring vehicle speed is more properly the concern of the Department of Transportation's National Highway Traffic Safety Administration (NHTSA).

Radar detectors and police scanners are receivers, and the FCC does not regulate receivers; therefore, the use of these devices is not a violation of FCC rules. However, radar "jammers" are definitely prohibited by the Commission. Jammers are devices that emit a radio signal tuned to interfere with, or "jam" a police radar signal. According to the Commission, "Anyone using a 'jammer' risks penalties such as revocation of any FCC licenses, payment of a fine or even criminal prosecution." And even though the FCC has limited jurisdiction over receivers, it "discourages any use of radio that might endanger highway safety." For more information, contact the FCC Private Radio Bureau, Education Branch, at 202-632-7125.

Correspondence

Conducted By Bruce R. Kampe,* WA1POI

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

POSITIVE FEEDBACK

☐ In response to the letter from WB7SAU in the August 1980 *QST* about the supposed overabundance of ads in *QST*, I have a couple of comments.

It is true that *QST* has a lot of advertising each month — as a matter of fact, the August issue has 93 pages that have ads on them out of 164 pages total — but that figure is somewhat misleading. Many of those 93 pages contain 50% or less advertisements and 50% or more copy, and some of the "ad pages" have only a small ad or two in the corner, so they can hardly be considered full of advertisements. Also, about a third of the pages that have no ads are printed in a considerably smaller type style than the rest, which means that in some parts of the magazine we are getting more information to the page.

Of course, all of this matters very little. The important point is that without all of those pages of advertising to pay the bills, our issue of *QST* each month would cost us a bundle, and we would probably have to spend a lot more money on the gear we buy, either in trying to track down the best prices or in paying a higher price because we were not aware of a better price somewhere else. — *Kenneth D. Hazlett, N8BVV, East Lansing, Michigan*

☐ I feel that the ads *QST* has are more educational, have superior makeup, have unsurpassed color and are useful to a greater number of people than any magazine in the industry. All this is possible without any cutting of articles and news! *QST*, as usual, carries only the best and presents it in a superior manner.

Forty years ago, I reached a code speed of 25 wpm in three months without benefit of another ham or any other help. The Instructograph I rented looked very much like the one pictured in July 1980 *QST* on page 144. The memories it brings back! — *Dawson W. (Bill) Bearden, W4IKK, Tullahoma, Tennessee*

☐ I disagree with WB7SAU's comments regarding ads in *QST*. The more advertisers we get, the more income we'll have and the less we'll have to raise the dues. Then again, maybe I shouldn't be concerned about the dues; I became a Life Member in '78. — *Bill Leahy, KØZL, Denver, Colorado*

☐ Even though WB7SAU doesn't like the ads in *QST*, some of us who really want to keep abreast of what's available that is state-of-the-art still enjoy the full-page and color portrayals of the new goodies. The ads also stimulate competition to keep the prices down on nationwide shopping through WATS lines. Keep the ads coming! — *W. M. Tucker, K3UEZ, La Vale, Maryland*

☐ I enjoy reading *QST* from cover to cover, including all the ads. To WB7SAU, all I can say is, "Whatever turns you on." — *Mike Jason, W4OTU, Homosassa, Florida*

UNHAPPY LANDING

☐ Well, here I am, 26 years old, healthy as a horse, lying flat on my back following the first day of Field Day. A friend and I thought we'd do the Wright brothers one better and try flying without wings from the top of a 40-foot tower. The flight was fine but the landing left something to be desired.

We did not know how unsteady a tower set in sandy soil and guyed by three ropes would be with two men and a TA33 at the top. When the guy wire snapped, our weight shifted and the tower came tumbling down. Ken, WA8LLM, landed belly first on a tool chest, cracking a rib and causing multiple bruises and abrasions. I did not fare so well. The point of impact was the left side of my face; I was tangled up in rope, tower and twisted beam elements. My left shoulder was ripped up from the inside out and my right knee was nearly totally destroyed, which is the reason for my surgery. Some individuals may think we were drinking, but my crew and I will not climb and drink.

One thing is clear. More and safer planning will be done on all construction on future Field Days, and I hope that this letter will impress the need for safety in planning and construction. — *Randy Mitchell, WD8AXY, Davisville, West Virginia*

PIRATES ON THE HIGH SEAS

☐ I am disturbed by three items on page 73 of August 1980 *QST* in the Public Service Diary. Were or were not these three ships bootleggers in the ham bands? No calls of the ships are listed.

I am in favor of saving the lives of even radio bootleggers, but I suggest that a strong protest be lodged with their country of registry *and* the U.S. Coast Guard. Outlaws in one activity are often outlaws in other activities! — *David T. Geiser, WA2ANU, New Hartford, New York*

LIFE IN A FISHBOWL

☐ Will 225 Main Street ever be the same again? Will the staff recover? Why did my tour guide look so dragged out after a simple 4-hour tour?

Highlights included immediate research and issuance of my Old Timers Club Certificate, the strange look of a staff member who asked, "Do you really read my articles?" and the preparation of *QST*, the 1981 *Handbook* and the new *Net Directory*. My sons even wanted to know if we were in a hospital — not that anyone was sick, but it was quiet, super clean, and everyone was trying to do their job even though they were in a fishbowl because a League member was being given a tour.

Most tours last an hour. I just wanted to meet everyone, see the League in operation, and most of all enjoy myself, which I did. The tour is a must for anyone in our hobby. I hope this letter serves as a thank you for a wonderful day. — *Dick Goodman, WB1HHH, Williamstown, Massachusetts*

A BIRD, A PLANE, A HAM?

☐ A conflict has arisen in the assignment of call signs in the amateur and aviation services, because of the advent of 1 × 2 call signs beginning with N.

It is now possible for an aircraft N number (which is used as that aircraft's radio call sign) and an amateur call to be the same.

I saw a Lear jet numbered N6KM on the ramp at Oakland the other day, N6KM being the call sign of Ken McTaggart, ex-SEC for San Francisco. The response from the FCC in Washington was, "They're on different frequencies and they're both pretty smart groups of people. We're not worried about it." But, still, two stations with identical call signs?

Don't be surprised if someday on your aircraft scanner you hear N6KM or some other ham-type call sign report passing the outer marker inbound for landing. — *Dick Dillman, N6VS, San Francisco, California*

WATER ON THE FIRE

☐ I am sure many of us are greatly concerned because of the recent tendency toward antagonism between the various groups of radio amateurs. In my opinion anything that fosters such division in our ranks is a serious mistake. Articles and letters in *QST* are no exception.

While I am heartily in agreement with the concept that *QST* should tell both sides of any controversial issue and permit amateurs to express their opinions pro and con on these issues, such letters and articles should be written without malice and the arguments used should be reasonably logical. Any argument that is an appeal to the feelings, passions and prejudices of the group addressed instead of to the intellect is an illogical argument and has no place in *QST*. Articles that make people mad are fine in politics but not in ham radio.

The article "CMP Plan" in April 1980 *QST* and Scott Davis, K5TA's letter in July 1980 *QST* both fall in this category. They just add fuel to the fire and have no place in the "ham" fraternity. — *H. E. "Doc" Elsen, W7JAC, Portland, Oregon*

OPEN EIGHTY?

☐ I think it is a shame to have 80-meter phone so congested from 3890 to 4000 kHz. This band should be open to all amateurs who possess a General class license. Most of the nets are jammed in the high end and traffic is heavy there. It is a close-in band, extremely valuable for all kinds of public relations work. I personally have no axe to grind since I hold an Extra Class license, but all my friends are above 3895, true also for the majority of users of 80 phone. Let's open the whole thing, 3775 to 4000, to all licensees of General class and higher. — *Jack Golden, WA2YPW, Portville, New York*

*Membership Services Assistant, ARRL

Washington Mailbox

Conducted By Richard K. Palm,* K1CE

Antennae

Although most amateurs are not concerned with the antenna restrictions specified in Part 97, some are. Let's take a look at these restrictions and how they affect those fortunate enough to contemplate that "Big Gun" antenna installation in the backyard.

Q. I'm contemplating that "Big Gun" antenna installation in the backyard. What are the rules concerning antenna height limitations, and what do they say in plain English?

A. §97.45 specifies antenna height restrictions. First, if your antenna will be higher than 200 feet above ground level, you are required to file two forms. One, with the FCC, is Form 714. And the other goes to the FAA (Form 7460-1).

For those of you who have the misfortune of living near an airport — besides the noise, you must deal with some additional limitations:

1) Refer to Fig. 1. If you live near an airport that has a long runway (3200 feet in length or more) and is listed in either the *Airport Directory* or the current *Airman's Information Manual*, or is operated by a Federal military agency, you must file the two forms mentioned above if your antenna construction will exceed heights limited by an imaginary surface extending outward and upward at a slope of 100 to 1. For example, your tower, 5000 feet away from the nearest runway, must not exceed 50 feet in height if you wish to avoid notifying FAA/FCC. A convenient equation for calculating these height limitations is

$$\frac{\text{distance from nearest runway in feet}}{\text{slope}} = \text{Antenna Height Limitation}$$

Using our example above

$$\frac{5000}{100} = 50 \text{ feet}$$

2) Refer to Fig. 2. If you live near an airport with its longest runway *under* 3200 feet in length (excluding heliports and seaplane bases without specified boundaries), then the limiting slope is a figure of 50 to 1. Using our equation, if you live 5000 feet away from the nearest runway, you may install an antenna up to 100 feet in height without notifying FCC/FAA.

3) Refer to Fig. 3. If you live near a heliport listed in the *Airport Directory* or operated by a Federal military agency, you're limited to an antenna height limitation slope of 25 to 1. This means that if your antenna will be constructed 5000 feet away from the nearest take-off and landing area of the heliport, your tower must not exceed 200 feet unless you submit the aforementioned paperwork.

Q. The phrase "near an airport" is very vague. Can you be more specific?

A. Yes — actually what you are concerned with is the distance from the nearest point of the nearest runway. In case 1, where the longest runway is longer than 3200 feet, you're affected by these restrictions if you live within 20,000 feet of the nearest runway. In case 2, where the longest runway is less than 3200 feet long, you're concerned with the additional antenna restrictions if you live within 10,000 feet. And finally, in case 3, you're again affected if you live within 5000 feet of the nearest take-off and landing area of a heliport.

Q. But what if my tower will be shielded by trees in my backyard?

A. You may wish to apply for an exemption. If your antenna will be shielded by existing structures such as buildings, trees or hills — so that air traffic would not be adversely affected — simply attach a statement to this effect with the required forms.

Q. Are there any other cases where special application is not required?

A. Yes — special application is not necessary for antennas of 20 feet or less, except one that would increase the height of another antenna structure.

Further details as to whether an aeronautical study and/or obstruction marking and lighting are required may be obtained from Part 17 of the Commission's rules, "Construction, Marking, and Lighting of Antenna Structures."

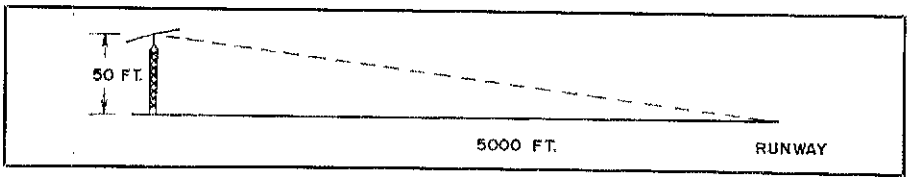


Fig. 1 — If you live near an airport runway *more than* 3200 feet long, you must notify the FAA and FCC if your antenna will exceed heights limited by a slope of 100 to 1.

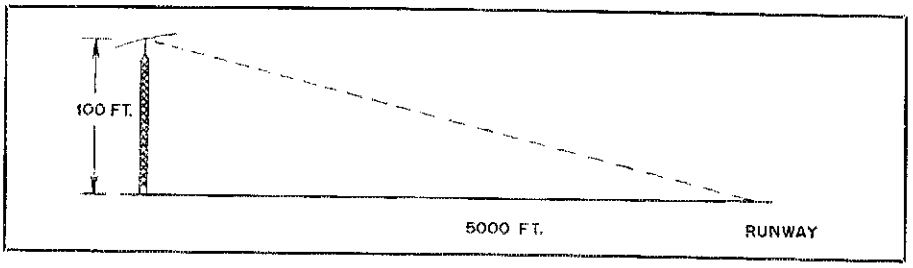


Fig. 2 — Where airport runways are *less than* 3200 feet long, you must notify the FAA and FCC if your antenna will exceed heights limited by a slope of 50 to 1.

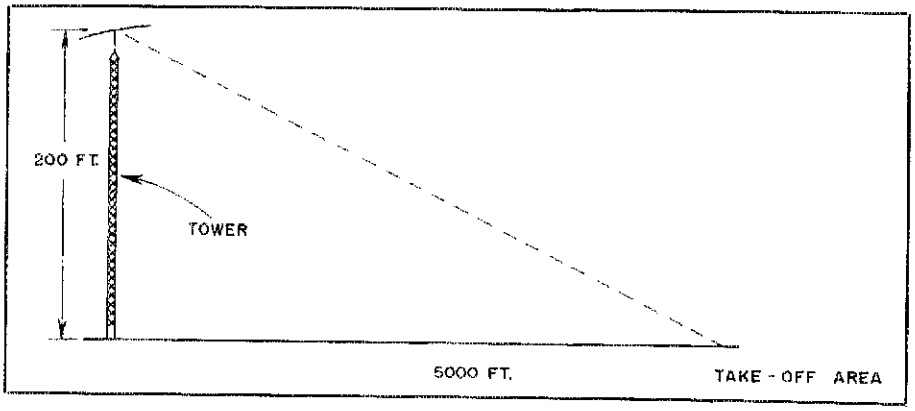


Fig. 3 — If there is a heliport near your antenna location, you must notify the FAA and FCC if your antenna will exceed heights limited by a slope of 25 to 1.

[Note: Questions appearing in this column are typical of those frequently asked of the FCC and other agencies. Answers, prepared at ARRL, have been reviewed by FCC staff. Interpretations contained herein concur with those of the FCC's Personal Radio Branch. Numbers in parentheses refer to specific sections of the FCC rules.]

*Membership Services Assistant, ARRL

Canadian NewsFronts

Conducted By Harry MacLean,* VE3GRO

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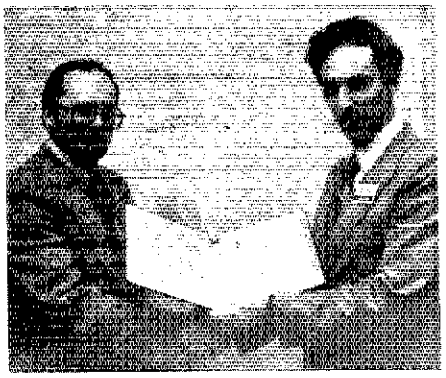
Canadian Amateur Satellite Project Moves Ahead

The failure of the Arianne launch vehicle and the demise of the first Phase III amateur satellite brought disappointment to thousands of amateurs around the world. Despite this setback, there are still many reasons to be hopeful. The Phase III satellite which went down on May 23 was by no means the only amateur satellite project under way.

For example, since 1978, a dozen or so amateurs in the Ottawa area, members of the Radio Amateur Satellite Association, Canada, generally known as AMSAT-CANADA, have been developing a Phase III-type transponder of their own. As with other Phase III projects, the design is for high orbit and long life. Members of AMSAT-CANADA have been working on only the transponder, the antennas and the control circuitry. Unlike the Phase III satellite which recently went down, the Canadian satellite package is not designed to become a totally independent satellite. It will remain "on the bus," that is, on the final stage of the launch vehicle, and share a power collection, storage and distribution system with a number of commercial units mounted on the same rigid frame. Since a malfunction in the amateur system could adversely affect the operation of the commercial units, the Canadian amateur satellite transponder is being designed and built to the strictest commercial standards.

Mode M, the primary mode of the Canadian satellite transponder, will take advantage of frequency allocations made at WARC '79. There will be a 1261.6-MHz uplink and a 435.6-MHz downlink. Such frequencies might frighten amateurs whose vhf-uhf experience ends with 2-meter repeater operation, but they offer many advantages. Ground station requirements become reasonable. Ten watts of rf fed to a simple antenna mounted over a 4-foot dish will easily access the transponder. The same dish can supply the gain needed for the receive antenna. The particular relationship between these uplink and downlink frequencies, and the small amount of Doppler shift expected with the geostationary or near-geostationary orbit, will make transceive operation viable and net operation easy. The minimum bandwidth of 100 kHz, and perhaps 200 or 300 kHz, and the projected height of over 36,000 km, will make the AMSAT satellite accessible to hundreds of amateurs, in over one third of the world, at any given time.



CRRL President and ARRL Canadian Director Mitch Powell, VE3OT, presents the CRRL Certificate of Merit to John Henry, VE2VQ, in recognition of John's outstanding contribution to amateur space communication. John is president of AMSAT-CANADA, a director on the AMSAT board in Washington and past-president of CARF, the Canadian Amateur Radio Federation. *(VE3WI photo)*

How soon might the Canadian satellite contribution be placed into orbit? The project has been slowed down, because of difficulty in obtaining parts which will maintain their tolerances in the harsh space environment. Conventional components degrade quickly when constantly bombarded by minute solar particles. AMSAT-CANADA President John Henry, VE2VQ, who also sits on the AMSAT board in Washington as an AMSAT director, estimates that everything could be assembled, tested and made ready for a launch within a year and one-half. He also adds that the Canadian project, as a whole, might *never* be placed into orbit. Instead, parts of the package, such as the transponder i-f strip, or some of the control circuitry, might be incorporated into one or another AMSAT project.

Whatever happens, however, Canadian amateurs can be proud that some of their number are making significant contributions to the amateur space program.

[Editor's Note: AMSAT-CANADA is related to AMSAT in much the same way that CRRL is related to ARRL. While remaining part of the larger, parent organization, it is incorporated in Canada and independent in many respects. Amateurs interested in learning more about AMSAT-CANADA, or supporting its work, may write to AMSAT-CANADA, Box 7306, Vanier, ON K1L 8E4.]

CRRL UPDATE

What has CRRL been up to lately? Plenty. CRRL recently negotiated publishing rights to a fine new study guide. The *Canadian Amateur Radio Licensing Manual* is written by Ralph Zbarsky, VE7BTG. Material is organized into 20 chapters, for individual study or a 20-week Amateur Radio course. Format is 187 loose-leaf pages in a three-ring binder, ideal for inserting class notes, instructor's handouts and DOC circulars. The book is open and easy to read. The diagrams are clear, and best of all, everything is explained beautifully, to just the right depth for the Amateur examination.

This is a proven study guide. Ralph is a highly successful Amateur Radio instructor in Vancouver. Material in the *Canadian Amateur Radio Licensing Manual* is based on Ralph's own teaching notes. Ralph has already published this guide privately, and it has been used extensively by Amateur Radio students in British Columbia, always with good results. Recently, Ralph became a League assistant director. He will be staying with the manual, to oversee its publication, keep it up-to-date as DOC licensing requirements change and adapt to it some of the fine instructor guides and student workbooks published by the League. Cost is expected to be about $16. Copies, with the CRRL-ARRL diamonds on the cover, are expected to appear on dealers' shelves by the end of this month.

CRRL now has several prints of the new film, "The World of Amateur Radio." Narrated by Roy Neal, K6DUE, Dick Van Dyke and Arthur Godfrey, K4LIB, it features clips of Barry Goldwater, K7UGA and King Hussein, JY1, operating their stations. It covers all aspects of Amateur Radio: history, modes, modern repeater and satellite work, emergency communication, traffic handling and just plain fun. Despite the number of American personalities, the emphasis is international rather than American. *It is the best film on Amateur Radio, to date.* As with other CRRL films, there is no charge for its use.

Ordering CRRL films has been simplified. It is no longer necessary to contact certain commercial distributors to order certain films. Our PRAs look after everything. In western Canada, order films from William Gillespie, VE6ABC, 10129 90th St., Edmonton, AB T5H 1R5. In central Canada, order from Wilf Antheunis, VE3FEA, 1254 Avenue Rd., Toronto, ON M5N 2G7. In eastern Canada, order from Edward Redman, VE1BIQ, Box 310, Porter's Lake, NS B0J 2S0.

Want to help spread the good word? CRRL has reserved calls with *QST* suffixes in all Canadian call areas, for use by an Official Bulletin Station system. If you would enjoy signing . . . DE VE1QST, or the like, and be willing to read ARRL-CRRL bulletins regularly on regional hf nets and local 2-meter repeaters, contact your SCM.

1980 RSO CONVENTION

Don't forget the 1980 Radio Society of Ontario Convention, being held Friday to Sunday, October 3, 4 and 5, at the Prince Hotel, Toronto. This is Canada's largest annual amateur gathering, and will feature forums on a host of technical topics, and a special joint forum on the implications of WARC '79, conducted by representatives of DOC, RSO, CRRL and CARF. If you can, be there!

*163 Meridene Crescent West, London, ON N5X 1G3

In Training

Conducted By Bill Grim,* WØMHK

OF CLASSES, TEACHING AND NEW EXAMS

The new FCC exams have arrived! Although it's too early for complete evaluations to be made, some preliminary information about the tests has crossed the training desk.

Initial reactions seem to be quite favorable. The demise of the FCC tricky question may be a reality. Examinees will complain 'til the end of time about wording of test questions, but the new exams apparently are composed of more clearly worded questions compared to those of the past.

FCC Study Guide topics also seem to correlate very well with exam questions. This has been another area of contention between examinees and the FCC.

Who's passing the tests and how? Information is sketchy and strictly hearsay, but would-be Novices will have less mathematics to fear than ever. Random comments point to good success for Novice and Technician/General class applicants. Advanced class hopefuls have met with less success because of more technical and regulatory detail. No information on the Extra Class exam has been heard, but judging by the syllabus and what we know about the exam author's philosophy, it will require more-sophisticated knowledge of less-common Amateur Radio technical applications. In short, prospective Extras will have to demonstrate no less expertise on their new 40-question exam than those qualifying for the license in the past.

Your first question might be, "What is the ARRL doing about all this?" If you haven't noticed, March 1980 *QST* contains a reprint of the new FCC Study Guides. This column in May *QST* contains a general comparison between old and new FCC Study Guides to give student and teacher a better idea of what information needs to be added, deleted or modified to conform with the new license guidelines. Also, all ARRL training materials will be revised where necessary to reflect new FCC requirements.

Time and production schedules have made it impossible to update all of our publications in time for the beginning of fall classes. A number of projects are presently underway to rewrite or restructure present texts. A new ARRL *License Manual* will make its appearance sometime during fall classes.

During this transitional period, instructors must turn this awkward situation inside out to produce a positive effect. It will be up to you to align your lessons with new FCC Study Guides. If an area of information is not included in your course, refer to various sources of information. The newest *Radio Amateur's Handbook* will be especially helpful in supplementing your instruction.

Fortunately, Novice revisions present few problems. The additional information required is probably common knowledge to instructors. This should dispel instructor fears that their present course outlines and materials are obsolete. Any adjustments will be minor.

Continue to teach concepts and attitude as you have in the past. These are two of the most important course ingredients, regardless of what data are included in the Study Guides.

You may ask, "But Ohm's Law is no longer included in the Novice study guide; what do I do about it?" Granted, it is no longer a part of the Novice requirements. But how long would it be before a would-be radio amateur needed to find the relationships between the quantities included in the formula? Our materials will continue to reflect what the Amateur Radio fraternity demands — well-rounded radio amateurs. Teaching Ohm's Law and other materials as found in *Tune in the World With Ham Radio* is the basis of a solid citizen of the amateur community. You, the instructor, make the information alive and relevant. It is only through your efforts that the final product can be realized.

"What about the General and higher class exams?" Here's where your time and experience will pay off nicely. Shuffle and reshuffle is the name of the game here. A good deal of the material necessary to study for these licenses is already in your possession. All you need to do is to sort it out by appropriate license classes.

Your May "In Training" *QST* column, page 64, provides you with the framework necessary to produce an accurate and complete study outline. Use it in conjunction with the new FCC Study Guides.

One observation that you'll quickly make about the Technician/General material is the increased emphasis on more common vocabulary and practical information of less depth. This was a stated goal in producing a new Tech/General syllabus, with the hope of making these classes of license more attainable.

In the Advanced and Extra Class study guides, you'll find more musical chairs of information between the two and a shift of technical topics, like classes of amplifiers, to positions above Element 3. New topics appear to better illustrate modern technology. Again, other publications, like the *Handbook*, are extremely valuable here. Our "Advanced/Extra Course Guide" has always been in the form of a multitext approach recognizing the breadth of information necessary for understanding more-complex study areas.

Need some quick help in putting together a lesson involving some new topics? This is a time when belonging to a club or having some knowledge about locals from chatting on 2 meters can really come in handy! Draw a bead on that person or persons with the special knowledge you need and get them to present a guest lesson or demonstration lesson to your class. Certainly, the recent change in exam material provides you with the justification and need to ask these people for a special performance of their expertise. It's a great way to get potential new instructors in the classroom while giving your lesson a more-solid foundation.

Consider the following topics as possibilities. Safety in wiring is a new General/Technician topic — any electricians in the vicinity? Mobile antennas is a new Advanced topic. Couple it with vehicle noise suppression, which is now in the Extra Class domain, and you have a good area for a dyed-in-the-wool mobiler to sink his teeth into — any county hunters around? Info and practical uses of solid-state devices like op amps, 7400 series TTLs and 4000 series CMOSs would be of help to those interested in passing the Extra — any solid-state experimenters lurking nearby?

Why not double the usefulness of such a lesson? Have the author present it, with possible minor modifications, as a club talk. Every club is constantly on the prowl for a good program. I'd bet there are a good number of old-timers and newcomers alike who could benefit from the presentation.

You might also ask, "Am I, the instructor, required to learn from this new situation?" Positively! You'll be doing exactly what you constantly ask your students to do — learn. After all, learning is one of the most stimulating parts of being a teacher.

Be watching for more information and teaching suggestions (covering the new FCC examinations) in this column and the quarterly "Instructor's Newsletter."

*Training Manager, ARRL

50 Years Ago

October 1930

☐ In "The President's Corner," Hiram Percy Maxim suggests that preparation be made for the upcoming International Radiotelegraph Conference to be held in Madrid in 1932. He urges that the League place a steady supply of amateur radio knowledge into the hands of those who will be delegates to the meeting.

☐ In a 10-page article Assistant Technical Editor Grammer describes "The Dynatron Frequency Meter," telling how to build it and calibrate it. Calibration points are obtained from commercial stations just outside the ham bands and from standard-frequency stations W1XP and W9XAM within the bands. W1XP's frequencies are always accurate to 0.01% and often better than 0.001%. To utilize this to best advantage, a good vernier dial is required (National 4- or 6-inch or General Radio). An elaborate 5-band meter built by Communications Manager F. E. Handy is also shown.

☐ In 1930 not many amateurs had used or even seen an oscillograph, so "How Our Signals Look," by Paul E. Griffith, W9DBW, was probably strange, or "too technical," for the time. Using an electromechanical oscillograph, flat to 1200 cycles and useful to 10,000, the audio output of a c.w. receiver was recorded simultaneously with a 1000-cycle timing channel. The 35-mm. recording film was *hand*-cranked during the exposures. Excellent examples of good, bad and sick are used and explained in the 4-1/2 pages.

☐ Robert Foreman, W9ZZE, treats "Neutralizing Radio-Frequency Amplifiers," a mysterious subject for the hams who are leaving the ranks of simple one-tube transmitters and moving up to crystal-controlled multi-stage rigs.

☐ Clark Rodimon, W1SZ, reports that the June 28-Mc. tests yielded no international QSOs, in spite of the activity on four continents. Many think 28 Mc. will be of little use during summer months, although some W9, W8 and W2 inter-district contacts were reported.

25 Years Ago

October 1955

☐ The "Modern Medium-Power Transmitter" of Richard Egbert, W8ETU, incorporates many features for the c.w. traffic and contest man, including a remote-tuned VFO, band switching, band-pass interstage circuits, and differential keying. Output tube of the 5-band rig is a 4-65A tetrode.

☐ R. C. Dennison, W2HBE, describes "A De Luxe Amateur-Band Receiver," in an appropriately-titled account of a home-assembled receiver. Band switching, dual conversion, and a pair of Collins filters for selectivity are some of the features. The dial and reduction drive are home-made.

☐ In "Tuning the Mobile Antenna from the Driver's Seat," Frank Morgan, W7RFG, puts war-surplus gear to good use. The roto-coil from a BC-696 transmitter is used for base loading the center-loaded rear-bumper-mounted whip. The roto-coil is adjusted from the front seat through the flexible shaft from an SCR-193. A three-turn link around the roto-coil provides coupling and a suitable match for the r.f. cable from the 75-meter rig under the dash. The meter and thermocouple from a BC-442 unit serve to indicate peak tuning.

☐ "Little Oskey" by Laird Campbell, W1CUT, describes a monitoring OScillator and KEYer (get it?) that works with any receiver-transmitter combination. Closing the key keys the transmitter, mutes the receiver and delivers a sidetone to the headphones. No modifications to receiver or transmitter are required.

☐ In "More Power with the AT-1" Lew McCoy, W1ICP, tells how to make some changes in the popular Heath 30-watt crystal rig that will increase the output on all five bands. Neutralizing the output stage and substituting a 6BQ6 for the 6L6 are the chief points in this detailed step-by-step description.

☐ "The Simplest Converter" is just that. Mason Southworth, W1VLH, describes a dual-triode tunable converter with 7-Mc. output that will work on 15, 10, 6, 2 and 1-1/4 meters. However, don't look for quick band change — QSY means unsoldering and resoldering two sets of coils.

☐ In the Recent Equipment department, the Technical Matériel GPR-90 and the Gonset VHF Linear Amplifier (for the popular Communicator) get good reviews.

☐ The Technical Correspondence from Bob Ritz, W7UUZ, tells of his working 200 miles with a transistor crystal-controlled oscillator. The Motorola XN-2 pnp junction transistor was running 2.5 mw on 3701 kc., a somewhat higher frequency than the more normal 455 kc. — *Byron Goodman, W1DX*

Coming Conventions

October 3-5
New England Division, Boxborough, MA

October 3-5
Virginia State, Virginia Beach

October 10-12
Midwest Division, Lincoln, NE

November 1-2
South Florida Section, St. Petersburg

November 7-9
Hudson Division, South Fallsburg, NY

ARRL NATIONAL CONVENTIONS

March 13-15, 1981
Orlando, Florida

July 23-25, 1982
Cedar Rapids, Iowa

July 29-31, 1983
Houston, Texas

SOUTH FLORIDA SECTION CONVENTION

November 1-2, 1980, St. Petersburg

The ARRL South Florida Section and Suncoast Convention will be held at the Bayfront Concourse Hotel, St. Petersburg. The convention, formerly held at Clearwater, has been moved to the new location to provide more exhibit space and ample on-site parking. All activities, exhibits, swap tables, forums and meetings will be on the main floor.

ARRL dignitaries are expected to be on hand for the ARRL forum. A noon luncheon will be held Saturday. The Saturday evening banquet will feature a prominent speaker. Special awards to be given at both affairs and at the ladies luncheon (where OMs are welcome, too). Hourly awards will also be made, in addition to the main award, a complete station.

Swap tables may be reserved at $10 for two days. Special hotel rates and additional information are available from FGCARC, Box 157, Clearwater, FL 33517, or Tel. 813-461-4267.

HUDSON DIVISION CONVENTION

November 7-9, 1980, South Fallsburg, New York

On November 7-9, 1980, the Hudson Amateur Radio Council will sponsor the ARRL Hudson Division Convention at the Pines Hotel, South Fallsburg, New York. The theme is "Good Times at the Pines."

The middle of the historic and beautiful Catskill Mountain area of New York will be the setting for the 1980 get-together. Emphasis will be on a mini-vacation type convention for both families and solo attendees. The Pines is a full-scale resort hotel featuring all activities, with three full-course meals each day. Cost of food, cocktail party and nightly entertainment in the 1400 seat night club, is included in the room rates. Hotel rates, which are based on double occupancy, per person, per night, also will include all dining room and maid service tips. Rates range from $38.50 to $49.50 per night. Special children's rates on request. Additional adults in a room are $31.50 each, up to two.

A full range of forums is planned, along with an exhibit hall and flea market. Contact Mike Troy, WA2TYV, 70 Ridge St., Rye, NY 10580, for advance tickets at $5 each through October 27, 1980. Indicate if you desire hotel reservations. Ample provision has been made for day trippers, including popularly priced food and free parking. For flea market information, contact Mike Evans, WB2RDD, Box 143, White Sulphur Springs, NY 12787, or call (evenings) 914-292-8630.

Hamfest Calendar

Florida: The Florida Gulf Coast ARC will hold its Suncoast convention Nov. 1-2, at the Bayfront Concourse Hotel, downtown St. Petersburg. Ample parking available. Booth space and swap area inside. Swaptable $10 both days, no one-day table. Displays, forums, Saturday luncheon, Saturday evening banquet, Sunday luncheon with a fashion show. Talk-in on 96/36, 66/06, and 52. Registration is $3 each, under 12 free. FCC Exams given, send to Tampa office for 610s. For more info contact FGCARC, Inc., P. O. Box 157, Clearwater, FL 33517, Tel. 813-461-4267.

Georgia: The Central Georgia ARC will hold its second annual hamfest Oct. 11-12, at the City Recreation Center on Watson Blvd., in Warner Robins. Activities include: dealer displays, indoor flea market, activities for YLs and harmonics. The annual meetings of the Georgia Single Sideband Association and the Georgia Cracker Net will be held. The Georgia State CW Association will have a Sunday morning breakfast. Talk-in on 25/85. For more info contact John Robuck, N4AMJ, 117 Avalon Dr., Warner Robins, GA 31093, Tel. 912-922-4527.

***Hawaii:** The Honolulu ARC will hold its HARC-Fest Dec. 13-14 at the Unity Church of Hawaii (parking lot and courtyard) located at Diamond Head Circle and Monsarrat Ave. Activities for Saturday 10 A.M. until 5 P.M., include exhibits, displays, and flea market. Sunday the activities include, at 10 A.M., a hidden transmitter hunt, and at 6 P.M., a banquet at the Pagoda Hotel, Rycroft Street, Honolulu. Entrance to exhibits/flea market is free. Flea market sellers: $2 a car; commercial tables: $10; Banquet $12.50 a person. Reservations for the banquet should be in no later than Dec. 1. Talk-in on 37/97. For more info contact Warren W. Munro, KH6WM, P. O. Box 431, Aiea, HI 96701, Tel. 808-988-7350.

Indiana: The Marshall County ARC will hold the Plymouth, Indiana Swap and Shop on Oct. 12 at the National Guard Armory in Plymouth. Tickets are $2 in advance and $2.50 at the door. Inside floor space available. Doors open at 7 A.M. Snacks and electronic goodies for sale or trade. Talk-in on 07/67 and 52, or follow signs to National Guard Armory in west part of Plymouth. For more info contact MCARC, P. O. Box 151, Plymouth, IN 45663.

Iowa: The Sooland Repeater Association will hold its 5th annual auction on Nov. 2, at the KD Stockyards Station in Sioux City. Bring surplus ham gear. Auction starts at 11 A.M. Food available. Talk-in on 37/97. For more info contact Charles Ruhleman, WAØPHW, 2820 South Cornilia, Sioux City, IA 51106.

***Louisiana:** The Jefferson ARC will hold the annual New Orleans Hamfest-Computerfest, now AMACOM '80 Oct. 11-12, at the Airport Hilton Inn, Kenner. Activities will include forums and demonstrations. Exhibitors of Amateur Radio and computer equipment will display wares inside hotel; flea market will be held outside. There will also be prizes and a Halloween party. Programs will be available for those not interested in the hamfest activities. Talk-in on 22/82, 34/94 and 885/285. For additional info on tickets, reservations contact AMACOM '80, P. O. Box 73665, Metairie, LA 70033 or Wayne Knabb, Tel. 504-943-5889 or 504-586-3560.

Maryland: The Columbia ARA will hold its 4th annual hamfest Oct. 12 at 8 A.M. at the Howard County Fairgrounds located 15 miles west of Baltimore off I-70 on Rte. 144, 1 mile west of Rte. 32. Admission is $3, tailgating and tables $5. Food available, prizes, talk-in on 735/135 and 52. For table reservations and information write Dennis Parra, 6955 Spinning Seed, Columbia, MD 21045.

Massachusetts: The 19-79 Repeater Association of Malden will hold its first annual flea market Oct. 19 from 11 A.M. to 4 P.M. (Sellers admitted at 10 A.M.) at the Beachmont VFW Post, 150 Bennington St., Revere. Admission is $1. Seller's tables $5 in advance, $7.50 at the door if tables are still available. Talk-in on 19/79. For table reservations send check to 19-79 Repeater Association, P. O. Box 221, Malden, MA 02148.

Massachusetts: The Framingham ARA will hold its annual flea market Nov. 9 at the Framingham Police Station drill shed. Doors open at 9 A.M. Admission is $1, sellers $6 a table. Talk-in on 75/15 and 52. For more info or to register contact Ron Egalka, K1YHM, 3 Driscoll Dr., Framingham, MA 01701, Tel. 617-877-4520.

Michigan: The Central Michigan ARC and Lansing CD Repeater Association will hold their Hamfair '80 Oct. 12 at the Grand Ledge High School, from 8 A.M. to 4 P.M. Lunches available, free parking. Talk-in on 34/94 and 22/82. For information call 517-372-5462 or 517-626-2237.

Michigan: The 26th annual VHF Conference will be held on Oct. 25 at the Western Michigan University from 2 to 9 P.M. Microprocessor control of vhf transceivers, plotting antenna settings, and other vhf topics will be featured at the conference. For more info write Dr. Glade Wilcox, Professor E.E., Western Michigan University, Kalamazoo, MI 49008.

New Jersey: The Greater Delaware Valley Hamfest will be held Oct. 19 from 8 A.M. to 5 P.M., at the Nashville East Cotillion Ballroom, Rte. 73, Pennsauken. Large indoor exhibit space, outdoor flea market for over 300 vendors (set-up will start at 2 A.M.). RV parking and camping Saturday night. Indoor exhibits will open to the public at 8 A.M. Parking lot and exhibit area security (6 P.M. Saturday to 6 P.M. Sunday). Activities include Seminars on DX-P, MARS, ARPSC, ARRL, traffic, antennas and more. Food and refreshments available. Table spaces $5 indoor and $3 per 10-foot space outdoors. Admission $2.50 at the gate and $2 in advance. Talk-in on 22/82 and 52. For advance tickets, table reservation or more information contact Greater Delaware Valley Hamfest, 15 E. Camden Ave., Moorestown, NJ 08057, Tel. 609-234-3926.

New Jersey: The Bergen ARA is holding a ham and computer Swap n Sell Oct. 11 at the Bergen Community College, Paramus Rd., Paramus. Tailgating only, bring your own tables. Sellers $3, buyers free. For more info contact Vic Jurkovic, WB2PYE, 325 Wilson Ave., Westwood, NJ 07675, Tel. 201-445-2855.

New York: The Radio Amateurs of Greater Syracuse will hold their hamfest Oct. 4 at the Arts and Home Center, New York State Fairgrounds, from 9 A.M. to 6 P.M. Exhibits, indoor and outdoor flea market, women's programs are among the activities offered. Breakfast and lunch will be available. Flea market vendors may bring their own table or rent one. Talk-in on 31/91 and 90/30. Tickets are $2. For more information contact the Radio Amateurs of Greater Syracuse, P. O. Box 88, Liverpool, NY 13088.

***North Carolina:** The Western Carolina ARS will hold its Asheville Autumnfest Oct. 11 at the Asheville Civic Center. Admission is $2 in advance and $2.50 at the door. Activities include McElroy Memorial CW competition, bingo, dealers, flea market, demonstrations. Talk-in on 31/91, 16/76, 04/64, 52. For more info contact WCARS, P. O. Box 1488, Asheville, NC 28802, Tel. 704-253-1192.

***North Carolina:** The New Bern ARC, will hold it New Bern Hamfest Oct. 12 at the New Bern, Craven County Fairgrounds on U.S. 70 (3.5 miles east of New Bern) from 9 A.M. to 6 P.M. Admission is 2 for $5 i

*ARRL Hamfest

advance or $3 at the door. Activities include prizes, flea market, vendors, programs for the ladies. Services include nearby motel accommodations and overnight RV and trailer parking on grounds. For information contact T. Phelps, WA4EME, P. O. Box 2483, New Bern, NC 28560, Tel. 919-637-4026.

Ohio: The 5th annual Heart of Ohio Ham Fiesta will be held Oct. 29 at the Marion County Fairground's Coliseum in Marion. Activities include flea market and prizes. Talk-in on 90/30 and 52. Dealer space available. For more information contact Paul Kilzer, W8GAX, 393 Pole Lane Rd., Marion, OH 43302.

Ohio: The Defiance County ARC will hold its 3rd annual hamfest Nov. 2 from 8 A.M. to 4 P.M. at the Defiance County Fairgrounds, Hicksville. Table space is free on a first come first served basis, inside or out. Tickets are $2 at the gate and $1.50 in advance. Talk-in on 69/09 and 52. For more info contact Ed Ballard, Jr., RFD 1, Roland Rd., Sherwood, OH 43556.

Oklahoma: The Beaver Hamfest will be Oct. 19 at the Fairgrounds building in Beaver. Doors open at 8 A.M. Registration at 10 A.M. Tickets $2.50 each. Short program at 1:30 P.M. Covered-dish luncheon, swap tables, prizes, nearby camper hookup and airport. Talk-in on 01/61 and 52. Details from Stella Shaw, WB5VUN, Box 310, Beaver, OK 73932, Tel. 405-625-3368.

Ontario: The third annual London ARC Swap and Shop will be held Oct. 26 at the Lord Dorchester High School from 9 A.M. to 4 P.M. Forums on current topics, prizes, display area both for tables and commercial exhibits, food and free parking. Talk-in on 78/18 and 52. For table reservations or further info contact Dick Reiber, 417 Regal Dr., London N5Y 1J8, ON Canada.

Pennsylvania: The R. F. Hill ARC will hold its 4th annual hamfest Nov. 9 in the Sellersville National Guard Armory, Sellersville. Doors open at 7 A.M. to sellers, buyers 8 A.M. For further information contact R. F. Hill ARC, P. O. Box 29, Colmar, PA or Robert Bentley, WB3EWP, 334 Railroad Ave., Souderton, PA 18964, Tel. 215-723-8303.

Pennsylvania: The Foothills ARC will hold its annual Swap and Shop Nov. 8 at the St. Bruno's Church in South Greensburg. Doors open from 9 A.M. to 5 P.M. Prizes. Dealers are welcome. For advance table reservations call Jim Yex, WB3CQA, 412-256-3531. For more info contact Chuck Hamman, 330 Center Ave., Greensburg, PA 15601 Tel. 412-837-9194.

***Tennessee:** The Chattanooga Tri-State F.M. Association and the Chattanooga ARC will hold Hamfest Chattanooga Oct. 25-26 at the Chattanooga State Technical Community College, Chattanooga. Doors open at 9 A.M. Admission is $1. Activities include forums, dealers, contests, ladies bingo, prizes, and flea market. Talk-in on 19/79 and 3980 kHz. Motels available. For more info contact Hamfest Chattanooga, P. O. Box 3377, Chattanooga, TN 37404.

***Tennessee:** The Mid South ARA, Memphis VHF Club, Raleigh ARA and Delta ARC will hold the Memphis Hamfest Oct. 11-12 at the Memphis Mid-South Fairgrounds (Youth Bldg.) from 8 A.M. to 4 P.M. Saturday and 8 A.M. to 2 P.M. on Sunday. Admission is $3, under 14 free. Activities include FCC exams, forums, ladies activities and large flea market. Special hotel rates. On-site trailer hook-up. For more info contact Clayton Elam, K4FZJ at 901-274-4418 or 901-743-6714.

Texas: The El Paso Hamfest will be held Oct. 11-12 at the Missle Inn, 9487 Dyer St. (U.S. 54). Activities include seminars, swap table, demonstrations, QCWA breakfast and prizes. Talk-in on 28/88. For more info write El Paso Hamfest, P. O. Box 4573, El Paso, TX 79914 or call Mary Ann or Roy Gould at 915-751-7638.

Silent Keys

It is with deep regret that we record the passing of these amateurs:

W1AAO, Howard H. Cooley, Newton Circle, MA
W1AMT, Clarence L. Gove, Pinehurst, NC
ex-W1AP, Lafayette A. Gosselin, Meredith, NH
WB1DKR, Adelma I. Bean, Brewer, ME
W1EMG, Richard P. Morris, Melrose, MA
W1EVR, Elboro Lupinacci, Stamford, CT
WB1HLX, Maurice J. Murphy, Manchester, NH
W1IDO, Frederick S. Taylor, Hartford, CT
W1RJE, Austin L. Beaulieu, Bangor, ME
W2AKS, Edward B. Castor, Amsterdam, NY
K2AT, Joseph L. Richey, Princeton Jct., NJ
WB2CTH, Oscar W. Perry, Fishkill, NY
KA2FJY, Lawrence J. Jackmin, Ithaca, NY
W2FUV, James "Gus" Pochick, Fords, NJ
WA2GOM, Irving F. Eastman, Winthrop, NY
WB2JJS, Albert Kahn, Flemington, NJ
K2KSN, Harry E. Magnuson, Jr., Pine Bush, NY
W2KUX, Burton W. Player, Spencer, NY
WB2PBV, Dr. Arthur Greenberg, Commack, NY
W2PEY, John Budell, Lockport, NY
WA2RDZ, Norman C. Nichols, Saddle Brook, NJ
WA2SWW, Wray H. Hills, Jr., Niagara Falls, NY
W2UGF, William R. Otter, Massapequa, NY
K3ARL, Grafton A. Matthews, Baltimore, MD
K3BA, Harold E. Price, Hagarstown, MD
K3BJG, William E. Murphy, Drexel Hill, PA
WB3FTI, James F. Quigley, Philadelphia, PA
K3FGC, Cdr. David E. Wikoff, Huntingdon Valley, PA
K3GOZ, Herman H. Klein, Philadelphia, PA
W3JC, Arthur K. Ault, Baltimore, MD
W3LM, Charles G. Yeagley, Royersford, PA
W3LRS, Stanley C. Dobrowski, Beaver Falls, PA
W3SQB, Frank J. "Fritz" Jancar, Bethesda, MD
W4AHO, Alexander D. Trum, Montgomery, AL
K4AHV, Robert McDonald, Panama City, FL
W4APJ, Charles L. Herman, Jr., Montgomery, AL
W4ATF, Cecil I. Liles, Montgomery, AL
WB4CDV, Harold Rogers, Gulfport, FL
N4CW, Charles Whiteley, Venice, FL
W4EHH, The Rev. Willie M. Wilson, Kingstree, SC
W4ET, Robert E. Kaval, Sr., Augusta, GA
K4GLJ, Charles G. Geibel, Holiday, FL
K4LLW, W. Lee Dingus, Kingsport, TN
WD4PCY, Lt. Col. James T. Babbitt, Bluemont, VA
ex-KB4QN, Max Bridges, Jr., Spartanburg, SC
W4RBN, F. Keith Hills, Venice, FL
WB4RIL, Harold C. Patterson, Kenneth City, FL
K4VGW, Frank A. Tucker, Thomasville, NC
WD5AEE, Martin D. Milliken, Southhaven, MS
W5FPF, Julian E. Ebbert, Little Rock, AR
KA5HJN, John J. Ackerman, Jr., El Paso, TX
K5ILL, Odell Hunter, Henderson, TX
W5UBE, Alexander P. Stikkers, West Fork, AR
*K5YMM, Maurice Singer, New Orleans, LA
W6CJM, Melvin C. Ringer, Sun City, CA
W6EOM, Wilson V. "Buck" Rogers, Clovis, CA
W6EZ, George R. Lee, San Marcos, CA
W6FXV, Floyd E. Drenon, Fresno, CA
WA6GJH, Edward M. Smith, Hayward, CA
W6HAX, Harry R. Dalton, Sun City, CA
WA6JNR, John Antol, Torrance, CA
WA6LPO, Loren A. Wann, Pollock Pines, CA
W6MLW, Clarke Dixon, San Diego, CA
WA6POL, Grand L. "George" Faly, Yucaipa, CA
W6QLM, Dorothy E. Williams, Salem, OR
W6RH, Ralph M. Heintz, Los Gatos, CA
W6RHD, Carl L. Adler, Forest Knolls, CA
K6SZU, Elmer K. Wakamatsu, Anaheim, CA
W6VTV, William J. Gilmore, LaJolla, CA
WB6YRO, Curby P. Goldsmith, Galt, CA
W8DBP, Thaddeus T. Czarnecki, Gaylord, MI
K8EUJ, Harry S. Underwood, Frametown, WV
KA8FJK, George E. Ryckman, East Liverpool, OH
*W8FTS, Charles D. Blust, Stow, OH
*W8LGI, Francis M. Strait, Summit Station, OH
WA8RTU, Burritt G. Fleming, Cincinnati, OH
K8SVG, Herman E. Barker, Gassaway, WV
W8TLL, Robert J. Pastorino, Ann Arbor, MI
WB8WNK, Richard E. Dorsch, Rochester, MI
W7ADJ, Kenneth E. Wilcox, Milwaukie, OR
WB7AES, Ralph O. Kernan, Portland, OR
W7DPZ, Henry W. Noble, Deer Park, WA
K7MWN, Herbert R. Smith, Kent, WA
WA7OFC, John E. Attwell, Everett, WA
WB7OVX, Wayne F. Schuknecht, Aberdeen, WA
W9BGB, Donald F. Secky, LaCrosse, WI
KA9ECO, Algirdas L. Jurasas, Berwyn, IL
W9OBS, Donald C. Shafstall, Marion, IL
K9VEC, Stanley D. Bartleman, Rochester, IN
K9WVL, Matthew L. Nealis, Marshfield, WI
W9YSZ, Leslie F. Downs, Madison, WI
WØLUG, Robert H. Irvin, Burlington, IA
WBØMSV, Andrew P. Kjar, Pierre, SD
WBØQIO, Harold E. Burden, North Glenn, CO
WØRWM, Elroy J. "Barney" Barnhart, Aberdeen, SD
WØRXB, William B. "Barney" Martin, Kansas City, KS
VE1CP, John L. Holman, Lepreau, NB
VE2ZL, Edouard Migneault, Charlesbourg, PQ
VE3AQI, C. Bertram Maloney, Belleville, ON
VE3CW, Douglas A. Widgett, Scarborough, ON
VE3GNY, Everett McDonald, Powassan, ON
VE3QS, Albert Pearsall, Toronto, ON
*VE6AW, James F. Sumner, Calgary, AB
VE6BQ, Roy I. Hallin, Edmonton, AB
VE7XZ, George J. Alexander, Victoria, BC
LA1FA, Harald Schulstock, Oslo, Norway
OE3HOW, Helmut Hoschek, Turnitz, Austria

*Life Member

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.

Strays

INTERNATIONAL POLICE ASSOCIATION NET

☐ Policemen and law-enforcement officers are welcome to join the International Police Association Radio Club net, which meets each Sunday on 21.410 MHz at 1700 UTC. For more information contact Vince Gambino, WB4QJO, 7606 Kingsbury Rd., Alexandria, VA 22310.

QST congratulates . . .

☐ Richard Smith, WA4AMX, new deputy chief of the FCC Field Operations Bureau. Mr. Smith has been a member of the FCC staff since 1963 and most recently served as assistant chief of the FOB Enforcement Division.

☐ Fran "Cuz" Thisse, W2BJI, of Manlius, New York, who was honored as central New York Ham of the Year at the hamfest of the Rome (New York) Radio Club, Inc.

☐ Harold Foot, KA7CGK, of Columbia Falls, Montana, who was recently elected to the National Honor Society. The high school junior teaches a Novice class consisting of six adults.

JOLIET ARS ANNIVERSARY OPERATION

☐ The Joliet ARS will be celebrating its 40th anniversary with a special commemorative operation from 1500 UTC, Saturday, October 18, until 2100 UTC, Sunday, October 19. Look for W9OGR, the call sign of the R. Melvin Whitaker Memorial Station, on 3.975, 7.275, 14.275, 21.375 and 146.52 MHz. A special certificate will be sent to each station sending a QSL card and s.a.s.e. to the *Callbook* address. The club will hold its anniversary dinner on October 4. All former members and friends are invited to attend. Contact Barry Boothe, W9UCW, 705 May St., Channahon, IL 60410, Tel. 815-467-6912, for more information. — *Marianne Vander Zanden, AB9X, Mokena, Illinois*

The New Frontier

The World Above 1 Gig

Conducted By Bob Atkins,* KA1GT

Microwave Activity

Of the rf spectrum allocated to amateur use between 1.8 MHz and 10.5 GHz over 96 percent of the space is at frequencies above 1 GHz. Unfortunately it is also true that the overwhelming majority of amateurs never operate in this region. Why this should be so is difficult to say. Many years ago the myth developed that working at microwave frequencies was difficult and that equipment could only be built and made to work by experts. While it is still true that you may have to be a little more accurate and careful in building equipment for these higher frequencies, it is also true that microwave equipment is being built and operated with great success by many amateurs today, who have no professional involvement or training in electronics.

Where to Start?

For the newcomer to the bands above 1 GHz probably the best place to start is at 1296 MHz. Activity is highest on this band and fixed-station operation using relatively simple and easily built equipment can yield rewarding results. There are also many constructional articles for equipment for use at 1296 MHz already in print and it is the only microwave band (except for 10 GHz) for which amateur equipment is commercially available. A list of articles giving details of equipment for 1296 MHz that can be home constructed is given at the end of this column. Of the converters, the interdigital design by W2CQH remains one of the best and is currently in use at many stations active on the band.

At the present time the most common way of generating rf at 1296 MHz is by tripling from 432 MHz. The tripler design using computer switching diodes given in the 1980 ARRL *Radio Amateur's Handbook* certainly represents one of the least expensive and easiest ways of getting a signal out on 1296 MHz. It may not be as efficient as a true varactor tripler, but it can be built in one evening and uses no difficult-to-obtain parts. It must, however, be followed by a filter, as must all triplers, to prevent any 432-MHz signal from its output from reaching the antenna.

Antennas currently in use at 1296 MHz fall into two main groups — either parabolic dishes of three to five feet in diameter or loop-Yagi antennas. The loop-Yagi is an antenna in which the elements are full-wave loops rather than linear half-wave rods as in the usual Yagi antenna. It is also sometimes referred to as a loop quad, since its element configuration is that of a quad. Since information on the loop-Yagi is difficult to find in U.S. journals, brief details of a 27-element and 38-element version developed by G3JVL are given here. Although it is difficult to find reliable figures for the gain of these antennas, measurements by a number of stations and comparisons with parabolic dishes seem to indicate that the 38-element version shows a gain in excess of 20 dBi (or about the same as a 4-foot dish) and the 27-element version is about 1.5 dB worse. An important constructional note concerning this antenna is the fact that the point at which the ends of the loops overlap and are fastened to the boom is a high-current point. Any corrosion between the overlapped ends of the loop at this point will lead to a reduction in the gain of the antenna. Care should be taken to minimize the possibility of this occurring, either by soldering the loops (which is difficult if aluminum is used), spot welding or weatherproofing the joint with a coat of paint or varnish. The loops could be made of brass or copper to facilitate soldering, though this would lead to a considerable weight increase.

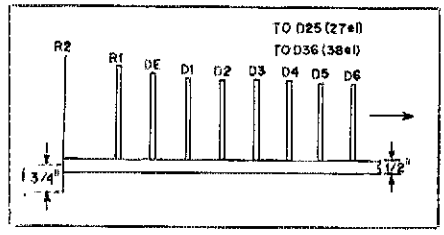


Fig. 1 — Element spacing from R2 (in inches): R1 — 3.10; DE — 4.05; D1 — 5.17; D2 — 6.00; D3 — 7.78; D4 — 9.56; D5 — 10.81; D6 — 13.12. All other directors spaced at 3.56-inch intervals. Inches × 25.4 = mm.

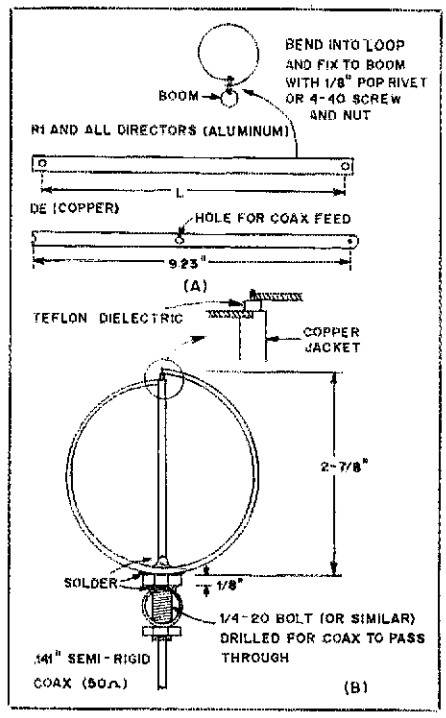


Fig. 2 — Loop dimensions (L) (in inches). These dimensions are for a 1/2 inch boom diameter. For a 1 inch boom, all element lengths (including DE) should be increased by 2.1%. Elements are 3/16 inch wide by 0.028 inch thick. R1 — 9.67 inches; DE — 9.23 inches (see drawing).
For 27-element version D1-D11 — 8.25, D12-D25 — 8.00.
For 38-element version D1-D11 — 8.25, D12-D18 — 8.00, D18-D36 — 7.70.
R2 is an aluminum screen sheet, 5.5 inches wide by 4.5 inches high. Inches × 25.4 = mm.

Awards

It is hoped that in the near future a scheme of awards for achievements on the microwave bands may be initiated. As things stand at present none of the available awards are achievable on the microwave bands (WAS on 1296 MHz by EME may one day be claimed, though that lies in the far future, I suspect!). One possibility is an award based on working a number of areas as defined in the ARRL UHF Contest (1° × 1° blocks). Hopefully such a scheme will encourage more people to operate on a regular basis on the microwave bands (rather than just during contests). More on this subject later.

1296 MHz Activity Information

A list of stations currently active on 1296 MHz is available from WB5LUA. If you're interested in getting on the band it is a good idea to find out who else in your area is active and get their advice. The activity list can be obtained by sending a legal-size (4-1/2 × 9-1/2 in.) s.a.s.e. with 28 cents postage to Al Ward, WB5LUA, Rte. 7, Box 32, McKinney, TX 75069.

Bibliography of 1296 MHz Construction Articles

Converters — R. E. Fischer, W2CQH, January 1974 *QST*, p. 11. (Also in 1980 ARRL *Radio Amateur's Handbook*, p. 9-26.)
Triplers — 1980 ARRL *Radio Amateur's Handbook*, p. 7-27. ARRL *VHF Manual*, third edition, p. 292. W. C. Tatt, W1WID/2, September 1959 *CQ Magazine*, p. 52.
Preamps — H. Paul Shuch, WA6UAM, April 1975 *Ham Radio*, p. 12. H. Paul Shuch, WA6UAM, October 1975 *Ham Radio*, p. 43.
Filters — 1980 ARRL *Radio Amateur's Handbook*, p. 7-27. E. E. Baldwin, WØRUG, April 1969 *QST*, p. 44.
Transverter — H. Paul Shuch, WA6UAM, September 1974 *Ham Radio*, p. 8.

Reader Input

In closing I would like to say that this column is for the benefit of its readers, so I need to hear from you. If you have any comments, suggestions or material for the column, please write. If you are working on microwave systems, also write and let me know. The only way that I can keep the column up to date with what is being done is if I hear from you.

10 GHZ NEWS

On July 12, 1980 a new world record was established on 10 GHz when IØSNY/7 worked IW3EHQ/3 and I3SOY/3 at a distance of 757 km. Gunnplexers and 1-meter dishes were used at both ends of the path.

*c/o ARRL, 225 Main St., Newington, CT 06111

How's DX?

Conducted By Clarke Greene,* K1JX

Station Design for DX — 1980, Part I

". . . DX is 90% operator, 10% equipment . . . Maybe so . . . but the successful DX-contest performers who bring up this point have several of the following: (a) a full gallon; (b) a tower over 65 feet high; (c) a boom over 30 feet long; (d) a quiet location; (e) a hilltop site."

Those were some of the opening comments in a 1966 *QST* series by Paul Rockwell, W3AFM, called "Station Design for DX."[1] Those comments still hold true today, as do the principles W3AFM espoused. Over the next few columns we're going to review some of the original article, and update it for today's world.

"The matter of good siting has been appreciated by amateurs for many years. Recent work[2] has made the criteria more clear. For the long hauls, the higher the antenna, the better. Try for a radiation angle ('take-off' angle) main lobe at 1° elevation. It is especially effective to locate an antenna of modest height on a coneshaped hill on which the ground slopes downward in all directions for a thousand feet or so at an angle of, say, 20°. If you have such a fortunate forezone, 50 feet is a good height for your 20-meter antenna.

"The formula for angle of maximum radiation (horizontal antennas, flat terrain) is

$$\alpha = \arcsin \frac{\lambda}{4h}$$

where h is height (in same units as for wavelength, λ) of the antenna relative to the ground reflection zone in the foreground. Required height for a given take-off angle is

$$\frac{\lambda}{4 \sin \alpha}$$

For 1° at 20 meters, flat terrain, this is about 1000 feet![3] Hence, just figure the higher the better.

"The ground-reflection (Fresnel) zone extends as an approximately elliptical area on the antenna forezone. The geometric ground-reflection point in this zone is at a distance

$$\frac{h}{\tan \alpha}$$

from the antenna. For 1° take-off angle, flat terrain, at 20 meters, this is about ten miles.

"The near-end distance of the ground-reflection elliptical area[4] is given by

$$d_n = \frac{h}{\tan \alpha}\left(3 - \frac{2\sqrt{2}}{\cos \alpha}\right)$$

and the far edge by

$$d_f = \frac{h}{\tan \alpha}\left(3 + \frac{2\sqrt{2}}{\cos \alpha}\right)$$

or about 1.7 and 58 miles, respectively, for 1° take-off.

"Ground reflections have been the subject of published material complete with diagrams.[5]

"A consideration for sloping sites, in addition to the marked reduction of optimum antenna height as mentioned above, is the reduction in size of the ground-reflection area. For a 20° sloping forezone, the reflection area is about the size required for 20° take-off angle on flat terrain, or a maximum far edge of about 1/6 mile.

"Incidentally, ground losses at hf for the grazing angles of interest, say 10° take-off angle, are almost never serious for horizontal polarization and are of the order of a few percent. Ideas of hf-site impairment by magnetic masses, etc., under the ground surface are superstitions.

"The advantage of a good site and/or a high antenna can be of the order of 10-20 dB[2] compared with modest suburban-neighborhood installations. It leads to situations where the 'mortals down below' can't even hear traces of the other end comfortably solid DX QSOs being conducted from the best sites. Incidentally, in progressive antenna changes at W3AFM, increments of only 2 dB in antenna gain have opened up, in each case, a new layer of workable central-Asian DX.

"A quiet location can make a telling difference. W2FZY, who seems to hear everything with a modest antenna, attributes his success largely to quietness of site. Some of the new appliances, notably mixers and bed heater-pads, can ruin DX reception in ordinary urban areas. Where there are only one or two such nuisances, they can be tracked down by auto and portable transistor radios. Their direction can be determined, with about 30°, by beam swinging. Once located, the problem can be corrected by (a) buying a new appliance and trading it for the offending one (b) offering a filter (c) both of the above. W3AFM's worst offenders have been found within 400 feet. Lesser offenders have been located and corrected at distances up to 800 feet.

"Trees and foliage are less of a problem in hf communications than generally imagined. The attenuation varies from a small fraction of a db, for horizontal polarization to 3 dB for vertical polarization. The values apply to 30 MHz through moderately thick trees as encountered in temperate zones. Attenuation through a brick wall is 2 to 5 dB at 30 MHz."[6]

"For plotting profiles of your site, excellent contour maps, 7-1/2' × 7-1/2', (i.e. 7-1/2 minutes of latitude by 7-1/2 minutes of longitude) may be had for almost any part of the USA at [$1.50] each. Detail is such that individual houses may often be identified. For explicit ordering information contact: Map Information Service, Geological Survey, Washington, DC 20242."

9X5LE, operating, and SMØAGD on safari in Rwanda May 1980.

SMØAGD in Botswana as A22GD, May 1980.

*187 Stafford Ave., Forrestville, CT 06010

[1] Rockwell, "Station Design for DX," *QST*, September 1966.

[2] Utlaut, "Effect of Radiation Angles on HF Radio Signals," *Radio Propagation* NBS CRPL-D, March-April 1961.

[3] For an approximation, double the take-off angle for each halving of height. Thus, at 14 MHz, 500 feet gives 2°, 250 feet 4°, 62 feet 16°, etc. To find the effective ground-reflection zone distance and elevation relative to antenna mast height, plot a profile on a topographical map.

[4] Plane earth. For spherical-earth ray studies see Norton and Omberg, *PIRE* January 1947.

[5] Bailey, Bateman and Kirby, "Radio Transmission in the Lower Atmosphere," *PIRE*, October 1955, p. 1226.

[6] Bullington, "Radio Propagation Fundamentals," *B.S.T.J.*, May 1957.

[7] Saxton and Lane, "VHF and UHF Reception, Effects of Trees and Other Obstacles," *Wireless World*, May 1955.

DX PORTFOLIO

"Dear DX Friends,

"I have returned to Sweden after my three month journey through Africa. On this trip I visited 10 different countries and managed to get on the air from four of them: March 13-19, Guinea Bissau, J5AG; May 1-4, Swaziland, WMØAGD/3D6; May 6-10, Botswana, A22GD; May 17-22, Rwanda, 9X5LE.

"The total ended up in some 9500 QSOs with 90% cw. 9X5LE is issued to the name Roland Lord, a Swedish missionary with whom I visited in Kigali, the capital city of Rwanda.

"All QSL cards go via SM3CXS, Joergen Svensson, Berghemsvägen 11, S-86021 Sundsbruk, Sweden.

"I carried an ICOM IC-701 transceiver, a 14 AVQ vertical and a Bencher keyer with me all the way. Thanks to the Bencher, I enjoyed cw a lot more now than I ever did before.

"The whole trip almost ended in a disaster, because on the return flight Kigali/Stockholm, my luggage including all the logs were lost somewhere enroute. It took a few days of worries before the luggage could be traced to a conveyer belt in Nairobi, where it had been moving around for some time. I do consider logbooks as valuable documents and normally I carry them with me as hand luggage, but this time I had done the mistake to pack them in my suitcase. Well, now the logs are safe in the hands of SM3CXS.

"In recent years my duties have taken me abroad approximately 50% of the time; I visited some 80 countries and I have been operating under more than 20 different callsigns, beginning with CE3AOF/Ø and SM2AGD/CEØ from Easter Island back in 1972. I had a lot of fun during these years, and I enjoyed very much meeting so many radio friends both over the air and in person.

"But things are changing and for some time I will now be more permanently posted in Sweden. I will not have so many paid trips to all those exotic places any more. But it would be difficult to stop my DX ambitions. So for the future I am planning some DXpeditions together with SM3CXS and The Sundsvall DX Group. One of the target areas is China. A member of our group, SM3BHY, is stationed in Peking. He has established good relations with the Chinese authorities and he has been in meetings with the former operators of BY1PK from the early 1960s. It will take time before our negotiations result in DX activity from China. But there are many branches of Amateur Radio and we have started on a very elementary level. This work is very interesting and perhaps in a year or two we can help a BY station to show on the HF bands. I am sure many other groups around the world are working on similar projects, and something will develop sooner or later because the Chinese are very interested. We must be patient. I already fear the pile-up, their first operators must be prepared for it.

"I would like to express my thanks to the DXers who sent many small contributions together with their QSL cards. After return postage was paid we had a small excess which has been saved in a fund. This money will be very useful for our future DXpeditions. Thank you.

Three generations of DXers. Left to right: Roland, Leo (ex-ON4SP, OQ5EH and 9Q5EH) and Michael, ON7EH.

"It will take some time before we are able to realize some of our plans. In the meantime you will find me in the crowd '5kHz up', trying to improve my own DXCC total which has been stand-still since 1968.

"73 and best DXing, Erik Sjölund, SMØAGD"

QSL Corner

Administered By Joan Becker

ARRL-Membership Overseas QSL Service

This is an "outgoing" service that allows ARRL members to send DX QSL cards to foreign countries at a minimum of cost and effort. While QSLing direct to foreign amateurs is faster, it is also more tedious. Time spent searching for addresses in the foreign *Callbook*, addressing and stuffing envelopes, and mailing could be better spent operating DX. And, the cost of IRCs, airmail postage and envelopes can be prohibitive.

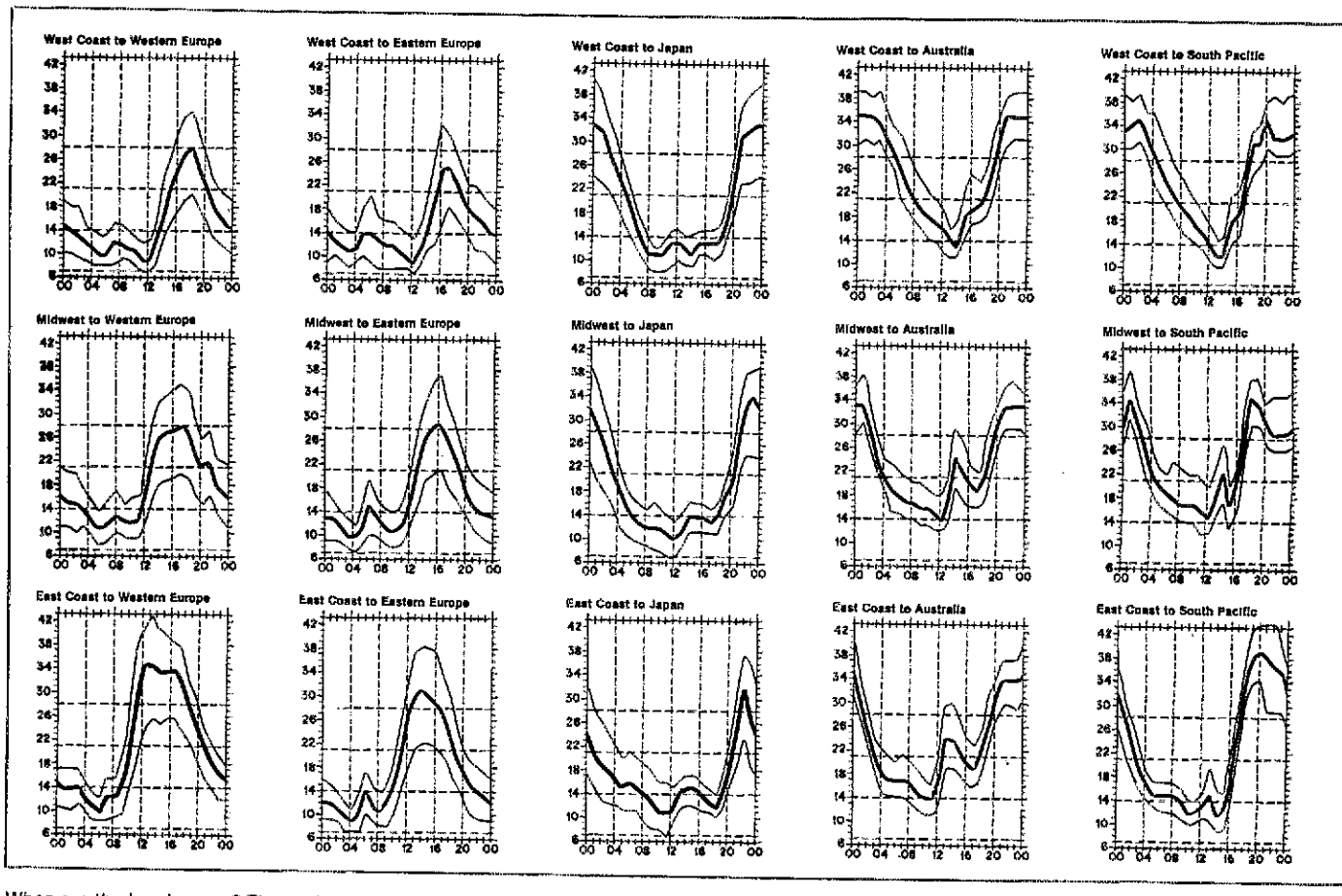
An unlimited number of QSLs may be sent for distribution 12 times per year. The fee is just $1 per pound or portion thereof (155 QSL cards average a pound). For distribution overseas send your QSL cards to ARRL, 225 Main St., Newington, CT 06111.

The ARRL-Membership Overseas QSL Service operates *only* in an "outgoing" capacity. To receive QSLs from DX stations, see "The ARRL DX QSL Bureau System," published every other month on this page.

U.S. amateurs may send SWL reports to foreign short-wave listeners. Unlicensed (associate) members may send SWL cards to foreign amateurs. QSL managers: write for details.

Requirements

1) Presort your DX QSLs alphabetically by call sign



When are the bands open? These charts predict this month's average propagation conditions for high-frequency circuits between the U.S. and various overseas points. One chart for East Coast to West Coast is also included. On 10 percent of the days of the month, the highest frequency propagated will be at least as high as the uppermost curve (highest possible frequency, or hpf). On 50 percent of the days of the month, it will be at least as high as the middle curve (maximum usable frequency, or muf). On 90 percent of the days of the month, it will be at least as high as the

prefix (A3, AP, C6, CE, F, FG, G, GI, GM, JA, 3A2, etc.).

2) Enclose the address label from the brown wrapper of your current copy of *QST*. This information shows that you are a current ARRL member. Family members may also use the service by enclosing their QSLs with those of the primary member. Include the appropriate fee with each individual's cards and indicate "family membership."

Sightless members who do not receive *QST* should indicate that the QSLs are from a "sightless member."

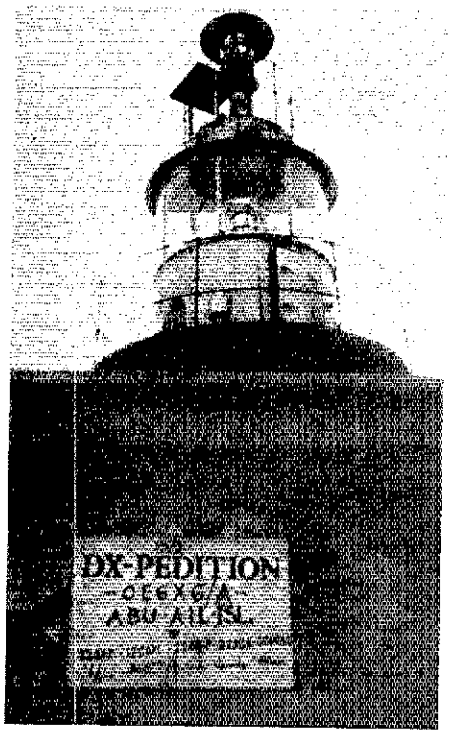
ARRL affiliated club stations may utilize the service when submitting club QSLs by indicating the club name. Club secretaries should check affiliation papers to ensure that membership is current.

3) Enclose payment in the form of a check, money order or cash.

Sending large amounts of cash through the mail is not suggested. Please do not send stamps.

Here is some QSL information for those who would like to QSL direct to the station location. It is passed along as we receive it and therefore may not be entirely accurate.

CN8CW (WA3HUP)
CT1AJY (N2BL)
EA8YA (Box 879, Tenerife, Canary Islands)
FW0DD (VE3ODX)
GU5DJI (ON7EJ)
H44KR (W8DUV)
H44SD (P. O. 350, Honiara, Solomon Islands)
HC5MC (P. O. 540, Cuenca, Ecuador)
HP1XEK (DL1HH)
HS1AMT (W2TK)
I17DMK (I2DMK)
I6LOU (KA4BOT)
J10YFU (P. O. 639, Ulan Bator)

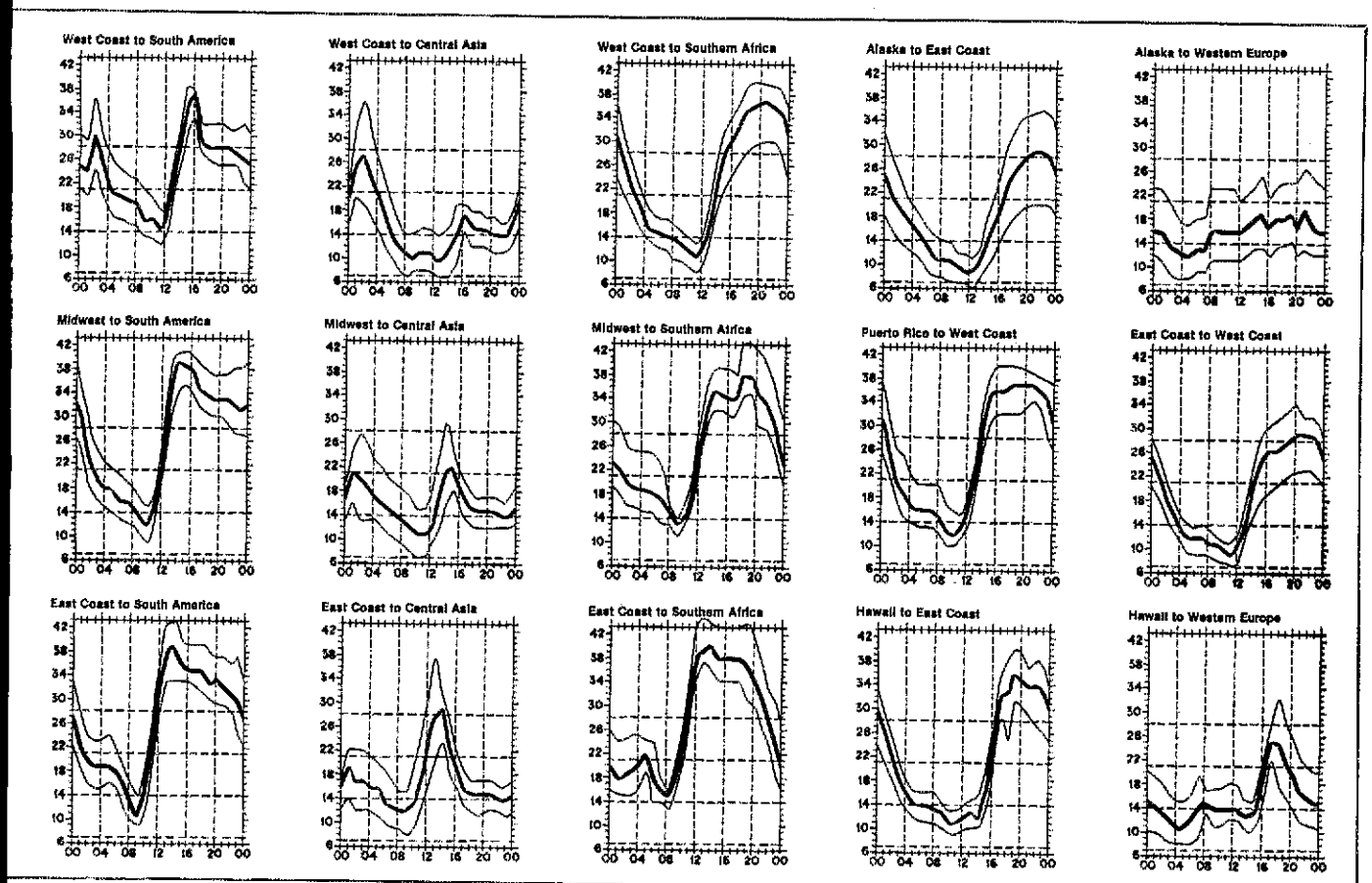


The 1979 DXpedition of OE6XG/A will be remembered for a long time. *(K3ZR photo)*

KX6LU (P. O. 93, APO S.F. 96555)
NP4AZ (KP4FEM)
OD5LM (WA2RPN)
PJ4CR (WB2LCH Contacts on and after Aug. 1, 1980)
P29BL (P. O. 7412, Boroko, Papua, New Guinea)
P29LB (WB2FLB)
SR9PRO (SP9ERV)
TA2TAT (Box 133, Ankara)
TD0G (P. O. 115, Guatemala City)
VP1SWC (KA0BCW)
VP2A (K4PJ)
VP2KAM (WB8LDH)
VP2MAX (JA2VUP)
YC1BMI (P. O. 314, Bandung, Indonesia, or JH1XUP, IRCs only)
ZC4MT (P. O. 413, Larnaca, Cyprus)
ZF2CD (W3ODJ)
4X4XB (KA5BBL)

QSL MANAGER VOLUNTEERS

WB3JRU N5BET
KN4F W2PD
KA6B no longer manager for HL9UN.
W7WQ not manager for HH2BM; correct manager is W6RP.
K4SR not manager for VK0XU.
K4DOT not manager for anyone.
Please do not send cards for YASME to WA6CPP.
QSLs to VP2E, for QSOs on March 29 and 30 only, go to K8ND.
QSLs to FG7AR/FS7 for QSOs, March 13 to 20, 1979 *only*, go to K8ND.
Many thanks to W2QL, W3BBL and W9LNQ for their help.



lowest curve (optimum traffic frequency, or fot). See 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, CO. These predictions, for October 15 to November 15, 1980, assume a sunspot number of 144, which corresponds to a 2800-MHz solar flux of 189.

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 20-country increments through 240, 10-country increments through 300, and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from July 1 through July 31, 1980. An s.a.s.e. will bring you the full rules for participation in the DXCC, the DXCC list and application forms.

New Members

Mixed

DF4FO/205
DF6CY/206
DKØSR/104
DL2UE/107
DL6JT/117
GD4HOX/106
HA5NK/142
JA1IHE/133
JA1JXR/126
JE2LQX/152
JR3RRY/113
JH4UVU/104
JA5GKD/150
JA7AXB/110
JA9DDM/106
JA9KGU/132
OH6AC/223
OK1JST/103
ON7EM/199
OZ7MP/129
PAØJIL/159
PAØNR/102
PY2CPU/223
SM5FBL/104
SM5FXF/101
SM7EXE/323
TR8AC/133
VE3JGT/106
VE3LNW/153
YV1TO/195
ZP5NW/110
ZS6BK/110
4Z4LG/107
K1AP/271
WB1DQC/269
WB1GDG/231
AF2A/103
AF2I/103
KD2G/102
N2EO/126
WA2PHA/118
WB2WUN/102
KA3CMR/100
W3TB/104
WB3DBO/101
WB3IET/123
WB3KCK/100
WB3KKX/148
KB4UO/100
KC4IH/102
N4ABZ/139
N4BQD/102
N4NG/111
W4BND/103
W4IAT/102
WB4NAU/102
WD4BJS/106
WD4DZF/100
WD4HKK/103
WD4IIR/105
WD4MJP/124
KG5J/102
N5SW/120
W5CBN/106
WB5NAA/104
WB5WDA/103
WB5WDG/100
WB5ZAM/108
K6LPL/268
KA6EZU/109
KK6X/146
N6AHU/272
N6BFQ/243
W6EKW/128
W6FWX/106
W6TJS/112
W6XI/152
WA6BEX/103
WA6URY/137
WB6KXL/106
AI7M/108
K7LJQ/104
KB7JE/103
N7CY/111
W7HO/101
W7MAF/106
W7PGY/102
WB7ROE/103
WB7TFT/120
AA8Z/173
AC8K/311
AG8U/100
AJ8J/135
K8JRM/157
KB8AU/109
KB8PK/102
N8BBK/101
WD8IDE/117
WD8KQI/100
WD8OWM/165
AG9V/108
KA9M/115
W9EIZ/166
W9XX/292
W9YRZ/111
WA9BBX/102
WA9NAY/100
WB9YJW/180
WD9BAJ/109
WD9CJG/100
KØJFN/120
KØSCM/151
KØSW/106
WØLV/107
WØPQC/100
WAØDCQ/192
WAØFZK/100
WAØUSA/126
WBØRAO/102
WDØCQW/109
WDØEWO/110

Radiotelephone

BV2B/116
CP6ID/104
CT2BV/104
DF4FO/154
DJ3UI/113
DJ4DK/113
DJ6SA/144
DJ7EV/108
DK4UH/157
EA6DX/250
EA9JE/129
G3VAO/103
HK3GK/108
I1HYW/182
I1SBU/125
I8ADG/150
JE2LQX/140
JR3RRY/113
JA5CKD/100
JA9DDM/106
KL7AHB/127
LU6DWA/104
OE8EPK/101
OH1TD/103
OK3CEE/106
PAØJIL/154
PY2CPU/152
TR8AC/130
VE3GCO/237
VE3IPR/118
VE3JGT/100
YV1EAH/202
K1AP/259
K1LJJ/136
AA2Z/200
KA2FRW/130
KB2ET/104
KD2G/101
W2DAU/105
WA2OOL/110
WA2PHA/101
WB2TBQ/116
K3STM/101
K3VY/102
N3AZU/100
W3CJI/201
W3DCT/104
W3GDK/211
WA3OID/100
WB3IET/119
WB3JWM/107
KB4HU/129
KB4NJ/104
KT4U/145
N4ABZ/122
N4BFW/111
N4NG/103
WA4FVT/262
WB4LMI/105
WD4BJS/102
WD4DZF/100
WD4MJP/121
K5AS/155
KA5CTZ/100
KB5IW/205
WA5BBR/106
WB5LWP/108
WB5MMM/100
WD5ABG/128
WD5FLK/109
K6LPL/238
N6AUA/108
N6AUO/108
N6BFQ/242
W6AEO/109
W6FWX/105
W6TJS/102
WB6CDM/101
WB6TKK/106
K7DK/150
K7LJQ/104
KB7DT/132
KB7JE/103
N7AGC/100
N7CY/100
W7LDJ/171
WB7NIW/151
WB7PHM/102
WB7TFT/116
K8JRM/157
KB8AU/109
KB8IO/109
KB8PK/101
N8BBJ/105
W8QWI/111
WA8UNP/100
WD8CEL/109
KØGND/104
KØSCM/136
NØASV/100
WBØMBD/104
WBØUFL/127
WDØCCL/101
KB9BX/110
N9JK/118
W9CA/135
W9XX/287
WA9BBX/101
WD9FKS/101
KØJCF/124

CW

DF8ZH/142
DK5XF/108
DK7SS/100
I8JOV/110
IN3KBZ/104
IT9VDQ/127
JA1IHE/104
JF3FMR/101
JA7AXB/110
OK3CEE/190
PA3ABB/118
PY2CPU/179
SM6HCJ/100
VE2FYR/104
VE3II/126
WB1HJF/102
WB3BVL/100
K4JST/102
W4BFR/109
W4UG/126
AE5H/120
K5AS/209
N5AW/134
W5VSZ/129
K5WE/132
KK6X/108
W6ATK/108
W6SYL/101
WD6GAR/103
N7US/117
W7YCK/101
AA8Z/169
AJ8J/106
W8QWI/116
K9BG/208
W9CG/102
W9NTY/105
W9XX/166
WD9IVC/117
KØJCF/124

5BDXCC

YO9APJ
W2LL
UK5MAF
SM5AKT
JAØDXG
W7IUV
K1MM
K1MEM
KØALL
W8NPF
N4CC
W2NC
JA3EMU
N4WJ
K3EKN
N4PY
K9FN

Endorsements

Mixed

DF9ZO/206
DJ3TF/151
DK5AD/260
DL1BO/355
DL1BS/291
DL1DA/266
DL7DX/249
DL7NS/298
EA3IH/178
F8DU/153
HB9AHL/303
HB9AMO/301
HB9JI/157
HC1HV/200
I1ZQD/212
I2VDX/291
IØJX/331
ISØLYN/249
JA1EOD/329
JA1JRK/330
JE1BSD/297
JA3DWT/300
JA3DY/341
JH3DAE/292
JH6HPL/294
JR6CWC/292
JH7BRG/256
JA8QO/229
JA9ESZ/300
KH6CD/358
KL7AF/253
KL7H/267
NL7J/121
KP4EBQ/260
OK1MG/212
OK3CEK/231
OZ1CTK/276
PY1HO/354
SK6AW/300
SM5BFC/266
SM6CVE/211
SM7BBV/313
SM7DMN/314
SM7DMT/178
VE2CK/VO1/200
VE3IPR/261
VE3LGQ/319
VE6AJF/172
VE7IG/330
YU4EBL/310
YV4BK/290
YV5AK/317
ZL1AH/336
ZL1CN/227
ZL4LZ/272
AG1J/263
K1MEM/307
K1PMJ/199
K1RQ/260
K1ST/272
K1THP/203
K1UO/302
K1VRT/146
K1WJ/290
K1WJL/280
N1AC/290
W1AFF/346
W1AXA/349
W1BFA/317
W1ETV/240
W1FX/266
W1GME/329
W1OD/121
WA1CCR/242
WA1EOT/302
WB1FRZ/178
WB1FSW/205
K2BXG/293
K2CM/331
K2JMY/339
K2LS/184
K2ON/200
K2YGM/291
KB2HZ/158
W2BDE/180
W2HGT/125
W2MIG/310
W2MOF/253
W2RC/150
W2SUA/323
W2TQC/351
W2TV/125
WA2CWP/129
WA2MNM/265
WB2HIQ/151
WD2AGS/137
K3NN/312
KA3BFX/192
KA3EGU/204
W3AX/289
W3GIA/219
W3NF/282
WB3CQN/235
WB3GPR/243
WB3JBF/230
AA4CK/281
AB4Z/280
K4LR/276
K4TFI/249
K4TSJ/305
K4TT/298
K4ZIN/141
KA4BFT/176
KI4M/290
N4AIG/125
N4JJ/305
W4BBP/343
W4WD/330
W4WFB/127
WA4GIQ/260
WA4MFS/264
WA4VSL/129
WA4YBV/251
WD4AJA/125
AA5C/176
AE5H/242
AG5X/255
AI5A/161
AI5B/281
K5AS/250
K5EOA/266
K5FNO/251
K5GOE/202
K5LIL/334
K5OS/326
K5QY/277
K5VR/163
KA5CTZ/120
KA5V/266
N5FW/292
W5GEL/330
W5JC/325
W5JE/200
W5NUT/353
W5SGT/175
W5VSZ/278
WA5TOS/242
WB5UDA/150
WD5ABG/129
WD5BCY/207
K6AAW/300
K6RK/301
K6XN/250
K6YKI/293
K6ZOR/200
K6ZXS/271
KB6BG/146
N6ADI/235
N6JV/311
W6DPD/202
W6DU/261
W6NLG/129
W6NPY/290
W6OMR/303
W6PLK/316
W6VUN/182
WA6AJP/253
WA6SZE/156
WA6TLA/290
AF7M/205
K7ABV/336
K7WA/161
K7ZA/281
W7CE/269
W7POC/158
W7RVQ/120
WA7BEV/311
WA7IRD/202
WA7NEQ/226
WB7BQA/178
AC8L/283
AD8J/125
AJ8L/166
K8CMO/293
K8GG/271
K8NA/305
K8VFV/252
K8ZR/314
K8BKW/273
N8TN/307
W8BE/314
W8NK/160
W8QWI/312
WA8OIY/283
WB8CSH/151
WB8KSG/199
AB9V/144
K9ARZ/252
K9BWQ/300
K9GSV/305
K9CJK/314
K9GM/328
K9IL/300
K9OTB/335
K9PPY/328
K9TUS/270
K9UWA/303
K9ZZ/226
KB9JF/183
N9AIB/151
N9RC/153
W9CA/199
W9IU/325
W9JI/203
W9MCR/300
W9NGA/298
W9YH/222
WB9KHK/140
WB9POH/252
WB9YXY/280
WB9ZBE/270
WD9ADB/203
ACØA/206
AFØQ/175
KØBX/227
KØGSV/305
NØAT/262
WØCAW/313
WØGXO/180
WØIQZ/127
WØJLC/163
WØNB/283
WØRT/240
WAØOTE/294
WBØNAA/261
WBØUFL/235

Radiotelephone

CT1FU/323
DA1MP/177
DK2BL/328
DK5AD/252
DK5XN/300
DK6XR/291
DL6QT/265
DL8KS/305
EA1VG/204
EA3AOC/280
EA3OJ/313
EA7ABV/159
EA8PP/253
G3YBH/239
I4FAF/250
I5FLN/327
I5WTI/340
I8JVK/237
IØJX/331
JA1EOD/327
JA1JRK/327
JE1BSD/290
JK1NLS/203
JF3ILZ/152
JH3DAE/278
JA8QO/199
JA9ESZ/294
KL7AF/226
KL7H/256
PJ3DO/174
PY3BXW/329
PZ1BK/200
S8AAP/160
SK6AW/299
SM5BFC/261
SM6CVE/196
SM7BBV/137
SMØAJU/299
VE3AZU/180
VE3LNW/150
VE3WT/337
XE1J/309
XE1NI/262
YV4BK/273
YV5IZ/228
ZL1AAS/295
ZL1AH/303
ZL1CN/178
ZL4LZ/272
AG1J/263
K1EFS/250
K1FPJ/152
K1MEM/290
K1ST/256
K1UN/201
K1UO/301
W1AFF/346
W1BFA/296
W1JR/251
WA1EOT/284
WA1KYW/301
WA1YTC/255
WB1DQC/268
WB1GDG/229
K2JMY/339
K2ZGC/149
KB2BC/125
KB2HZ/158
W2CPI/254
W2IJB/250
W2MIG/305
W2MOF/245
W2OEH/271
W2SUA/321
WA2CBB/227
WA2ETA/237
WD2AGS/132
AF3T/262
KA3BFX/187
KA3EGU/202
W3DQJ/239
WB3BAP/178
WB3EJP/200
WB3GPR/240
AA4CK/274
K4TT/259
KA4ABA/147
KA4BFT/131
KA4DI/292
KB4TE/159
W4WFB/127
W4ZCB/271
WA4BRQ/152
WA4MFS/245
WA4MMO/290
WA4VSL/128
WA4WTG/305
WA4YBV/250
WB4FOT/174
WB4KDU/139
WB4VBL/179
AE5E/177
AE5H/224
K5BG/253
KA5V/264
KB5AX/272
KB5DQ/207
W5TJQ/200
W5URN/205
W5VSZ/265
WA5HLO/167
WB5FLP/132
WB5HGS/300
WB5PBA/201
WD5DBV/261
WD5GIF/202
K6DQ/199
K6RK/280
K6ZXS/271
KB6BW/151
N6ADI/219
N6AFD/233
N6AHU/269
N6BLN/124
N6JN/211
N6JV/157
N6NA/333
W6DPD/202
W6LUR/124
W6MFC/260
W6OMR/265
WA6RLE/220
WA6SZE/155
WB6FBN/199
AF7M/153
W7DSZ/266
W7FXI/270
W7KZE/151
W7MSI/259
WA7CYB/173
WA7OBH/200
WB7BQA/178
WB7NCD/263
AC8L/283
K8CMO/290
K8GG/262
K8LZ/307
K8MG/226
K8NA/301
K8UQ/175
K8VFV/250
K8ZR/310
N8ANC/243
N8BO/287
W8BE/259
W8CNL/323
W8NVP/280
W8SET/290
W8WVM/161
W8ZET/321
WA8QIY/247
WB8CSH/139
WB8RMD/242
WD8JAB/232
K9ARZ/236
K9BWQ/300
K9IS/225
K9JF/182
W9DMH/219
W9YH/188
W9ZX/229
WB9JBH/182
WB9RPY/150
WB9YJW/178
WB9ZBG/152
WD9ADB/202
ACØA/203
KØEPE/307
KØGSV/283
KBØHJ/138
NØAT/257
WØNB/249
WAØOTE/288

CW

DJ5DA/204
DK5AD/192
DK5AD/W3/161
DK7XX/169
DL1BS/169
DL7DX/175
HI8LC/139
IØDYB/152
JA1JRK/296
JH7BRG/262
KL7AF/166
LA8CJ/192
OZ1CTK/208
PY2KN/180
SM6INC/152
SMØAJU/268
VE6AJF/137
YV4BK/199
N1AC/265
WA1CCR/179
WB1FRZ/173
K2IJ/241
W2MIG/241
W2NC/270
AA4CK/163
AG4S/198
N4RJ/303
W4WJ/260
WA4DAN/240
WA4MFS/150
K5EOA/182
N5AIL/142
N5DX/223
K6RK/145
K6YK/243
N6JV/252
W6BS/241
WA6TLA/278
WB6ZUC/271
AF7M/135
K7ZA/236
K7ZR/261
W8CEU/219
WA8SAE/142
AB9V/142
W9AG/165
NØHY/161
WØNB/207

QST Profiles

Conducted By Dave Bristol,* KA2BNV

Amateur Radio is in the Movies

Dave Bell, W6AQ, president of Dave Bell Associates, was born in Omaha, Nebraska, on January 11, 1932. Hollywood, California, is now home for Dave, his wife, Sam, and (off and on) two sons and two daughters. First licensed as W8GUE, in 1951, Dave has operated from Germany, Macao, Switzerland, France and Jordan, as well as many locations in the U.S. His station consists of a Drake R4C receiver with Sherwood filters, T4XC transmitter and a kilowatt amplifier. The antennas are Hy-Gain 5-element monoband beams on 10, 15 and 20 meters, with verticals and dipoles for 40, 80 and 160 meters. In 1957 and 1958, Dave first brought national attention to Amateur Radio when he produced The Ham's Wide World *episode for the ABC-TV documentary series* John Hopkins File 7. *He recycled the title in 1969 for a brand new movie,* The Ham's Wide World, *starring K7UGA, K4LIB and W2SKE. In the mid '70s he produced* This is Ham Radio *and* Moving up to Amateur Radio, *with NBC's Roy Neal, K6DUE, as host. Dave capped all this with* The World of Amateur Radio, *featuring Dick Van Dyke, K7UGA, K4LIB, K6DUE, WD6FBU (now KI6M) and JY1, plus dozens of other hams from all walks of life (August 1980* QST, *p. 48). The film was commissioned by the ARRL to provide positive information for delegates to WARC-79 and, later, to recruit more people into Amateur Radio.*

QST: *How did you first become interested in Amateur Radio?*

Bell: In the summer between the 8th and 9th grades I was listening to my favorite broadcast station one day when it was wiped out by a voice calling J9AAI repeatedly. I sought out the source of the interference, which turned out to be at the base of an enormous tower about a block away from my house. The culprit was W8LIO. I don't know how many people are attracted to Amateur Radio because of broadcast interference, but that's my story.

QST: *What are your two favorite aspects of Amateur Radio, and why?*

Bell: DX and eyeball QSOs are my favorites. I especially like eyeball QSOs with station operators from foreign countries because cultural differences are especially interesting to me. I guess I like DXing because it's harder to do than ragchewing and, after all these years, I find it both exciting and romantic.

QST: *What do you like best about DXpeditions, and why?*

Bell: As a DXer, it's fun to be on the other end of a pile-up occasionally. I also enjoy travel. Ham radio and travel are two of my favorite activities, and combining them is obviously pleasurable.

QST: *How has Amateur Radio helped your career?*

Bell: Ham radio is so totally different than my daily life that it's a relaxant — it helps me keep my sanity.

Dave Bell, W6AQ, spends one of those rare moments relaxing in his shack.

QST: *How have you helped the field of Amateur Radio?*

Bell: The films that I've made have helped popularize an extremely complex hobby, I think. I also think that the films have served as an introduction for a lot of people who otherwise would probably never have been attracted to the hobby.

QST: *What are your views on the newly allocated amateur bands?*

Bell: Like every ham I know, I think it's terrific that we got the new bands. I think the 10-MHz band ought to be all cw, since it's so small. In fact, as I suggested to ARRL Vice President Max Arnold, W4WHN, I think we ought to view that 50 kHz as the cw "portion" of the whole 10-MHz band (when we get it).

QST: *Who is the most memorable amateur you've met, and why?*

Bell: I've had the good fortune of meeting a lot of famous hams in the course of my filming, so I'm tempted to say the most memorable ham is JY1, or K7UGA, or Arthur Godfrey, or Bill Leonard or any of the other celebrities. But in thinking about it, I guess the most memorable ham is the late Sam Harris, W8UKS, W1BU and so forth. Sam was a guy with a constant twinkle in his eye and a good word for a new, not-too-bright ham such as myself. He was also a demon experimenter. For example, when transistors first came out, Sam took a week off from his job and fooled around with transistors on the kitchen table, "just to see what the little buggers would do." (Incidentally, he patented a number of transistor applications.) The day before the 15-meter band was made available to hams, Sam decided to be among the first people on. In less than a day he put together a 5-element beam at about 160 feet and reworked the kilowatt amplifier to work on 15. That was Sam.

QST: *What are your views on "no code" licensing proposals?*

Bell: I am against no-code licensing for a very simple reason: I think the Morse code is the glue that holds ham radio together. It is the one thing that all amateurs have in common (and the only thing). The "no code" idea is another example of fuzzy-headed thinking. Despite overwhelming evidence to the contrary, our government can't seem to get it through its head that people do not value things they don't have to work for. The fact that they *should* value something that's valuable, whether it's free or earned, is what a friend of mine would call "a crock of should."

QST: *What do you see in the future of Amateur Radio?*

Bell: You don't have to be clairvoyant to realize that ham radio is changing. Experimentation, construction and "breakthroughs of a scientific nature" will get to be fewer and fewer. Emergencies, social support (such as ham radio for the aged and infirm) will increase. According to a lot of social scientists, one of the biggest problems in this country is loneliness. There are very few cures for loneliness, and while ham radio is not a perfect cure it's probably the best one around — its value in this regard should be promoted whenever possible.

QST: *What are some of the activities that you are involved in outside of Amateur Radio and show business?*

Bell: Ham radio and my career account for about 195% of my time. The other 5% is spent in trying to find more time for ham radio.

QST: *Can you tell us something about your television interview show that has appeared on public TV?*

Bell: You are probably referring to some of the college credit courses which our company has done as in-service for school teachers. In the past, I hosted a few of those films for two reasons: (1) I was involved in producing the films and knew the subject, and (2) I work cheap. Other things we are working on at the moment are segments for NBC's *Real People* and segments for the new series *Speak Up America*, also on NBC. We are finishing three, hour-long documentaries for RKO and national syndication. *Hard Time* is about life in a maximum-security prison, *Whatever Happened to Lori Jean Lloyd* is about runaways and *Combat in the Classroom* is about violence in schools. We are also attempting to get a situation comedy started and are working on some feature films and movies for television.

QST: *Why do you like making movies and doing TV shows?*

Bell: Films and television are exciting, challenging and fun. I can't remember the last time I was bored, but I sure remember the last time I was exhausted.

QST: *What was the most exciting experience you've had on a set?*

Bell: Filming His Majesty King Hussein was probably one of the most interesting experiences of my career. His Majesty is a very imposing figure.

*Editorial Assistant, *QST*

The World Above 50 MHz

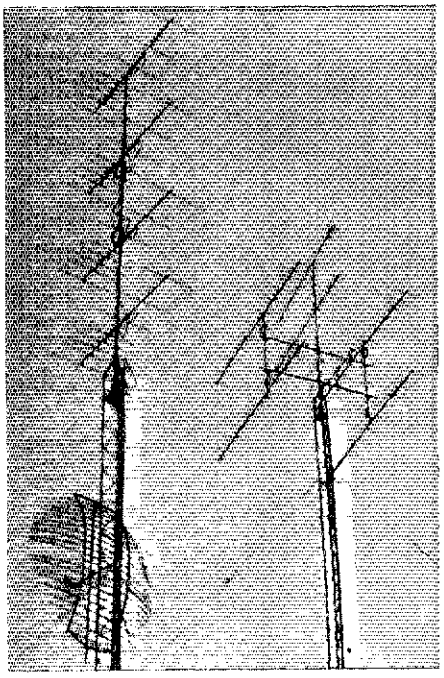
Conducted By
William A. Tynan,* W3XO

Another Chance

Most dyed-in-the-wool 6-meter operators, and many who rediscover the band only during years of high solar activity, will fondly remember the fall days of 1979. Yes, the DX worked over those two months, from mid October to mid December, surely ranked among some of the best ever in the history of our lowest-frequency vhf band. When conditions collapsed in the early days of January, many concluded that Cycle 21 was over, as far as 6-meter DX was concerned. This attitude has led many to give up on 50-MHz operation and go back, or on, to other pursuits. This may be a big mistake, as there is evidence that we may see 6-meter F2 propagation again this fall. Although conditions will probably not be up to the high level experienced last fall, effort expended could well result in some truly memorable contacts.

What leads me to the conclusion that 50-MHz F2 is not totally a thing of the past? For one thing, even the lackluster Cycle 20, which peaked in 1968, produced some 6-meter F2 contacts up through 1972. True, they were almost exclusively with South American stations and were limited to the southern tier of states. The other reason for some optimism is that, other things being equal, the month of November seems to be the best one, at least for the path from North America to Europe and the Far East — next best apparently is February. What appears to have happened last February is that solar activity, as judged by the 10.3-cm flux, was not quite high enough, at least not in company with reasonably low magnetic activity. Thus, if we have reasonably high solar activity over the next few months, while, at the same time, magnetic storms don't mess things up too badly, we may have an opportunity to work some pretty good DX again this year. This theory is borne out by long-time observer of solar events, Ed Tilton, W1HDQ. Ed's charts indicate that conditions should be reasonably good again in the late months of 1980. Certainly the high peaks of 10.3-cm flux reached in June and July show that "Old Sol" has not thrown in the towel yet. George Jacobs, W3ASK, in a recent issue of *Mail-A-Prop*, notes that a Zurich mean sunspot number of 157.2 was reached in June 1980, which he says results in a smoothed sunspot number of 165.3 centered on December 1979. George goes on to make a statement to the effect that the present cycle is continuing its statistical climb toward a maximum.

If the maximum did not occur during the fall of 1979, as many have assumed it did, but somewhat later (or if this cycle has a "back porch" similar to Cycle 20) we could yet be in for lots more 50-MHz F2 excitement. This is not the time to put that 6-meter rig back into mothballs. We *may* have another chance!



The antenna farm at W9UD Moline, Illinois. Jim's arrays include four 8-element KLMs for 2 meters at 80 feet, four 14-element KLMs for 1-1/4 meters at 90 feet and two 16-element KLMs for 70 cm at 95 feet. The fixed dish is for monitoring uhf TV channels.

SOLAR HOT LINE

For those trying to follow doings on the sun, NASA has established a special "hot line." The number is 301-344-8129. You must pay for the call but there is no charge for the information, which is derived from satellites carrying special instrumentation for recording solar events.

ON THE BANDS

6 Meters — Although 6-meter Es conditions were outstanding during July, they were somewhat overshadowed by the phenomenal performance of 2 meters. (See the 2-meter section, which follows.) Nevertheless, a great deal was worked on the band, including some rare double-hop states. K2OVS had just finished writing that he couldn't smoke out Wyoming, when along came July 17 and KA7EWZ; *voilà*, after 22 years, state number 50 for Jay! All operation has been with no more than 100 watts and a 6-element beam at 20 feet. I don't know how Jay found time to work 6 when he ran up such a total on 2 meters that great evening.

A letter from W1DDV/C6A summarizes Dave's operation from the Bahamas during July. He has worked all of the states in all 10 call areas except the 7th, as well as several in that part of the country. His log also contains some nice DX calls such as HI8DAF, HP1XRK, HP1XDZ, KV4FZ, KP4FMN, WP4ACQ, KP4EOR, PJ2DW, PJ2DEW and DL3ZM/YV5. A 7-element KLM is now in place at 35 feet and a 100-watt amplifier should be on stream by the time this appears. That other busy representative of C6A, C6AUY, has moved to Puerto Rico and is active as WA7UWE/KP4. KB7Q Bozeman, Montana, notes good double hop the evening of July 27. One of the goodies Gene picked up on that occasion was the aforementioned W1DDV/C6A.

SM6PU writes that Europe experienced a very strong Es opening July 11, which also affected 2 meters. Olof heard the FY7THF beacon from 2055 until 22277, with signals peaking at 579 about 2145. He notes that the signal had little QSB. Others hearing the French Guiana beacon that evening were EI6AS and several Gs, including G4BPY. The latter reported hearing it for only about 2 minutes at 2033Z. It was also reported heard in England by G4BPY on June 27, 28 and 29, and by EI6AS on the 28th. The characteristics of the propagation appear similar to reception of the ZB2VHF beacon, here on the East Coast, reported in last month's column. SM6PU also reports several 10-meter crossband Es contacts with Irish and Italian stations, and 10-meter to 4-meter QSOs with Ireland, England and Wales.

ZL1MQ sends along an interesting F2 report. Cliff says that he worked PY2XB on April 13 for the first New Zealand-to-Brazil 6-meter contact. What was particularly interesting was that his beam was aimed at California, while Fred's was pointed toward Europe. Cliff speculates that there must have been a very strong backscatter area somewhere over the Atlantic. Signals were 5 × 7 both ways.

2 Meters — It goes without saying that the principal news for the latter half of July and early August has to be "the greatest E-skip opening of all time." That's how many described it, and that's the way this conductor sees it, too. Never before, to my knowledge, has 2-meter Es been so widespread and prolonged. "The band sounded like 20 meters," is an oft-repeated phrase in the large stack of mail that has been received up through the first few days in August, when I had to depart for a West Coast trip and the Central States VHF Conference in Colorado Springs. The *QST* space allotted to this column does not permit my covering all of the reports received, but I will try to summarize enough of them to provide a glimpse of that gargantuan event of July 17. A letter received from K4SAO Inman, South Carolina, provides a good overview from that part of the country. Don worked 17 stations in Minnesota, three each in Wisconsin and Kansas, two in Colorado and a single station in each of the states of Texas, Missouri and North Dakota. To top it off, VE4MA in Winnepeg was contacted as well. The rig at K4SAO consists of a Yaesu FT-225RD running 25-watts output! At times, Don dropped his power to less than 1/2 watt with little effect on reception by stations at the other end. One sporting even less power than K4SAO is WB2IKL Bayonne, New Jersey. With an IC-202 producing a mere 3 watts to a 5-element beam, he picked up Iowa, Nebraska, Illinois and South Dakota. Another Jerseyite, W2RS, reports similar results. Using his Kenwood TR-9000 and 4 elements at 35 feet, Ray had a total of 16 QSOs in five Midwest states. Like many others, K2OVS on Long Island used the massive opening to up his state total. A contact with NØAIT South Dakota brings Jay to 35. A few other East Coasters also benefited from the fine operating of NØAIT, who incidentally is WØSD's son. This conductor overheard Curt answering a question as to how many stations he had worked that day. His response was "260, so far!" Among those gaining a South Dakota contact by virtue of NØAIT's snappy operating was WB2CUT Metuchen, New Jersey. Rich worked a total of 36 stations and added two states to his total — South Dakota and Kansas. WB2CUT now stands at 32. Another helping his position in the standings is K8RZB Conover, Ohio. Bob says that, in addition to working Texas and Oklahoma stations, he was one of the lucky ones to nab K5FF, W5FF and W5HM, New Mexico. Like K2OVS, his total is now 35.

With all of this activity, there should be quite a few changes in the standings. Many stations who could not make the grade before should now be qualified for listing. Remember, I am culling out those who have not reported their status within the past two years to make room for those who are active. It helps my job a great deal if states are reported on the special forms I have had printed. Please don't put other information on these forms, such as general reports of activity and openings. If I encounter such other information, I normally put the form containing it into the stack of mail for consideration in writing the next column, instead of immediately into the state-box file. Occasionally, such forms or other state-box information not going right to the file becomes mislaid and hence the next publishing of the box does not carry the correct information. I try not to let this happen, but sometimes it does. If you do not have any of the forms, drop me an s.a.s.e. and I'll be happy to send you some. A number-10 envelope is best. Those postcard size envelopes require so much folding of the

*Send reports to Bill Tynan, P. O. Box 117, Burtonsville, MD 20730, or call 301-384-6736 and record your message.

As proof that dishes can be useful for applications other than eating from and providing gain, W7LUX finds a perfect place to warm his hands on a cold May morning. The photo was snapped at the antenna-gain-measuring session held in conjunction with the 1980 West Coast VHF/UHF Conference, Santa Barbara, California. *(K6ZMW photo)*

forms that they get all wadded up. Enough of this trivia; back to the opening.

From Pensacola, Florida, WB4BSZ reports that he worked the states of Iowa, South Dakota (NØAIT again), Nebraska, Wisconsin and two stations in Colorado, WBØRRU and WBØQMN. Rob says that he got his kW going just 15 minutes prior to the opening. VE3FN makes comments similar to many others. Ray notes that he has never seen a 2-meter Es opening cover so much territory and last so long. From his Ottawa QTH, he reports working stations as close as the Chicago area, about 650 miles (1050 km) and as far as Oklahoma City, 1300 miles (2100 km) distant. Speaking of distances, there were some pretty good paths covered during the course of this super opening. WBØTEQ Garden City, Kansas reports working WA1MAO Tolland, Connecticut, which I calculate to be 1527 miles (2458 km). In addition, K5FF near Albuquerque hooked up with K3BA Hagerstown, Maryland, which is nearly 1600 miles (2570 km). K5FF, and OM W5FF, also QSOed a number of eastern stations in Kentucky, Indiana, Illinois, Ohio, Western Pennsylvania, West Virginia, Virginia and the Carolinas. Incidently, Lee tried to get someone to run with her on 1-1/4 meters but much telephoning did not produce anyone ready to go. WØVB and W3IY/4 almost had better luck. They heard each other on 220.1 but conditions did not remain in long enough to confirm the necessary information for a contact. Another good 2-meter DX example is W2AZL New Jersey working WØRRT in southwest Nebraska around 1500 miles (2400 km) with the Ø running 10 watts to a vertical.

From the rare state of North Dakota, KØALL reports that he was alerted by a phone call from K3ARN here in Maryland. Naturally Charlie needed North Dakota. Ron got on and proceeded to work 58 stations in 11 East Coast states. You guessed it. He was unable to work Charlie.

If it were not for the huge proportions of the July 17 opening, other notable events would have been more than enough to warrant extensive column coverage. For example, AIØL, La Plata, Missouri, submits a list of 315 stations in 27 states and two Canadian provinces worked between July 1 and 22. A large percentage of these were on the 17th, but by no means all. Tropo between the 12th and 14th and aurora on the 18th accounted for many. In addition, a few days before the 17th, there was an extensive tropo opening across the Midwest and South reported by N4JS/5 Meridian, Mississippi, and several others. There were also two or three good auroras, including one the evening of July 18. N4CD Lynchburg, Virginia, notes working stations from New Hampshire to Wisconsin on that occasion. Bob was active the night before also and was one of the lucky ones to pick up New Mexico by working K5FF. Another Es opening took place a few days after the "big" one. On Monday evening, July 21, the band was open from the central part of the country to the Pacific Northwest. WØRSJ Dodge City, Kansas, reports working a number of Oregon and Washington stations as well as WA1JXN/7 Montana. Another Kansas station, NØLL, worked, among others, W7FN Seattle providing that well known 2-meter operator his 50th state. It's somewhat unusual for a moonbouncer to get the last state via Es but I am sure that Don will take it.

In other 2-meter news, VP9IB writes that he is running a breakable beacon on 144.2 whenever he is in the shack. It sends VP9IB BEACON at about 18 words per minute once every 15 seconds. Tom's address is Thomas S. Hall, P. O. Box 111, Southhampton, 8-05, Bermuda.

It is with great sadness that I report the passing of K3BA only a few days after receiving confirmation of his noteworthy contact with K5FF, reported above. Hal will be missed on the band.

70 cm — WB6NMT San Diego reports another of those famous California-to-Hawaii tropo openings. Louis says that he first heard the KH6HME 432-MHz beacon when he arrived home at 2045 PDT Tuesday July 22 (0345Z July 23). The next morning at 0630 PDT it was still there. That evening, a number of Los Angeles stations were copying it too. It was not until the next day, Thursday July 24, that contacts were made when KH6IAA drove up the mountain to where he could get into the duct. Al worked WB6NMT, AA6DD and N6NB, as well as several other 70-cm stations at that time. WB6NMT and N6NB also made the grade on 223.5 MHz fm for the first 1-1/4-meter contact across the path in over 20 years. In addition, WB6NMT worked Al on 2-meter ssb with S9 reports, but signals soon faded and it is understood that few 2-meter QSOs took place. Louis was away over the weekend attending the ARRL National Convention, so details for that period are sketchy. It is understood that KH6IAA/KH6 was active again making a number of contacts, including KD6R on Mt. Palomar, showing that California stations at elevated locations (4500 feet) can get into the duct, at least at times. When WB6NMT returned from the National Convention the KH6HME beacon was still in, as it was for the next several days. Altogether the path was open for a total of nine days.

One interesting aspect of the opening was the scarcity of 2-meter results. A number of attempts to hear and access 2-meter repeaters at each end of the path were unsuccessful.

One of the most fascinating uhf tropo tales this conductor has heard in some time comes from W5GVF. Bill tells of a trip that he and Carl, WA5TBE, took from Corpus Christi to Houston on July 12. They rode in Carl's pickup which was adorned with a rotator and antennas for 70 and 23 cm. Some might recall that this same pair accomplished the first known mobile m.s. contact, working KØMQS Iowa on 2 meters from a similarly equipped vehicle several years ago. On this year's jaunt, they were able to keep busy during the whole 200-plus-mile (320-km) trip, working 432 ssb. Contacting W5HN in Dallas 265 miles (425 km) to the north on 70 cm, they decided to try the higher band. The 23-cm rig consisted of their 70 equipment followed by a tripler producing 2-1/4 watts into a four-foot loop Yagi. Unfortunately they forgot to bring along a key so they tried whistling code into the mike. Result was a "599" report from W5HN who was 5 × 9 plus 30 dB on ssb in the truck. Next heard from was WB5LUA, another 30 miles (45 km) to the north of W5HN. They also completed a two-way with Al using the same technique. The only problem the pair had was trying to whistle understandable Morse while endeavoring to hold back the laughter. On the return trip things weren't so funny. About 100 miles out of Houston they encountered a serious accident. Their 70-cm ssb rig came in handy for reporting the situation to Houston station WA5VAJ, who phoned the Texas Highway Patrol. Having an amplifier and a beam makes 70-cm mobile really practical and fun is the conclusion that Bill and Carl have reached.

Many have reported excellent tropo conditions over the summer. As would be expected of tropo, all vhf bands have been affected. K4GL Pickens, South Carolina writes that he caught a fine opening July 12. Worked, on 70 cm, were WA4IPI Kentucky, W9ZIH, K9HMB and WB9SNR Illinois and W8DJY Ohio. Jack has a kW, and a 4-quagi array should be in place by the time this appears. An EME array, consisting of 16 EYE Yagis, is also in the works. It looks as if K4GL should be a good bet for those needing South Carolina. He is also active on 6, 2 and 1-1/4 meters. Another active 70-cm station, WA4CQG Auburn, Alabama reports that July 1 was a big day for him. Dale managed contacts with Missouri, Iowa, Wisconsin, Minnesota, Indiana and Michigan on that occasion. The opening brought his state total to 25.

23-Cm Standings

Figures are states, U.S. call areas (plus VE and XE call areas, plus other DXCC countries not located within the borders of the above) and best DX in miles.

K1PXE	13 5	448	W5GVE	11	366
W1JR	10 4	475	K5PUF	11	290
K1FO	10 4	405	W5HPT	11	257
KA1GT	7 4	360	WA5HNK	11	250
W1XP	7 3	300	K6ZMW	3 3	402
W1QXX	6 3	260	W6XJ	2 3	250
WA2LTM	17 6	770	W6OCU	2 2	200
K2UYH	17 6	770	N6NB/6	1 2	420
W2VC	13 5	537	N6CA	2 2	—
K2JNG	10 4	305	WB6NMT	11	296
W2DWJ	10 4	200	N6TX	11	112
K2YCO	8 5	570	K7GNV/7	3 3	402
WA2VTR	6 4	320	N6CA/7	11	220
K2EVJ	5 3	247	W7LUX	11	130
WA2FUZ	5 3	125	K8WW	6 4	448
WA2EUS	4 5	320	W8YIO	5 4	551
K2OVS	3 2	135	WB8PAT	3 3	405
W3HMU	11 5	300	WB8BKC	3 2	165
K3IUV	9 4	290	W9ZIH	10 5	790
WA3JUF	7 4	300	W9UD	5 4	760
K4QIF	15 6	790	W9HUV	5 3	525
K4NTD	3 7	847	W9JIY	5 3	300
W4VHH	3 1	350	WB9SNR	4 2	325
W4LDV	1 1	290	W9WCD	3 3	770
WB5LUA	4 2	760	W9JTP	3 2	165
K5LLL	2 2	847	WØZJY	3 1	170
W5LDV	2 2	838	WØPW	3 2	97
WB5TCO/5	2 2	218	WØMDL	2 2	340
W5HN	2 1	365	WØVB	2 2	290
W5UKQ	2 1	365	XE2BC	1 1	420
WA5TBE	1 1	372			

Strays

1980 JAMBOREE-ON-THE-AIR

☐ The 23rd annual BSA Jamboree-on-the-Air (JOTA) will be held on the weekend of October 18 and 19. JOTA presents Cub Scouts, Boy Scouts, Girl Scouts, Explorers and Girl Guides the opportunity to talk with distant fellow Scouts via Amateur Radio. Interested hams are asked to contact their local Scout troop and invite a group into their shacks for a specified period of time during this two-day event. Control operators should monitor all the activity to prevent the Scouts from unknowingly engaging in illegal third-party traffic (conversations with others in countries not having third-party agreements with the U.S. or Canada).

Certificates are available for all participants, whether they listen, look, talk or operate the stations, for an s.a.s.e. to Harry Harchar, W2GND, JOTA Coordinator, 216 Maxwell Ave., Hightstown, NJ 08520. Hams and unit leaders are also asked to submit reports and photographs to this address for consolidation and forwarding to the World Scout Bureau. Operating details and frequencies are in "Contest Corral," this issue. — *Sally O'Dell, AE8P, Youth Groups Program Manager*

SHORTWAVE NEWS BULLETIN

☐ A bimonthly news bulletin devoted to the DX listening hobby, containing technical and general interest articles, is available for $7 per year (sample copy $1) from World Shortwave Listeners Club, 80 Hartsdale Ave., White Plains, NY 10605.

QST congratulates . . .

☐ Joseph and Jean Schwartz, K2VGV and WA2JQC, of Flushing, NY. Joseph was recently elected president of the National Association of Civilian Conservation Crops Alumni and Jean was appointed secretary/treasurer.

YL News and Views

Conducted By Jean Peacor,* K1IJV

New Clubs Offer New Awards

In April 1979, YLs in Great Britain formed a new YL club, BYLARA (The British Young Ladies Amateur Radio Association). Nine YLs attended the first meeting. Volunteers from this group gave the club its first slate of officers: Mary Adams, G4GAJ, president/chairman, Rita Shephard, G3NOB, treasurer and Diana Hughes, G4EZI, secretary. The club last reported more than 100 members, after just a few short months. YLs worldwide are welcome to join, both licensed amateur operators and SWLs with a common interest in Amateur Radio (OMs may be associate members).

The club sponsors a BYLARA Award for working YL members; SWLs are also eligible on a "heard basis." Award requirements follow. *Britain and Europe:* Work 15 YL members of BYLARA, to include 10 British YLs (G, GM, GW, GI, GD, GU, GJ). *DX outside Europe:* Work 10 YL members, to include 6 British YLs. *Starting date:* April 29, 1979. All bands, all modes, one contact per member. Special endorsements available on request, e.g., all cw, all 10-meter ssb. *To apply:* Send log data, signed by applicant, with fee of £1.50, 12 IRCs or $4 (U.S.) to Diana Hughes, G4EZI, 3 Primley Park Crescent, Leeds LS17 7HY, England. No QSLs necessary.

There is a BYLARA net on Mondays on 3605 kHz plus or minus QRM at 1915 (UTC) (winter) and 1815 UTC (summer). For 30 minutes the net is for YL discussion, after

Diana Hughes, G4EZI.

which other stations may call in.

Membership in BYLARA may be obtained by contacting Judith Brooks, G4IAQ, treasurer, 28 Avon Vale Rd., Loughborough, Leics. LE11 2AA, England. Dues are £1.50 or $4 (U.S.).

One of the club's aims is to stimulate interest among YLs. Diana Hughes, G4EZI, certainly perpetuated that aim by kicking off YL Activity Day. Diana writes that she is not certain exactly where the idea originated. She believes i has been tried before but now, by the additio of "look for YLs on the hour every hour on th 6th of each month," a better frame· o reference has been provided. Suggested fre quencies — ssb: 14,288, 21,388, 28,588 an 28,688 kHz; cw: 14,058, 21,133 kHz; an Novice: 7133 and 28,133 kHz.

YL Activity Day provides a good opportun ty to work toward the BYLARA certificate, a many of its members are active that day. It pro vides the same opportunity to work toward th many other YL certificates. Remember the 6t of every month.

WYO YLs

WYO YLs is a new (year-old) organizatio for YLs in the state of Wyoming. Cath Markley, WB7WQR, is serving as presider and Foncey Taylor, N7AKM, is secre tary/treasurer.

There are only about 62 YLs in the stat with perhaps half of those active on vhf fre quencies, so earning the club's new award ca be a challenge. Four YLs must be contacte The award is given for phone (any and a bands) and cw (any and all bands), as well a for 2-meter contacts. The certificate read "Congratulations. You have roped in fou Wyoming YLs." For QSL confirmation an your certificate, contact Shirley Tastad KA7FYB, 519 Flint St., Laramie, WY 82070

LETTER FROM AN LSPHER

An excerpt: "Shame on you for not knowing about the joys of galena/catwhisker receiver construction and operation. (See May 1980 *QST*) Few males know that homemade crystals of babbit and sulphur were better than the bought ones. Too, we used a nickle or a Gillette razor blade for a crystal — not as good as a crystal, but they worked. I enclose a page of circuits from an *old* notebook. Try one, it's fun!" — *Helen Douglas, W5LGY.*

Helen, who lives in Commerce, Texas, mentioned the term LSPHers in the same letter. This article is a result of the correspondence that followed.

Helen's interest in Amateur Radio goes back to her early childhood. As a child, she well remembers first hearing the sound of code at the railroad station as Western Union messages were clicked out on a Prince Albert tobacco can to improve the tone. To Helen, it was fascinating "music" that she looked forward to hearing every time she went to the station. After receiving her Master's Degree and becoming financially independent, she was ready to pursue this interest. Her marionette and philatelic hobbies were then put out to pasture.

Unfortunately, the time was right during WW II, when there were no hams on the air, and none locally, to help. Equipment was frozen for military use. With the help of an Instructograph tape machine and BBC newscasts in code, she obtained her General class (Class-B operator's license) in February 1945. Since no

Helen Douglas, W5LGY

station licenses could be issued, such licensees were dubbed LSPHers (licensed since Pearl Harbor). Fingerprints and photographs accompanied all license applications. Following WW II, such licensees could make application for station licenses. By then, Helen had her Class-A operator license.

Helen soon discovered that, in that era, not all OMs greeted a woman on the ham bands with open arms. To the best of her knowledge, of the approximately 1500 women licensed at the time, only 300 had Class-A privileges. Only time convinced many OMs that the women had indeed earned that privilege.

Helen has participated in many emergenci throughout her years of hamming. She served as Ar Emergency Coordinator for 20 or more consecuti years; is a charter member of the Commerce rad club and the Texas YL Round Up Net; past treasur of CHC; and is QCWA no. 10370. She has built kinds of radio gear and assisted many along the way becoming Novices. Ham radio has enabled her to me many grand people, both on and off the air.

The *Commerce Journal* recently chose Helen as t subject of a front-page editorial, which coupled h Amateur Radio activities with her interest as a amateur meteorologist. During the heat wave this pa summer, she was able to make many comparison relating to the weather in Texas. Her records of dai temperatures and rainfall date back to 1954, the ye her mother turned this task over to her.

As a long-time resident of Commerce, Helen h written numerous historical manuscripts on differe aspects of Commerce and Hunt County. She is cu rently working on the history of local businesses (19 to 1909). Surprisingly, she's finding that many wom were involved in the business world at the time; a tin when women were expected to be in the home. She also working with the local East Texas State Universi Archive Committee.

All these activities do not interfere with Helen Amateur Radio activities. She's on the air every da Galena and catwhiskers may be radio parts to som for me, through a letter to the editor, they produc the story of a YL who would be a delight to meet either on or off the air.

*Country Club Dr., Monson, MA 01057

47th ARRL November Sweepstakes Announcement

The November SS signals the start of another "contest season." It's also a good time to start to organize your own and your club's contesting efforts. A good place to start looking for information is a thorough review of the ARRL contest disqualification and club competition rules, which is found on page 90 of January 1980 *QST*.

Something new in the way of penalties for miscopied call signs is in effect for the first time in the 1980 SS (in fact, in all ARRL contests since January 1980). Three additional QSOs are removed from an entrant's log for each miscopied call that is removed by our log checkers at Hq. Quite an incentive to ask for fills/repeats rather than guessing to fill in the missing letter.

The only other change in the SS format has to do with time-outs. The minimum length of a time-out has been increased from 15 to 30 minutes for the 1980 contest.

It's not too early to request official entry forms. Send a self-addressed, stamped (one unit of postage for each five forms requested) envelope. You will want one summary sheet (use a separate one for each mode if you are going to operate both phone and cw), enough log sheets (100 QSOs fit on each log sheet) for as many QSOs as you think you will make and one dupe/check sheet for each mode worked.

Remember to postmark your entry no later than December 16, 1980, and send it via first class mail to be sure that it arrives in time to make the *QST* listings. An entry that arrives after December 30 may not make the *QST* listings. For a little insurance and peace of mind, you might want to include a self-addressed, stamped postcard along with your entry. We will mail the card back to you upon receipt of your entry.

Club officers are reminded to fulfill the membership list requirements for the affiliated club competition. Good luck!

Rules

1) **Object:** For stations in the United States and Canada (including territories and possessions) to exchange QSO information, as detailed in Rule 4, with as many other U.S. and Canadian stations as possible on 160 through 10 meters.

2) **Contest period:**

(A) **Cw** — First full weekend in November.

(B) **Phone** — Third full weekend in November.

(C) **Time** — Begins 2100 UTC Saturday and ends 0300 UTC Monday. Operate no more than 24 of the 30 hours. Off periods may not be less than 30 minutes in length. Times off and on must be clearly noted in your log, and listening time counts as operating time.

3) **Categories:**

(A) Single operator. One person performs all transmitting, receiving, spotting and logging functions.

(B) Multioperator, single transmitter only. Those obtaining any form of assistance such as relief operators, loggers or use of spotting nets.

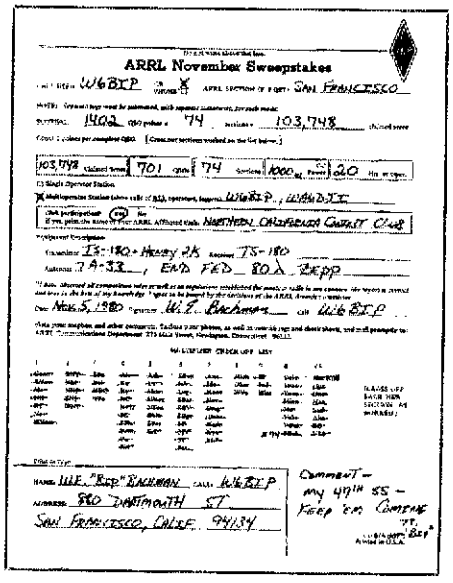
4) **Exchange:** A consecutive serial number, precedence ("A" if you run 200 W dc or less, "B" if more than 200 W), your call sign, check (last two digits of the year you were first licensed), and your ARRL section. For example, KN6M answers W1AW's call by sending W1AW NR178 B KN6M 55 EB for QSO number 178, more than 200 watts, first licensed in 1955 and East Bay section.

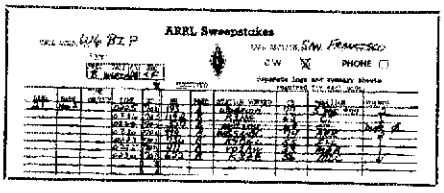
5) **Scoring:**

(A) QSO points. Count two points for each complete two-way QSO. No cross-mode contacts. Work each station only *once*, regardless of the frequency band.

(B) Multiplier. Each ARRL section (listed on page 8 in this issue) plus VE8/VY1 — maximum of 74. KP4, KV4/KP2 and KG4 stations are in the West Indies section, while KH6 and other U.S. possessions in the Pacific count as the Pacific section.

(C) Final score. Multiply QSO points (two per QSO) times the number of ARRL sections (plus VE8/VY1).





6) **Miscellaneous:**

(A) A transmitter used to contact one or more stations may not subsequently be used under any other call during the contest period (with the exception of family stations where more than one call is assigned by FCC/DOC).

(B) One operator may not use more than one call sign from any given location during the contest period.

(C) The use of two or more transmitters simultaneously is not allowed.

7) **Reporting:** Contest forms (log sheets, summary sheet, dupe sheet) are available from ARRL hq. for an s.a.s.e. Official forms are recommended. Any entry claiming more than 200 QSOs must submit duplicate-checking sheets (check sheets). Incomplete or late entries will be classified as checklogs. Logs should include dates, QSO times, exchange sent/received, band and mode. Postmark your entry within 30 days after the phone portion of the contest (December 16, 1980).

8) **Club Competition:** ARRL-affiliated clubs for club gavels and awards in the local, medium and unlimited categories as described in January 1980 *QST*, page 90.

9) **Awards:** Certificates to the top single operator cw and phone scorers in both the "A" and "B" categories in each ARRL section, and the top multioperator entry in each ARRL Division.

10) **Conditions of Entry:**

(A) Each entrant agrees to be bound by the provisions as well as the intent of this announcement, the regulations of his licensing authority and the decisions of the ARRL Awards Committee.

(B) Disqualifications: See January 1980 *QST*, page 90.

Suggested Frequencies

Cw	*Novice*	*Phone*
1800-1810		1810-1820
3550-3650	3710	3850-3950
7050-7100	7110	7200-7250
14,050-14,100		14,250-14,300
21,050-21,100	21,110	21,300-21,400
28,050-28,100	28,110	28,550-28,650

Contest Period

	Starts	*Ends*
Cw —	Saturday, Nov. 1 2100 UTC	Monday, Nov. 3 0300 UTC
Phone —	Saturday, Nov. 15 2100 UTC	Monday, Nov. 17 0300 UTC

Explanation of Exchange

	Number	*Precedence*	*Call*	*Check*	*Section*
Exchanges	Consecutive serial number	Power input more than 200 W dc	Send your station call	Last two digits of year first licensed	Your ARRL section
Sample	NR178	B	KN6M	55	EBAY

Results, 1980 ARRL International DX Contest

The times they are a-changin'.

Tom Frenaye,* K1KI and Bill Jennings,** K1WJ

The 1980 running of the ARRL International DX Contest bore little resemblance to its 45 predecessors. This year's contest saw the addition of single-band categories, an expanded awards program and a basic change in the contest format that permitted non-W/VE stations to work each other for QSOs, points and multipliers.

Despite mediocre propagation during the cw weekend, the conditions during the phone weekend were outstanding, contributing to a healthy increase in entries received — just breaking the 4000 mark (1914 on cw and 2095 on phone).

While the change to single-band categories and the various plaques offered proved to be very popular, the change to a "world works the world" format proved to be quite controversial. After considerable deliberation by all concerned, it was decided to go back to the previous contest format, with United States and Canadian stations working the rest of the world, and vice versa. The rest of the changes will remain in place and, in addition, a limit to station size (500-meter-diameter circle for all transmitting and receiving equipment — not antennas) will be implemented for the 1981 contest. Full details of the rules for the 1981 contest (February 21-22 for cw and March 7-8 for phone) will appear in an upcoming issue of *QST*.

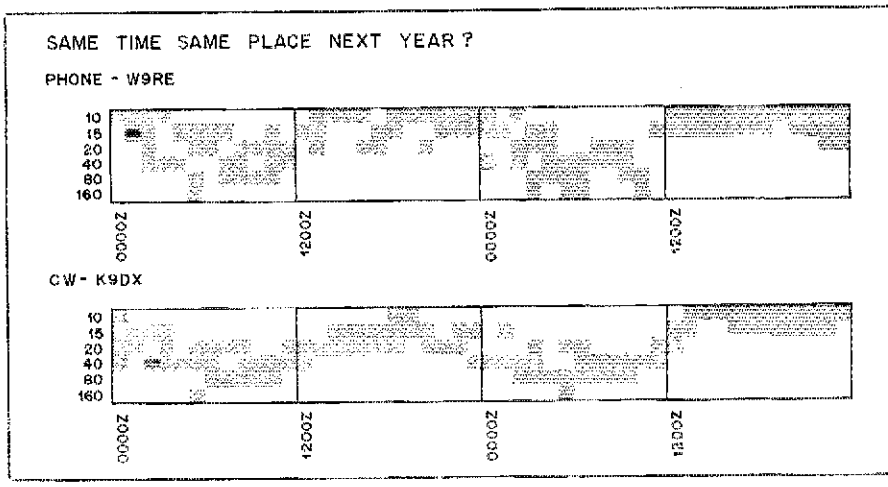
Perhaps the best way to point out the top scorers is to go down the list of those winning plaques this year. Though the top/W/VE single-operator scores seem to come from the northeast, probably because European multipliers are easier to catch on the low bands, it is interesting to note how well the winners are spread across almost all U.S. call areas and Canada. Cracking the top ten from the midwest and western U.S. has always been a tough job so it's good to see propagation and operator ability helping out K9DX, KØRF (WØUA) and K1EA/5 on cw and W9RE, W9ZRX and N7DF on phone in their quest for the top single-operator score. The single-band category seems to have captured quite a crowd of supporters with a large percentage of 28-MHz phone entries, with VE6WQ making good use of JA QSOs to overcome the multiplier advantage enjoyed by K1UO in Maine. In fact, several single-band efforts topped those of the big multi-multis.

Looking farther down the list shows some pretty intense competition at the multi-single and multi-multi level. The battle of phone giants was settled in favor of the N2AA crew, with the help of some imported talent. Hard to believe more than 6000 QSOs is possible in one weekend, including nearly 2700 on 15 meters alone, though someday a group will undoubtedly manage to work 5BDXCC in a contest weekend. You might look back to the results of the 1976 contest when the big scores were around 3500 QSOs in the multi-multi category and single-operator totals were about the same as this year's contest. Then remember that back then it was a 96-hour ordeal. Seems like someone decided to make the assembly li move faster and faster and . . .

Not to be overlooked was the competitio from the other side. The Caribbean was t place to run up the big scores, with VP2ML phone and K1ZZ operating VP2ML on cw ta ing the honors. Incidentally, note that the effort required an average of 99 QSOs per ho for the *entire* contest. Leading the Europea scores on phone was OH3YI, with two SM a two OH stations right behind him, seeming show that with peak conditions, the northe Europeans do get their day in the sun. G3FX found himself at the top of the familiar Eur pean cw scores, but with unusually strong co petition from OZ1LO and OK1ALW, be anxious to dethrone him.

*Assistant Communications Manager, ARRL
**Communications Assistant, ARRL

"Change is one thing, progress is another. 'Change' is scientific, 'progress' is ethical; Change is indubitable, whereas progress is a matter of controversy."
— Bertrand Russell



A close look at the W9RE phone and K9DX cw efforts will show you that band-changing strategy is a very important part of top scores. Notice that there are very few times when an hour goes by without a band change, either to snag new multipliers or to keep the QSO rates high. The phone weekend was blessed with outstanding propagation, shown by the reliance on 10 meters for muc of the contest. On cw the effects of a major solar storm can be seen until 1600Z the first day, along with a gradual improvement in conditions through the second day. Local sunrise was at about 1245Z and local sunset about 2345Z.

Activity seemed to be up from all corners of the world, with multiplier totals at the highest levels ever. W/VE logs alone showed more than 700 calls from 90 countries on 80-meter phone and 500 call signs from 90 countries on 40-meter phone. Many thanks to those casual and not-so-casual participants who took the time to send in their logs for this year's contest. A very special thanks to those clubs, groups and individuals who are sponsoring plaques for the big winners. As usual, certificates should be in the mail by mid-month.

As you might imagine, with the uniqueness of the 1980 DX Contest rules, it is nearly impossible to justify trying to make comparisons to DX contests past or future. We'll simply bypass the all-time records comparison and issue a hearty "well done" to all participants of the 1980 contest, especially our certificate and plaque winners.

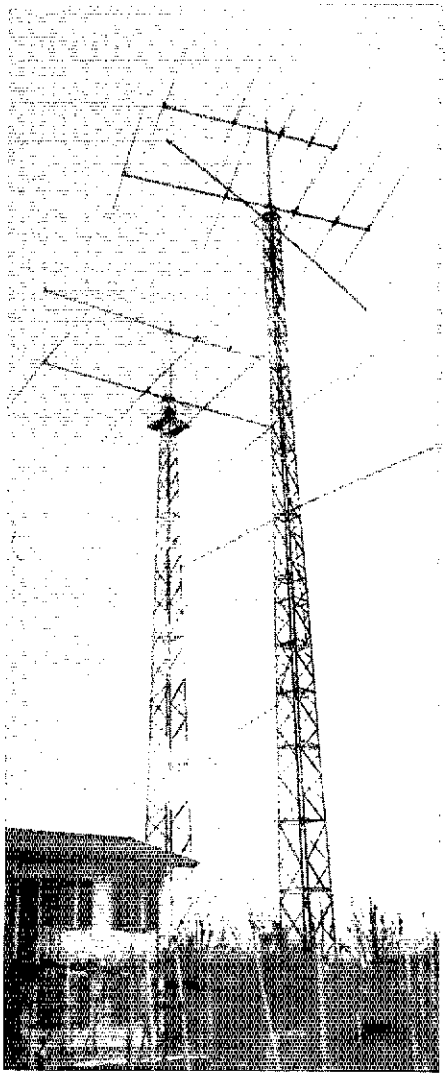
The Clubs

Frankford Radio Club, Murphy's Marauders and the Central Virginia Contest Club are to be congratulated as club gavel winners in the unlimited, medium and local club categories, respectively. As we see the number of clubs competing in the club competition rise,

United States and Canadian Plaque Winners

	Winner	*Donor*
Phone		
Single Operator		
All Band	**K1VTM**	Frankford Radio Club
28 MHz	**VE6WQ**	Roy and Kathryn Tucker, N6TK and AA6TK
21 MHz	**N7XX (WA1KKM)**	Hamfesters Radio Club
14 MHz	**K9DX**	Richard Loehning, N9ACP and Mark Michel, W9OP
7 MHz	**WA7ZLC (N4EA)**	David Thompson, K4JRB/K5MDX
3.5 MHz	**WA4SVO**	Gary Firtick, K1EB/W1EBC
1.8 MHz	**W4PZV**	ARRL
QRP	**VE3KKB**	Rockford Amateur Radio Association
Multi-Single	**K4VX**	Mid-Ohio Contest Club
Multi-Multi	**N2AA**	Buffalo Area DX Club
CW		
Single Operator		
All band	**K1PR**	Frankford Radio Club
28 MHz	**N4WW**	ARRL
21 MHz	**K6LL/7**	Willamette Valley DX Club
14 MHz	**K3TW**	Neenah-Menasha ARC
7 MHz	**W5UN**	Ellis-Doucett Memorial
3.5 MHz	**N4AR**	Northern Illinois DX Association
1.8 MHz	**W8LRL**	W1TX Roy Fosberg Memorial (Connecticut Wireless Association)
QRP	**N4BP**	Hollywood ARC
Multi-Single	**K5RC**	Mid-Ohio Contest Club
Multi-Multi	**W4BVV**	W4IZ Hollis Graves Memorial (Northern Florida ARS)

Hats off to the Kansas City DX Club for their world-high multi-single phone score from VP1A.



European multi-single phone champs at I3EVK pose for a "family portrait." Left to right are; W3US, I1DFS, I3MAU, I3EVK, I3ON and IN3DYG. The I3EVK antenna farm (right) includes 5 elements on 10 meters, 5 elements on 15 meters, 5 elements on 20 meters, 4 elements on 40 meters and a 4-element Delta loop on 80 meters, all at about 30 meters in the air.

DX Plaque Winners

Phone	Winner	Donor
Single Operator		
All Band-World	**VP2ML**	North Jersey DX Association
Africa	**EL2AV**	William Shepherd, K3WS
Asia	**JA1ELY**	Lafayette ARC and Acadiana DX Association
Europe	**OH3YI**	Ron Nevers, K1VTM
North America	**6D2AF (N7DD)**	Chod Harris, VP2ML
Oceania	**VS5MM (K1MM)**	Ray Stone, W5RBO
South America	**4M3AZC**	Roy and Kathryn Ticker, N6TK and AA6TK
28 MHz	**H31LR (HP1XOJ)**	Mike Badolato, W5MYA
21 MHz	**OH2FQ (OH2BH)**	Worldradio
14 MHz	**OH5LF**	ARRL
7 MHz	**PJ2FR**	KN6M Contest Machine
3.5 MHz	**CT2AK**	Robert Peterson, W3YY
1.8 MHz	**G3SZA**	Arkansas DX Association
QRP	**TG9GI**	ARRL
Multi-Single World	**VP1A**	Delta DX Association
Africa	—	Indy DXers
Asia	**UK9CAE**	Kansas City DX Club
Europe	**I3EVK**	K8LSG Roger DeBusk Memorial
North America	**KV4FZ**	Lynn and Rosie Lamb, W4NL and KA4S
Oceania	**VK4TC**	Carl Smith, WØBWJ
South America	**HK3AXT**	Liga Colombia de Radioaficionados
Multi-Multi World	**GB4ANT**	Gloucester County ARC — SNJ
Asia	**JA2YKA**	Mike Badolato, W5MYA
Europe	—	Grosse Pointe Farms DX Association
North America	—	Southeastern DX Club
CW		
Single Operator		
All Band — World	**VP2ML (K1ZZ)**	North Jersey DX Association
Africa	**EL2AV**	San Diego DX Club
Asia	**UL7MAR**	Sonoma County Radio Amateurs
Europe	**G3FXB**	Clarke Greene, K1JX
North America	**8P6J (N6TJ)**	Pete Grillo, W6RTT
Oceania	**KH6NO**	Ray Stone, W5RBO
South America	**W1BIH/PJ2**	Alamo DX Amigos — San Antonio
28 MHz	**LU8DQ**	West Jersey Radio Amateurs W2JUG/W2KUU
21 MHz	**YU7BCD (YU7OQI)**	Southern New England DX Association
14 MHz	**YU3TU**	Bencher, Inc.
7 MHz	**I2XXG**	Art Boyers, K3KU
3.5 MHz	**UP2NK**	Earl D. Merry Memorial (W8KI)
1.8 MHz	**G3SZA**	Arkansas DX Association
QRP	**G4BUE**	ARRL
Multi-Single World	**DKØTU**	Texas DX Society
Africa	—	Red Stick DX Association
Asia	**UK9HAC**	Red Stick DX Association
Europe	**IØMGM**	South Florida DX Association
North America	**VP2KAH**	The K5RC Multiop Crew
Oceania	—	KN6M Contest Machine
South America	—	Mike Badolato, W5MYA
Multi-Multi World	**JA7YAA**	QRZ DX
Europe	**SK2IV**	Martti Laine, OH2BH
North America	—	Ventura County ARC, K6MEP

Special Plaque Winners

Single Operator	Winner	Donor
Scandinavian high score	**SL2ZZU (SM2EKM)**	John Lindholm, W1XX
Rhodesia (phone)	**ZE3JJ**	DX Association of Connecticut
Top Score low power both modes	—	Ken Bolin, W1NG
World combined score	**9Y4VU**	Yankee Clipper Contest Club
Israel (phone)	**4X6AF**	Marty Hartstein, N6WW
Israel (cw)	**4Z4TA**	Marty Hartstein, N6WW
Western U.S. Big Gun (14-MHz phone)	**K5GA**	Larry Pace, N7DD
Canada (cw)	**VE1AIH**	CANAD-X
Japan (cw)	**JA1BWA**	Randy Thompson, K5ZD and Tom Morrison, K5TM
Japan (phone)	**JH1ARJ**	Western Washington DX Club
Japan (combined)	**JF1SEK**	Northern California Contest Club
Top W/VE operator (combined)	**N2LT**	National Contest Journal
Europe (3.5 MHz cw)	**UP2NK**	Southern Florida DX Association
U.S. 8th call area (phone)	**N8KK**	Livonia ARC
Multioperator		
Caribbean (phone)	**VP5EE**	W5QBM, Joe Johnston Memorial

a few words to the wise for club members and officers alike might be in order. First and most important, for ARRL-sponsored contests *in* which there is a club competition, your club must be ARRL affiliated in order to compete. Affiliation is a relatively simple and painless process, which can be initiated simply by dropping a line to the ARRL Club and Training Department. After the club becomes affiliated, there are certain criteria that must be met before a club entry is considered a valid entry. The club secretary must submit to ARRL hq. a list of *all* eligible members (who meet club criteria listed each January in *QST*) who may submit scores for the club. In turn, each eligible member should be careful to mark the *proper* full name of his/her club on the summary sheet of the contest entry. It takes a *minimum* of three separate entries to constitute a countable club aggregate entry. By the way, a multioperator entry counts as only *one* entry, regardless of the number of operators that helped out. Club certificate winners on each mode are listed only if there are three or more scores submitted by that club for that particular mode. Club winner certificates and club gavels are slated to hit the mails about the same time as the individual certificates.

Karl, OK2BLG, number one all-band-phone score from Czechoslovakia.

Gary, OH5LF, winner of the world 14-MHz-phone plaque.

The JA7YAF multioperator/multi-transmitter crew turned in the number-two multi-multi score from Asia.

ZE3JO, Mal, top cw score from Rhodesia (now Zimbabwe) and the number-three single-operator score from all of Africa.

Division Leaders — Single Operator

Phone	*Division*	*CW*
N3BB	Atlantic	N3AD
W9RE	Central	K9DX
KØDD*	Dakota	WØHP
AB4H	Delta	K4AMC
N8KK	Great Lakes	WB8VPA (WD8ALG)
W2YV	Hudson	N2LT
WØEJ	Midwest	WØWP
K1VTM	New England	K1PR
N7XX (WA1KKM)**	Northwestern	W7NI
N6MG	Pacific	N6TV
W4QAW	Roanoke	K4PQL
N7DF	Rocky Mountain	KØRF (WØUA)
WB4OPG	Southeastern	N4KG
K6RR (N6IN)	Southwestern	K6RR (N6IN)
K5RX	West Gulf	K1EA/5
VO2CW	Canadian	VE1AIH

*14 MHz only
**21 MHz only

Neil, WB3KIL, enjoyed doing a little ssb work from eastern Pennsylvania during the contest.

DX Continental Leaders — Phone

	Africa	*Asia*	*Europe*	*North America*	*Oceania*	*South America*
All-band	EL2AV	JA1ELY	OH3YI	VP2ML	VS5MM	4M3AZC
28 MHz	EA8JI	JH1ARJ	G3ZQW	H31LR	VK2VGI	9Y4VU
21 MHz	EA9IE	UAØSAU	OH2FQ	VP2MO	YBØACL	W1BIH/PJ2
14 MHz	EL9A	UL7JCA	OH5LF	VE3PE/VP9	VK4QK	—
7 MHz	ZS6DW	JA2BAY	DL8PC	6H1J	KH6JSG/KH2	PJ2FR
3.5 MHz	—	JA9AGX	CT2AK	KP4WI	W8FR/KH6	HK6AQT
1.8 MHz	—	—	G3SZA	—	—	—
QRP	—	JA1YFL	I5NSR	TG9GI	AH6J	—
Multi-Single	—	UK9CAE	I3EVK	VP1A	VK4TC	HK3AXT
Multi-Multi	—	JA2YKA	GB4ANT	—	—	—

DX Continental Leaders — CW

	Africa	*Asia*	*Europe*	*North America*	*Oceania*	*South America*
All-band	EL2AV	UL7MAR	G3FXB	VP2ML	KH6NO	W1BIH/PJ2
28 MHz	EA8TY	JH1EDD	YU3EW	TF5DC	—	LU8DQ
21 MHz	5Z4YW	UAØSAU	YU7BCD	—	KG6DX	PY8ZLC
14 MHz	EA8QE	JA2NDQ	YU3TU	8P6NX	—	PY8BI
7 MHz	EA8RL	UJ8JAS	I2XXG	H31LR	KH6H	—
3.5 MHz	—	UJ8JCL	UP2NK	VP1HE	ZL1AMO	YV1OB
1.8 MHz	—	UA9MR	G3SZA	—	—	—
QRP	—	JF1VVR	G4BUE	KL7IBT	—	—
Multi-Single	—	UK9HAC	DKØTU	VP2KAH	—	—
Multi-Multi	—	JA7YAA	SK2IV	—	—	—

SOAPBOX

The bands sure went punk on the first day of the cw weekend. To be sure, solar flares are the one guise of "Murphy" that makes one feel ultimately helpless. A guy always wonders if everyone gets treated equally during such disappointments (K7QA). Just think if all those radio waves were visible, say pink or green, and if an observer were on the moon, it would be like the best fireworks show ever! I think that there were so many radio waves vibrating around up there that a permanent path was burnt to Europe (WB3IFD). In the interest of adding a little class to your recent DX contest, I made a few contacts with some of the contestants and am submitting check logs for both modes (W1PWK). [Thanks, Richard, those check logs come in real handy. — Ed.]. Well, now I know what a solar eclipse does to 10 meters! (K6IGZ). Will I ever have a 70-hour in a cw DX contest?? (K1MM/N1EE). This contest suffered from the worst propagation ever . . . even with the solar flux above 200 (KØFPC). It was a fun contest. Hope that you stay with the single-band entries. That way we can pick a band to work and still get some sleep (KB9HG). Eliminate the single-band categories — what a bore to wring the band dry (K3WS). For me it was a bad time for a DX contest. I wasn't going to miss any of the Winter Olympics (W2AWF). The new 10-minute rule (for multi-singles), allowing for working new multipliers, is great. Should have been this way years ago. Now, if only in the IARU Radiosport . . . (K6MYC/N6IG). The highlight of this, my first DX Contest in six years, was when I found myself neck and neck with W2PV on the same frequency and *beating* them into Europe

Top Ten, CW — Single Operator

W/VE		*DX*	
K1PR	1,496,748-1564-319	VP2ML (K1ZZ)	3,330,702-4757-254
K1KI	1,287,072-1312-327	8P6J (N6TJ)	2,039,042-4071-177
N2LT	1,202,166-1363-294	VP2MOC (K2YY)	2,024,862-3323-222
W2PV (K1AR)	1,189,188-1287-308	G3FXB	1,544,550-2594-210
K9DX	1,113,474-1229-302	OZ1LO	1,530,594-3057-186
KØRF (WØUA)	1,087,881-1411-257	OK1ALW	1,520,215-2503-235
K1BW	1,064,655-1203-295	W1BIH/PJ2	1,508,536-2718-202
K4PQL	1,064,304-1167-304	HH2VP (N4XR)	1,485,105-2907-181
N3AD	1,029,483-1257-273	9Y4VU	1,393,672-2979-104
K1EA/5	1,024,650-1242-275	RX1DZ	1,325,520-2541-210

Top Ten, Phone — Single Operator

W/VE		*DX*	
K1VTM	2,025,450-1929-350	VP2ML	4,138,480-5348-282
W9RE	1,671,816-1699-329	4M3AZC	3,197,180-4047-287
W9ZRX	1,663,020-1629-340	OH3YI	2,802,688-4178-238
K1KI (K3UA)	1,640,430-1657-330	6D2AF (N7DD)	2,704,857-4729-201
N3BB	1,548,645-1715-301	C6ACY	2,578,911-5144-173
W2YV	1,467,252-1536-318	SL2ZZU (SM2EKM)	2,175,738-3728-214
W3BGN	1,436,770-1590-301	SMØAQD	1,980,072-3489-206
N1GL	1,304,160-1235-352	4U1ITU (W1RR)	1,364,562-2193-258
N2LT	1,273,515-1439-295	OH1LW	1,362,837-2388-219
N7DF	1,043,676-1641-212	OH1IJ	1,339,268-2793-196

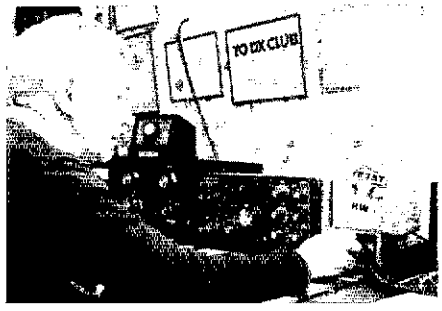
(WA1WLM/WB2JSJ). Like last year, a few hours before the contest began, there was a 50-MHz opening to ZL; so trying to keep track of that sort of thing really cut into the 10-meter operating time (WA5IYX). Kind of missed the old High Band category (WB8JBM/WB8DQP). Had never operated QRP, but when I saw the new DX contest rules announcing the QRP category, my reaction was "Hey, that could be fun." And it was. Let's keep the QRP category . . . Another QRP convert for sure! (W6ABI). I had a good time operating from a different location this year. I feel honored to be the first Portugese to operate from Poland with a reciprocal call (CT1DW/SP5). Had a super time. Display of Aurora Borealis on Friday night disrupted all communications for my 5 watts until Sunday morning . . . Looking forward to the phone weekend (KL7IBT). Would you believe . . . It took a trip to the bathroom on the second night of the contest to alleviate my three month old 20-dB over S9 noise level on 80 meters? The noise went away when I sleepily turned off the bathroom fluorescent light which we leave on all night, every night (until now). What a relief! (K9EF/8RI). I am very pleased to send in my results for my sixth consecutive ARRL International DX Contest (JF1MYI). Congratulations on the new single-band classifications. It was really a challenge to use my 2 element collinear delta loop mounted inside my attic. My CQs brought few responses, so I had to do all the calling. Nevertheless, I succeeded in working JAs and UAØs to the east and W7s and VE8 to the west. I think that's not too bad for an indoor antenna (DJ4YH). I was very fortunate to be in Puerto Rico on business the week prior to the contest and have my trip to Tortola coincide with the contest (VP2VFS/W6IGG). We have only recently built up our amateur station and as we are in a very isolated location here, we find it very difficult to get the up-to-date contest information and trust that this entry is in order . . . we had several of the local shortwave listeners sit in on the contest with us . . . Arthur, A4XIH and myself have been operating here only since last year and are quite glad to see others get interested in Amateur Radio, this being such an ideal QTH for DX work. We are located on a vast desert plain, 1500 feet above sea level, that stretches north from here. Our antennas are homebrew; a ground plane for 10 meters and dipoles for 15 and 20. Hopefully, a beam antenna for the high bands is in our future (A4XIU/A4XIH/A4XCA). There's too much wishful thinking occurring in contest pileups. About 3% of the QSLs that I'm receiving for the VP2ML cw operation are for QSOs that did not take place. Duplicate QSOs get more attention, but in my case only 2.26% of the QSOs were dupes (VP2ML/K1ZZ). I operated from the Friendly Islander Motel in Nuku'alofa, using a 12-volt storage battery to power my Yaesu FT-301. The QTH was less than 50 feet from the ocean and propagation seemed to be very good. It was a good contest and lots of fun. It was a great feeling to be on the other end of the pileup for a change (A35OM/N6OM). As a result of an accident on board the airplane while returning stateside, about half of the 20-meter log and all of the 10- and 15-meter logs were destroyed. I apologize to those who worked VS6DO for a new one. I am still trying to reconstruct the remainder of the 20-meter log (VS6DO/K1NG). Through the kindness of Dan Craan, HH2MC, I operated from his summer home in Fermanthe. This is up in the mountains, about a 40-minute drive from downtown Port-au-Prince, at an elevation of 4000 feet. The antennas were all in good working order from previous operation at that QTH. There is a great view from this QTH. It is also a good taking-off point for radiowaves . . . It was a great time and now that I am rested up from my 3 k-QSO contest operation, I'm ready to have another go at it. QSL to N4XR (HH2VP/N4XR). CU in 1981 . . . If I succeed in convincing my XYL and kids once more! (DJØIV).

Regional Leaders (QSOs/Multipliers)

		1.8	3.5	7	14	21	28
Phone							
Single Operator							
East	K1VTM	3/2	45/36	79/40	433/75	602/96	792/101
Central	W9RE	10/9	50/35	52/42	393/80	495/81	716/81
Mountain	N7DF	4/3	29/21	17/13	156/46	888/69	567/60
West	K6RR (N6IN)	0/2	21/19	112/27	150/59	640/46	467/63
Multi-Single	K4VX	6/8	38/40	63/58	486/88	1130/112	773/109
Multi-Multi	N2AA	24/19	297/72	184/75	1429/134	2691/142	1591/128
CW							
Single Operator							
East	K1PR	3/5	123/52	328/63	415/73	396/61	302/65
Central	K9DX	2/2	67/48	242/64	312/59	316/69	290/60
Mountain	KØRF (WØUA)	2/2	20/16	349/52	361/64	365/58	314/65
West	N6TV	2/3	56/19	323/45	211/53	353/51	230/50
Multi-Single	K5RC	11/10	79/51	336/66	540/94	629/84	374/81
Multi-Multi	W4BVV	20/14	281/69	618/92	902/105	621/95	505/91

W/VE Low-Power Leaders (200 W or less)

Phone		*CW*	
VO2CW	812,361	N4HI	295,176
VE6MP	462,624	K2MFY	281,916
N1AU	289,476	W3ARK	236,664
WØUC	241,224	W7YAQ	177,804
W3ARK	179,760	K8MR	175,086
WD9IIC	168,270	WØUC	152,427
N7ABJ	165,672	VE3JTQ	128,871
KT4P	164,640	W2EA	115,320
W7YAQ	164,352	K3TC	110,352
W3JPT	162,670	W2FTY	101,346

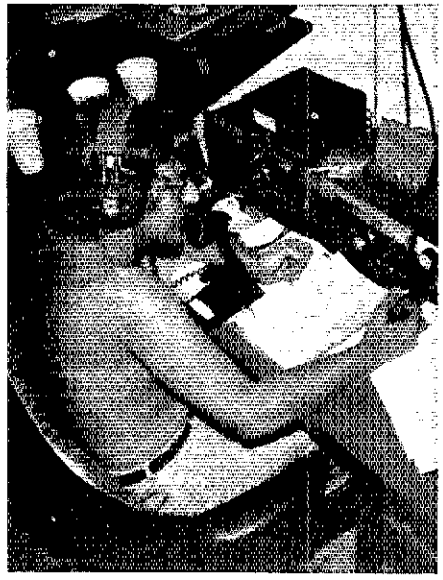


F3AT, Ivan, single operator, all band, cw.

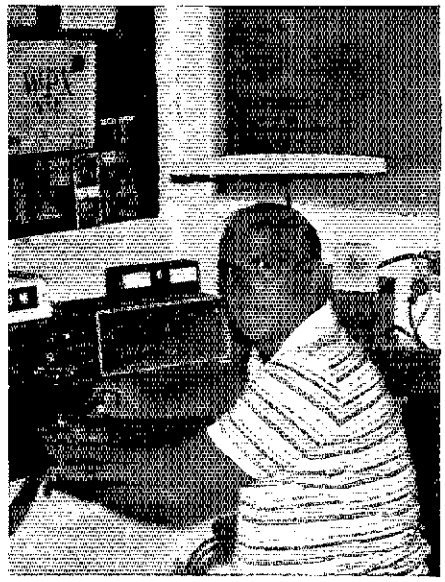
FEEDBACK

A couple of items slipped past the proofreaders last year. ON6FT is the correct call sign for the high-band cw leader from Belgium. N7NG was overlooked as the Rocky Mountain Division leader in the all-band cw category. F8VJ should have been listed with B (less than 200 W) power. WB5FND (WA3OVC) should have been listed in fourth place, Southern Texas, in the high-band category. OE5CWL's cw log was clipped to his phone log during log sorting, so his leading Austrian score of 321,750-715-150-C wasn't properly credited. YU2RTC's high-band phone score was improperly listed with the cw results. K2IGW's Atlantic Division-leading low-band phone score mysteriously appeared in the ENY rather than WNY

IC8POF on Capri Island takes time to reflect upon his 20-meter monoband phone effort in the 1980 ARRL DX Contest.



N7DD at the controls of 6D2AF on his way to winning the North American single-operator phone plaque.



VK4TC, shown above, teamed up with VK4JB and VK4NUI to take home the Oceania, multi-single, phone plaque.

Affiliated Club Competition

Unlimited Class	*Score*	*Entries*	*CW Winner*	*Phone Winner*
Frankford Radio Club	81,538,888	120	N2LT	N3BB
Yankee Clipper Contest Club	57,384,306	71	W2PV (K1AR)	W2YV
Potomac Valley Radio Club	53,673,902	102	K4PQL	K3TW
Northern California Contest Club	26,162,957	54	N6TV	N6MG
Medium Class				
Murphy's Marauders	12,499,237	30	K1PR	K1VTM
North Texas Contest Club	12,382,410	35	N5JB	K5RX
Mad River Radio Club	11,619,636	12	WB8VPA	K8MR
San Diego DX Club	6,124,845	11	W6YA	K6XT
Eastern Iowa DX Association	6,108,162	23	WØWP	WØEJ
Willamette Valley DX Club	5,947,916	13	W7NI	W7GUR
Southeastern DX Club	5,447,742	24	N4HI	WA4FBH
Wireless Institute of the Northeast	5,132,587	17	W2RQ	W2AZO
Western Washington DX Club	5,048,873	38	WA7ZLC (N4EA)	N7XX (WA1KKM)
Texas DX Society	4,677,282	21	K5KG	K5DX
Southern California DX Club	4,144,239	22	K6RR (N6IN)	K6RR (N6IN)
Ill Wind Contesters	2,929,236	16	W9RW	K9MK
Northern California DX Club	2,321,106	25	N6AN	N6OJ
Alamo DX Amigos	2,004,430	16	W5JC	K5DB
Northern Ohio AR Society	1,284,879	18	WB8JBM (WB8DQP)	WB8JBM (N8VT)
DX Association of Connecticut	742,053	12	WA1CCR	W1NG
South Jersey Radio Association	558,189	12	W2EA	W2BHK
Ft. Wayne Radio Club	409,647	11	N9AR	W9LT
Local Class				
Central Virginia Contest Club	6,304,334	6	—	W4MYA
Fraser Valley DX Club	4,454,156	8	—	VE7BTV
Indy DXers	3,538,815	4	—	—
Gloucester County AR Club	2,770,512	7	—	W2SUA (AA2Z)
Kansas City DX Club	2,630,643	7	NØTT	NØXA
Halifax Amateur Radio Club	2,400,393	7	VE1AIH	—
Northern Illinois DX Association	2,375,174	9	K9DX	K9DX
Colorado Contest Conspiracy	1,881,456	5	KØRF (WØUA)	—
Point Radio Operating Society	1,680,488	9	K3VX	K3MD
Flyweight DX Association	1,368,048	8	N4DW	AB4H
Mississippi Valley DX & CC	1,196,042	6	—	KØMW
Neenah-Menasha AR Club	1,078,753	8	—	W9OP
Sevier County AR Club	987,708	4	—	—
Sheboygan County DX Association	928,220	9	—	WA9TGL
Central Arizona DX Association	914,856	6	N7CW	—
Buffalo Area DX Club	905,405	5	—	WA2ECA
Lynchburg Amateur Radio Club	824,694	8	N4UA	WA4FHQ
Overlook Mountain AR Club	776,214	9	W2XL	W2XL
Grumman Amateur Radio Club	702,999	8	WA2LQO (W2DKM)	W2INJ
Memphis DX Society	580,491	4	—	WA4EAV
Radio Association of Erie	546,492	5	—	W2WZ
Santa Barbara AR Club	490,077	7	—	WA6ZYG
Michigan DX Association	413,844	3	—	N8JW
Lincoln Amateur Radio Club	356,804	3	—	KØSCM
Ohio Valley AR Association	337,872	5	N8FU	—
Columbus Amateur Radio Association	335,811	6	W8ELE	—
Mitre-Bedford AR Club	301,869	6	W1FM	W1FM
Lake Success Radio Club	248,429	9	—	W2SGK
Ventura County AR Club	220,929	5	—	WA6IJZ
Hollywood Amateur Radio Club	216,879	3	—	—
St. Cloud Amateur Radio Club	205,773	6	—	KØIR
Red Stick DX Association	205,290	4	—	—
Great South Bay AR Club	199,740	3	—	—
Albany Amateur Radio Club	197,640	4	—	—
Kettle Morraine Radio Amateurs	169,965	5	N9EZ	—
Orange County DX Association	163,227	3	—	WA6FIT
Hampden County Radio Association	146,082	3	—	—
Sabine Valley AR Association	141,793	4	—	—
Carbob Amateur Radio Club	135,634	8	WB3JYY	WB3JYY
Motor City Radio Club	119,748	4	—	K8SIA
Dauberville DX Association	106,467	8	—	WB3FYL
Splitrock Amateur Radio Association	87,747	7	K2RF	WB2WIK
ARINC Amateur Radio Club	85,721	5	WA3JYV	—
Larkfield Amateur Radio Club	46,957	6	—	WA2JCX
Poway Amateur Radio Society	24,308	4	—	—
Harlan County AR Club	19,815	4	—	KS4K
Chicago Radio Traffic Association	19,302	3	—	—

DJ4GL, Joachim, mounted a multi-single phone effort with friends K5TM and K5WM.

listings. AA6DX should have been credited with the top Sacramento Valley all-band score. Still another typo transformed AD3Z to AB3Z, along with WA7PVE previously listed as WA7PUE. WB2ITR's NLI-leading high-band phone effort was discovered hiding in WNY. In the low-power phone leaders, KG4W should not have been listed, which moves up numbers two through 10, with W2FGY appearing at the bottom of the top ten. Credit AA2Z as the operator at the W2SUA all-band score. Finally, the Gloucester County ARC should have been credited with 19 entries and 4,995,904 points, moving them into fourth place in the medium-club group. Maybe 14 errors out of 3749 listings isn't so bad after all — only 0.4%.

SCORES

The scores are broken down by mode — phone or cw. Within each mode there are continent and country subdivisions for DX stations and ARRL Section headings for W/VE participants, single-operator stations only. Under each subheading, scores are listed in descending order by category, all-band first, 10-meter monoband next, followed by 15-meter monoband entries, then 20-, 40-, 80- and 160-monoband scores, with QRP entries lsited last. The individual linescore gives call sign of the station, a different operator if applicable, the total score achieved by that station, number of contacts, number of multipliers, a letter that indicates the greatest level of power used by that station (where A indicates up to 10 watts of input power, B means greater than 10 watts, but less than 200 watts of input power and C means that a power input of more than 200 watts was used). A sixth column is used to indicate the entry category of the station (single-operator stations only). AB indicates single operator all band, 10 for 10-meter monoband, 15 for 15-meter monoband, 20 for 20-meter monoband, 40, 80 and 160 for monoband entries on those respective bands. QRP is for 10 watts or less of input power, of course. The sixth column category indicator is listed only for the first occurrence of that particular category. All the entries that follow are assumed to be in that same category until a change is indicated in that sixth column.

Example: let's take the W/VE — Phone, Single Operator listings in the first U.S. call area in the Connecticut Section. K1VTM is the first listing. He has a score of 2,025,450 points, 1929 total QSOs, 350 multipliers, runs "C" (greater than 200-watts input) power and is in the all-band category. Since there are no changes in the sixth column, all the following listings up to WA1FCN are also all-banders. WA1FCN's score is indicated as a monoband 10-meter entry, as are all listings below his until we come to W1NG, whose 217,464 points represent a 15-meter-only effort. The next change occurs with K1WIL's 20-meter-only score — the only 20-meter-phone monoband score in Connecticut. W1XX is the only monoband 80-meter score in that section and AA1K is the Lone Ranger in Connecticut on phone on 160 meters.

Multioperator-single-transmitter entries are listed in the U.S./Canada in descending order by call area only and by continent and country for DX stations.

Multioperator-multi-transmitter scores are separated by country and listed in descending-score order.

Disqualifications

Phone

K1EM, W1FC, K6OYE (+ AI6V, N6DN, W6EEN, WA6s, AVS NTG, WB6s DHN DSV KNU) KB6SL (+ N6CCN, WD6EIZ), K9KU (WA9ZPR, opr), WAØARS.

CW

K6OYE (+ AI6V, N6DN, WB6s DHN DSV, K7DZ), N6CCN, W6VPH.

W/VE - PHONE

Single Operator

1

Connecticut

K1VTM 2,025,450-1929-350-C-AB
K1KI(K3UA,opr) 1,640,430-1657-330-C
N1GL 1,304,160-1235-352-C
W1WEF 512,912- 874-196-C
K1RM 312,816- 686-152-C
K1ZZ 219,861- 479-153-C
N1JW 185,952- 416-149-C
W1XK 167,400- 310-180-C
WA1YEC 159,840- 370-144-C
K1YXG 131,784- 323-136-C
WA1ZDW 127,062- 362-117-B
AB1U 120,000- 400-100-C
WA1CCR 53,631- 177-101-C
K1DD 52,200- 200- 87-B
K1NYK 31,104- 144- 72-B
W1DO 30,000- 100-100-C
W1VV 28,044- 114- 82-C
W1OD 13,350- 89- 50-C
K1WGO 7560- 72- 35-B
K1CC 6624- 48- 46-C
WB1CRI 855- 19- 15-B
WA1FCN 76,440- 364- 70-B-10
K1WJ 70,290- 355- 66-C
WB1EAZ 36,051- 197- 61-B
N5AW/1 20,832- 124- 56-B
W1NG 217,464- 697-104-C-15
K1DII 1125- 25- 15-B
K1WA 27- 3- 3-B
WB1FKU 27- 3- 3-B
K1WJL 64,515- 253- 85-C-20
W1XX 6708- 52- 43-C-80
AA1K 972- 18- 18-B-160

Eastern Massachusetts

K1MM(N1EEF,opr) 559,764- 876-213-C-AB
N1AU 289,476- 561-172-B
K1LS 226,350- 503-150-C
K1MEM 207,564- 353-196-C
W1FM 143,184- 314-152-B
W1FJ 136,764- 351-131-C
K1RB 26,584- 104- 82-B
K1GRB 13,608- 81- 56-C
WA1YVT 12,816- 89- 48-B
W1PLJ 936- 24- 13-C
W1CWU 206,448- 782- 88-C-10
W1GXT 31,641- 199- 53-C
W1JR 432- 12- 12-B
WB1ANT 252,000- 875- 96-C-15
K1VUT 720- 16- 15-C-80

Maine

W1OO 591,570- 939-210-C-AB
K1SA 212,430- 485-146-C
W1PCD 16,920- 94- 60-C
W1CTR 294- 14- 7-C
K1UO 578,460-1555-124-C-10
KA1CVM 54,210- 278- 65-B
N1AFC 32,754- 206- 53-C
W1MN 17,292- 131- 44-C
W1GX 6534- 99- 22-C
WA1PDG 72,735- 373- 65-C-15

New Hampshire

K1GQ 144,531- 303-159-C-AB
W1LQQ 114,375- 305-125-C
W1VY 27,540- 108- 85-C
W1UN 5664- 59- 32-B
W2NSD/1(WB8BTH,opr) 216,513- 891- 81-C-10
W1ICU 22,464- 156- 46-B

Rhode Island

AI1K 103,398- 304-114-C-AB
W1RFQ 18,900- 105- 60-B
K1VSJ 6615- 63- 35-B

Vermont

WA1WLM(WB2JSJ,opr) 52,374- 301- 58-C-10
KA1FJ 1275- 25- 17-C-20

Western Massachusetts

K1BW 896,760-1060-281-C-AB
N1CQ 499,448- 802-208-C
W2TA/1 430,098- 739-194-C
WA1ZAM 139,797- 323-147-C
W1RBU 67,980- 206-110-B
W1JP 4851- 49- 33-B
W1AUT 34,545- 235- 49-C-10
WB1HIH 21,000- 140- 50-C
WB1ABF 5103- 63- 27-B
W1DGJ 58,500- 250- 78-C-20

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Eastern New York

W2YV 1,467,252-1536-318-C-AB
W2IB 690,855- 869-265-C
W2AZO 431,886- 637-226-C
W2XL 272,448- 516-176-C
WA2HFT 147,030- 377-130-B
K2QF 127,140- 326-130-C
N2JJ 76,608- 273- 96-B
N2BIN 62,652- 227- 92-B
K2MN 50,490- 170- 99-B
WA2LJM 45,123- 169- 89-C
WA2KLV 39,609- 163- 81-B
WB2MJQ 15,582- 98- 53-B
N2FS 9126- 78- 39-C
N2BHP 4128- 43- 32-B
WA2STM 3762- 38- 33-B
KB2FC 3360- 40- 28-B
WA2RNX 3696- 56- 22-B-10
N2BJB 741- 19- 13-B
K2IBW 94,275- 419- 75-C-15
W2DW 11,703- 83- 47-C
WA2AUB 2511- 33- 27-C-80

New York City - L.I.

W2MOY 187,089- 413-151-C-AB
WB2TCQ 137,541- 361-127-B
W2SGK 108,537- 253-143-C
W2NBI 50,925- 175- 95-C
K2JCC 39,372- 193- 68-C
N2UN 31,941- 124- 91-C
WA2JCX 17,664- 92- 64-B
AC2P 16,500- 100- 55-C
WB2PXA 16,224- 104- 52-C
WA2OZD 10,494- 66- 53-B
WA2OVG 6840- 57- 40-B
W2QAN 4056- 52- 26-B
W2GLE 3312- 46- 24-B
WA2ISH 3005- 45- 23-B
WB2PUE 2772- 42- 22-B
WA2LTP 1071- 21- 17-B
WA2SEL 363- 11- 11-B
K2MFY 100,485- 435- 77-B-10
W2KZE 56,064- 292- 64-C
WB2AMU 28,224- 168- 56-B
K2CMV 1920- 32- 20-B
WA2TSF 1674- 31- 18-B
W2JGQ 78,246- 322- 81-C-15
W2INJ 4554- 46- 33-C
KB2NS 288- 12- 8-C
WB2KCT 3564- 44- 27-B-20

Northern New Jersey

N2LT 1,273,515-1439-295-C-AB
K2NJ 611,520- 910-224-C
W2IFK 397,800- 663-200-C
W1GD/2 226,944- 403-192-C
K2PH 189,216- 432-146-C
W2WD 78,936- 253-104-C
WA2YLY 62,379- 239- 87-C
KD2L 54,540- 202- 90-C
WB2WIK 39,195- 195- 67-C
AG2N 35,478- 219- 54-C
W2HN 35,478- 162- 73-C
K3OX/2 15,642- 79- 66-C
WA2PQU 12,672- 96- 44-B
W2GD 9180- 60- 51-C
KB2DN 7722- 66- 39-C
WB2LUD 2244- 34- 22-B
WA2IFS 105,006- 407- 86-C-10
WB2VIR 57,474- 309- 62-B
WA2GUM 13,338- 117- 38-B
KA2COY 2880- 40- 24-B
N2WT 349,485-1013-115-C-15
W2FFQ 8085- 55- 49-C
WB2HJW 1176- 28- 14-C-20
WA2ZWH 75,900- 283-100-A-QRP
K2RF 20,904- 104- 67-A

Southern New Jersey

W2SUA(AA2Z,opr) 792,360- 852-310-C-AB
N2MR 577,404- 755-258-C
WA2DPU 441,936- 744-198-C
N2VW 270,963- 483-187-C
WB2YOF 248,688- 528-157-C
K2SNK 177,963- 433-137-C
N2ATD 154,770- 335-154-C
W2BTU 106,386- 298-119-C
W2SDO 84,912- 232-122-C
K2ZSY 53,280- 185- 96-C
W2FHY 51,798- 194- 89-C
W2FGY 34,854- 157- 74-C
N2DN 28,314- 143- 66-C
W2PFQ 26,325- 135- 65-B
KN2QWO 20,496- 112- 61-C
W2BLV 19,140- 116- 55-B
N2CM 9936- 72- 46-B
K2OWE 1794- 26- 23-C
W2BHK 229,278- 742-103-C-10
AE2O(WA3TBL,opr) 149,178- 529- 94-C
W2QKJ 24,816- 177- 47-B
N2CQ 12,240- 87- 48-C
WA2WJL 12,600- 100- 42-B-20
WB2VFT 231- 11- 7-B-40
WA2AWS 32,400- 216- 50-A-QRP
WB2ZEU 7533- 81- 31-A

Western New York

K2VV 646,926-1022-211-C-AB
KB2HF 257,250- 490-175-C
W2STM 176,856- 444-133-C
KB2DE 151,659- 369-137-C
N2AOM 81,270- 258-105-B
AC2J 80,955- 257-105-C
W2TU 80,784- 264-102-B
KB2NU 65,700- 146-150-C
KB2KN 52,845- 271- 65-B
W2PHT 48,906- 209- 78-B
WB2ZFZ 27,144- 116- 78-C
W2FUI 5985- 57- 35-B
WA2VUR 80,100- 358- 75-B-10
WB2NLR 22,776- 146- 52-B
WB2TKD 19,500- 130- 50-B
WB2ZEL 13,899- 113- 41-C
WA2ORX 8094- 71- 38-C
W2HPF 285,450- 865-110-C-15
N2HR 125,030- 485- 86-C
WA2ABN 5608- 54- 34-B
WA2ECA 19,722- 173- 38-C-20
WB2AIO 11,322- 111- 34-C
N2US 41,082- 167- 82-A-QRP
K2GXT(WA1QGC,opr) 10,488- 76- 46-A

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Delaware

K3HBP 108,744- 394- 92-C-AB
W3WD 88,479- 261-113-C
KA3EFL 6204- 47- 44-B
WB3GXD 3588- 52- 23-B-10
AD3V 2592- 48- 18-QRP

Eastern Pennsylvania

N3BB 1,548,645-1715-301-C-AB
W3BGN 1,436,770-1590-301-C
K3NZ 950,562-1214-261-C
K3MWV 921,858- 934-329-C
KB3AG 729,908-1116-221-C
W3AP 579,150- 715-270-C
K3KNH 354,900- 676-175-C
WA3NHO 290,220- 691-140-C
K3II 287,646- 502-191-C
WB3CIW 249,018- 539-154-C
W3YFV 235,008- 512-153-C
W3IQS 230,670- 466-165-C
KB3HE 195,825- 373-175-C
K3ZA 194,852- 396-164-C
N3HW 189,618- 442-143-C
W3ARK 179,760- 435-140-B
W3GRS 152,067- 298-173-C
W3ALB 149,640- 344-145-C
WA3WRD 137,676- 298-154-C
WA3YIV 110,760- 290-130-C
W3HYJ 93,726- 246-127-C
W3KFQ 93,000- 250-124-C
WB3FYL 89,280- 320- 93-B
N3ALF 81,510- 250-110-C
WA3YOB 73,554- 299- 82-C
W3EVW 60,297- 197-101-C
K3TC 51,840- 160-108-C
WA3VPQ 43,248- 212- 68-C
AD3Z 42,195- 145- 97-C
WB3KIL 39,405- 185- 71-B
W3BNQ 38,982- 146- 89-B
WB3JYY 32,955- 169- 65-B
W3PC 31,824- 136- 78-C
WB3FVJ 28,980- 140- 69-C
K3JGJ 24,354- 124- 66-B
WB3JZE 24,010- 130- 59-B
WB3EFH 22,713- 113- 67-C
WB3EAG 13,464- 102- 44-C
WB3HYX 9225- 75- 41-B
WB3EFI 7548- 68- 37-B
WA3ZGL 4263- 49- 29-B
WA3YTI 3534- 38- 31-B
N3AMY 1920- 32- 20-B
WB3EPW 1575- 25- 21-B
W3EHZ 1026- 19- 18-B
WB3FPA 768- 16- 16-C
K3EUH 756- 18- 14-B
N3AYT 270- 10- 9-C
WB3CVK 108- 9- 4-B
KA3ARQ 71,631- 379- 63-C-10
K3CXR 147- 7- 7-C
KA3BOD 2112- 33- 22-B-15
K3FN 127,563- 421-101-C-20
W2CKR/3 264- 11- 8-C-40

Maryland - D.C.

K3TW 842,700-1060-265-C-AB
K3ZJ 736,695- 963-255-C
N3RL 627,300- 820-255-C
WB3GCG 610,857- 681-299-C
W3UJ 496,587- 749-221-C
K3HPG 448,920- 645-232-C
N3UN 406,119- 581-233-C
N3II 339,693- 569-199-C
WA3UPH 230,868- 484-159-C
K3AV 215,220- 422-170-C
K3BHJ 170,724- 347-164-C
W3JPT 162,670- 374-145-B
N3AM 111,870- 339-110-C
W3GRF 110,214- 314-117-C
K3ON 94,605- 265-119-C
WB3AVN 87,849- 227-129-C
W3HVM 83,172- 239-116-C
W3PWO 41,914- 126- 83-C
W3IDT 39,984- 196- 68-B
AG3S 27,348- 106- 86-B
K4YT 13,908- 76- 61-C
WA3YKR 8316- 66- 42-B
W3FQE 3150- 35- 30-C
K2PLF/3 158,610- 622- 85-C-10
K3WS 129,717- 497- 87-C
K2ITG/3 89,586- 378- 79-C
WA3EEE 47,817- 253- 63-C
W3GN 6636- 79- 28-C
K3ZNV 5220- 60- 29-B
WA3JYV 3564- 44- 27-C
WA3VPL 5940- 60- 33-B-15
W3GG 75,180- 358- 70-C-20
WA3LJP 26,448- 152- 58-C
W3EWL 66,030- 310- 71-A-QRP

Western Pennsylvania

K3MD 464,667- 763-203-C-AB
WB3KAF 27,300- 130- 70-C
K3TJM 19,110- 98- 65-C
K3LTP 2340- 30- 26-C
WB3IET 64,233- 351- 61-C-10
W3PIX 41,400- 230- 60-B
AF3B 31,752- 189- 56-B
AD8J/3 19,188- 164- 39-C
K3HWL 14,259- 97- 49-B
K3KO 11,730- 115- 34-B
W3WZ(WB3IFD,opr) 69,720- 332- 70-C-15
K3RN 43,142- 191- 74-C
AG3H 24,648- 104- 79-A-QRP

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Alabama

AC4X 184,635- 373-165-C-AB
K4ZGB 45,927- 189- 81-C
WA4MIT 22,302- 177- 42-C-10

Georgia

WB4OPG 348,582- 533-218-C-AB
K4BAI 329,640- 670-164-C
WA4FBH 269,724- 532-169-C
K4BAM 67,545- 237- 95-B
WB4RRC 29,760- 160- 62-C
WA4OPV 26,418- 119- 74-C
AK4T 3885- 37- 35-C
W4DXI 49,980- 238- 70-C-10
W4OMQ 7854- 77- 34-C
W4NWB 6804- 63- 36-C-10
W4LVM 4200- 56- 25-C
N6CR/4 133,560- 424-105-C-15
N4JA 124,500- 405-100-C
WA4HNL 31,488- 164- 64-C
WA4TPS 5133- 59- 29-B
K4PI 52,398- 246- 71-C-20
WD4NAE 3969- 49- 27-C
W4MGX 1764- 28- 21-C-80

Kentucky

WA4UBM 148,452- 356-139-C-AB
N4XM 77,526- 219-118-C
K54K 7896- 56- 47-B
WD4HCC 3042- 39- 26-B
WD4NWW 1680- 28- 20-B
WB4YPW 37,950- 275- 46-B-10
N4AOJ 29,535- 179- 55-B
WB4PRU 16,704- 116- 48-C
KA4FBZ 4200- 50- 28-B
K4ISV 193,344- 608-106-C-15
WB4FOT 33,480- 180- 62-C
KA4HWG 6039- 61- 33-B
KA4IDW 2997- 37- 27-B
WD4FXX 7350- 70- 35-A-QRP

North Carolina

N4ANV 413,712- 663-208-C-AB
N4AA 237,072- 449-176-C
WA4ZXA 232,656- 591-131-C
KB4RV 60,164- 216- 93-C
WD4LTW 58,464- 232- 84-C
N4CUY 25,833- 109- 79-C
W4UW 12,150- 81- 50-C
AA4S 11,076- 71- 52-C
N4UH 204,477- 637-107-C-15
WA4TLJ 20,532- 118- 58-C-40
AA4R 16,848- 104- 54-C
WA4FXJ 6498- 57- 38-C

Northern Florida

KT4P 164,640- 392-140-B-AB
WB4OKY 66,402- 217-102-B
W4WKQ 56,244- 218- 86-C
WD4OMQ 50,076- 214- 78-B
WD4HSA 13,464- 102- 44-B
W4DRK 2070- 30- 23-C-20
WA4SVO 15,180- 92- 55-C-80

South Carolina

WB4QWM 69,894- 353- 66-B-10
WD4NNP 5568- 58- 32-B
AA4V 6642- 54- 41-C-80

Southern Florida

WA4NPO 187,110- 385-162-C-AB
K4KUZ 133,650- 270-165-C
AF3E 127,350- 283-150-C
KA4BBS 118,902- 298-133-B
W4BV 52,839- 171-103-C
K4JRF 31,275- 139- 75-C
W4YN 29,304- 132- 74-C
W4PC 19,095- 95- 67-C
VE3BTQ/W4 16,728- 82- 68-C
WD4FGI 10,656- 74- 48-C
KB8CR/4 45,012- 242- 62-C-10
W2SDB/4 75- 5- 5-B-15
W4PZV 2040- 29- 24-B-160
N4BP 29,070- 114- 85-A-QRP
WB4BBH 8235- 61- 45-A

Tennessee

AB4H 362,598- 542-223-C-AB
WA4EAV 302,484- 554-182-C
KF4H 121,656- 296-137-C
W4EAL(WA4ZZU,opr) 61,110- 210- 97-C
W4ZWZ 59,508- 228- 87-C
W4OGG 19,764- 122- 54-C
K4AMC 3726- 46- 27-C
WA4IQL 1380- 23- 20-B
N4IR 75,537- 327- 77-C-10
WB4PHW 8400- 100- 28-C
WB4VMS 2754- 34- 27-B
KA4CVW 3- 1- 1-B
KB4KA 23,814- 147- 54-C-20

Virginia

W4QAW 635,145- 805-263-C-AB
W4MYA 359,100- 700-171-C
K4IQH 253,440- 528-160-C
K4CTY 230,769- 407-189-C
W4DM 191,808- 432-148-C
W4RW 157,734- 381-138-C
K8SYH/4 113,778- 301-126-B
K4GKD 112,236- 398- 94-C
W4YE 111,510- 295-126-C
N4XD 104,625- 279-125-C
N4DW 95,259- 281-113-C
K4OD 92,748- 236-131-C
W4XR 89,666- 247-123-C
N4MM 79,968- 224-119-C
K5OGU/4 69,888- 224-104-C
WB4FIH 49,053- 197- 83-C
KB4O 44,280- 164- 90-C
K4TSU 41,400- 230- 60-C
N4SN 39,690- 147- 90-C
W4JVN 33,540- 172- 65-C
WB4YPI 30,150- 134- 75-C
W4EI 27,813- 127- 73-C
WD4GCE 22,890- 109- 70-B
WB4ZPF 18,600- 100- 62-B
KT4Y 17,820- 99- 60-C
AA4M 183,708- 756- 81-C-10
WA4YBV 55,800- 248- 75-C
W3YY/4 174,740- 495- 84-C-20
W4KMS 14,214- 103- 46-C
AA4FF 11,139- 79- 47-C-40
WA4FHQ 31,440- 131- 80-A-QRP

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Arkansas

AD5F 2604- 31- 28-B-AB
W5EIJ 1380- 23- 20-C-10
KØVGB/5 1275- 26- 17-B-15
K5UR 14,076- 102- 46-C-80

Louisiana

W5OB 44,175- 155- 95-C-AB
W5HFZ 21,924- 84- 87-C
WD5GLJ 6603- 71- 31-B
WA5IGD 47,286- 213- 74-C-15

Mississippi

AI5A 79,461- 243-109-B-AB
K5YPV 65,520- 208-105-B
W5MUG 10,800- 90- 40-B-10
WA5OYU 2940- 35- 28-C
W5OSL 1584- 24- 22-C-20

New Mexico

K5TA 319,683-1171- 91-C-10
N6BK/5 153,840- 641- 80-C
WA5YTX 1890- 30- 21-C-15

Northern Texas

K5RX 994,014-1127-294-C-AB
AF5K 732,164-1142-214-C
K5TJ 689,574- 818-281-C
K5NW 595,818- 838-237-C
N5JB 282,186- 514-183-C
K5LP 224,664- 506-148-C
W5LKP 206,737- 403-171-C
W5LSF 106,560- 296-120-C
KA5Q 102,912- 268-128-C
K2SCU/5 73,102- 197-122-C
N5ANN 41,580- 180- 77-B
KA5W 26,163- 121- 81-C
N5UA 25,536- 112- 76-B
W5TEN 12,760- 96- 44-C
N5BET 4800- 64- 25-B
K5RA 41,940- 233- 60-C-10
N5UD 27,360- 152- 60-C
W5RKT 14,553- 147- 33-C
W5DYH 3741- 43- 29-B
WB5UDX 12,126- 94- 43-B-15
W5VGX 6090- 58- 35-C-40
WB5WOE 2908- 51- 19-A-QRP

Oklahoma

W5JME 135,993- 317-143-C-AB
N5ND 43,550- 150- 95-C
K5DEC 19,293- 110- 59-C
K5WE 7140- 68- 35-C-20

Southern Texas

K5TM(K5ZD,opr) 908,086-1106-277-C-AB
K5DX 322,812- 549-196-C
WB5FND(WA3OVC,opr) 254,016- 432-196-C
KB5FU 176,256- 384-153-C
K5KG 163,126- 362-141-C
K5DB 128,700- 390-110-B
N5HB 53,595- 215- 83-B
W5JC 40,890- 145- 94-C
W5DV 29,106- 147- 66-C
WA5IYX 15,147- 99- 51-C
W5KCR 11,760- 70- 56-C
WB5ZKO 5508- 54- 34-B
AK5E 3381- 49- 23-B
W5BE 3264- 34- 32-C
W5YB 513- 27- 19-B
K5RC(N5JJ,opr) 262,251- 883- 99-C-10
K5RF 66,912- 328- 68-C
N5AHD 1134- 27- 14-B
K5BZU 118,830- 466- 85-C-15
K5WA 103,518- 426- 81-C
W5GO 18,306- 115- 54-C
W5IYR 10,368- 72- 48-C
K5TU 1518- 23- 22-B
K5GA 278,280- 773-120-C-20
K5NA 1848- 28- 22-C-40
K5SF 8400- 70- 40-C-80
KA5N 798- 19- 14-A-QRP

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East Bay

WA6BOB 22,491- 147- 51-C-AB
K5VNJ/6 17,928- 83- 72-C
K6OP 17,034- 167- 34-C
K6CSL 6510- 70- 31-B
K6MGF 8640- 96- 30-C-10
WA6IQM 35,139- 221- 53-C-40

Los Angeles

K6EVR 615,126-1306-157-C-AB

WB6ZHT 207,835- 415-167-C
W6CN 144,018- 378-127-C
KB6FN 4071- 59- 23-C
N6AW 179,280- 747- 80-C-10
N6ZZ 44,016- 264- 56-C
K6YRA 38,481- 127-101-C
W6LUL 3000- 40- 25-C
WA6EKL 371,394-1317- 94-C-15
WB6EAU 162- 9- 6-B
W6OK 18,720- 104- 60-C-20
K6SE 45- 3- 5-B-160

Orange

K6RR(N6IN,opr) 902,016-1392-216-C-AB
WA6FIT 119,214- 358-111-C
K6TXA 57,240- 212- 90-C
WA6TMY 5202- 51- 34-B
N6PE 168- 8- 7-C
W6YMV 24,021- 157- 51-C-10
N6TO 67,737- 337- 67-C-15
AB6R 13,440- 112- 40-B

Santa Barbara

W6SWM 130,923- 373-117-C-AB
WA6ZYG 67,488- 296- 76-C
WB6OBB 39,528- 216- 61-C
W6DUL 21,024- 146- 48-C
W6SRM 20,160- 160- 42-B
WA6VNN 18,150- 121- 50-C
WB6DNN 13,545- 105- 43-B
WD6ADG 3135- 55- 19-B
WA6IJZ 43,524- 235- 62-B-10
WA6NHB 17,520- 146- 40-C
N6HK 2178- 33- 22-C
N6VR 2760- 40- 23-C-80

Santa Clara Valley

N6MG 444,960- 824-180-C-AB
K6WJ 431,034- 722-198-C
N6NF 136,590- 314-145-C
W6BJB 119,808- 416- 96-C
N6HR 63,672- 257- 84-C
N6CCL 52,962- 194- 91-C
K6FB(WB6JGS,opr) 52,640- 293- 60-C
AK6P 44,499- 163- 91-C
W6OKK 9600- 100- 32-C
KB6G 8190- 70- 39-C
WD6CHF 1887- 37- 17-B
K6OMB 42,381- 277- 51-B-10
WA6TKT 25,092- 164- 51-C
N6BZA 14,190- 86- 55-C
W6ISQ 3564- 44- 27-C
N6GJ(WB6PYI,opr) 148,578- 688- 72-C-15
W6HXW 42,735- 185- 77-C-20
W6YVK 1044- 29- 12-A-QRP

San Diego

WA6EJL 93,636- 289-108-C-AB
WA6UFY 24,948- 126- 66-C
K2UVG/6 2886- 37- 26-C
W6KBD 1710- 30- 19-B
K6XT 248,310- 930- 89-C-10
WA6VNR 18,696- 152- 41-B
K6NA 167,244- 724- 77-C-15
WA6DBC 159,327- 843- 63-C
AA6EE 126- 14- 3-B

San Francisco

N6OJ 392,931- 891-147-C-AB
N6QC 20,160- 120- 56-C
WD6EEQ 60,480- 504- 40-C-15
KF6I 24,696- 196- 42-A-QRP

San Joaquin Valley

KB6AR 77,235- 271- 95-C-AB
W6BYH 54,570- 170-107-C
WD6FLB 31,515- 191- 55-B
W6BVM 29,280- 122- 80-C
N6LK 14,880- 80- 62-C-20
N6YD 2436- 58- 14-A-QRP

Sacramento Valley

K6OR 6336- 64- 33-C-AB
WA6BRV 1881- 33- 19-B
WB6MBF 95,850- 450- 71-C-10
W6YMH 24,192- 192- 42-C
WA6POC 18,720- 160- 39-A-QRP
W6TZA 432- 10- 9-A

7

Arizona

W7AYY 33,699- 239- 47-C-10
K6LL/7 426,000-1420-100-C-15
K7SP 282,690-1047- 90-C
W7RV 105,894- 333-106-C-20

Idaho

K7LR 423,225-1485- 95-C-10
N7AOS 94,920- 452- 70-C
K7NHV 65,700- 365- 60-C
W7EYR 7128- 72- 33-C-20

Montana

W7JYW 184,896- 642- 96-C-AB
K7QA 9348- 76- 41-C
KA1EA/7 1980- 44- 15-B-10

Nevada

WB7VVH 19,800- 120- 55-C-AB
W7JKA 6225- 83- 25-C
N7BCQ 8268- 106- 26-B-10
W7IA 10,332- 82- 42-C-40

Oregon

W7YAQ 164,352- 428-128-B-AB
W7GUR 103,155- 299-115-C
W7TWL 25,092- 204- 41-B
WA7CYP 18,900- 90- 70-C
WB7FEI 17,028- 88- 66-C
W7JNC 6396- 52- 41-C
WA7JWC 2856- 34- 28-C
KA7COD 54,432- 324- 56-C-10
W7MLJ 18,612- 188- 33-B
W7FP 85,425- 335- 85-C-20
WA7DRP 23,250- 125- 62-C

Utah

N7DF 1,043,676-1641-212-C-AB
W7HS 77,868- 252-103-C

Washington

K7WQD 609,416-1229-168-C-AB
K7ZA 258,930- 685-126-C
N7AYF 224,649- 687-109-C
WB7BNP 145,632- 394-123-C
WA7PVE 117,744- 446- 88-B
N7AM 99,615- 266-125-C
K7UR 65,601- 197-111-C
KB7KE 32,175- 195- 55-C
WB7CLU 12,600- 70- 60-C
K7DS 12,096- 72- 56-C
AJ7K 11,400- 100- 38-C

KA7BAY 4026- 61- 22-B
W7DWJ 1620- 45- 12-C
W7WA 442,428-1603- 92-C-10
K7CY 348,558-1351- 86-C
N7ABJ 165,672- 767- 72-B
N7BJH 112,140- 623- 60-C
WB7PSP 67,368- 401- 56-B
K7WA 22,137- 157- 47-B
K7IDX 5394- 62- 29-C
N7XX(WA1KKM,opr) 645,327-2313- 93-C-15
K7MX 113,664- 582- 64-C
WA7GVM 102,885- 361- 95-C-20
WA7ZLC(N4EA,opr) 59,472- 354- 56-C-40
N7EA 6630- 65- 34-C-80

Wyoming

WB7RGN 129,363- 403-107-B-AB
W7SE 118,080- 320-123-C
WAØLJN/7 5832- 72- 27-B

8

Michigan

N8BCD 165,318- 467-118-C-AB
WD8KXN 114,300- 300-127-C
K8SIA 102,960- 240-143-C
W8QGP 91,770- 266-115-C
K8CV 43,524- 186- 78-C
W8LQZ 42,582- 151- 94-C
KB8AI 14,544- 101- 48-C
K8XE 12,201- 83- 49-B
WA8LSS 1620- 27- 20-C
WD8CUQ 624- 16- 13-C
W8FGA 60,024- 328- 61-C-10
KA8T 53,463- 251- 71-C
WB8WZT 10,950- 73- 50-B
W8UA 295,164- 911-108-C-15
N8JW 263,424- 896- 98-C
W8UD 71,613- 327- 73-C
W8TWA 150,024- 532- 94-C-20
WB5PAW/8 4032- 56- 24-C
W8JWN 21,771- 123- 59-C-40
AA8G 396- 12- 11-C
KC8P 10,296- 85- 44-A-QRP

Ohio

N8KK 446,832- 696-214-C-AB
K8MR 433,992- 676-214-C
WB8VPA 419,175- 621-225-C
KB8JF 372,480- 640-194-C
K8EF 187,056- 433-144-C
N8ATR 148,050- 329-150-C
W8UPH 140,538- 397-118-C
AC8C 109,998- 291-126-C
N8ARA 105,576- 332-106-C
N8AHK 96,612- 388- 83-B
N8BJQ 89,301- 289-103-C
W8FDN 83,517- 287- 97-C
K8IQQ 72,216- 236-102-C
N8AKF 71,604- 234-102-C
W8YGR 45,126- 138-109-B
WD8MOV 31,860- 118- 90-C
N8TN 30,192- 148- 68-C
W8ANM 28,188- 115- 87-C
N8LM 28,044- 123- 76-C
WB8MIP 21,840- 112- 65-C
K8JK 19,656- 104- 63-C
N8BKX 19,500- 100- 65-C
W8DWP 17,568- 96- 61-C
W8IMF 14,469- 91- 53-C
W8NPF 10,800- 80- 45-C
WB8HLI 3306- 38- 29-C
WA8TNO 161,343- 591- 91-C-10
WB8JBM(N8VT,opr) 157,320- 690- 76-C
WB8KKI 58,692- 268- 73-B
N8FU 52,668- 308- 57-C
AD8P 48,960- 240- 68-C
N8BKB 13,230- 105- 42-B
WD8DPT 13,110- 115- 38-B
WB8PAT 12,654- 111- 38-B
WB8JBM(WB8OQP,opr) 275,025- 965- 95-C-15
W8YX(KL7JER,opr) 99,963- 383- 87-C
AA8S 5859- 63- 31-C-20
K8WW 24,003- 127- 63-C-40
K8BXT 8820- 98- 30-A-QRP

West Virginia

K8OQL 12,402- 79- 53-C-AB
W8WVM 20,088- 124- 54-B-15
W8LRL 540- 15- 12-B-160

9

Illinois

AI9J 849,528-1026-276-C-AB
K9MDO 194,832- 451-144-C
WD9IIC 168,270- 395-142-B
N9ANP 113,100- 371-100-C
KB9AW 87,696- 232-126-B
KA9DIL 42,975- 191- 75-C
WD9AEU 41,448- 157- 88-C
W9TNZ 29,403- 123- 81-B
WD9DBC 25,254- 122- 69-C
K9BQL 23,769- 139- 57-C
KA9AUS 23,112- 107- 72-C
W9HPG 14,832- 104- 48-C
N9BEM 7314- 53- 46-C
AI9P 4410- 42- 35-C
W9REC 2871- 33- 29-B
KA9AWS 2592- 32- 27-B
KA9ADP 585- 15- 13-C
K9MK 449,031-1237-121-C-10
K9RN 389,730-1181-110-C
K9RF(WB9TIY,opr) 354,480-1055-112-C
K4VUD/9 95,532- 419- 75-C
W9DWQ 77,748- 341- 76-C
KA9CQM 73,911- 347- 71-B
K9MNT 46,716- 229- 68-C
W9VA 44,352- 233- 64-C
K9ARZ 30,369- 191- 53-C
W9TA 29,160- 180- 54-C
WD9GSU 10,800- 90- 40-B
K9VMI 7224- 86- 28-B
WD9IIX 164,430- 522-105-C-15
KB9EW 41,238- 237- 58-C
K9JDV 37,698- 206- 61-C
K9DX 445,752-1208-123-C-20
W9NWE 6630- 65- 34-C-40
W9PNE 3468- 39- 34-A-QRP
WD9CUP 2652- 34- 26-A
WA5CIY/9 2142- 34- 21-A

Indiana

W9RE 1,671,816-1699-328-C-AB
W9ZRX 1,663,020-1629-340-C
WB8RNL/9 61,560- 228- 90-B
WD9HLR 31,752- 189- 56-B
W9TG 27,300- 130- 70-C
N9AR 24,570- 117- 70-C
WA9RAP 22,302- 126- 59-C
WB9UAO 8673- 59- 49-C
K1TH/9 4551- 41- 37-B
K9ODF 2268- 36- 21-C

K9CLO 170,343- 701- 81-C-10
KA9DOO 66,861- 323- 69-B
K9JCR 17,292- 131- 44-B
W9MOY 15,444- 132- 39-B
N9ASP 11,856- 104- 38-B
W9LT 201,285- 639-105-C-15
W9OBF 14,352- 104- 46-C
N9AYJ 105- 7- 5-B-20
KB9HG 30,429- 161- 63-C-40
K9UWA 765- 17- 15-B-160

Wisconsin

N9AFY 410,352- 664-206-C-AB
W9OP 404,230- 709-190-C
WA9TGL 180,420- 485-124-C
K9DAF 169,695- 419-135-C
AG9V 168,051- 403-139-C
W9AMM 156,156- 338-154-C
WA9BZW 101,598- 287-118-C
W9RF 73,164- 268- 91-C
W9GXR 53,133- 199- 89-C
WA9YRA 51,120- 213- 80-B
W9FBC 33,300- 185- 60-C
K9IZT 30,222- 146- 69-B
AG9G 24,924- 124- 67-B
N9AGB 11,658- 67- 58-C
WB9GLB 2705- 45- 35-B
KB9DZ 2520- 30- 28-B
AJ9K 624- 16- 13-B
WB9FUM 60- 5- 4-B
WD9DEE 54,855- 265- 69-C-10
WB9TXJ 23,970- 170- 47-C
N9ER 18,834- 86- 73-C
WB9VJT 5115- 55- 31-B
W9HE 2340- 30- 26-C
K9DID 178,272- 619- 96-C-15
WB9CXY 1881- 19- 11-B
WA9LCU 1311- 23- 19-C
W9YCV 48- 4- 4-C
K9XJ 3- 1- 1-B-20
WB9OAR 28,914- 158- 61-A-QRP

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Colorado

WØYK 488,880-1552-105-C-10
WØKEA 255,348-1038- 82-C
KØZFL 44,217- 289- 51-B
KAØFPJ 1173- 23- 17-B-20
ACØS 1860- 31- 20-C-40

Iowa

WØEJ 760,235-1051-245-C-AB
KØLUZ 715,176-1032-231-C
WBØZTN 287,232- 498-192-C
KØGT 144,787- 289-167-C
WØPPF 83,460- 260-107-C
WØRU 77,184- 268- 96-C
WØMJN 74,400- 248-100-C
AKØM 61,236- 189-108-B
KBØV 37,884- 154- 82-B
WAØDCB 22,491- 119- 63-C
NØADI 65,844- 354- 62-B-10
KØGVG 51,975- 275- 63-B
AGØM 3564- 54- 22-B
WØSML 38,016- 176- 72-C-20
WØVX 30,744- 170- 61-C

Kansas

WAØTKJ 144,960- 329-151-C-AB
WØRT 93,024- 272-114-C
WØGYS 43,602- 169- 86-C
K9BLY/Ø 5781- 47- 41-C
NØXA 444,288-1424-104-C-10
ABØX 62,340- 290- 72-C-15
KAØAZQ 1782- 33- 18-B

Minnesota

WØUC 241,224- 437-184-B-AB
KØIR 83,916- 259-108-C
WØBF 43,344- 168- 86-C
WØLP 37,683- 159- 79-C
NØACH 32,526- 139- 78-C
WAØADX 11,703- 83- 47-B
WAØFPL 59,535- 315- 63-C-10
KAØBCL 28,080- 216- 65-B
WBØFHS 8640- 64- 45-B
KBØC 52,164- 252- 69-C-15
KAØAIT 31,680- 165- 64-B
KØDD 258,564- 743-116-C-20

Missouri

KØVUW 368,445- 605-203-C-AB
WØPKO 89,916- 254-118-B
WØZH 56,682- 201- 94-C
WBØWCN 43,350- 175- 85-B
KBØKK 13,200- 88- 50-C
WDØELL 12,264- 73- 56-B
NØAQK 241,392- 856- 94-C-10
N5AHS/Ø 26,163- 153- 57-B
WA1IIE/Ø 7548- 60- 37-B

Nebraska

KØSCM 210,843- 513-137-C-AB
KØAFN 10,854- 71- 54-C
NØAON 109,440- 480- 76-B-10
W6SSC 23,256- 136- 57-B
KØGND 27,060- 164- 55-C-20

North Dakota

KØQQ 56,964- 202- 94-B-AB
WØRIB 126- 7- 6-B-10

South Dakota

WØACT 67,947- 319- 71-C-10
WDØBHV 39,474- 258- 51-B
WØWUU 3600- 50- 24-C
WDØHWX 1140- 20- 19-B

VE

Maritimes - Newfoundland

VO2CW 812,361-1133-239-B-AB
VE1MX 120,120- 280-143-B
VE1CCC 81,774- 231-118-B
VO1AW 39,078- 167- 78-C
VE1BNN 565,338-1597-118-C-10
VE1FW 79,968- 392- 68-B

Quebec

VE2DU 483,336-1096-147-C-AB
VE2AYU 438,795- 735-199-C
VE2VQ 36,624- 218- 56-C-10
VE2GE 43,860- 215- 68-C-20
VE2WA 5292- 42- 42-B

Ontario

VE3GCE 61,344- 213- 96-C-AB
VE3EWE 31,319- 135- 77-B
VE3KYP 16,038- 81- 66-B
VE3GWM 3444- 41- 28-C-10
VE3JTQ 9804- 76- 43-B-20
VE3IKN 10,260- 76- 45-C-80
VE3BBN 300- 10- 10-B-160
VE3KKB 103,368- 292-118-A-QRP
VE3BBH 2340- 39- 20-A

Manitoba

VE4ADV 47,376- 188- 84-B-AB
VE4VV 260,022-1057- 82-C-10
VE4SL 2250- 30- 25-C-80

Saskatchewan

VE5TT 9888- 103- 32-B-10

Alberta

VE6MP 462,624- 976-158-B-AB
VE6LU 126,153- 321-131-C
VE6WQ 650,268-2007-108-C-10

British Columbia

VE7BTV 558,306- 882-211-C-AB
VE7BSM 36,332- 184- 66-C
VE7AIO 27,132- 238- 38-B
VE7IN 477,495-1965- 81-C-15
VE7VX 81,510- 418- 65-C-20
VE7WJ 55,266- 302- 61-C-40

W/VE - Phone

Multioperator Single Transmitter

1

K1PR(+K1s CC TO XM,KA1GD, WA1MAO) 2,760,072-2347-392-C-CT
K1RX(+K1HI,KA1EP) 2,339,096-2179-376-C-NH
N1TZ(+K1s KNQ SF,W1BR, WA1UZH) 2,249,598-1963-382-C-WM
K1RQ(+W1s GG ZT,WA1VTA) 1,346,268-1364-329-C-WM
K1RU(+K1YR) 1,336,668-1334-334-C-CT
AG1C(+W1YN) 1,247,517-1429-291-C-EM
AB1A(+K1ST) 833,850- 850-327-C-EM
K1GW(+K1s KA LL) 471,450- 898-175-C-NH
W1BK(+N1CW,WA1UAR) 122,694- 286-143-C-EM
WA1PHY(K1EB,W1UI,K2OF, WB6KDG,oprs) 111,435- 323-115-C-EM

2

K2OY(+W2YX,WB2SJG) 1,243,908-1308-314-C-ENY
W2RQ(+W2s PA SQ) 1,230,675-1345-305-C-NNJ
AE2A(+K2JT,N2CR,W2ZZ) 1,168,272-1464-266-C-NNJ
WB2TTR(+WB2s FZO PWV) 1,128,582-1378-273-C-NLI
K2FL(+N2ATX) 1,016,418-1079-314-C-SNJ
WA2LQO(K2s DOD OG,W2DKM, WB2FMP,oprs) 476,847- 783-203-C-NLI
W2RR(WA2AOG,WB2ABD,oprs) 464,576- 717-216-C-WNY
W2HG(+WA2LOG) 424,710- 605-234-C-WNY
K2TD(+Net) 376,461- 573-219-C-SNJ
W3HKK/2(Multiop) 346,164- 634-182-C-WNY
W2UI(+N3KR) 325,941- 586-187-C-SNJ
WA2PHA(K2QIE,WB2WSV,WB3s KHE KHF,oprs) 175,950- 391-150-C-WNY
WB2RNT(+KA2CIW) 167,139- 379-147-B-NLI
W2YC(+WA2s LET MMA,WA3KRL) 146,118- 349-142-C-SNJ
N2SS(+Net) 120,879- 414- 99-C-SNJ
WB2TUM(+WA2DHZ) 49,980- 196- 85-B-WNY
K2FJ(Multiop) 41,184- 143- 96-B-SNJ
W2YKQ(+K2ZIM,W2CZZ) 13,959- 99- 47-C-NLI

3

AI3C(+N3MG,WB3FOG, WB4QPL) 2,570,040-1947-440-C-MDC
W3MA(+Net) 776,958- 949-273-C-EP
W3GU(+K3CY,W3KU) 554,724- 811-228-C-EP
W3KWH(WA3s DEE FYJ,WB3EHQ, oprs) 457,130- 787-194-C-WP
WA3EKL(+KB3EI,WB3HMX) 446,877- 613-243-C-MDC
K3IU(+K3KU) 430,902- 647-222-C-MDC
W3GNQ(+Net) 425,733- 679-209-C-MDC
KA3BFX(+KB3s FA HB) 356,301- 649-183-C-WPA
WB3CFD(+KB3FN,WB3s BZZ CBH) 230,736- 506-152-C-MDC
K3SME(+N3EG) 203,376- 446-152-C-EP
W3KT(+Net) 156,156- 338-154-C-EP
N3QA(+K3RYQ,KA3BKW,W3OSZ, WA3SWD,WB3HGQ) 86,001- 263-109-B-MDC
KA3CRC(+KA3CTW) 37,128- 221- 56-B-WP
AJ3G(+Net) 34,194- 139- 82-C-EP
W3XE(+Net) 22,570- 105- 78-C-MDC
K3PA(Multiop) 17,085- 85- 67-C-EP

4

K4VX(+WB3DNL,KØCMF) 3,107,520-2496-415-C-VA
N4WW(+AA4MM,K4HGU, KB4BU,KC4BH,N4SA,WA4JDI) 1,839,264-1568-391-C-NF
N4HB(+N4ZJ,WA4KNP,WB4BVY) 1,582,200-1461-355-C-VA
N4KG(+KD4Y,WN4KKN) 931,470-1018-305-C-AL
W4PRO(+W4HBK,N4ABZ, WB4ZHQ) 720,225-1067-225-C-VA
WA4QQV(+KB4YI,KQ4L,KR4N, N4AOC,WA4QMQ) 624,624-1183-176-C-KY
K4XU(+KA4GZT,KF4H) 595,593- 817-243-C-TN
N4UF(+K4LK,KA4FPO, WD4ITK) 257,964- 518-166-C-NF
WD4LFD(+W4OVN) 252,813- 517-163-C-TN
WD4FIG(+WA4VGE,WB4s LED SFM,WD4HLZ) 243,615- 545-149-C-SC
WA4WQH(+N4OE) 200,772- 468-143-C-GA
K4EBY(+WB4RDV) 196,555- 355-147-C-VA
KG4F(+KM4Z,WB4PAT) 122,625- 327-125-C-VA
KM4X(KA4HEP,WDØHTN,oprs) 108,966- 286-127-B-VA
G3AOS/W4(+N4BP) 40,131- 147- 91-C-SF

5

W5VX(+K5TSQ) 1,314,726-1361-322-C-ST
K5QY(+N5s BQQ EG,WB5NQH, W9PL) 926,250-1235-250-C-NT
W5AC(KA5s BVP CQN HSA, N5BTO,WB5s MWZ OON PIL UHJ WOH,N7DE,YS1MAE,opr) 513,348- 774-234-C-ST
KA5C(+KB5QO,KØRL) 218,517- 431-169-C-NT
K5MFA(Multiop) 43,803- 157- 93-C-NT
K5PFL(+Net) 5166- 42- 41-C-ST

6

K6MYC(+KI6P,N6IG,WB6SHD) 1,740,290-2005-286-C-SCV
W6XX(+Net) 925,722-1302-237-C-SCV
K6HNZ(+Net) 873,792-1184-246-C-SCV
N6RZ(+WA6UCV) 347,625- 927-125-C-SCV
W6BIP(WA6s DJI PYN) 322,428- 554-194-C-SF
W6FQF(+Net) 317,107- 611-173-C-SCV
K6TZ(WA6s KTZ SRJ,oprs) 313,686- 666-157-C-SB
W6GO(+K6HHD) 182,700- 350-174-C-SV
K6MEP(KA4ABL,AC6I,AA6BB, KA6s V DVA GLQ,K6UMN,N6s AFI CCD,WA6DJS,WB6GNS, W7MSR,oprs) 146,289- 403-121-C-SB
K6MA(+AG6O,N6QW) 100,440- 270-124-C-SCV
WB6SHL(+Net) 84,240- 241-117-C-ORG
WD6DPL(+KA6GCL,WA6s FFU NDN) 69,894- 353- 66-C-SF
N6ST(+Net) 63,024- 208-101-C-SCV
WB6RWJ(+KA6ING) 46,413- 191- 81-C-SCV
K6XO(+Net) 31,524- 147- 74-B-EB
K6YK(+Net) 30,096- 116- 88-C-SJV
K6SMH(+Net) 18,600- 100- 62-B-SCV
W6SZN(+Net) 10,125- 125- 27-B-SCV

7

AG7M(+KA7EPP,N7ZZ,W7WHB) 1,724,370-2290-251-C-ORE
W7ZR(+W7EJ) 1,609,255-1881-285-C-ORE
W7NI(+AI7B) 1,307,305-1854-235-C-ORE
WA7YCZ(+WB7VXR) 280,575- 725-129-C-WA

8

AG8W(+AC8Y,AI8D,K8s LF MJZ, WB8BWN,WD8DSV) 991,800-1425-232-C-MI
KB8EI(+K4VYU,AD8U,K8s CMO MN,KA8BBN,N8AOL,WBs CEF SDL,WB8ZJY,WD8DEL) 751,894-1048-239-C-OH
K8URE(+WA8EEA,N9AG) 682,758- 914-249-C-OH
WB8YQX(+N8BIK,WB8YQX) 448,440- 740-202-C-MI
W8MR(+WD8JSC) 424,512- 704-201-C-MI
W8NGO(+W8s KR MNL, WA8WDZ) 411,600- 686-200-C-MI
WB8UCW(+KA8CTE,WD8MKC) 333,234- 594-187-C-OH
K8LPF(+N8BFY) 189,840- 452-140-C-MI
WA8BSF(+AC8W,K8DD,N8AXH) 94,875- 253-125-C-MI
WD8OBO(Multiop) 44,550- 225- 66-B-OH
KA8CIM(+WA8s ECB OMK) 7155- 53- 45-B-OH

9

WB9ZBE(+K9GM) 585,480- 969-205-C-WI
WB9UZR(+AI9F,K9GS) 557,907- 857-217-C-IL
N9RR(+WB9ZKK,WD9CSA) 316,128- 592-178-C-IL
W9RW(+W9TG) 68,880- 170-140-C-IL
K9HWU(+WD9DSS) 10,440- 87- 40-C-IL
WB9LDH(KA9s DXC DXD EAP GQV GQX,W9MON,WD9s JCF JFB) 6975- 75- 31-C-IL

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WØFO(+KØs AT JSY,WØs IZ WP) 1,240,440-1357-278-C-IA

I5NSR, holder of the second-place-phone QRP score, worldwide.

JE1BYI, Fumio, stirred up a little action on 28 MHz in the phone portion of the DX Contest.

K3IU keeps the microphone warm while multi-single partner K3KU snaps the photo.

K0RWL(+AK0A,K0s VBU WTW, W0VWW,WA0s SLL ZHY,WB0s LFY TCQ)
1,024,800-1220-280-C-MO
W0MYN(+K0FX,WA0ECN)
921,981-1322-233-C-CO
K0FU(+WB0PDN)
236,676- 492-163-C-MO
WB0UFL(+WB0OYA)
229,784- 604-182-C-IA
KA0EBD(+KA0s OMB ELX, N0AZF,WB0WOT,WD0GIL)
128,538- 385-111-C-IA
WA0YPY(+WA0ASM)
118,901- 351-113-C-NB
N0AEX(+WB0PJB)
116,535- 457- 85-B-SD
W0HJ(+WD9HTA,WB0s GNV QMA, WD0AQS) 115,968- 302-128-C-IA
AC0W(+WB0LTH)
112,644- 298-126-B-MN
WD0GML(+WD0FSJ)
54,735- 205- 89-C-MO
K0AZV(KA0CDG,WA0UIS,oprs)
44,880- 187- 80-B-MO
K0NB(+AD0H,K0DI)
12,420- 90- 46-C-NB

VE

VE1DXA(VE1s AIH AVX BSE FH,oprs) 1,908,930-1970-323-C-MAR
VE2CUA(VE1ALK,VE2s AYA BVS DUB EHI EWQ FEW DFH XB, JH3OII,YV6ARC,oprs)
326,988- 586-186-C-QUE
VE3BPC(VE3s EEH ENF HZD,oprs)
111,456- 288-129-B-ONT

W/VE - Phone

Multioperator Multi-Transmitter

N2AA(+K2s BQ GL NG SS TT XR,WA2s BIQ OVE SFB, WB2VYA,K3EST,W3ZZ)
10,629,360-6216-570-C-ENY
W2PV(+AF1O,K1s AR DG OME UA VR,K2XA,W3AZD)
9,031,755-5405-557-C-ENY
K8LX(+AA8U,K8s GM MD,N8EA, W8s TA WW,WA8s TBQ YVR ZDT, WB8ALP,WN8PEE,WD9HFW)
7,309,875-4825-505-C-MI
K2UA(+K2BU,N2ME,WA2HGM, N3RD) 6,278,094-4009-522-C-SNJ
W1ZM(+AF1C,K1s EB XX ZM,K2s DM ZM,N2NT,K9ES)
5,697,000-3798-500-C-CT
K2TR(+AD2J,K2s MM WR, WA2SPL,K1DH)
5,248,152-3738-468-C-ENY
W3MM(K3s GM OO ZUF,N3VV, WA3s VYD WMG,oprs)
5,217,045-3485-499-C-EP
K3WW(+K2ZSY,K3WJV,KA3BLP, KB3GJ,N3s EC ED,oprs)
5,022,990-3283-510-C+P
K0RF(+K0s EU GU ZX,N0CP, W0s CP UA,WB0s CMM IWL, WD0DSU)4,922,775-3825-429-C-CO
W3RJ(+K3RL,N3AD)
4,568,631-3089-493-C-EP
W3LPL(+K3NA,N3IR,W3MR, WA3UXU,WD4AXM)
4,567,050-2985-510-C-MD
W3FA(+W3ABC,K3ZZ,N3s CL GB, WA3s KCY ZAS,N8II)
4,543,044-2981-508-C-MDC
W4BVV(+K3s RT RV,W3IUU, K4YEP,N4MO,WA4IVL)
4,198,881-2839-493-C-VA
W3DHM(+AD3s V Z,K3JLT, WA3LRO)
4,024,566-3042-441-C-EP
W4DR(+KG4W,KN4U,W4PFM, WD4s BAS IMC)
3,762,456-2812-446-C-VA
N6RO(+K6RM,K9LBQ,N9NC, WA7LQO)
3,314,169-2811-393-C-EB
W3GM(+AA3R,K3s GQJ ND, W3FV,WB3DJF)
3,046,362-2222-457-C-EP
N7RO(W7EKM,AI7P,WA7ZWG, KA7AUH,WL7AFF,W7ISX, WB7CAO,WB7CLU,VE7AZG, VE7XG,VE7CC)
3,006,450-3275-306-C-WA
K5JA(Multiop)
3,003,804-2628-381-C-NT
W6RDF(N6s CW ND ZI,W6s OVO UQF,WD6CZR,oprs)
2,873,556-2646-362-C-SD
W4NT(AE4Q,KB4s ET I,KC4s M U,K54Q,N4s NX PN RJ,W4s LBP LVM,WB4GNT,oprs)
2,523,729-2119-397-C-GA
W6MSF(N6KT,WA6s HCI VEF, oprs) 2,374,788-2342-338-C-SCV
K6RU(+W1ARR,K6SEM,N6NE, W8RPA) 2,143,167-2327-307-C-SCV
W2VJN(+K2BMI,N2GJ,W2REH, WA2ZKY)
2,007,936-1743-384-C-NNJ
N4RV(+N4RA)
1,898,442-1729-366-C-VA
N2RM(+WB2GTW)
1,485,749-1657-319-C-SNJ
N3AW(+N2MM,N3s AFU DA)
1,438,638-1471-326-C-EP
K6ZM(+K5GOE,K6KLY,N6s KB VQ) 1,429,857-1573-303-C-EB
K3RA(+WA3s VUQ WTQ,N4NW)
1,287,954-1173-366-C-MDC
W9JZ(K9QXY,KA9s BKS CBN, N9s BAF RB,W9s LA XM ZI, WD9KGQ,WB9s NOV OQU RNF, WD9s BCM CPX CWJ HWY,oprs)
1,262,616-1493-304-C-WI
W3BI(+N3LR)
1,080,576-1407-256-C-EP
K3UC(+AJ3H,K3VDU)
1,043,094-1118-311-C-EP
N5IH(+AD1S,K5NK,KE5M,WD5s CSK CSM HBX,WB6QLL)
993,720-1183-280-C-OK
W6YX(+W2JU,N3ER,AJ6V, N6AUV,WA6ITV,N7MH)
758,640-1160-218-C-SCV
WB3IXG(+K3WOK,WB3FTP)
446,898- 706-211-C-EP
AK0P(+KA0CLQ,WB0RMT, WD0EIF)
358,200- 600-199-C-IA
K6SG(+W8KZH)
316,368- 624-169-C-SV
K4VHC(+KS4C,N4s BGH UZ, WA4s SZZ WXK WXO)
241,956- 517-156-C-GA
WB3CZK(+WB3JRU)
117,342- 318-123-C-MD
WB3JYO(+W3ICC,KA3EEX, WA3ZPA,WB3LRW)
102,816- 288-119-B-EP
W2IQZ/7(+K7RDG,KB7HB, W7ACI,WB7WVH)
88,920- 195-152-C-AZ
N6AA(Multiop)
67,158- 246- 91-B-LA
W5JMN(+WD5s HEQ HER)
28,860- 185- 52-C-ST

DX - Phone

Single Operator

Africa

EA8TY 806,884-2405-118-B-AB
EA8JE 46,846- 298- 59-B-10
EA8NL 10,233- 139- 27-B-
EA8VV 26,685- 249- 45-B-20

EA9IE 288,340-1643- 65-B-15

EL2AV 811,368-1649-177-C-AB
EL9A 486,045-1678-105-C-20

N4HX/TT8
191,866- 873- 86-C-AB

ZE3JJ 6435- 79- 33-B-AB

ZS6OX 16,866- 321- 18-C-10
ZS6DW 1295- 64- 7-C-40

5T4QS 97,414- 674- 53-B-AB

Asia

BV2B 27,944- 435- 28-B-20

HS1ABD 378,102-1369-106-C-AB

HZ1HZ 95,936- 632- 57-B-AB

JA1ELY 1,013,364-1860-198-C-AB
JF1SEK 353,400- 833-120-B
JA6CNL 264,696- 808-123-C
JA1DDH 235,228- 710-124-C
JI1QPU 107,180- 437- 92-B
JA8SW 106,488- 416-102-C
JR3XEX 104,490- 477- 81-B
JG1RKN 93,365- 480- 71-B
JA6BIF 88,640- 460- 80-B
JA1CLW 42,150- 301- 50-B
JA1ALX 39,591- 277- 53-B
JA4ESR 37,392- 288- 46-C
JA2HMF 37,345- 262- 55-B
JR3WXA 33,592- 314- 38-B
JR6LKG 29,298- 216- 57-B
JA1IZ 27,778- 251- 38-C
JH7AJY 23,490- 161- 58-B
JA1VZM 21,080- 220- 34-B
JH1MTR 14,801- 134- 41-B
JH1LSS 13,328- 143- 34-C
JA6AKV 12,744- 138- 36-B
JM1BRP 12,720- 158- 30-B
JF3CEC 12,336- 181- 24-B
JA1BZM 11,165- 141- 29-B
JR2AMZ 9835- 106- 35-B
JA9SOT 9074- 125- 26-B
JA4AQR 8924- 137- 23-B
JA0ZGA 8288- 112- 32-B
JR6LKG 8280- 91- 40-B
JG3RDO 8277- 101- 31-B
JA4SRG 8118- 96- 33-B
JH5AUE 8091- 97- 31-C
JG1GWE 5738- 109- 19-B
JA7FMZ 5220- 63- 36-B
JR7DXE 4950- 66- 30-B
JA4JKD 2992- 66- 17-B
JG1UNE 2694- 150- 6-B
JI1LJD 2380- 46- 20-B
JK1BBO 1644- 49- 12-B
JA9JKL 1530- 38- 15-B
JH7JDB 816- 68- 4-B
JG3DLI 720- 29- 9-B
JA1EDQ 513- 21- 9-B
JK1NNT 154- 9- 7-B
JI1DSU 24- 3- 4-B
JH1ARJ 444,657-1823- 87-B-10
JA7BSK 302,337-1727- 63-B
JH1VRQ 262,650-1258- 75-C
JR1CFG 238,770-1225- 70-B
JH1AGU 227,436-1261- 66-B
JL1CGL 139,770-1086- 45-B
JH7JGG 122,976- 716- 63-B
JH7UJU 111,834- 716- 57-B
JF1EEK 107,688- 899- 42-B
JA1SJV 87,814- 666- 46-B
JA4XKL 85,200- 609- 50-B
JH1ARC 84,600- 804- 36-B
JA3EQC 66,088- 543- 44-B
JA1JKG 56,342- 753- 26-B
JK1AXR 43,650- 374- 45-B
JH1BBU 42,756-1191- 12-B
JA4UQY 36,828- 319- 44-B
JE1SLP 36,367- 338- 41-C
JA0JES 35,000- 335- 40-B
JA7NVF 30,186- 399- 27-B
JF3KNQ 28,880- 299- 38-B
JR3IOT 28,396- 336- 31-B
JR1ZTI 26,096- 315- 32-B
JR2HAE 26,970- 316- 30-B
JH2QRJ 21,480- 265- 30-B
JH1UUT 20,496- 270- 28-B
JA1DFQ 19,596- 332- 23-B
JA3HGL 18,415- 235- 29-B
JR2VLS/1 17,676- 183- 36-B
JE3FUN 17,080- 224- 28-B
JA7JGD 14,304- 140- 32-B
JE2DOD 13,202- 108- 46-B
JL1BLW 13,014- 184- 27-B
JA5PEE 11,368- 153- 28-B
JE2ABK 10,080- 370- 10-B
JH7WKQ 10,000- 147- 25-B
JA1NTK 9840- 174- 20-B
JA3BBG 9509- 100- 37-B
JA3AA 7920- 171- 16-B
JE1BYI 7728- 125- 23-B
JA2DSF 6160- 117- 20-B
JK1NWD 5958- 123- 18-B
JA2WB 5187- 102- 19-B
JR3CVO 5022- 100- 18-B
JL1CCX 4968- 143- 12-B
JA3HUL 3660- 76- 20-B
JA1AAT 3402- 61- 27-B
JK1TXS 3384- 70- 18-B
JM1DJQ 2702- 73- 14-B
JL1VHB 2678- 75- 13-B
JA1GRI 2592- 64- 16-B
JA1JGP 2574- 57- 18-B
JH0PDZ 2145- 54- 15-B
JA9YE 2100- 62- 12-B
JR7MOE 1600- 42- 15-B
JA5CPO 1260- 36- 14-B
JA1EEG 1050- 40- 14-B
JR3QCT 988- 30- 13-B
JA1DSR 606- 20- 6-B
JE1MMX 604- 52- 4-B
JA1FQ 572- 22- 11-B
JA6ADA/6 441- 23- 7-B
JG3WOE 330- 23- 5-B
JA7WFA 215- 16- 5-B
JH1FJK 135- 11- 5-B
JA3MDI 126- 21- 2-B
JJ1OLC 36- 6- 2-B
JF2LTH 2- 1- 1-B
JK1HAM 119,630- 617- 70-B-15
JA9BMP 105,927- 589- 67-B
JG1TSF 72,177- 542- 49-B
JL1JJL 36,378- 291- 47-B
JA8DHI 35,908- 297- 47-B
JF2GWO 35,800- 325- 40-B
JA8UJY 23,052- 255- 34-B
JJ1ASO 21,720- 206- 40-B
JI1QLB 18,840- 228- 30-B
JH0NBN 16,870- 184- 35-B
JA1QXY 15,176- 152- 28-B
JG1LCN 13,827- 159- 33-B
JJ1LBJ 11,675- 166- 25-B
JA9MSK 10,560- 138- 30-B
JA3FZI 10,440- 161- 24-B
JL1QNG(JM1AJH,opr)
7920- 131- 22-B
JA0GYN 6456- 105- 24-B
JR4INH 6384- 104- 24-B
JA6PL 5428- 91- 23-B
JF1FTU 5049- 109- 17-B
JH0GLH 4590- 112- 15-B
JE1VTZ 4485- 120- 13-B
JM1CPA 4305- 106- 15-B
JH4PHW 3624- 63- 24-B
JA1KAW 2815- 192- 5-C
JK1JSB 1776- 59- 12-B
JJ1NKE 1744- 75- 8-B
JL1OLI 1674- 66- 9-B
JA4PWH 1608- 48- 12-B
JM1CDN 1566- 76- 7-B
JH7OHN 1392- 60- 8-B
JA1HYU 1337- 66- 7-B
JH4KMA 1261- 36- 13-B
JI1KMY 780- 27- 12-B
JR4FPO 440- 19- 10-B
JL1XLB 424- 22- 8-B
JF2HGP 406- 21- 7-B
JR4API 378- 23- 6-B
JA4YGM 132- 9- 6-B
JR3LLU 64- 6- 4-B
JF3WDQ 56- 5- 4-B
JA0JHA 193,308- 863- 89-B-20
JA9CWJ 41,728- 269- 64-C
JE1SGH 7392- 91- 32-C
JA5UBW 6050- 90- 25-B
JA9CKK 5568- 91- 24-B
JA0CGJ 1344- 34- 16-B
JG1FZG 4- 1- 2-B
JA2BAY 71,550- 486- 54-C-40
JA1VKV 59,690- 457- 47-C
JA9UX 21,368- 309- 24-C
JA9RYL 72- 12- 2-B
JH7BDS 54- 18- 1-C
JA1BOK 48- 16- 1-B
JA9AGX 4400- 82- 20-C-80
JA1YFL(JA5GIY,opr)
23,883- 174- 57-A-QRP
JL1PAM 22,076- 270- 32-A
JH4UTP 12,408- 142- 33-A
JR1MSR 3749- 62- 23-A
JR2NTC 2352- 58- 16-A
JA0BMS/1 760- 34- 8-A
JH8DEH 693- 30- 9-A
JA2ANA 286- 48- 2-A
JR1WZI 189- 12- 7-A
JA5ZDW 8- 2- 2-A

JA1YNW/JD1(JA6RTJ,opr)
129,161-1061- 53-B-AB
JD1AIZ 520- 18- 13-B-10

JT1BG 2880- 62- 20-B-AB
JT1BF 1403- 29- 23-B-20

JY9OZ 31,876- 327- 41-B-AB

UA9OO 309,453- 795-183-B-AB
UA9FDL 67,760- 389- 80-A
UA0CCW 18,944- 142- 64-B
UA9FGD 121,302- 726- 69-B-10
UW9WK 112,535- 752- 71-B
UA9YDX 102,300- 678- 66-B
UA0ADR 92,820- 851- 51-B
UA0CED 73,620- 986- 30-B
UA9UPS 61,820- 875- 55-B
UA0CBO 47,929- 402- 41-B
UA9YE 12,600- 148- 40-B
UA9UTF 10,880- 134- 32-B
UA9FBV 8320- 130- 32-A
UA0SGL 1044- 30- 18-B
UA0SAU 344,370-2199- 65-B-15
UA9JBD 117,168- 961- 48-B
UA9MR 22,724- 449- 19-B
UA0LEO 77,172- 499- 59-B-20
UA0OAG 44,325- 387- 45-B

UD6DKZ 72,303- 380- 77-B-AB
UD6DER 24,990- 195- 49-B

UF6FCZ 24,434- 277- 38-B-AB
UF6OAC 9734- 136- 31-B-10
UF6QAC 13,962- 166- 39-B-15
UF6CX 1072- 28- 16-B-20

UG6JJ 7560- 106- 30-B-15
UG6GAF 41,832- 336- 56-B-20
UG6LT 10,650- 161- 30-B

UI8AAY 44,844- 444- 49-B-10

UJ8JCQ 20,880- 227- 45-B-10
UJ8JCT 12,245- 186- 31-B
UJ8JCL 1008- 36- 14-B-80

UL7MAR 572,676-1581-156-B-AB
UL7EAF 19,080- 233- 40-B-10
UL7QF 146,982- 911- 66-B-15
UL7JCA 212,170-1229- 70-B-20
UL7PBY 3596- 42- 19-B-80

VS6DO(K1NG,opr)
65,706- 466- 47-B-20

4X6AF 6150- 123- 25-B-AB

5B4EP 1356- 43- 12-B-AB

9K2DR 137,907- 558- 99-B-AB

Europe

CT1AL 53,232- 285- 67-C-AB
CT4MS 37,882- 250- 62-B
CT2DF 197,408-1160- 62-B-10
CT2QN 163,279- 727- 87-C-20
CT2AK 65,156- 467- 52-C-80

DK7ZT 93,525- 743- 43-C-AB
DK5KJ 2300- 45- 20-C
DF8EA 1638- 80- 9-C
DK8AX 497- 25- 7-B
DF8XC 125,443- 954- 47-B-10
DK3GI 112,420-1105- 35-C
DF92P/P 85,492- 587- 58-B
DF2HL 52,624- 410- 44-B
DK5WQ 40,509- 252- 63-C
DF1DR/P 17,632- 378- 16-B
DJ4YH 10,770- 138- 30-B
DL1AM 495- 21- 11-B
DA1WZ 7210- 346- 7-B-15
DL1KAV 1764- 57- 12-B
DL8PC 38,520- 348- 40-C-40

FD1FD 684,488-1984-119-C-AB
ED1OM 323,736-1354- 84-C
EA2QU 299,912- 654-116-C
EA3CBQ 115,695- 480-101-B
EA1JO 34,821- 210- 73-C
EA3WZ 286,578-1935- 54-B-10
EA2CQ 23,439- 250- 39-B
EA3LA 5800- 96- 25-B
EA7BDJ 187,575- 985- 75-B-15
EA3SF 253,300-1140- 85-C-20
EA4ZO 18,090- 237- 27-B

EI2BB 209,587-1026- 79-B-20

F6BVB 66,008- 327- 74-B-AB
F8WE 12,768- 158- 38-B
F5BV 11,554- 94- 54-B
F6CLM 3699- 57- 27-B
F6BRP 2212- 58- 14-B
F6FNA 1656- 39- 18-B
F6CXJ 3864- 66- 24-B-10

G2QT 407,904-1305-112-C-AB
G3NT 48,006- 280- 63-C
G3ZQW 870,865-3546- 89-C-10
G5CMX(N8ET,opr)
667,602-3030- 78-C
G3YHB 149,702- 771- 74-B-15
G3RAM 40,040- 300- 55-B-20
G5CTB 1862- 43- 19-C-40
G3SZA 2408- 68- 14-B-160
G3XPM 40,464- 303- 48-A-QRP
G5DEH 19,343- 239- 29-A

GD4HOX 12,360- 226- 24-B-10
GD4GWQ 1045- 36- 11-B-20

GI4ELQ 89,937-1131- 27-B-10

GM3RAO 470,400-1444-120-B-AB
GM4FDM 125,060- 605- 74-C

GW4BLE 66,960- 511- 45-B-AB
GW3CDP 150,416- 770- 79-B-15
GW3KYA 85,635- 706- 45-B
GW3NYY 2640- 56- 20-B-80

HA4XX 214,406- 604-158-B-AB
HA0HW 23,939- 231- 37-B
HA6KNH(HA6OI,opr)
1200- 32- 16-B
HA5KBM 238,176-1167- 72-B-10
HA9KPU 197,030-1230- 61-B
HG8KQX(HA8BY,opr)
86,454- 615- 54-B
HA4YQ 73,072- 477- 63-B
HA3GJ 29,720- 295- 40-B
HA6KNB 7400- 120- 20-B
HA5EIV 531- 23- 9-B-10
HA8VB 286,230-1620- 70-B-15
HA4KYB(HA4XH,opr)
308,790-1340- 94-B-20
HA6NW 155,840- 699- 80-B
HA8KWO 42,021- 308- 63-B

HB9BLQ 101,724- 487- 84-B-AB
HB9AUS 61,200- 353- 68-C
HB9BRQ 6048- 100- 27-B
HB9ASJ 5664- 86- 24-B
HB9DX 3588- 598- 2-C-10

I18AF 985,647-1699-199-C-AB
I2MQP 309,015-1016-108-C
I5SDG 757,350-2801- 99-C-10
I6NOA 587,288-2114-104-C
I1YBM 398,194-2055- 74-B
I0WKS 230,547-1228- 67-B
I1HAG 228,001-1280- 67-C
I8ZLW 77,760- 625- 48-B
I7LMR 3824- 90- 16-B
I6FLD 612,540-2975- 82-C-15
I4CSP 19,832- 216- 37-B
I2YCF 106,533- 695- 57-B-20
I5JFG 98,356- 572- 67-C
I0PSB 68,680- 223- 85-B
IC8POF 66,881- 560- 47-C
I4AVG 36,182- 329- 49-B-80
I5NSR 166,278- 829- 74-A-QRP
I3FIY 42- 5- 3-A

I50KNG 62,336- 706- 32-B-15

LA5YJ 795,800-1616-184-C-AB
LA6UL 246,620- 813-110-B

LA9GX 89,346- 690- 58-B
LA9CQ 46,276- 192- 92-C
LA2AD 42,395- 263- 61-B
LA5YV 14,446- 102- 62-B
LA1KQ 5713- 93- 29-C
LA2GV 3303- 367- 6-B
LA3VW 3010- 75- 14-B
LA6ZV 2286- 127- 6-B
LA7NW 1938- 34- 19-B
LA2IJ 1776- 148- 4-B
LA3JT 5899- 131- 17-B-10
LA7SI 324- 27- 6-B
LA9HW 34,840- 288- 52-B-15
LA4YF 1599- 48- 13-B
LA2GN 1014- 40- 13-B
LA4WV 336- 56- 2-C
LA4TG 2440- 205- 4-C-20
LA4YW 3528- 62- 28-C-80

LZ2VP 15,330- 170- 42-B-20
LZ2YJ 3380- 63- 26-B

OE5CWL(OE5CUL,opr) 79,299- 831- 33-C-AB
OE1SBA 5486- 82- 26-A-QRP

OH3YI 2,802,688-4178-238-C-AB
OH1LW 1,362,837-2388-219-C
OH1IJ 1,339,268-2793-196-C
OH7UV 104,465- 502- 85-B
OH7NW 93,610- 349-115-B
OH1EH 91,372- 714- 53-B
OH6PA 58,401- 285- 81-B
OH2KP 52,866- 266- 89-B
OH3SG 27,555- 175- 65-B
OH2BFF 7045- 105- 43-B
OH2VZ 5191- 73- 29-B
OH6SA 4843- 68- 29-B
OH1HS 867- 30- 17-C
OH1FM 490- 16- 14-B
OH4PW 22,260- 186- 53-C-10
OH6UJ 17,824- 209- 32-B
OH1PU 12,420- 170- 36-C
OH1PS 5328- 118- 16-B
OH6AG(OH6MN,opr) 1028- 86- 4-C
OH5OQ 128- 8- 8-B
OH7SC 102- 34- 1-C
OH2FQ(OH2BH,opr) 961,469-3710-101-C-15
OH5TS 507,122-2686- 77-C-
OH2BCD 9145- 133- 31-B
OH5BZ 4378- 85- 22-C
OH3FW 1012- 22- 22-B
OH5LF 540,235-1900-103-C-20
OH5LP 115,103- 561- 79-B
OH2OT 49,296- 388- 52-B
OH3AA(OH3WS,opr) 15,179- 162- 43-B
OH9PH 11,583- 97- 39-B
OH5OL 6880- 124- 20-B
OH3DP 5624- 70- 37-B
OH1MQ 784- 24- 16-B
OH1ZK 5985- 87- 35-B-40
OH6NG 1462- 43- 17-A-160
OH3WU 7084- 74- 44-A-QRP

OHØPA(OH1AS,opr) 48- 6- 4-A-160

OK2BLG 479,468- 842-187-C-AB
OK2SPS 64,980- 386- 60-B
OK1KZ 36,780- 213- 60-B
OK1AVD 22,620- 166- 60-C
OK1XG 14,227- 168- 41-B
OK1AAE 5858- 71- 29-B
OK3FON 4048- 68- 22-B
OK1FAR 730,887-2982- 87-C-10
OK2BTI 236,550-1267- 75-B
OK3EA 103,311- 901- 39-C
OK2BJR 27,710- 359- 34-B
OK2RBI 15,390- 215- 27-C
OK3CFA 13,068- 164- 36-C
OK2QX 1425- 32- 19-B
OK3CMZ 1224- 68- 6-B
OK1XC 1045- 39- 11-B
OK1AGN 193,380-1094- 60-C-15
OK1XN 51,060- 430- 46-B
OK2SLS 32,544- 215- 56-B
OK2BQL 12,366- 171- 27-B
OK1ASQ 1848- 55- 12-B
OK3TDN 46- 10- 2-B
OK1AMI 44,850-1725- 51-C-20
OK2JK 39,198- 334- 47-B
OK1AJY 9250- 101- 37-B
OK2BBJ 1887- 45- 17-C
OK1AOJ 1177- 46- 11-B
OK1MIZ 810- 27- 15-B-80
OK1AVG 754- 31- 13-A-160
OK1DKS 88,350- 376- 93-A-QRP
OK2BKR 25,792- 176- 52-A

OR5KP 296,338-1667- 61-C-AB
OR5FV 7358- 121- 26-B
OR4XG 20,700- 253- 30-B-15
OR6JG 35,640- 323- 45-B-80
OR4HG 69,536- 525- 53-A-QRP

OY1A 4092- 73- 22-B-AB
OY9R 3638- 76- 17-B

OZ8T 97,226- 475- 87-B-AB
OZ6UG 63,114- 353- 67-B
OZ9NN 38,192- 233- 62-B
OZ1AXG 7800- 100- 30-B
OZ3ZK 3925- 79- 25-B
OZ8HE 3914- 76- 19-B
OZ1EQC 3206- 32- 14-B
OZ2BM 1602- 89- 6-B
OZ1FAO 516- 18- 12-B
OZ6XR 89,880-1064- 30-B-10
OZ6YZ 10,585- 99- 29-B
OZ9OL 8880- 160- 20-B
OZ8SC 344- 30- 4-B
OZ5EV 17,920- 192- 40-C-80

PAØDUO 19,872- 142- 54-B-AB
PAØLIE 17,604- 135- 54-B
PA3AJA 8990- 101- 31-B
PAØMVW 1120- 36- 10-B
PA2TMS 576,882-2494- 81-C-10
PAØAWI 111,435- 801- 51-B
PAØIJM 15,234- 203- 36-B-80
PAØCF 120- 20- 2-A-QRP

SL2ZZU(SM2EKM,opr) 2,175,738-3728-214-C-AB
SMØAQD 1,980,072-3489-206-C
SM5CAK 216,879-1903- 39-C
SM7EHJ 24,564- 375- 23-C
SM7AIO 16,686- 223- 27-B
SMØARF 13,560- 140- 40-C
SMØDEN 3705- 285- 5-B
SM5AAT 728- 61- 4-C
SM5FBL 648- 37- 6-B
SM2RS 192- 16- 4-C
SM6HCJ 62- 5- 4-C
SMØAJU 415,982-1871- 86-C-10
SM4HCM 170,686-1080- 62-C
SM3DNI 91,542- 879- 38-B
SM3IUV 85,567- 870- 41-B
SMØJOQ 46,460- 372- 46-B
SM5CBM 45,900- 355- 54-B
SM5ARL 40,470- 274- 71-B
SM6JVQ 26,906- 474- 22-B
SM6CSB 20,760- 201- 40-C
SMØATN 15,800- 155- 40-B
SM5AZU 8025- 116- 25-B
SM5BDA 7080- 113- 24-B

SM6CST 6516- 184- 12-B
SM5CSS 3766- 95- 14-C
SM6HCX 3145- 82- 17-C
SM5KWC 2618- 62- 17-B
SM7HSP 2107- 102- 7-C
SMØFM 1854- 73- 9-B
SMØCGO 924- 79- 4-B
SM5EUF 192- 32- 2-B
SM6JNW 18- 6- 1-B
SM5GMG 795,375-2907-105-C-15
SM5CMP 29,352- 453- 24-B-20
SM6DSS 23,547- 202- 47-C
SM5EQW 2771- 72- 17-C
SM4CAN 42,126- 320- 59-C-80
SM6BXV 1702- 32- 23-C
SMØBVQ 540- 18- 15-B
SM6KXE 21,009- 163- 47-A-QRP
SMØFSM 7366- 104- 29-A
SM6AOQ 6020- 119- 20-A
SM6FAX 4375- 96- 19-A

CT1DW/SP5 68,355- 303-105-C-AB
SP9AKD 55,986- 270- 93-B
SP9HWN 52,633- 253- 73-B
SP8KAF 48,676- 470- 83-C
SP9FLY 27,030- 202- 53-B
SP5BLF 22,755- 185- 41-B
SP9EM 10,266- 126- 29-C
SP7KTE 7735- 136- 35-B
SP6ECA 6864- 83 33-B
SP8DYS 4524- 85- 29-B
SP5BR 101,568- 612- 69-B-10
SP7FTP 46,224- 564- 36-B
SP5GIQ 16,720- 316- 22-B
SP6HRK 3348- 70- 18-B
SP2PIK 1515- 103- 5-B
SP9ERC 3591- 56- 27-B-15
SP3BYZ 840- 27- 12-B
SPØPCZ(SP9JX,opr) 9773- 134- 29-B-20
SP9EML 7223- 93- 31-B
SP3IOE 4805- 71- 31-B
SP9BRP 3621- 81- 17-B
SP3XR 3496- 61- 23-B
SP7EJS 2850- 52- 19-B
SP8RJ 2185- 36- 23-B
SP9EMU 1580- 39- 20-B
SP6DVP 162- 10- 9-B
SP3DOI 19,592- 228- 31-B-40
SP9DH 4- 2- 1-B-160

SVØAU 897- 26- 13-B-AB
SVØAR 54,150- 449- 87-B-10

TF3US 18,424- 163- 47-B-20

UA3TN 123,414- 396-134-B-AB
UV3DN 100,359- 641- 63-B
UA4ACD 18,908- 142- 58-B
UV3MM 16,948- 164- 38-B
UA6AKT 15,176- 125- 56-B
UA6WS 9460- 98- 44-B
UV3AP 790- 54- 5-B
RA3DKE 77,462- 456- 77-B-10
RA3DPD 70,755- 580- 53-B
RA3LAL 57,150- 468- 50-B
UA6LIA 56,368- 474- 52-A
UA4CZ 50,764- 488- 49-B
UA6LAX 33,814- 415- 29-B
UA4NAA 31,507- 280- 49-B
UW3EH 23,232- 219- 48-B
UA3LCU 20,648- 153- 58-B
UA6UDB 13,986- 177- 37-B
UA4CM 13,382- 172- 33-B
UA3DJS 10,703- 330- 11-B
UA3DAT 9594- 104- 39-B
UA3TAM 9280- 138- 32-B
UV3NB 4284- 94- 17-B
UA4CM 840- 71- 4-B
UA6LAP 108,832- 624- 76-B-15
RX1MU 72,520- 595- 49-B
UW3RR 64,011- 510- 57-B
UA3PAZ 9968- 131- 28-B
UA4ACP 7890- 117- 30-B
UA4CH 5691- 115- 21-B
RW1AE 276,579-1402- 79-B-20
UA1CAI 124,100- 670- 73-B
UA3XAN 85,866- 542- 66-B
RZ1AET 34,830- 336- 43-B-20
UA3TAG 2975- 52- 25-B
UA4AEE 2730- 49- 36-B
UA3EAL 4179- 76- 21-B-80
UA6LHU 3016- 58- 26-B
RV3FD 1680- 42- 21-B
UA4AHT 19,950- 238- 38-A-QRP
UA4WWA 9360- 137- 30-A
UA4PBX 1650- 61- 10-A
RA3DQP 495- 21- 9-A

UA2EC 13,858- 141- 4-B-15
UA2FBZ 10,132- 132- 34-B-20

UB5MDI 346,026-1208-101-B-AB
UT5OV 6930- 171- 14-B
UB5KAN 46,384- 361- 52-B-10
UB5QES 31,020- 310- 44-B
UB5EKG 19,988- 234- 38-B
UB5ABK 46,605- 472- 39-B-15
UB5VAA 23,091- 238- 43-B
UY5OO 32,384- 356- 32-B-20
UY5TE 16,687- 184- 41-B
UB5QBG 7020- 101- 26-B
UB5IFN 30,184- 316- 49-B-40
UB5MFR 2594- 57- 21-B
UB5EGB 1320- 33- 20-B-80

UC2ACD 6200- 160- 25-B-10
UC2LBE 2366- 61- 14-B-80

UO5OGX 11,820- 165- 30-B-10
UO5OCL 6534- 108- 22-B

UP2BCD 60,000- 272- 96-B-AB
UP2BAR 13,376- 150- 32-B
UP2BAO 13,212- 141- 36-B
UP2DM 157,740-1171- 55-B-10
UP2PAD 68,423- 516- 53-B
UP2NA 105,610- 692- 59-B-15
UP2AV 17,238- 198- 39-B
UP2BBF 7680- 112- 32-B-20

UQ2DZ 102,780- 682- 60-B-10
RQ2GAI 71,891- 776- 37-B
UQ2OP 23,904- 306- 32-B
UQ2GGS 8721- 192- 17-B
UQ2GBU 540- 27- 10-A-160

RU2OV 64,305- 626- 45-B-AB
RU2QD 41,525- 271- 55-B
RU2RCU 29,108- 271- 38-B-10
UR2OI 7527- 88- 39-B
UR2TBG 1450- 52- 10-B

Y49WF 220,564- 732-134-B-AB
Y45YA 182,368- 530-164-B
Y24NO/A 165,057- 572-111-C
Y35LM 129,008- 467-104-C
Y41ZH 39,744- 310- 48-B
Y44ZK 25,953- 251- 41-C
Y47LN 16,926- 207- 31-B
Y46WF 16,836- 141- 46-B
Y23HM/A 10,505- 86- 55-B
Y33TA 2442- 76- 11-B
Y21JH 650- 22- 13-B
Y45SA 50- 5- 5-B
Y79ZL 172,458-1039- 66-B-10
Y22TO 137,167- 777- 73-C
Y41YM 47,472- 444- 46-C

Y38YK 37,111- 359- 37-B
Y38YE 34,827- 295- 47-B
Y37ZE 32,079- 249- 51-B
Y34SE 5256- 109- 41-B
Y54VA 19,008- 236- 32-B-15
Y37UF 20,382- 235- 43-B-20
Y25HL 18,025- 242- 35-B
Y22PF 12,738- 239- 22-B
Y23EE 8350- 135- 25-A-QRP
Y22MC 1210- 37- 15-A

YO6KEI(YO6AWR,opr) 218,722- 769-119-B-AB
YO3JW 20,957- 210- 39-B-20
YO8BSE 19,229- 195- 41-B
YO8FR 15,211- 149- 41-B
YO3UA 28- 5- 2-B
YO3KSC 1404- 39- 18-B-40
YO6AJI 1938- 61- 19-B-80

YU2OM 27,800- 254- 40-B-AB
YU7NZR 11,360- 138- 32-B
YU3DRM 9240- 96- 42-B
YU5XAF 696- 40- 6-B
YU1OBA 208,560-1035- 79-B-10
YU2CBV 28,175- 456- 25-B
YU7GMN(YU7QEF,opr) 62,622- 469- 49-C-15
YU3TCM 3024- 46- 24-B
YU2BHI(YU2RGG,opr) 356,544-1806- 72-B-20
YU1OFT 324,870-1298- 98-B
YU7SF 19,110- 175- 42-C
YU1PYL 2754- 163- 17-B

4U1ITU(W1RR,opr) 1,364,562-2193-258-C-AB

9H4L 40,350- 484- 30-CAB

North America

C6ACY 2,578,911-5144-173-B-AB

HI8IMR 3871- 186- 7-B-AB
HI8GBG 29,022- 271- 42-C-10
HI8LC 14,769- 199- 27-B-15

H3ILR(HP1XOJ,opr) 1,066,524-4097- 94-B-10

HR1FVA 12,255- 276- 15-B-AB

J7DB 2895- 201- 5-B-AB

KL7AF 195,396- 682-114-C-AB
KL7IDT 24,570- 404- 21-C
KL7Y 206,293-1190- 67-B-10
AL7Y 25,370- 176- 59-C
NL7C 7435- 498- 5-B
WB4WXE/KL7 7370- 230- 11-C

NP2AE 58,539- 513- 39-B-AB

WP4API 70,200- 543- 45-B-AB
W3NX/KP4 25,750- 320- 28-B
KP4WI 47,775- 348- 49-C-80

OX3ZM 478,192-1191-152-C-AB

TG9PH 2590- 36- 35-C-AB
TG9GI 180,362- 725- 91-A-QRP

VP2ML 4,138,480-5348-282-C-AB
VP2MO 97,759-1139- 29-B-15

VP2VFS(W6IGG,opr) 140,049- 497-117-B-AB

VE3PE/VP9 32,400- 242- 54-B-20

6D2AF(N7DD,opr) 3,704,857-4729-201-C-AB
4A2MX(XE2MX,opr) 704,055-1755-165-C
6H1MEX(XE1MEX,opr) 601,725-1894-113-C
6F1VOZ(XE1VOZ,opr) 257,542-1451- 61-B
XE1LLS 95,750-1296- 25-B-10
6H1J(XE1J,opr) 88,355- 745- 41-C-40

YS9RVE 242,352- 642-136-C-AB

ZF1AK 2134- 70- 11-B-10
ZF2AA 882- 51- 6-B-20

8P6KY 153,931- 573- 59-B-10

Oceania

A35OM(N6OM,opr) 49,998- 476- 39-B-AB

KH6JLC/DU2 49,784- 766- 28-C-AB

KH6JSG/KH2 9200- 198- 20-B-40

KH6ND 643,062-1893-122-C-AB
W8FR/KH6 7092- 203- 12-C-80
AH6J 1572- 48- 12-A-QRP

W7KHN/KH9 562,615-2934- 85-B-AB

VK4VU 708,246-1962-126-B-AB
VK5MF 26,865- 340- 27-C
VK2VGI 216,572-1490- 58-B-10
VK4QK 297,038-1223- 98-C-20

V55MM(K1MM,opr) 733,761-2380-133-B-AB

YB2SV 234,784- 992- 92-B-AB
YB2CR 1400- 69- 8-B-10

YBØACL 53,508- 913- 28-B-15
YC1BZ 50,761-1060- 23-B

5W1BK(HB9RS,opr) 9384- 188- 17-C-AB
5W1BZ 1267- 62- 7-C-40

South America

CE3TK 35,280- 227- 63-B-AB

CP6EL 800,632-2147-136-C-AB
CP8ET 35,343- 240- 63-B

CX7BY 102,464- 682- 64-B-15
CX1TH 47,970- 441- 45-B
CX4BW 8284- 152- 19-B

KA6CNS/HC1 58,380- 594- 35-B-10

HK3BON 73,458- 436- 63-B-AB
HK3YH 135,999- 804- 69-B-10
HK6AQT 780- 29- 10-C-80

LU2KAE 136,400-1121- 63-C-10

OA4AWD 478,246-1292-134-C-AB

W1BIH/PJ2 461,465-1885- 89-C-15

PJ2FR 222,154-1060- 76-B-40

PT7TP 461,700-1162-150-C-AB
PY1ZBJ/PY8 144,480- 493-112-C
PY1NEZ 141,966- 767- 66-C
PT2LS 10,944- 113- 36-B
PY2DJC 17,784- 524- 12-B-10
PY5OGG 23,268- 407- 21-C-15
PT2ZAE 4305- 102- 15-B

4M3AZC 3,197,180-4047-287-B-AB
YV2IF 20,490- 300- 30-C-40

ZP5GLS 6939- 260- 9-B-15

9Y4VU 689,052-2778- 91-B-10

DX

Multioperator Single Transmitter

Asia

A4XCA(A4s XIH XIU,oprs) 66,661- 323- 89-B

HL9TO(K5UJ,WB6GYS,oprs) 214,600-1055- 74-C

JA7YCQ(JI1s FLP OFP,JH7s FZI IMX UGG VVR XUZ, JA9XBG,JHØCZQ,oprs) 273,836-1380- 68-C
JA8YXI(JA8s ERG OYC JCR QCB,oprs) 63,448- 320- 77-C
JA9YAV(Multiop) 21,924- 264- 29-C

UK9CAE(UA9s CJK CPB,oprs) 1,021,142-1718-206-B
UK9UAA(UA9s UDR UFR UKT UZS,oprs) 481,454-1168-159-B
UK9CCC(Multiop) 355,884-1234-141-B
UKØAAB(3 oprs) 331,712-1038-142-B
UKØSAW(3 oprs) 121,380- 624- 84-B
UK9WAA(2 oprs) 11,107- 43- 9-B

UK7LAF(3 oprs) 196,992- 668-128-B

UK8MAA(5 oprs) 225,336- 814-123-B

Europe

DJ4GL(+K5s TM WM) 1,788,400-3136-200-C
DLØWW(DA1UY,DD9FB, DF1ZE,DF5ZF,DF7ZP,DJØSU, DK8WD,oprs) 1,108,156-3205-133-C
DLØUR(DF4NP,DL8RH,oprs) 356,200- 950-137-C
DF8EN(+DF6XB) 3516- 293- 4-C

EA3AIN(Multiop) 1,150,368-2337-184-B

EA6BW(+EA6s CE CP ET EU) 1,478,246-3353-154-C

G5YC(G4s CTP DKA DOA GQA G8s RRD TYO,oprs) 515,160-1692-106-C
G4IRF(G3XVR,G4s AUC EUR, G8IUY,oprs) 442,260-1204-140-C

GM3STU(+GM3RFR) 163,620- 679-101-B

HA5KFL(HA5HM,HA7s RJ RS UX,oprs) 1,169,862-2722-222-B
HA5KKC/7(HA6BV,HA5GQ, HA5LV,HA5MA,HA5MO,oprs) 1,033,044-2107-186-B
HA7KSV(Multiop) 1,026,762-2628-141-B
HAØKLE(Multiop) 1,024,488-2032-186-C
HA3KNA(HA3s NS NU,oprs) 789,396-1895-157-B
HAØKDA(HAØs DV HZ,oprs) 407,898-1071-153-C
HA5KKR(Multiop) 315,692- 764-169-B
HA3KHC(Multiop) 190,112- 701-104-B
HA5KKG(Multiop) 171,347- 581-114-B
HA6KNP(HA6s ND NL NN NY ON,oprs) 146,064- 560-102-B
HA8KAZ(Multiop) 122,220- 519-105-B
HA8KWG(Multiop) 87,152- 371-104-B
HA2KMR(Multiop) 1656- 143- 4-C

HBØBEI(HB9s AOO BEI,oprs) 874,584-1727-216-C

I3EVK(+I1DFS,I3s MAU ON, IN3DYG,W3US) 5,962,836-5356-398-C
I5SFE(+I5s BQN ELO KKW SZB WJW) 483,630-1264-147-C
I1OJE(+I1s FQH POR) 298,758-1029-102-C

LA5X(LA1EE,LA3s LJ RT, LA7XK,LA9DL,oprs) 1,955,580-3290-220-C
LA1K(LA3GW,LA6s MP MU, LA8s BU KV,LA9UX,oprs) 865,350-2252-150-C

LZ1KDP(Multiop) 632,095-1502-167-C

OE2VEL(+DK9CW,DL9PT, OE2s DDL DYL,OE3ALW) 570,372-1184-174-C

OH2AA(OH2s BCP BNP BQB BQS BRW,oprs) 3,745,151- 481-289-C
OH7AB(OH7s UE VR XY,oprs) 765,672-1115-183-C
OH2AC(OH2s BQG BSJ BTD CR DT,OH3BX,oprs) 388,796-1065-148-B
OH6AH(OH6s OC DH,oprs) 11,456- 175- 32-B

OH1AS/Ø(OH1s CQ CW,oprs) 64,705- 306- 85-B

OK1KRG(OK1s ALW DWA,oprs) 2,709,885-3756-255-C
OK1KTW(Multiop) 277,225-1519- 65-C
OK3KII(Multiop) 105,742- 410- 91-B
OK3KFF(Multiop) 90,948- 386-106-C
OK1KYS(Multiop) 39,130- 216- 70-C
OK1KZQ(Multiop) 18,576- 172- 54-B
OK3KTY(Multiop) 8602- 149- 34-C
OK3KTP(Multiop) 2875- 54- 25-B
OK1KIR(Multiop) 2432- 47- 19-B
OK1KCF(Multiop) 1580- 53- 10-B
OK2KVI(Multiop) 168, 28- 2-B

OZ7SAC(OZ1s AJP CKZ DID, OZ2KI,OZ5RU,oprs) 475,072-1656-104-B

PAØGN(PA2AWU,PAØs ERA GIN KEN OOS,oprs) 1,745,766-3102-198-B
PAØVAJ(+PAØGAM) 759,675-2526-105-B
PI1MHN(+PA3s ABA ADJ AIR, PAØs INE JWR KHS TP VVH, WB6GET) 590,024-1594-131-B
PI1ARS(Multiop) 23,555- 259- 35-B

SK4NI(SM4s AIQ MI,SM6s CJK EOI,oprs) 2,907,360-4335-240-C
SK4BX(SM4s AJV EMO IJS, oprs) 117,068-1075- 37-C
SK6MY(Multiop) 16,900- 237- 26-B

SP5KOH(Multiop) 26,520- 172- 51-B
SP6KNE(SP6s BGB LHI,oprs) 5540- 124- 20-B

SVØAE(+SVØYL) 582,525-1588-135-C

UK3QAE(UA3s QJW QKX,oprs) 1,180,135-2206-215-B
UK4WAE(3 oprs) 1,042,344-1591-279-B
UK3QBM(UA3s QBG QBP QDC QDR QDW QBX QGX,oprs) 898,221-1794-213-B
UK4WAB(4 oprs) 461,274-1176-174-B
UK4AAN(2 oprs) 189,420- 565-164-B
UK6LTG(3 oprs) 169,617- 655-123-B
UK3NAA(3 oprs) 101,260- 484- 83-B
UK4ABZ(3 oprs) 54,044- 397- 59-B
UK3DBV(3 oprs) 40,796- 294- 62-B
UK3WAC(3 oprs) 20,672- 164- 64-B
UK1TAR(2 oprs) 13,718- 160- 38-B

UK2FAD(3 oprs) 41,140- 334- 55-B

UK5MAF(UA3HK,UB5s MNM MNX MOA,UY5LK,RB5MUV, oprs) 1,800,040-3272-220-B
UK5IAZ(6 oprs) 1,475,500-2202-250-B
UK5IBM(3 oprs) 443,173-1244-131-B
UK5QBE(3 oprs) 377,428- 895-157-B
UK5EAQ(5 oprs) 90,988- 400- 92-B
UK5HAB(2 oprs) 23,541- 167- 57-B

UK2WAR(3 oprs) 47,472- 436- 43-B

UK2PRC(Multiop) 1,877,720-3100-230-B

UK2GDZ(3 oprs) 735,635-1641-167-B

UK2RDX(Multiop) 741,440-1720-160-B
RK2RAQ(2 oprs) 47,329- 382- 47-B

Y23DL(+Y23CL) 1,323,822-3825-122-C
Y31AA(Multiop) 3876- 74- 19-C

YO9KAG(YO9s ASS HP HT, oprs) 131,040- 473-117-B

YU1BKL(YU1s OMY PKI,oprs) 95,772- 415- 92-B

North America

N4UM/C6A(+N4NJ,WD4IYS) 510,120-1564-117-B

KV4FZ(+KØs KJS TG TK,NØBG WAØRBW,WBØGDB,oprs) 5,889,574-7364-277-C
K2GBH/KV4(+WA2KCL) 896,384-3236- 94-B

VP1A(ABØI,KØBRO CS TLM, KBØU,KCØB,WØs AR CY DEL JU UN ZKW,WBØISW,oprs) 6,266,667-7164-313-B

VP2A(K3DMI,K4LTA,KR4C, W4MDX,WA4s CDH DEP,oprs) 1,890,500-5141-125-B

VP2KAL(N8s CC SW,W8UVZ, WB8LDH,oprs) 3,894,472-5684-236-C
VP2KAH(W6s KG QL,oprs) 2,064,822-2968-262-C

VP5EE(+KU4J,W4GTS, WB4ZNH,WN4FVU) 4,584,008-5511-286-C

Oceania

VK4TC(+VK4s JB NUI) 940,347-2336-163-A

ZL2AH(Multiop) 525,742-2064- 94-B

South America

HC2A(HC2s CG DQ JN SL TC, oprs) 1,171,310-2815-145-B

HK3AXT(+HK3s AFD ASE SO TF) 2,166,072-3773-204-B
SK4LRM(HK4s FZ BKB DKR DUM,oprs) 1,907,756-2875-240-C
HK3BED(+HK3DBQ) 974,816-2119-164-B

WD4RCO/8R1(+K9EF, WB4LRB)1,178,982-2358-189-C

Multioperator Multi-Transmitter

Asia

JA2YKA(JE2s KPM BQT, JH2QXQ,JR4GNC,JA4UDP, JH4VBQ,JA8NFO,oprs) 2,017,872-3071-243-C

JA7YAA(JG1UJD,JA7s JQG KPK LMU NRQ TNO UQA WBW, JH7s AEF MWR LIS SFY WTC, JR7OMD,JA8FTW,JA9PPC, JR7CMF,oprs) 1,876,953-3075-221-C
JA3YKC(JR2QUJ,JH3VOT, JR3s FRR KEG,JE3s BLA KKC MAS MXQ,JG3EMB,JA3s GZB TDH,JA6YXM,oprs) 994,884-2052-179-C
JA1YHA(JG1s OFO,WTN, JK1AJX,JI1AEB,JI1BDV, JE3MLS,JH4TJS,oprs) 380,700-1069-135-C
JA4YQO(JA4QVM,JH4s HKM LGI RIU ROR TPH WAT,JR4s MOQ NEA,JA5POS,JI8CGU, JR6IHX,oprs) 111,616- 417-109-C
JA5YAU(JA5XUQ,JH5s EML HTZ,oprs) 29,657- 244- 47-B

Europe

GB4ANT(G3s JOC LDI MPN TMA VZT XLL,IOR,G4s BAV BTY DYC GVW,G8HWO,oprs) 7,472,850-7833-350-C

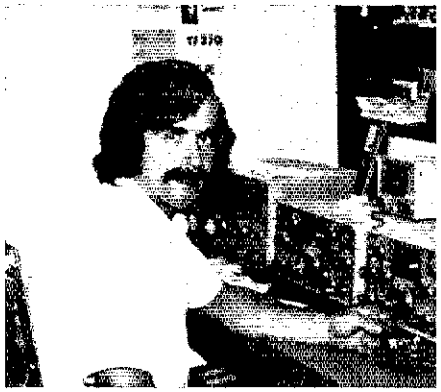
OK3VSZ(Multiop) 612,560-1522-155-C

SP6PAZ(SP6s DVP HEK,oprs) 108,745- 480- 91-C

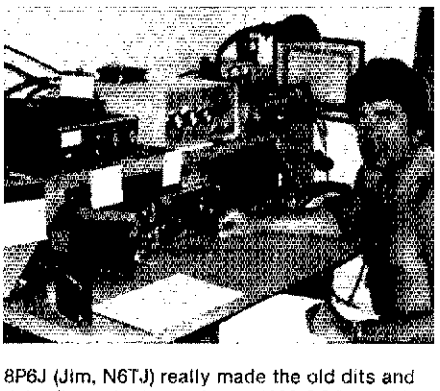
SK2IV(SM2s AGJ CDF IVR, oprs) 85,932- 426- 84-B

Check Logs

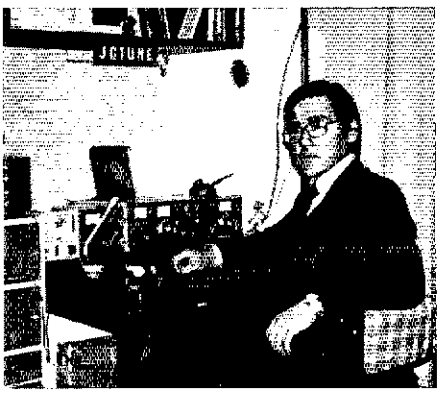
DF2HL,DL8QT,DL9HP,EA3BSE, EA5TD,EA7AKQ,F2SI,F6CMO, F6CZQ,F6FPH,G4BUO, G5CMX,GW3NYY,HA6NP, HA9RU,HC1AK,HC1HV,HB9EA, I2VRN,I5NPH,I8WDX,K3TGM, K4CHN,K4GDI,K8EM,K9BJD, K9LD,LA1H,LA5WN,LA6ZW, LA9LO,LA9ML,N6UW,N9BKL (+KA9EYL,KB9LC,N9s BDM BIL BKY),OH1VR(OH2BBM, oprs),OH1XX,OH2BSS,OH2BTG, OH2CZ,OH3UJ,OH4MM,OK1CIJ, OK1FT,OK1MSN,OK1PCL, OK2BJU,OK2BNK,OK2SWD, OK3TCA,OX5AP,OZ1DTF/A, OZ1ZE/A,OZ5BS,OZ7XU, OZ9FJ,PA3ASC,PA9AT Y, PA9LEG,PA9NRD,PA9TV, PA9TW,U,PT7AW,PY1BFJ, SM3GWS,SM5CBM,SM5CMP, SM5EJN,SM5FTH,SM5IDF, SM5LKQ,SM7AAQ,SM7AIL, SM7BBV,SM7DBD,SM7FSV, SM7IWN,SM9BDS,SP1KKO, SP2DFW,SP2IRK,SP3AGE, SP5CFD,SP5EAQ,SP5EKY, SP5GMW,SP5KRD,SP5UIT, SP5IQU,SP6HAY,SP6PCL, SP9AQA,SP9FTA,SP8JPA, SP9PZD,SR5QPZK(SP2s BLU FAX,oprs),TG9ML,T12CC, UA1OE,UA3DDC,RA3DDU, UA3DEA,UA3DFK,UA3DID, UA3DNK,UA3DNV,UA3DCX, UA3IDT,UA3PBY,UA3PDA, UA3TCH,UA3TCI,RA3YCR, UA4CDC,UA4FCZ,UA4FDJ, UA4HAD,UA4HFG,UA4YAC, UA9HBA,UA9QAQ,UA9UID, UA9CEY,UA9JDD,UA9KBC, UB5AAF,UB5ABJ,UB5EAX, UB5HBT,UB5QAY,UB5QFJ, UB5VAZ,UK1NAD,UK2BAS, UK2FBQ,RK3AAH,RKJACW, UK3QAV,UK5UBF,UK5WAA, UK6HBK,UK6LWA,UK7GAL, UK7LH,UK9CBY,UK9CIM, UK9FER,UK9HAP,UK9QAA, UK9SAY,UK9UAC,UM8MAO, UM8MBL,UO5AP,UP2BCR, UP2BV,UQ2GCN,UQ2GEI, UR2MG,UV3CS,UW1LW,RW3FW, UW9SG,UW9MF,RX1DJ, RZ1ADN,RZ3UBI,RZ5UWG, VE3CEA,VE7NI,K7SEV,P2A, W1PWK,WA2BZW,W2DAU, W2HAZ,WA4BTG,W4KO, WD4LFD,W4NOS,WA7CWM, WB7RUN,WA9GFR,WA9OTD, WA9WWW,Y23GC,Y29RK, Y23IL,Y23OH/A,Y24GE,Y25KH, Y25PL/A,Y25RL,Y28TI,Y25XH, Y26DO,Y26HO,Y31QA,Y34YF, Y37UO,Y37XJ,Y37YL,Y38ZF, Y41ZM,Y46TF,Y46XF,Y47VN, Y47XN,Y49UH,Y53WL,Y54ZI, Y75OL,Y86VL,YO2ARV, YU2CDS,YU2ROX,oprs), YU3ZV,YU4WST,ARS-43496, I6-15858,Y9-7684/E



Glenn, WB2JGD, tries his hand at a little cw DX contesting from Southern Florida.



8P6J (Jim, N6TJ) really made the old dits and dahs fly to the tune of over 4000 QSOs on his way to winning the single-operator all-band, cw plaque for North America.



Aki, JG1UNE, spent some time in the all-band phone category of this year's DX Contest.

W/VE - CW

Single Operator

1

Connecticut

K1PR 1,496,748-1564-319-C-AB
K1KI 1,287,072-1312-327-C
K1CC 517,050- 766-225-C
W1VV 135,360- 320-141-C
WA1YEC 135,255- 355-127-C
WA1CCR 92,064- 274-112-C
K1BV 75,568- 257- 98-C
W1NG 62,445- 181-115-C
W1RWS 52,200- 174-100-C
N1UW 44,361- 159- 93-C
W1CNU 16,704- 96- 58-B
N1CC 6864- 52- 44-B
WB1CRI 2496- 32- 26-B
W1CUH 1320- 22- 20-B
K1WA 12- 2- 2-B
K1EM 49,268- 282- 58-C-10
K1WJ 9384- 92- 34-C
N5AW/1 4464- 49- 31-B
K1RM 200,928- 728- 92-C-15
K1VTM 169,320- 669- 85-C
WA1FCN 61,230- 314- 65-B
K1WJL 44,544- 257- 58-C-20
W1KKF 6528- 68- 32-C
K1WB 31,146- 179- 58-C-40
W1XX 11,025- 105- 35-C
AA1K 216- 9- 8-B-160
WB1GEB 1794- 26- 23-A-QRP

Eastern Massachusetts

W1KM 878,444-1073-276-C-AB
K1DG 855,855-1045-273-C
W1DA 491,205- 715-229-C
K1MM(N1EC,opr) 425,985- 735-193-C
W1FJ 352,968- 616-191-C
WB1ANT 351,450- 710-165-C
W1FM 44,370- 174- 85-B
K1MEM 39,798- 134- 99-C
AD1Z 23,760- 110- 72-C
N1AU 8694- 63- 46-C
N1DC 2916- 36- 27-B
WA1YVT 2898- 42- 23-B
WA1KSF 2400- 32- 25-C
W1OPJ 1680- 28- 20-B
W1JR 1368- 24- 19-B
AD1C 1080- 20- 18-C
W1BK 264- 11- 8-C
WB1CNM 91,35- 87- 35-B-15
W1PLJ 648- 18- 12-C
W1YN 131,646- 593- 74-C-20
W1ZK 70,200- 360- 65-C
K1VUT 32,832- 192- 57-C
K1MC 1083- 19- 19-B
K1VR 106,560- 480- 74-C-40
AG1C 20,664- 164- 42-C
W1BB 330- 13- 10-B-160

Maine

W1OO 429,345- 705-203-C-AB
K1SA 406,638- 779-174-C
K1PQS 10,920- 91- 40-B
WA1PDG 540- 15- 12-C-15

New Hampshire

KA1EP 122,094- 323-126-C-AB
K1GQ 64,350- 195-110-C
W1LQQ 35,520- 160- 74-C
W1VY 27,552- 112- 82-C
W1END 26,130- 134- 65-B
W1JSM 16,740- 93- 60-C
W1UN 2754- 34- 27-C
K1RR 109,908- 516- 71-C-10

Rhode Island

W1GL 610,092- 807-252-C-AB
AF1O 381,888- 663-192-C
K1TZQ 61,182- 206- 99-C
W1RFQ 8550- 75- 38-B
K1VSJ 663- 17- 13-B
K1JA 84,132- 369- 76-B-15

Vermont

K1IK 882- 21- 14-C-AB
KA1FJ 7728- 92- 28-C-20

Western Massachusetts

K1BW 1,064-655-1203-295-C-AB
N1CQ 307,593- 717-143-C
W1AUT 204,600- 620-110-C
W1MM 19,602- 99- 66-C
WB1HIH 6912- 72- 32-C-10
W1JP 168- 7- 6-B
W1GG 44,946- 227- 66-C-15

2

Eastern New York

W2PV(K1AR,opr) 1,189,188-1287-308-C-AB
W2IB 756,798- 974-259-C
W2AZO 562,694- 809-233-C
W2XL 304,623- 543-187-C
WA2AUB 130,080- 271-160-C
WA2LJM 58,938- 209- 94-C
W2GUP 36,354- 166- 73-C
N2AIF 33,750- 150- 75-B
W2AWF 13,500- 75- 60-C
WB2NFG 3456- 48- 24-C-10
K2MN 40,194- 231- 58-B-15
W2DW 8208- 72- 38-C
K2OB 27,540- 170- 54-B-20
WA2MJX 1083- 19- 19-C

New York City L.I.

K2MFY 281,916- 492-191-B-AB
WA2LQO(W2DKM,opr) 185,955- 386-161-C
K2SX 129,927- 269-161-C
K2PE 108,558- 326-111-C
N2UN 78,324- 214-122-C
WA2ISH 44,880- 176- 85-B
W2LPA 40,455- 155- 87-B
K2BSM 31,824- 136- 78-C
K2QD 16,377- 103- 53-C
W2SGK 11,502- 71- 54-C
WA2EYW 11,094- 86- 43-B
K2CMV 3060- 34- 30-B
W2III 351- 13- 9-B
WB2AMU 20,664- 123- 58-B-10
WB2DLA 2511- 31- 27-B
WB2ENW 3036- 46- 22-A-QRP

Northern New Jersey

N2LT 1,202,166-1363-294-C-AB
W2RQ 910,590-1195-254-C
W2GD 787,932-1018-258-C
N2IC 444,000- 740-200-C
K2NJ 287,960- 524-180-C
W2VJN 271,800- 455-200-C
AE2A 63,654- 206-103-C
W2HN 50,569- 196- 86-C
W1GD/2 46,968- 152-103-C
K2BLA 18,231- 103- 59-B
N2CR 11,130- 70- 53-B
W2IFK 3360- 40- 28-C
WA2KIR 2400- 32- 25-B
K3OX/2 2376- 33- 24-C
WA2PIP 810- 18- 15-B
WA2PQU 672- 16- 14-B
W2UL 495- 15- 11-C
K2FE 17,145- 127- 45-A-10
AF2L 16,464- 112- 49-C
W2WD 65,436- 287- 76-C-15
WA2IFS 6195- 61- 35-C
WB2FGZ 975- 25- 13-C
AA2U 147- 7- 7-A
W2NJ 48,564- 228- 71-B-20
K2JT 28,512- 176- 54-C-40
WA2ZWH 68,952- 221-104-A-QRP
K2RF 5850- 50- 39-A

Southern New Jersey

W2REH 568,512- 792-252-C-AB
N2MR 200,718- 385-177-C
W2EA 115,320- 248-155-B
WB2YOF 82,176- 256-107-C
W2PAU 58,740- 178-110-C
K2OWE 31,275- 139- 75-C
WA2VYA 7080- 59- 40-C
K2ZSY 5805- 45- 43-C
W2BLV 2016- 28- 24-B
WB2ZEU 1800- 30- 20-B
N2CM 507- 13- 13-B

Western New York

W2FTY 101,346- 254-133-B-AB
WA2EYA 40,089- 161- 83-C
W2TU 27,440- 160- 78-B
W2FUI 30,954- 134- 77-B
WA2ABN 30,573- 129- 79-B
WA2ORX 16,066- 93- 54-C
W2STM 4512- 47- 32-B
KB2HF 3999- 43- 31-C
K2XU 3450- 50- 23-B
KA2CGV 2160- 30- 24-B
K2UAN 540- 15- 12-B
WA2CSY 10,179- 87- 39-B-10
W2SEC 41,064- 232- 59-C-15
N2HR 39,501- 231- 57-C
AD2J(N2ALK,opr) 37,279- 243- 51-B
W2ABM 45,000- 250- 60-C-20
N2RT 1518- 22- 19-B-80
N2US 21,762- 117- 62-A-QRP
KA2HDY 9126- 78- 39-A

3

Delaware

K3HBP 16,500- 110- 50-C-AB
AD3V 3936- 41- 32-B

Eastern Pennsylvania

N3AD 1,029,483-1257-273-C-AB
W3MA 459,810- 655-234-C
W3AP 394,200- 600-219-C
N3AW 383,382- 722-177-C
N3VV 288,750- 550-175-C
N3BB 256,080- 440-194-C
W3ARK 236,664- 456-173-B
K3FN 233,031- 449-173-C
N3AFU 181,800- 404-150-C
N3HW 148,230- 405-122-C
W3GRS 93,978- 227-138-C
K3II 87,480- 243-120-C
WA3WRD 85,077- 207-137-C
N3ALF 47,520- 176- 90-B
W3YFV 35,757- 137- 87-C
W3EAN 32,436- 159- 68-C
WA3SZV 30,876- 124- 83-C
W3BI 27,405- 145- 63-B
W3PC 21,168- 98- 72-C
W3HMR 16,128- 96- 56-C
W3ALB 13,776- 82- 56-C
WB3JYY 11,172- 76- 49-B
WB3EFI 4692- 46- 34-B
K3YL 4356- 44- 33-C
W3EHZ 3906- 42- 31-B
WB3JZE 3564- 44- 27-B
WA3NHO 2673- 33- 27-C
W3HYJ 2349- 29- 27-C
N3LR 158,226- 631- 82-C-20
K3WOK 1368- 24- 19-B
W2CKR/3 1653- 29- 19-C-40
W3MFW 30,600- 170- 60-C-80

Maryland - D.C.

K3RA 842,295-1165-241-C-AB
W3UJ 437,526- 669-218-C
K3SA 426,537- 571-249-C
W3GRF 345,000- 575-200-C
W3AZ 262,950- 550-163-C
K2PLF/3 236,466- 453-174-C
N3IL 198,204- 398-166-C
K3AV 197,706- 397-166-C
W3GN 194,340- 410-158-C
N3UN 131,772- 316-139-C
K3BHJ 130,425- 235-185-C
K3TC 110,352- 242-152-B
K3TM 94,458- 346- 91-C
W3EYF 85,800- 201-143-C
WB3DNL 66,975- 235- 95-C
W3EE 10,692- 81- 44-C
WA3UPH 5175- 69- 25-C
AG3S 1584- 24- 22-B
W3FQE 882- 21- 14-C
WA3EEE 3666- 47- 26-C-10
W3KS 6000- 50- 40-C-15
WA3VPL 5292- 49- 36-B
K3YW 196,290- 727- 90-C-20
WB3AVN 49,203- 231- 71-C-40
W3HVQ 7242- 71- 34-C-80
WA3JYV 27,000- 125- 72-A-QRP

Western Pennsylvania

W3HDH 106,743- 299-119-C-AB
K3VX 83,538- 234-119-B
K3KO 29,415- 185- 53-B-10
AD8J/3 38,115- 231- 55-C-15
AF3B 6384- 76- 28-B-40
W3QM 14,850- 110- 45-C-80
AG3H 13,200- 80- 55-A-QRP

4

Alabama

N4KG 305,670- 456-230-C-AB
AC4X 99,072- 258-128-C
K4KZE 15,792- 112- 47-B-15

Georgia

N4HI 295,176- 502-196-B-AB
WB4RUA 73,152- 192-127-C
N4WQ 31,440- 131- 80-C
WB4ZRC 26,334- 133- 66-C
WA4EPM 1848- 28- 22-C
W4DXI 23,532- 148- 53-C-10
K4BAM 14,040- 104- 45-B
N4SV 9576- 84- 38-C
N4TZ 99,645- 455- 73-C-20
N4RJ 60,204- 346- 58-C-40
N4CL 5724- 54- 36-C-80
K4UEE 216- 9- 8-B-160

Kentucky

WA4QMQ 66,783- 197-113-C-AB
N4XM 27,432- 127- 72-C
KA4HWG 13,860- 105- 44-B-15
WB4FOT 9765- 93- 35-C
K4FU 57,672- 267- 72-C-40
WB4PRU 2280- 40- 19-C
N4AR 36,900- 205- 60-C-80

North Carolina

WB5YMS/4 7830- 58- 45-B-AB
W4ZZ 1080- 20- 18-C
AA4S 69,569- 317- 73-C-40
K2SD/4 11,868- 92- 43-C

Northern Florida

W4WKQ 45,507- 197- 77-C-AB
AA4EH 20,700- 100- 69-B
KB4ZO 1380- 23- 20-B
N4WW 206,739- 741- 93-C-10
WB4QBB 87,150- 415- 70-C

South Carolina

N4ZG 36,783- 201- 61-C-20

Southern Florida

W4WBC 135,660- 323-140-C-AB
WA4OML 104,640- 320-109-C
K4KUZ 73,710- 195-126-C
W4YN 66,444- 226- 98-C
W4RV 42,210- 134-105-C
K4JRF 31,464- 138- 76-C
W4MLA 1482- 54- 43-B
WB4TDH 126,456- 479- 88-C-10
WB2JGD/4 28,899- 169- 57-B
N4AW 18,900- 126- 50-C-40
N4BP 147,678- 329-151-A-QRP

Tennessee

K4AMC 208,833- 461-151-C-AB
K4XU 178,605- 315-189-C
KF4H 91,854- 243-126-C
N4IR 69,006- 217-106-C
AB4H 135,954- 546- 83-C-20
AA4AK 8487- 69- 41-B-80

Virginia

K4PQL 1,064,304-1167-304-C-AB
K4VX 864,291-1121-257-C
N4UA 437,580- 719-204-C
N4DW 319,194- 514-207-C
K4XL 296,208- 528-187-C
W4DM 220,077- 429-171-C
W4NH 216,000- 450-160-C
K4OAQ 187,875- 375-167-C
K4RZ 181,620- 380-133-C
K4CTY 130,005- 321-135-C
K4GKD 120,042- 351-114-C
W4EI 107,169- 257-139-C
K5OGU/4 80,892- 252-107-C
KG4W 71,904- 224-107-C
W4YE 68,544- 224-102-C
N4OT 58,092- 188-103-B
N4MM 37,422- 126- 99-C
W4QF 17,584- 98- 91-C
WB4YPT 14,685- 89- 69-C
K4OD 7155- 53- 45-C
K4JST 7155- 53- 45-B
WB4ZPF 1701- 27- 21-B
W4OLL 39,195- 195- 67-C-10
WA4FC 61,857- 261- 79-C-15
WA4MYA 124,584- 678- 91-C-20
K3RR 94,527- 389- 81-C
W3YY 86,592- 451- 64-C
AA4FF 18,150- 110- 55-C-40
W4KMS 1056- 22- 16-C
W4UQ 5586- 49- 38-C-80

5

Arkansas

W5RUH 8178- 58- 47-B-AB
W5FIJ 546- 14- 13-C
K5UR 27,258- 154- 59-C-80

Louisiana

WA5IGD 118,560- 304-130-C-AB
W5OB 99,840- 256-130-C
W5WG 74,592- 222-112-C
WB6FHK/5 27,951- 111- 77-C
W5HEZ 17,520- 80- 73-C
W5WMU 182,766- 746- 83-C-15
WB5PYL 6708- 82- 43-A-QRP

Mississippi

K5YPV 10,395- 77- 45-B-AB
WA5OYU 810- 18- 15-C-10

New Mexico

K5TA 696,864- 976-238-C-AB
W5TVX 5175- 75- 23-B-15
N5RR 15,105- 98- 53-C-20
WA5YTX 6372- 59- 36-C-40
W5JW 20,724- 157- 44-C-80
W5YZ 89,760- 272-110-A-QRP

Northern Texas

N5JB 579,150- 975-198-C-AB
K5NW 471,585- 745-211-C
K5TJ 370,512- 664-186-C
K5RX 351,585- 601-195-C
W9PL/5 75,864- 218-116-C
N5UD 59,241- 217- 91-C
KE5C 52,992- 184- 96-B
AF5K 33,060- 190- 58-C
K5BJ 31,080- 148- 70-B
K2SCU/5 26,928- 132- 68-C
K5BDX 22,200- 100- 74-B
K5FUV 21,696- 113- 64-B
W5QF 19,656- 126- 52-B
W5LSF 16,530- 95- 58-C
KA5W 15,189- 83- 61-C
N5ARB 12,690- 90- 47-C
KA5Q 6993- 63- 37-C
W5TEN 3330- 37- 30-C
WD5FMQ 1173- 23- 17-B
N5UA 882- 21- 14-B
W5MYA 121,200- 505- 80-C-10
W5RKT 15,351- 119- 43-C
K5IU 91,140- 434- 70-C-15
W5UN 121,731- 527- 77-C-40

Oklahoma

KB5OX 12- 2- 2-A-15
K5WE 77,154- 334- 77-C-20
W7FG/5 5742- 66- 29-C

Southern Texas

K1EA/5 1,024,650-1242-275-C-AB
K5TM(K5ZD,opr)
726,264- 917-264-C
K5KG 477,972- 748-213-C
N5RF(WA3OVC,opr)
197,127- 447-147-C
W5JC 116,986- 253-154-C
W5DUI 98,592- 134- 96-C
N5HB 73,320- 235-104-B
N5JJ 56,337- 211- 89-C
K5TSQ 55,860- 190- 98-C
K5DB 37,878- 214- 59-C
K5TU 27,744- 136- 68-B
W5ASP 24,552- 124- 66-B
W5DV 19,488- 116- 56-C
K5NA 19,008- 96- 66-C
K5DX 11,352- 86- 44-C
W5NR 6975- 75- 31-C
W5KCR 3192- 38- 28-C
K5WA 78,960- 376- 70-C-10
K5RF 10,656- 96- 37-B
W5GO 64,227- 271- 79-C-15
W5IYR 1710- 30- 19-C
K5SF 55,428- 300- 62-C-20
W5PF 8556- 92- 31-B
W5WQN 28,512- 177- 54-C-40
K5MA 4779- 59- 27-C
K5BZU 300- 10- 10-C-80

6

East Bay

WA6IQM 290,562- 613-158-C-AB
W6OT(K6CSL,opr)
675- 25- 9-C
K6CSL 561- 17- 11-B

Los Angeles

K6EVR 148,770- 522- 95-C-AB
WB6ZHT 72,765- 315- 77-C
N6AA 25,857- 169- 51-C
N6IM 9936- 72- 46-B
N6NU 76,680- 360- 71-C-10
N6AW 54,825- 361- 51-C-40
K6SE 702- 26- 9-B-160

Orange

K6RR(N6IN,opr)
447,360- 932-160-C-AB
K6TXA 65,124- 268- 81-C
W6SGU 61,488- 244- 84-B
WB6SHL 39,312- 182- 72-C
WD6EWG 22,230- 130- 57-B
K6GLF 4788- 57- 28-C
N6TO 24,570- 182- 45-C-15
AB6R 6552- 78- 28-B
W6HJ 10,176- 108- 32-C-20
K6KM 4140- 60- 23-C-80

Santa Barbara

W6SWM(N6NC,opr)
50,718- 214- 79-C-AB
W6OUL 21,222- 131- 54-C
N6HK 10,455- 85- 41-C
K6IGZ 10,608- 104- 34-B-10
N6TR 5940- 66- 30-C-80
N6VR 3588- 52- 23-C

Santa Clara Valley

N6TV 777,478-1173-221-C-AB
N6MG 328,158- 618-177-C
N6AN 278,400- 580-160-C
AJ6V 52,896- 232- 76-C
KH6G 43,632- 202- 72-C
W6VG 41,385- 155- 89-C
N6NF 28,224- 147- 64-C
WA6TKT 26,325- 135- 65-C
K6MA 5814- 51- 38-C
W6OKK 2754- 54- 17-C
K6OP 2703- 53- 17-C
W6QDE 1350- 25- 18-C
W6NV 117,555- 461- 85-C-10
N6RZ(WB6SHD,opr)
103,587- 473- 73-C
AG6D 20,523- 157- 43-C-20
W6ATO 17,667- 151- 39-C

San Diego

W6YA 199,557- 389-171-C-AB
AA6EE 19,550- 133- 49-B
W6OVO 5850 65- 30-C
N6KW 5589- 81- 23-B
W5VGF/6 4758- 61- 26-B
K6XT 72,030- 343- 70-C-10
WA6DBC 97,500- 500- 65-C-20
W6ABT 10,350- 75- 46-A-QRP

San Francisco

W6BIP 191,754- 402-159-C-AB
K6ANP 56,079- 201- 93-B
AA6DX 57,750- 350- 55-C-10
WD6EEQ 10,800- 100- 36-C-20
AE6U 243- 9- 9-B-160

San Joaquin Valley

W6BYH 60,480- 224- 90-C-AB
W6BVM 53,682- 218- 82-C
N6YD 1122- 51- 22-A-10
N6GG 47,124- 238- 66-C-20

Sacramento Valley

W6SX 157,590- 515-102-C-AB
W6NKR 141,858- 333-142-C
K6DR 85,824- 298- 96-C
AF6D 10,797- 61- 59-C
WA6BRV 1152- 32- 12-B
WB6MBF 32,436- 212- 51-C-10
W6YMH 9765- 105- 31-C
N6DM 6222- 61- 34-C-40
WA6POC 37,950- 230- 55-A-QRP
W6TZA 75- 5- 5-A

7

Arizona

N7CW 325,959- 607-179-C-AB
N7MW 74,298- 203-122-C
W2GGL/7 40,527- 171- 79-C
N7BJX 21,465- 159- 45-C
W7IR 104,550- 425- 82-C-10
W7AYY 17,100- 150- 38-C
K6LL/7 210,834- 901- 78-C-15

Idaho

AC7P 29,304- 148- 66-B-AB
K7FC 2223- 39- 19-A-15

Montana

K7QA 247,200- 515-160-C-AB
W7JYW 116,400- 400- 97-C
KA1EA/7 960- 20- 16-B-10

Nevada

AJ7S 204,561- 573-119-C-AB
WA7CWM 152,190- 445-114-C
W7JKA 759- 23- 11-C

Oregon

W7NI 562,419- 897-209-C-AB
W7YAQ 177,804- 449-132-B
W7TC 49,815- 205- 81-C
W7KSA 16,317- 111- 49-C
W7LNE 2538- 47- 18-B-10
AG7M 98,658- 522- 63-C-20
WA7RQS 7500- 100- 25-B
K7DBV 399- 19- 7-C

Utah

N7DF 497,424- 964-172-C-AB
W7HS 63,729- 219- 97-C
W7LGG 32,256- 192- 56-C-20

Washington

W6RR/7 519,156- 874-198-C-AB
WA7ZLC(N4EA,opr)
391,608- 777-168-C
K7LAY 129,465- 411-105-C
K7ZA 120,594- 398-101-C
W7TS 76,665- 269- 95-B
WB7FFF 40,755- 247- 55-C
W7IIT 29,415- 185- 53-B
N7AM 17,490- 110- 53-C
W7BCS 8550- 75- 38-B
WB7PSP 8496- 59- 48-B
K7NF 6930- 66- 35-C
WB7BNP 180- 6- 10-B
K7WA 24,684- 188- 44-B-10
N7XX(WA1KKM,opr)
199,728- 912- 73-C-15
W7RVD 32,262- 283- 38-C
W7KKR 3960- 60- 22-C
KB7KE 576- 24- 8-C-20
K7UR 53,181- 311- 57-C-40
N7EA 15,510- 110- 47-C
K7XX 5688- 82- 24-C

Wyoming

N7NG 661,203- 907-243-C-AB
W7SE 26,112- 128- 68-C
W7TO 3- 1- 1-B-80

8

Michigan

K8LJG 17,490- 110- 53-B-AB
W8TW 13,728- 88- 52-B
W8FEM 1296- 24- 18-C
K8QWG 1080- 24- 15-B-10
K8KIC 3825- 51- 25-B-15
W8TWA 76,626- 387- 66-C-20
W8UVZ 15,900- 108- 50-C-80
W8VSK 13,398- 77- 58-A-QRP

Ohio

WB8VPA(WD8ALG,opr)
283,500- 500-189-C-AB
W8ELE 184,059- 401-153-C
K8MR 175,086- 411-142-B
WB8NOJ(KL7JER,opr)
117,453- 329-119-C
N8FU 90,900- 303-100-C
N8LM 85,674- 262-109-B
W8GOC 80,404- 232-115-B
W8ZCQ 69,906- 171-122-C
W8UPH 63,054- 226- 93-C
W8YGR 40,635- 129-105-B
W8DWP 34,686- 141- 82-C
N8TN 24,288- 184- 44-C
AA8S 19,836- 116- 57-C
W8NPF 18,792- 108- 58-C
K8JK 15,219- 89- 57-C
K8US 14,850- 99- 50-C
W8KHP 5928- 52- 38-B
W8MH 4800- 50- 32-C
W8WPC(N9AG,opr)
111,627- 471- 79-C-10
K8WW 100,854- 431- 78-C
WB8KKI 46,305- 245- 63-B
WA8TNO 40,704- 212- 64-C
WB8JBM(WB8DQP,opr)
122,859- 561- 73-C-15
WD8AUB 122,421- 559- 73-C
W8RSW 56,592- 262- 72-C
WD8KGZ 29,733- 188- 53-B-20
K8IQQ 816- 17- 16-B
N8BC 25,134- 145- 59-C-40
N8BJQ 12,393- 81- 51-A-QRP

West Virginia

W8BZ 77,469- 217-119-C-AB
K8OQL 40,455- 145- 93-C
WD8KAC 1056- 22- 16-B
AD8V 7722- 66- 39-B-10
W8LRL 2583- 41- 21-C-160

9

Illinois

K9DX 1,113,474-1229-302-C-AB
W9RW 634,500- 846-250-C
K9BGL 510,899- 762-229-C
AF9C 166,362- 466-119-C
WD9DBC 89,436- 256-116-C
W9DWQ 76,941- 249-103-C
W9AG 30,744- 122- 84-C
K9UQN 17,400- 116- 50-C
KA9ACS 10,656- 74- 48-B
W9TNZ 8712- 66- 44-B
W9HPG 4200- 40- 35-C
W9REC 4050- 45- 30-B
K9MK 3456- 36- 32-C
W9GSB 2520- 30- 28-B
AA9F 1320- 22- 20-B
K9UJ 585- 15- 13-B
KA9EAT 150- 10- 5-B
W9BW 64,444- 311- 68-C-10
W9VA 61,065- 298- 69-C
WD9EJE/N 4125- 55- 25-B
W9OA 123,324- 478- 86-C-15
K9RN 77,211- 373- 69-C
K9TI 56,112- 334- 56-C
WD9IIX 55,173- 301- 61-C
N9RR 48,960- 272- 60-C
KB9EW 18,348- 139- 44-B
K9WYI 14,445- 107- 45-B
WD9IIC 49,248- 288- 57-C-20
W9WR 270- 10- 9-B
K9GS 6324- 64- 34-C-40
WB9TIY 16,536- 106- 52-C-80
W2EQS/9 192- 8- 8-B-160
W9PNE 19,695- 101- 65-A-QRP

Indiana

N9AR 55,584- 193- 96-C-AB
K9TUS 27,216- 144- 63-C
K9UIJ 4992- 52- 32-B
K1TH/9 1725- 25- 23-B
AG9C 1344- 28- 16-B
WB9MNW 396- 12- 11-B
W9OBF 72,633- 341- 71-C-15
W9FN 2046- 31- 22-C-20
KB9HG 18,603- 117- 53-C-40
K9KM 6552- 56- 39-C-80
K9FW 5952- 64- 31-C
W9JG 3108- 39- 28-C

Wisconsin

AA9A 468,720- 840-186-C-AB
W9NA 259,077- 511-169-C
W9OP 238,977- 501-159-C
N9EZ 91,500- 250-122-B
W9HE 71,505- 227-105-C
W9FBC 11,475- 85- 45-C
N9KS 2100- 35- 20-C
WB9VJT 1380- 23- 20-B
AJ9K 990- 22- 15-B
W9WAQ 12,096- 98- 42-B-10

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Colorado

KØRF(WØUA,opr)
1,087,881-1411-257-C-AB
WDØABI 31,620- 155- 68-B
WØZV 132,345- 519- 85-C-10
WØYK 107,448- 487- 74-C
NØCC 1209- 31- 13-B
ACØS 79,191- 419- 63-C-15
WØCP 153,000- 750- 68-C-20
NØCP 44,247- 301- 49-C-40

Iowa

WØWP 499,173- 733-227-C-AB
N4RR/Ø 480,900- 700-229-C
WØEJ 373,752- 716-174-C
NØGA 234,240- 488-160-C
WBØZTN 165,072- 362-152-C
WDØBCE 109,557- 329-111-C
AKØM 20,196- 99- 68-B
NØAYM 5100- 50- 34-B
WBØPYD 25,368- 153- 56-B-10
WØSR 13,959- 99- 47-C-15
WØVX 28,026- 173- 54-C-20
WØFO 13,038- 106- 41-C
WØHJ 8880- 80- 37-C-40

Kansas

WØIUB 165,222- 402-137-C-AB
KØFPC 18,096- 104- 58-C
WBØISW 17,640- 98- 60-B
WØGYS 6105- 55- 37-C
K9BLY/Ø 2550- 34- 25-C
WAØTKJ 25,410- 156- 55-C-10
ABØX 15,240- 127- 40-C

Minnesota

WØHP 463,437- 699-221-C-AB
WØYCR 218,268- 423-172-C
WØUC 152,427- 341-149-B
WØLP 23,250- 125- 62-C
WAØADX 5205- 51- 34-B
KØIR 29,928- 232- 43-C-15
AA4MD/Ø 22,197- 151- 49-C
NØNO 79,590- 379- 70-C-40

Missouri

KØVUW(NØAQK,opr)
246,012- 494-166-C-AB
WØPKO 2220- 37- 20-C
K9HF/Ø 3276- 39- 28-B-10
KAØP 48- 4- 4-B
NØTT 98,769- 451- 73-C-20

North Dakota

KØQQ 6720- 56- 40-B-AB
WØLHS 5076- 47- 36-B
WØRIB 468- 13- 12-B-10

South Dakota

WØRSP 108- 6- 6-A-QRP

VE

Maritime - Newfoundland

VE1AIH 185,871- 371-167-C-AB
VE1ANU 70,638- 193-122-C
VO1AW 70,308- 252- 93-C
VE1MX 68,781- 227-101-B
VE1ZZ 23,220- 129- 60-C
VE1BLX 17,388- 84- 69-B
VE1BNN 10,824- 88- 41-C-10
VE1FW 20,385- 151- 45-B-15
VE1UG 28,665- 209- 49-B-20
VE1AI 71,622- 346- 69-C-40

Quebec

VE2JR 11,808- 96- 41-B-15

Ontario

VE3JTQ 128,871- 333-129-B-AB
VE3JCV 97,995- 235-139-B
VE3DAP 41,565- 163- 85-B
VE3KYP 35,880- 130- 92-B
VE3GCE 29,127- 133- 73-C
VE3KZ 71,712- 374- 72-C-10
VE3DZV 41,664- 217- 64-C
VE2AEJ/3 14,382- 102- 47-C
VE3UOT(VE1BCZ,opr)
39,627- 262- 51-C-20
VE3BBH 3480- 40- 29-C-40

Manitoba

VE4JB 114,750- 306-125-C-AB
VE4ADV 52,332- 196- 89-B

Saskatchewan

VE5ZU 189- 7- 9-B-15
VE5RA 2208- 32- 23-C-40

Alberta

VE6LU 159,975- 395-135-C-AB
VE6MP 37,620- 191- 66-B

W/VE - CW

Multioperator Single Transmitter

1

K1RU(+K1YR)
1,094,154-1262-289-C-CT
K1RX(+K1HI,N1AAP)
898,326-1047-286-C-NH
K1RQ(+W1ZT,WB1AUL)
757,380- 971-260-C-WM
N1TZ(+K1s FIR KNQ SF,W1BR)
707,067- 939-251-C-WM
K1ST(+AB1A,K9ES)
683,724-1004-227-C-WM
K1XA(+K1TO)
371,580- 563-220-C-CT

10

2

W2YV(+N2NT,K3UA)
2,115,477-1911-369-C-ENY
W2SUA(+AA2Z,AB2E,N2s ATD CQ)
1,109,952-1128-328-C-SNJ
K2FL(+N2ATX)
583,200- 675- 288-C-SNJ
K2BK(+W2IFK)
568,998- 771-246-C-NNJ
W2YC(+WA2s LET MMA)
505,632- 736-229-C-NNJ
KD2I(+W2DG,WA2PID,WB2s EGI TSY) 430,962- 662-217-C-NNJ
W2RR(WA2AOG,WB2ABD,oprs)
353,625- 575-205-C-WNY
W2UI(+N3KR)
311,283- 583-183-C-SNJ
K2TD(+Net)
289,872- 488-198-C-SNJ
K2GBH(+WA1TWC)
176,712- 398-148-C-ENY
WA2ECA(+N2CU)
56,160- 240- 78-C-WNY
WA2STM(+N2BHP)
51,834- 163-106-B-ENY
K2BMI(+Net)
45,066- 203- 74-C-NNJ
WB2TUM(+WA2DHZ)
26,724- 131- 68-B-WNY
KA2O(Multiop)
12,642- 98- 43-B-SNJ

3

N3RD(+N3RS,W3XU)
1,583,142-1411-374-C-EP
W3BGN(+N3ED)
1,569,114-1461-358-C-EP
K3NZ(+K3OO)
1,011,744-1171-288-C-EP
W3GG(+K3RT,W3GOH)
679,680- 944-240-C-MDC
K3UC(+K3VDU)
677,376- 896-252-C-EP
K3RN(Multiop)
557,250- 743-250-C-MDC
K3QMR(+W3s HV YQ,WA3PXA)
452,610- 705-214-C-EP
K3IU(+Net)
406,122- 599-226-C-MDC
K3HPG(+Net)
353,829- 581-203-C-VA
K3NL(+K3JJG)
351,000- 600-195-C-EP
W3GNQ(+Net)
270,156- 479-188-C-MDC
N3RL(Multiop)
265,800- 443-200-C-MDC
K3ZJ(+N4ZR)
255,867- 493-173-C-MDC
W3KT(+Net)
233,688- 428-182-C-EP
K3UEI(+Net)
166,320- 396-140-C-EP
WB3IXG(+WB3FTP)
98,136- 348- 94-C-EP
K3SME(+Net)
73,188- 228-107-C-EP
W3KFQ(Multiop)
72,504- 212-114-C-EP
W3EVW(+Net)
42,300- 150- 94-C-EP
WA3NAN(+K3ON)
42,240- 160- 88-C-MDC
WB3CZK(+WB3JRU)
25,272- 108- 78-C-MDC

4

N4RV(+N4RA)
796,620- 935-284-C-VA
K4VT(+K4PI)
698,544- 882-264-C-GA
W4HJ(+N4HB,WB4BVY)
356,528- 606-196-C-VA
W4RW(+W4RX)
299,484- 564-177-C-VA
N4UF(+K4LK,KB4B,WD4ITK)
265,761- 579-153-C-NF
K4IQH(+N4SN)
239,190- 469-170-C-VA
W4EAL(AF4T,WB4LEH,oprs)
228,627- 399-191-C-TN
W4CUE(KA4DVL,N4s AID QB,
W4AZE,WB4s VSH ZBN,oprs)
178,932- 403-148-C-AL
N4AU(+K4IZN,WA4MTG)
150,639- 337-149-C-AL
K4EBY(+WB4RDV,KH6BIO)
101,412- 313-108-C-VA

5

K5RC(+K5s AAD GA LZO
MA,KA5CHW)
2,291,682-1979-386-C-ST
W5AC(K5GN,WB5YOT,oprs)
1,033,668-1126-306-C-ST
N5RM(+N5s AIL BET)
982,998-1126-291-C-NT

6

W6BA(+N6s AED AV)
609,201- 981-207-C-ORG
K6DC(+W6s BJH KJG)
437,517- 843-173-C-SCV
N6GJ(WA6HCI,WB6PYI,oprs)
411,104-1132-124-C-SCV
K6XO(+Net)
381,990- 749-170-C-EB
K6OS(+W6MX)
263,082- 538-163-C-ORG
W6GO(+K6HHD)
101,250- 225-150-C-SV
N6ST(+Net) 27,885- 169- 55-C-SCV
K6SMH(+Net)
26,412- 142- 62-B-SCV
K6MEP(AC6I,N6MA,W6RGQ,
WA6IJZ,oprs)
24,768- 192- 43-B-SB
W6SZN(+Net)
16,650- 150- 37-B-SCV
W6FQF(+Net)
16,416- 96- 56-C-SCV

7

N7TU(+K7OEW,WA7RKJ)
509,352-1117-152-C-WA
W7ZR(+W7EJ)
471,240- 952-165-C-ORE
K7LXC(+WB7PSP)
82,152- 326- 84-B-WA

8

AD8P(+AD8C,W8s FN XU,WB8s
PGW WMB)
646,734- 902-239-C-OH
AI8D(+AC8Y,K8s LF MJZ,
WB8MTD,WD8DSV)
315,033- 607-173-C-MI
K8AQM(+WA8ARS,WB8ZFB)
313,650- 510-205-C-MI
W8GLC(AC8W,K8s DD JLB,
N8AXH,WA8MEC,oprs)
233,784- 408-191-C-MI
W8MNL(+LA8OH,K8SIA,N8BNF,
WB8YRY,WD8DSB)
203,040- 423-160-C-MI

9

K9KA(+K9GL,WB9OEP)
861,735-1015-283-C-IL
AI9J(+K9EVB)
786,480- 906-290-C-IL
K9HMB(+K9MK,WB9TIY)
190,755- 471-135-C-IL
W9PK(+WD9JBK)
30,030- 130- 77-C-IL

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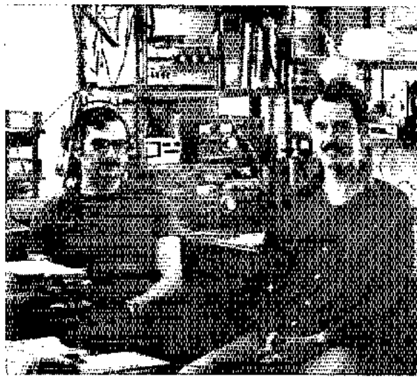
ABØI(+ABØs W X,AEØK,AKØA,
KØs BRD RWL UAA VBU,
KAØBCW,NØs SS XA,WØJU,WAØs
GKZ ZHY,WBØs LFY TNY,W6FN
WA6DGX) 967,566-1231-262-C-MO
KØINR(+KØLUZ,WAØTVV)
590,102- 911-216-C-IA
AKØP(+WDØEIF)
99,876- 287-116-C-IA

W/VE - CW

Multioperator Multi - Transmitter

W4BVV(+K3s EST KU RV,
W3ZZ,WA3AMH,K4YF,
WB4SGV)
4,118,508-2946-466-C-VA
K2NG(+K2s BQ GL SS TT XR,
WA2s BIQ OVE,WB2VYA)
3,723,408-3042-408-C-ENY
W3LPL(+K3NA,N3TR,WA3UXU,
K4FJ,WD4AXM)
3,400,830-2606-435-C-MDC
N9MM(+K8MN,W8CNL,K9s FN JF
UWA,N9NS,W9s LF RE VNE ZRX,
WB9s LTY POH)
3,319,140-2585-428-C-IN
K3WW(+K3s LKN WJV,KB3s AG
GJ,KA3BLP,N3s EC EG)
3,078,702-2409-426-C-EP
W3FA(+K3ZZ,N3s CL GB,W3s
ABC XY,WA3s KCY ZAS,N8II)
3,041,868-2484-409-C-MDC
W3MM(+N2BA,WA2ZKY,AJ3G,
K3s GM ZUF,WA3s VYD WMG)
2,723,697-2209-411-C-EP
K8LX(+K8s GM MD,N8EA,W8s
KPL TA WA,WA8s TBQ YVR
ZOT,WN8PEE)
2,597,340-2372-365-C-MI
K2TR(+K1s DH OME UA,AD2J,
K2s TR UF WR,WA2SPL,K4YX)
2,449,746-2262-361-C-ENY
K3RL(+AA3B,K3s ND OA,W3FV)
2,332,062-1978-393-C-EP
K2VV(+K2s QF XA,N2JJ,W2NC)
2,217,600-2100-352-C-WNY
N6ND(+N6s RM ZI,W6UQF,
WB6HGJ) 2,201,625-2375-309-C-SDGO



HL9TO (left) multioperated both phone and cw with partner HL9UJ. Home calls are WB6GYS and K5UJ, respectively.

AD8J/3 went the monoband route; 10 meters on phone and 15 meters on cw from Western Pennsylvania.

Jes (right), EA1JO, went all-band, single operator, on both phone and cw, while Victoria, EA1WN, lent moral support.

N6RO(+K6RM,WA6KXN,K9LBQ,
N9NC) 2,099,340-2140-327-C-EB
K2UA(+K2BU,N2MM,WA2s DPU,
HGM) 2,034,900-1785-380-C-SNJ
N2RM(+N2ME)
1,702,506-1679-338-C-SNJ
W1ZM(+K1s XX ZM)
1,481,310-1510-327-C-CT
K6RU(+W1ARR,N6s NE YV)
1,349,979-1711-263-C-SCV
W3RJ(+K3VW)
1,338,504-1297-344-C-EP
N5AU(+K5MR,WB5PIP)
1,274,844-1426-298-C-NJ
W6MSF(AA6UO,WA6VEF,oprs)
1,014,354-1199-282-C-SCV
K6ZM(+N3ER,K6CLV,N6OP,W6XX)
1,006,974-1301-258-C-EB
KF6I(+N6s CEI IG)
907,228-1172-258-C-SF
W3GU(+W3KV)
614,544- 868-236-C-EP
K6SG(+W8KZH)
421,056- 816-172-C-SV
W6YX(K1JH,W2JU,K4EO,
WA6ITV,N7MH,W8ZI,oprs)
293,664- 736-133-C-SCV
K3PI(+WA3EKL,WB3BVL)
123,120- 304-135-C-MDC
W2IQZ/7(+K7RDG)
115,968- 302-128-C-AZ
N6ZZ(Multiop)
99,072- 348- 96-C-LA
WA6EUZ(+W7ACC)
8694- 69- 42-B-EB

DX - CW

Single Operator

Africa

EA8TY 61,920- 519- 48-C-10
EA8QE 51,171- 530- 37-B-20
EA8RL 47,693- 458- 37-C-40

EL2AV 110,727- 505- 81-C-AB

ZE3JO 61,440- 404- 64-B-AB
ZE4JS 38,600- 394- 40-B-10

WB5DIZ/5NØ
97,625- 521- 71-B-AB

5Z4CW 5720- 57- 44-B-AB
5Z4YW 16,992- 266- 24-B-15

Asia

A7XE 26,660- 277- 43-C-40

HS1ABD 405,118-1218-133-C-AB

HZ1HZ 558,888-1318-174-B

JA1BWA 326,628- 922-129-C-AB
JF1SEK 314,640-1001-120-B
JA8FXO 219,000-1064- 75-B
JA1DDH 206,546- 661-122-C
JR3XEX 179,970- 710- 90-B
JA6CNL 149,142- 540-106-C
JH1MTR 111,390- 449- 94-B
JAØVBJ 101,556- 591- 62-C
JJ1SOE 98,748- 472- 78-B
JA3AA 86,184- 395- 84-C
JJ1QPU 84,796- 385- 86-B
JA8SW 78,001- 376- 77-C
JA1NW 72,930- 367- 78-B
JH5AUE 69,750- 370- 75-C
JK1VXH 53,940- 335- 58-B
JA9FT 52,129- 265- 77-C
JJ1PCN 51,389- 296- 67-B
JA2MYA 46,458- 306- 58-B
JH6DOG 45,632- 304- 64-B
JG1JMH 38,266- 262- 53-B
JA6BIF 34,099- 230- 61-B
JA6LYV 25,824- 218- 48-B
JA4OEL/1 19,182- 166- 46-B
JA1PS 18,834- 167- 43-B
JE1DXC 18,142- 156- 47-B
JA1VZM 18,050- 140- 50-B
JA1HYH 17,797- 177- 37-B
JA3BAG 17,360- 170- 40-B
JA1IZ 13,949- 139- 37-C
JA2HMF 13,916- 119- 49-B
JH4UVU 13,490- 154- 38-B
JK1NNT 11,385- 103- 45-B
JA6AKV 9702- 100- 42-B
JA1BFN 9625- 113- 35-B
JA3HUL 9153- 124- 27-B
JHØAQS 7182- 120- 21-B
JR3WXA 6966- 134- 18-B
JJ1QLQ 6771- 79- 37-B
JA3CS 6700- 119- 20-B
JG3RDO 3920- 89- 16-B
JA7FMZ 2184- 59- 13-B
JA1KFX 1734- 40- 17-B
JJ1OSP 1548- 47- 12-B
JAØGTM 990- 37- 10-B
JA2ENQ 368- 18- 8-B
JA3SLU 272- 23- 4-B
JH1EDD 132,867- 918- 57-C-10
JA2YKA(JH2QXG,opr)
90,792- 707- 52-B
JH1VRQ 78,147- 543- 57-B
JH7UJU 55,084- 444- 47-B
JA5KJD/1 50,186- 411- 46-B
JA2WB 50,150- 401- 50-B
JH3FYR 49,800- 395- 50-B
JH1BBT 46,244- 399- 44-B
JA1SJV 41,856- 326- 48-B
JA3EQC 37,464- 360- 42-B
JA2TTO 29,160- 284- 40-B
JA1EM 27,468- 268- 42-B
JH1WIX 25,536- 237- 42-B
JA1EF 24,978- 223- 46-B
JA1JKG 23,776- 271- 32-B
JR3IOT 23,712- 246- 38-B
JE1BYI 18,980- 265- 26-B
JH7JVJ 18,833- 218- 37-B
JE2SOY 18,270- 206- 35-B
JA3HGL 16,243- 192- 37-B
JA2DHL 14,880- 189- 30-B
JA1DFQ 13,202- 282- 23-B
JA3LQI 12,400- 153- 31-B
JA2UUZ 12,172- 159- 34-B
JA8EJO 11,618- 130- 37-B
JA3BRB 11,100- 137- 37-B
JA6YCC(JR6CNR,opr)
11,040- 149- 32-B
JA1OP 10,488- 172- 23-B
JA7EC 8120- 119- 28-B
JA5RB/1 7884- 123- 27-B
JA8FRG 5649- 106- 21-B
JH7RZW 4420- 97- 17-B
JA4XKL 3750- 90- 15-B
JA1BC 3648- 67- 24-B
JR2NTC 3633- 69- 21-B
JH6CQY 2576- 69- 14-B
JA1AAT 2204- 45- 19-B
JA5JCC 109,388- 814- 51-C-15
JA6OKB 103,540- 680- 62-B
JE2KPM 69,360- 638- 40-B
JA1IDY 40,057- 372- 41-B
JG1TSF 35,080- 335- 40-B
JK1HAM 21,555- 183- 45-B
JE1VTZ 20,490- 250- 30-B
JF1MYI 20,367- 261- 31-B
JE3UNA 18,476- 229- 31-B
JH7RKT 12,180- 173- 28-B
JG3DLI 8550- 114- 30-B
JA1BZM 7920- 126- 24-B
JR4HVF 4224- 98- 16-B
JA9YE 4080- 70- 24-B
JA4AQR 3173- 67- 19-B
JA1JAT 3132- 52- 27-B
JE3TYJ 1606- 54- 11-B
JA1SIN 1152- 46- 9-B
JA2KPV 767- 26- 13-B
JH4NJQ 246- 28- 3-B
JA2NOQ 196,528-1030- 71-C-20
JAØCGJ 39,861- 362- 43-B
JH4DRB 12,879- 178- 27-B
JA5UBW 11,201- 176- 23-B
JH7BRG 9078- 104- 34-C
JG1QGQ 5798- 89- 26-B
JA1BDI 5494- 55- 41-B
JG1FZG 3289- 94- 13-B
JA2DN 2679- 55- 19-B
JA1UPO 1479- 36- 17-B
JA1SMA 678- 40- 6-B
JA6FYM 305- 22- 5-B
JA7LEX 99- 33- 1-B
JA1OUM 93- 11- 3-B
JR1TJO 93- 11- 3-B
JA1AVI 84- 10- 3-B
JA1UPO 58- 10- 2-B
JG3GQA 6760- 124- 20-B-40
JK1FFZ 3268- 67- 19-B
JA2DCN 3084- 94- 12-B
JA3BCT 505- 39- 5-C
JA1BOK 504- 46- 4-B
JA9CWJ 1530- 56- 10-C-80
JA2IVK 1287- 44- 11-C
JA7NI 33- 4- 3-C-160
JF1VVR 69,192- 371- 72-A-QRP
JR6KRI 23,480- 231- 40-A
JA5XOZ 13,176- 136- 36-A
JR1MSR 3588- 61- 23-A
JF3VGU 2268- 55- 18-A
JJ1INO 1700- 60- 10-A
JR1IMV 1309- 32- 17-A
JH8RHI 354- 26- 6-A
JR1WZI 306- 19- 6-A
JH8OEH 296- 16- 11-A
JAØZG/1 78- 6- 6-A
JAØVFM/1 18- 3- 2-A

JR1INZ/JD1 40- 4- 4-B-80

JT1BF 1596- 66- 12-B-AB
JT1KAA(JT1BL,opr)
2556- 103- 12-B-20

UD6DHC 98,672- 385-112-B-AB
UD6DKW 66,200- 315-100-B

UF6QAC 14,744- 158- 38-B-15
UF6CX 40,066- 397- 46-B-20
UF6QAM 30,576- 348- 39-B

UG6GAI 8514- 115- 33-B-40

UH8HAI 284,886- 943-147-B-AB
UH8HBR 3289- 59- 23-B-20

UJ8JCQ 34,482- 410- 42-B-10
UJ8JAS 46,072- 422- 52-B-40
UJ8JCL 11,997- 189- 31-B-80

UL7MAR 595,000-1562-175-B-AB
UL7LA 31,550- 257- 50-B
UL7QF 18,870- 229- 37-B-15
UL7EAH 18,837- 223- 39-B
UL7LCZ 118,784- 736- 64-B-20
UL7BAA 52,532- 517- 46-B
UL7PA 44,484- 412- 44-B
UL7JCO 35,340- 466- 60-B
UL7PBY 3402- 62- 27-B-80
UL7JCA 2394- 66- 18-B

UM8NNN 113,625- 511-101-B-AB
UM8MAO 28,084- 173- 68-B
UM8MBA 27,328- 183- 61-B
UM8MBN 33,746- 339- 47-B-20
UM8NAG 1312- 42- 16-B

UA9CAL 227,696- 718-133-B-AB
UA9OO 164,150- 547-134-B
UA9UIZ 117,300- 656- 68-B
UAØDP 31,818- 236- 61-B
UA9OCI 864- 51- 6-B
UAØWAS 79,200- 716- 55-B-10
UA9SAX 77,054- 618- 59-B
UA9FGD 73,160- 582- 59-B
UA9NP 24,720- 262- 48-B
UAØCBO 24,384- 297- 32-B
UA9YE 7429- 160- 23-B
UA9QBT 4080- 70- 30-B
UAØSAU 151,415-1200- 55-B-15
UA9SCH 35,002- 359- 43-B
UA9FGJ 1122- 33- 17-B
UAØLEO 37,481- 405- 37-B-20
UA9UTF 23,562- 257- 34-B
UAØOAG 22,752- 266- 36-B
UA9HBJ 7061- 124- 23-B
UA9OBG 10,656- 134- 36-B-80
UAØZCR 308- 59- 2-B
UA9MR 208- 13- 8-A-160
RA9SQN 10,881- 168- 31-A-QRP

4Z4TA 29,542- 253- 43-B-AB
4Z4NUT 16,492- 311- 19-A-QRP

9V1TL 104,112- 651- 72-B-AB

Europe

CT2QN 102,268- 533- 74-C-AB

DJØIV 469,773-1354-127-B-AB
DK1IO 230,076- 644-132-B
DL7CF 202,776- 578-142-C
DLØVW(DF3OL,opr)
74,880- 363- 78-B
DK8KC 57,510- 314- 71-B
DK2ZF 52,470- 349- 55-B
DK9NH 38,775- 215- 75-B
DF9SI 36,582- 197- 78-B
DA1UI 35,224- 208- 74-B
DF3QN 32,091- 223- 57-C
DJ4OE 28,272- 266- 38-B
DK7ZT 20,202- 200- 37-B
DF2HL 7410- 78- 38-B
DA1GJ 5964- 148- 14-B
DL1OO 4932- 274- 6-B
DLØSA 4472- 187- 8-B
DL1AM 2640- 46- 24-B
DK9MB 1648- 48- 16-B
DJ4SO 93,928- 625- 59-C-10
DF5MD 62,920- 610- 40-C
DF3LZ 59,950- 540- 55-B
DK3GI 52,331- 450- 43-C
DL1TH 4498- 75- 26-B
DK8BI 22,876- 314- 28-C-15
DL1RB 22,795- 232- 37-B
DA2JA(K5LZT,opr)
6- 2- 1-B
DK3NR/A 10,672- 147- 29-B-20
DF2CH 1008- 32- 12-B
DL1KS 4179- 77- 21-C-80
DK9FN 18- 6- 1-A-QRP

EA3AIR 400,000-1183-128-C-AB
EA2HW 205,656- 627-132-B
EC5AA 98,671- 507- 79-B
EA1JO 62,350- 321- 86-C
EA3GF 17,100- 76- 30-B
EA4BV 660- 55- 4-B
EA2CR 552- 46- 4-B
EA7AAW 20,888- 319- 28-B-10

EI9J 439,520-1166-134-B-AB
EI2BB 37,440- 360- 39-A-QRP
EI3CP 34,668- 376- 36-A

F8TM 96,884- 367-106-B-AB
F3AT 39,528- 221- 72-B
F6EQV 16,653- 110- 38-B
F8TQ 6924- 197- 12-B-15
F6CRT 24,500- 183- 50-B-20
F6EPO 7463- 161- 17-B-40
F8ZF 286- 12- 10-A-QRP

G3FXB 1,544,550-2594-210-B-AB
G3ESF 353,122- 891-154-B
G2QT 247,294- 748-122-B
G5CTB(N7DC,opr)
85,330- 481- 70-B
G6NK 26,350- 217- 50-B
G3APN 7592- 199- 13-B
G3WP 4404- 125- 12-B
G5CMX(N8ET,opr)
184,688-1036- 68-B-10
G4BUO 142,052- 811- 68-B
G3MZV 50,800- 402- 50-B
G3KKP 83,340- 540- 60-B-15
G3SZA 7904- 137- 26-A-160
G4BUE 400,603-1042-151-A-QRP
G4FDC 4896- 107- 16-A
G4ETJ 4830- 72- 30-A
G3ILO 4028- 76- 19-A

GM3LYY 171,756- 558-117-B-AB
GM4FDM 53,460- 330- 66-B

GW3JI 266,600- 960-100-B-AB
GW3NYY 45,264- 400- 48-B-80

HA1ZG 171,264- 537-128-C-AB
HA8KQX(HA8WH,opr)
155,038- 700- 89-B
HA7MC 123,597- 533- 93-B
HA4YQ 114,304- 503- 94-B
HA3HZ 31,212- 241- 54-B
HAØHW 7200- 133- 20-B
HA7UJ 4669- 77- 23-B
HA2MG 4531- 79- 23-B
HA1TK 2070- 53- 15-B
HA6NP 1183- 32- 13-B
HA3GJ 54,834- 567- 38-B-10
HA5KBM 41,752- 439- 34-B
HA5PA/4 87,138- 745- 47-B-15
HA6OA 85,260- 667- 49-B
HAØLR 39,864- 377- 44-B
HA4XS 26,691- 254- 41-B
HA4XC 26,044- 300- 34-B-
HA3KHC 7480- 144- 20-C
HA2KMB(HA6OI,opr)
5704- 106- 23-B
HA2NI 60- 20- 1-B
HA4KYB(HA4XT,opr)
172,726-1021- 67-B-20
HA4YG 53,850- 439- 50-B
HA3HE 34,896- 303- 48-B
HA4XR 27,600- 250- 46-B
HA7TM 22,077- 279- 33-B
HA2MV 16,422- 262- 23-B
HA5HM 9583- 117- 37-B
HA4XX 4968- 67- 23-B
HA1SN 2737- 60- 23-B
HA5FK 1695- 45- 15-B
HA3GO 592- 50- 4-C
HA5FE 423- 58- 3-B
HA1ZZ 75,680- 695- 43-C-40
HA6NW 13,662- 182- 33-B
HA3PT 765- 23- 15-B
HA9RU 71,746- 524- 58-B-80
HA1TJ 30,200- 318- 40-B
HA6NG 11,020- 176- 29-B
HA3MY 7958- 144- 23-B
HA6OM 4150- 83- 25-A
HA5BA 1932- 46- 21-B
HA6OM 4150- 83- 25-A-QRP
HA6NN 2016- 40- 24-A
HA3NR 48- 6- 4-A

HB9BLQ 269,388- 822-126-B-AB
HB9BRQ(K3KWJ,opr)
7788- 85- 44-B
HB9BOW 7380- 129- 20-B
HB9R/P(HB9QA,opr)
833- 22- 17-B
HB9DX 3084- 348- 3-C-15

I2UBI 700,974-1663-162-B-AB
IØXXR 306,075- 766-159-B
I7PXV 232,960- 632-160-B
I4JCC/5(W3US,opr)
161,655- 960- 65-C-10
I2RVW 17,856- 252- 31-B
I4KRF 148,560- 974- 60-C-15
I1ZEU 60,967- 544- 41-C
I7LMR 46,116- 443- 36-B
IØYWK 13,488- 214- 24-B
I1QJC 38,016- 316- 18-B-20
I1EUA 3774- 87- 17-B
I2XXG 179,852-1240- 57-C-40
I1XPQ 5550- 88- 30-B-80

ISØOMH 80,654- 344- 98-B-AB
ISØFPH 23,564- 199- 43-B-15

LA5YJ 296,723- 816-133-C-AB
LA9GX 11,655- 100- 45-B
LA6ZV 3240- 180- 6-B
LA4YW 1092- 30- 14-C
LB8CA 5457- 118- 17-A-15
LA6VM 111- 13- 3-C-20
LA9HW 25,428- 291- 39-B-40
LA7SI 37,064- 204- 82-A-QRP
LA5SH 29,116- 190- 58-A

LZ2KR 33,495- 175- 77-B-AB
LZ2GS 7920- 105- 33-C-10
LZ1IA 4264- 79- 26-B
LZ2VP 40,755- 422- 39-B-20

OE5CWL 292,600-1079-100-C-AB
OE6HZG 24,624- 285- 38-B-80
OE8NTK 4116- 97- 21-B-160

OH1HS 203,112- 658-126-B-AB
OH6NG 164,424- 510-136-B
OH7NW 87,928- 322-116-C
OH3KS 67,160- 310- 92-B
OH2BSA 63,646- 226-121-B
OH6MM 61,568- 246-104-C
OH5PT 42,966- 192- 93-C
OH9PH 41,408- 279- 64-B
OH9VE 33,784- 183- 82-B
OH7KJ 31,494- 220- 58-B
OH2BKY 27,694- 191- 61-B
OH9TD 23,400- 145- 78-B
OH6EF 11,642- 99- 58-B
OH2BVM 9108- 103- 44-B
OH1FM 8294- 118- 29-B
OH8PZ 4074- 80- 21-B
OH6PA 90- 10- 3-B
OH2FS 121,638- 762- 66-C-10
OH8PF 63,232- 507- 52-B
OH1CQ 33,150- 288- 50-B
OH3CO 31,800- 267- 50-B
OH6RC 31,694- 243- 53-B
OH9VM 11,946- 168- 33-B
OH5PA 1620- 37- 16-B
OH6ZAB 180,992-1263- 56-C-15
OH5KE 36,296- 315- 52-C
OH3RF 15,138- 202- 29-B
OH3IQ 11,286- 174- 27-B
OH7XY 5700- 128- 19-B
OH7UV 4807- 98- 19-A
OH6LK 4683- 106- 21-B
OH9VT 3146- 70- 17-B
OH3BP 1504- 46- 16-B
OH1RV 126- 21- 2-B
OH2PM 12,214- 157- 31-C-20
OH3FW 2964- 38- 38-B
OH1MQ 2825- 52- 25-B
OH6RE 12,160- 146- 38-B-40
OH2BCI 29,950- 293- 50-C-80
OH2BNP 240- 15- 8-A-160
OH6DH 4848- 99- 24-A-QRP
OH6DL 3675- 82- 21-A
OH6DC 2988- 75- 18-A
OH1PV 1647- 66- 9-A
OH2BUT 168- 12- 7-A
OH7AA 36- 12- 1-A

ON4FO 705,345-1566-177-B-AB
OT6FT 487,320-1417-131-B
OR4XG 228,868- 766-116-B
OR5WL 1386- 49- 11-B-80
OR7BV 8820- 108- 36-A-QRP

OK1ALW 1,520,215-2503-235-C-AB
OK1AVD 462,960-1100-180-C
OK3YX 159,936- 586-102-C
OK1MG 159,510- 466-130-C
OK3KEE 153,842- 633- 97-B
OK2BCI 110,228- 506- 68-C
OK2SGW 109,643- 490- 83-B
OK1DKR 106,674- 314-138-B
OK3CAU 52,640- 293- 70-B
OK2LN 41,625- 247- 75-C
OK1BLC 37,180- 270- 55-B
OK1FCA 29,469- 194- 57-B
OK1KZ 29,250- 135- 78-B
OK3IF 26,035- 232- 41-B
OK1KSH(OK1DOJ,opr)
22,152- 284- 26-B
OK2BSA 8757- 147- 21-B
OK3KGQ 8481- 124- 33-B
OK1KIR 6032- 94- 29-B
OK1MIZ 5576- 68- 41-B
OK1ASG 5256- 149- 12-B
OK2SWD 2412- 138- 6-B
OK2PBG 1224- 102- 4-B
OK3TDN 1134- 26- 18-B
OK1AEH 416- 16- 13-B
OK1MSO 159- 21- 3-B
OK1DOC 144- 16- 3-B
OK1AWC 40,966- 526- 39-B-10
OK3YDP 112- 8- 7-B
OK3TJI 80,558- 741- 47-B-15
OK1AGN 40,248- 332- 43-B
OK1JVQ 19,008- 230- 33-B
OK1JHR 16,928- 191- 32-B
OK1TW 3105- 143- 15-B
OK1AOZ 43,884- 290- 53-B-20
OK1AJY 23,790- 247- 39-B
OK2SLL 12,576- 162- 32-B
OK2BCJ 11,725- 127- 35-B
OK1AII 6014- 82- 31-B
OK2BWH 4032- 83- 18-B
OK2BJU 2104- 91- 8-B
OK1EP 2064- 48- 16-B
OK1AXB 1806- 86- 5-B
OK3TCK 1515- 29- 3-B
OK1FCW 99,905- 736- 53-B-40
OK3TCF 5304- 103- 24-B
OK2HI 11,778- 140- 39-B-80
OK3CEL 9389- 112- 41-B
OK3CEI 2700- 45- 27-B
OK3COK 420- 33- 7-B
OK1DIJ 3586- 78- 22-A-160
OK2BPF 576- 24- 12-A
OK3KYG/P 400- 20- 10-A
OL3AXS 208- 13- 8-A
OK2QX 20,150- 139- 62-A-QRP
OK2BMA 3738- 73- 21-A
OK1DKW 3618- 80- 18-A

OZ1LO 1,530,594-3057-186-C-AB
OZ5WQ 222,552- 651-132-B
OZ1EQC 131,250- 522-105-B
OZ5MJ 97,820- 376- 91-B
OZ1FAO 64,770- 269-102-B
OZ1W 48,985- 192-101-B
OZ7BW 35,465- 305- 41-B
OZ1EE 27,401- 194- 53-C

OZ1EHL 1080- 43- 9-B
OZ1BII 26,568- 277- 41-B-10
OZ7YL 3768- 160- 8-C
OZ1DTF/A
236,572-1280- 68-C-20
OZ5KU 66,063- 477- 57-B
OZ8E 17,225- 107- 65-A-QRP

PAØLOU 267,520- 652-152-B-AB
PA3ASC 63,325- 304- 85-B
PAØYN 14,460- 101- 60-B
PAØWWV 5920- 170- 20-B
PA3ABA 1748- 36- 19-B
PAØDIN 4284- 79- 21-B-10
PAØPHK 1760- 40- 22-B
PA3AIC 39,200- 330- 49-B-20
PAØGT 12,250- 108- 49-B
PA3AEX 924- 48- 7-B
PAØATY 16,632- 125- 56-A-QRP
PAØCF 744- 62- 4-A

SM2HAK 746,820-1501-180-C-AB
SM4DHF 303,996- 838-141-C
SM6HCJ 72,270- 340- 90-B
SM5CAK 49,170- 771- 22-C
SM6JNW 38,692- 237- 68-B
SM7AIO 21,816- 240- 36-B
SM5AFE 19,305- 114- 55-C
SM3DNI 2914- 45- 31-B
SM6JY 1680- 80- 8-B
SM5RE 648- 27- 12-B
SMØAJU 148,960- 875- 70-C-10
SM5CMP 106,925- 665- 65-B
SM3DXV 47,472- 393- 48-B
SMØCKT 10,034- 149- 29-B
SM7HPV 4712- 100- 19-B
SMØCGO 960- 44- 8-B
SM5CSS 912- 52- 6-C
SM5GMG 71,136- 726- 38-C-15
SM6JHO 50,396- 449- 43-B
SLØAX(SM6DER,opr)
29,718- 300- 39-C
SM6AOQ 15,148- 217- 28-A
SM6JNT 9360- 199- 18-B
SLØDT 112,800- 975- 47-C-20
SMØBVQ 36,740- 357- 44-C
SM5VB 33,384- 349- 39-B
SM7DBD 7956- 88- 36-C
SM6CST 7259- 149- 17-B
SM4CAN 5313- 95- 21-C-80
SM6BXV 3069- 45- 31-C
SM5KAS 37,986- 401- 39-A-QRP
SM6AOQ 15,148- 217- 28-A
SL3AH(SM7KTQ,opr)
8732- 108- 37-A
SM7CZC 5168- 68- 34-A
SM6HPL 3886- 66- 29-A
SMØFSM 2020- 73- 10-A
SM7BNG 93- 11- 3-A
SM3BP 33- 11- 1-A

SP2FAP 165,632- 578-128-B-AB
SP9AKD 23,616- 146- 64-B
SP4INT 18,081- 302- 21-B
SP4CZD 12,642- 161- 49-B
SP9HWN 6300- 74- 35-B
SP9AOA 5824- 77- 28-B
SP7AWA 1744- 57- 16-B
SP5CJQ 1644- 58- 12-B
SP9EQS 1098- 61- 6-B
SP5AD 77,894- 555- 58-B-10
SP2DX 56,052- 405- 54-B
SP9CAV 17,235- 189- 45-B
SP5BR 50,331- 354- 57-B-15
SP5EKZ 111- 37- 1-B
SP9BRP 26,528- 323- 32-B-20
SP8BAI 22,704- 258- 33-B
SP8MJ 21,640- 224- 40-C
SP8BRQ 9164- 122- 29-B
SP3XR 8025- 133- 25-B
SP9EMU 4590- 70- 30-B
SP6DMI 594- 99- 2-B
SP1FOQ 336- 19- 7-B
SP9EEE 123- 41- 1-B
SP8BPJ 16,188- 201- 51-B-80
SP5ES 480- 19- 10-B
SP3KXC 260- 13- 10-B
SP9DH 2688- 69- 21-B-160
SP7JWZ 440- 20- 11-A
SP5JTR 3510- 98- 15-A-QRP
SVØAR 254,264- 746-148-B-AB
SVØAA(W6GBG,opr)
2160- 47- 20-B-80

RX1DZ 1,325,520-2541-210-B-AB
UA4HAL 715,050-1455-210-B
UA4HBP 365,620- 823-202-B
UA6AJO 157,069- 611-109-B
RX3GO 75,072- 372- 92-B
UA3ST 56,374- 328- 71-B
RZ3AAH 17,738- 159- 49-B
UV3DN 16,796- 220- 34-B
UA4QK 13,524- 133- 46-B
UA1CFF 13,158- 129- 51-B
UA1CE 7820- 92- 46-B
UA4ACO 6384- 74- 42-B
RV3AB 5805- 133- 15-B
UA4CK 97,625- 808- 55-B
UA1ZCW 64,512- 606- 48-B
UW3UO 32,508- 368- 42-B
UA3ECF 31,175- 342- 43-B
UA3PGO 29,400- 240- 49-B
UA6HBF 18,440- 208- 40-B
UW3EH 17,298- 247- 31-B
UA3TAM 10,710- 149- 35-B
UA3DKU 3425- 72- 25-B
UA4ADP 3400- 85- 20-B
UA3RDH 3105- 65- 23-B
UA3PAW 2340- 78- 15-B
UA3LCU 2288- 44- 26-B
UA3DCY 112,980- 779- 60-B-15
UW3HY 75,978- 734- 42-B
UA3DFK 74,186- 654- 49-B
UA3FZ 55,305- 534- 45-B
UA6LLT 28,482- 257- 47-B
RZ3AEZ 20,150- 308- 26-B
UA4CH 14,944- 198- 32-B
UA6ARX 186,550-1229- 65-B-20
UA3PAV 90,816- 610- 64-B
UA1CAI 87,920- 633- 56-B
UW3HY 85,373- 534- 59-B
UA3TBQ 61,056- 488- 53-B
UA3RFU 59,218- 439- 58-B
UA6EAM 51,844- 419- 52-B
UA4ACA 48,330- 373- 54-B
UA3DAM 30,084- 303- 46-B
UA3ESN 29,120- 240- 52-B
U3ACM 21,605- 289- 29-B
UA6AKT 13,172- 169- 37-B
UA6LLI 12,276- 139- 36-B
UA1QDB 3612- 77- 21-N
RZ3AHN 14,760- 190- 40-B-40
UA6ALV 4940- 143- 20-A-80
UA3GD 54,400- 250-100-A-QRP
UA3IDT 4248- 91- 18-A
UA1AUF 3668- 63- 28-A
UA3XBY 330- 15- 11-A
UA6WA 160- 10- 8-A

UA2EC 32,144- 269- 49-B-15

UB5IJZ 137,923- 559-107-B-AB
UB5EAX 76,048- 358- 98-B
UK5JAR 50,496- 334- 64-B
UB5GBN 31,752- 235- 54-B
UB5ZBF 17,290- 132- 65-B
UB5ZCT 4460- 152- 10-B
UB5LDP 49,966- 484- 43-B-10
UB5TR 42,789- 363- 51-B
UB5ICS 36,550- 331- 50-B
UB5NCF 24,535- 307- 35-B
UY5OQ 64,032- 560- 48-B-15
UB5HCW 10,875- 173- 29-B
UB5RS 10,816- 134- 32-B
UB5CAZ 5250- 100- 21-B
UB5KBF 570- 24- 10-B
RZ5UDH 30,520- 315- 40-B-20
UT5PI 27,489- 280- 49-B
UB5QAU 25,049- 316- 37-B
UY5TE 22,160- 247- 40-B
UB5SG 20,295- 193- 45-B
UB5EEP 20,085- 241- 39-B
UB5LCK 7168- 95- 32-B
UT5EM 6048- 107- 27-B
UB5MDD 2106- 62- 13-B
UB5SBM 37,688- 306- 56-B-40
UB5IFN 19,740- 244- 35-B
UB5IF 17,061- 220- 47-B
UB5UCR 12,042- 165- 27-B
UB5DAX 33,856- 342- 46-B-80
UK5QAD 11,016- 157- 34-A
UB5JIQ 9405- 122- 33-B
UY5OO 5957- 77- 37-B
UB5LGM 18,798- 230- 39-A-QRP
UB5UCY 16,039- 153- 43-A
UB5UGF 11,438- 138- 38-A

UC2OCB 133,358- 442-131-B-AB
UC2RZ 16,530- 239- 38-B
UC2ACL 10,416- 124- 42-B
UC2OCH 95,745- 645- 65-B-10
UC2WBI 21,350- 267- 35-B
UC2WBL 46,182- 456- 43-B-20
UC2WAZ 39,416- 320- 52-B
UC2AFI 9060- 129- 30-B
UC2WAS 855- 36- 9-B
UC2ACZ 26,664- 277- 44-B-40
UC2LBE 1309- 64- 7-B-80
UC2AFJ 19,560- 168- 60-A-QRP

UO5OWC 161,894- 571-122-B-AB
UO5OGX 36,600- 309- 50-B-15
UO5OCA 6870- 114- 30-A-40
UO5AP 10,582- 142- 37-B-80

UP2BAR 902,652-1625-228-B-AB
UP2BAO 800,176-1558-208-B
UP2BAS 169,932- 537-119-B
UP2BCG 14,400- 159- 45-B-10
UP2NA 65,847- 608- 47-B-15
UP2BAE 43,780- 336- 55-B
UP2AV 4008- 83- 24-B
UP2BF 10,848- 139- 32-B-20
UP2BDX 4700- 89- 25-B
UP2BCW 31,680- 313- 48-A-40
UP2AW 8928- 130- 31-B
UP2BB 4991- 76- 31-B
UP2NK 89,220- 664- 60-B-80
UP2BBF 20,160- 202- 48-B
RP2BET 1952- 61- 16-A-160

UQ2IF 59,800- 283- 92-B-AB
UQ2DZ 43,022- 201- 98-B
UQ2GBR 15,624- 183- 56-B
UQ2GDM 88,704- 553- 64-B-10
UQ2GGS 6726- 140- 19-A
UQ2GDW 191,730- 999- 77-B-15
UQ2PQ 99,735- 586- 61-B
UQ2GQ 7587- 123- 27-B
UQ2OP 50,922- 530- 41-B-20
UQ2GAG 41,760- 394- 48-B
UQ2GEI 30,492- 297- 44-B
UQ2GFM 36,900- 349- 45-B-40
UQ2PP 4158- 48- 42-B-80
UQ2GBM 988- 38- 13-A
UQ2PM 1972- 59- 17-A-160
RQ2GCR 792- 36- 11-A
UQ2GCN 7028- 124- 28-A-QRP

RU2CR 12,672- 133- 48-B-AB
UR2RSA 1584- 31- 24-B
UR2RKS 49,980- 404- 51-B-10
RU2QD 18,348- 223- 33-B
UR2OI 18,250- 171- 50-B
RU2RCU 129,920- 847- 64-B-15
UR2QY 1326- 39- 17-B-40

YO3CR 80,883- 316- 99-B-AB
YO8OD 73,034- 310-106-C
YO6MD 30,805- 233- 55-C
YO2BTK 11,439- 111- 41-B
YO2CY 11,328- 101- 48-B
YO8BMQ 8520- 113- 30-B
YO6XA 6524- 159- 14-B
YO6MZ 3525- 75- 25-B
YO9GP 1140- 95- 4-B
YO6KNI 3781- 77- 19-A-10
YO3UA 1110- 36- 15-B
YO3JX 5886- 120- 18-B-15
YO2BPM 246- 41- 2-B
YO2BEO 53,152- 489- 44-B-20
YO9HP 30,645- 297- 45-B
YO9AFY 21,014- 196- 38-B
YO9AGI 8928- 138- 31-B
YO8BSE 1280- 40- 16-B
YO4BEX 1005- 33- 15-B
YO8BNI 166- 28- 2-B
YO3AWD 19,992- 199- 42-B-40
YO3CDN 13,650- 186- 35-B
YO4BBH 11,385- 107- 45-B
YO2BMK 2925- 53- 25-B
YO3BWK 1276- 42- 11-B
YO3KSC(YO8BDP,opr)
720- 24- 15-B
YO3JW 309- 103- 1-C

YU1NZW 159,138- 526-126-B-AB
YU3TCM 126,198- 392-123-B
YU7SF 106,645- 554- 77-C
YU7OCZ 49,818- 400- 46-B
YU1OJT 10,904- 96- 47-B
YU7NGO 5715- 214- 9-C
YU2BTU 5520- 92- 24-B
YU3EW 317,817-1565- 79-C-10
YU1NYU 128,100- 727- 63-C
YU3TOJ 4592- 119- 16-B
YU7BCD(YU7OQI,opr)
278,040-1544- 70-C-15
YU7GMN 12,726- 250- 18-C
YU3TU 296,556-1442- 78-C-20
YU1OFT 204,525-1111- 75-B
YU2BHI(YU2RGG,opr)
143,360- 960- 56-B
YU1AHO(YU1OTZ,opr)
44,080- 297- 58-C
YU2RAT 1351- 66- 7-C
YU1EXY 127,104- 790- 64-C-40
YU2EZA 2954- 80- 14-B
YU1IW 54,007- 441- 63-C-80

Y45SA 181,504- 605-128-B-AB
Y37UF 181,240- 660-115-B
Y21YH 71,370- 311- 90-B
Y22UB 35,039- 405- 37-B
Y56ZA 34,602- 193- 79-B
Y23IL 14,592- 131- 48-C
Y38WG 13,410- 161- 30-B
Y39XO 10,720- 124- 32-C
Y51ZE 9789- 116- 39-B
Y41ZH 2810- 99- 10-B
Y23CM 2592- 59- 16-B
Y31XA 2323- 49- 23-B
Y55XL 14,421- 269- 19-C-10
Y46XF 7128- 133- 22-B
Y22TO 3927- 88- 17-C
Y21JH 2967- 59- 23-B
Y37WE 368- 18- 8-B
Y22HF 228- 27- 3-B
Y37ZE 2189- 73- 11-B-15
Y26WL 1096- 93- 4-B-20
Y75UL 890- 33- 10-B
Y31ZF 12,712- 178- 28-B-40
Y33VA 5313- 85- 23-C
Y35NM 8625- 142- 25-C-80

ZB2EO 98,691- 527- 67-B-AB

4U1ITU(K3KWJ,opr)
142- 24- 2-B-10

North America

FGØAYO/FS 5796- 217- 9-B-40
HH2VP(N4XR,opr)
1,485,105-2907-181-C-AB
HI8LC 9174- 149- 22-B-20
HP1AC 19,516- 245- 28-B-AB
H31LR(HP1XOJ,opr)
29,960- 374- 28-B-40
KL7Y 325,278-1227-102-C-AB
KL7AF 70,290- 415- 66-C
KL7DM 13,226- 205- 25-B
KL7IBT 11,380- 200- 20-A-QRP
NP2AE 108,225- 820- 45-B-AB
W3NX/KP4 253,152-1231- 72-B-AB
TF5DC 11,856- 204- 26-B-10
TG9ML 50,840- 294- 62-C-AB
VP1HE 15,168- 454- 12-A-80
VP2AZE(G3JYP,opr)
77,894- 906- 29-B-AB
K4FW/VP2K 79,129- 535- 53-B-AB
VP2ML(K1ZZ,opr)
3,330,702-4757-254-C-AB
VP2MOC(K2YY,opr)
2,024,862-3323-222-C
VP2VGC(N7ZZ,opr)
118,256-1054- 38-B-AB
XE2MX 125,580- 865- 52-C-AB
XE1KC 66,378- 612- 37-B-AB
8P6J(N6TJ,opr)
2,039,042-4091-177-C-AB
8P6NX(WØSA,opr)
187,876-1306- 52-B-20

Oceania

W7LPF/DU2
201,624-1013- 93-B-AB
FOØDX(K1MM,opr)
590,520-2460- 84-C-AB
KG6DX 250,250-1643- 65-C-15
KH6NO 628,935-2004-115-C-AB
KH6ND 539,066-1783-107-C
KH6CP 480- 34- 5-B-15
KH6H 5184- 188- 6-B-40
VK3AHI 160,944-1042- 56-B-AB
VK3CM 38,136- 337- 42-B
VK3AEW 9480- 271- 12-B
VK3MR 120- 43- 1-B-80
ZL1AMO 9061- 242- 13-B-80
5W1BZ 20,235- 462- 15-C-AB

South America

CX7BY 36,260- 408- 35-B-15
HC2SL 943,776-3355- 96-C-AB
HK3YH 26,419- 315- 29-B-80
LU8DQ 454,038-1940- 78-C-10
OA4AWD 43,890- 439- 36-C-AB
W1BIH/PJ2
1,508,536-2718-202-C-AB
PY1DHG 236,457- 743-117-C-AB
PY1ARS/4 145,020- 858- 60-C
PR8ZPJ/9 17,776- 301- 22-B
PY2JX 15,780- 188- 30-B
PY1BOA 3864- 187- 7-B
PY2BZD 1572- 262- 2-A-10
PY8ZLC 45,702- 855- 18-C-15
PY8BI 10,120- 171- 22-B-20
YV1NX 893,026-1801-178-C-AB
YV1OB 44,484- 358- 44-C-80
K9EF/8R1 20,960- 359- 20-C-80
9Y4VU 1,393,672-2979-164-C-AB

DX - CW

Multioperator Single Transmitter

Asia

HL9TO(HL9UJ,K5UJ,WB6GYS, oprs) 154,847- 840- 77-C
JA3YKC(JR2SQU,JE3MAS, JR3FRR,JA5s GZB MOU,oprs)
535,370-1327-155-C
JA7YCQ(JA9XBG,JAØSLY,JH7s FZI IMX QMG ROP UJI VVR WRC XUZ,JH8BZR,JHØCZQ, JI1s FLB OFP,oprs)
113,298- 599- 69-C
JA3YEN(Multiop)
73,511- 387- 73-B
JA4YBU(JH4s SDI XKW,JR4s 8VS DNN FCH,oprs)
33,033- 847- 39-B
UK9HAC(UA9s HBH HBJ,oprs)
396,683-1870-223-B
UK9CBD(UA9s CAM CBM CDJ CDP COM CT,UV9DO,UW9DW, oprs) 705,876-1400-206-B
UK9FER(UA9s FAL FDW, UV9FN,oprs)
697,000-1550-205-B
UKØQAA(UAØs QDL QWN,oprs)
499,525-1532-145-B
UKØFAA(UAØs FBE FBX FM, oprs) 364,877-1520-113-B
UK9ABA(5 oprs)
258,774- 962-129-B
UKØZAB(UAØs ZBF ZBT ZBW ZCG,oprs) 231,012-1113- 81-B
UKØSAW(3 oprs)
110,529- 570- 88-B
UKØZAH(UAØs ZBP ZCJ ZCQ, oprs) 110,160- 811- 54-B
UK7GAA(UL7GBN + 2 oprs)
530,765-1298-185-B
UK7BAL(UL7s BBB BBC,oprs)
161,111- 933- 73-B
UK7PAG(2 oprs)
15,688- 150- 53-B
UK7PBE(3 oprs)
504- 21- 12-B
UK8MAA(UM8MCY + 2 oprs)
350,277-1037-159-B

Europa

DKØTU(DK1PD,DF5GX,DK5s GB HH,DK6QI,DL7s WC ZN, DJ9NX,oprs)
2,217,875-3023-275-C
DJØUY(+DJ4NJ,DL4NV, DK8NX) 206,640-1043- 72-C
DLØWH(DF2IG,DK8IT,oprs)
98,841- 780- 47-C
EA3OG(+EA2LY,EA3s AVV BRL BXE XZ)
1,109,284-2264-187-C
HA5KFL(6 oprs)
1,497,530-2411-230-B
HG6V(6 oprs)
1,221,436-2486-188-C
HAØKLE(4 oprs)
1,099,131-2001-209-C
HA3KNA(HA3s NS NU,oprs)
693,848-1573-172-B
HA7KSV(6 oprs)
642,408-1696-142-B
HA5KKC/7(HA5s BV GQ LV, oprs) 617,728-1834-127-B
HA1KSA(6 oprs)
537,862-1543-137-C
HAØKDA(5 oprs)
478,170-1192-161-B
HA6KNP(HA6s ND NL OL ON OU,oprs) 474,930-1347-135-B
HA9KOL(4 oprs)
463,848-1251-154-B
HA8KVB(HA8VB, + 2 oprs)
453,993-1488-123-B
HA5KKG(6 oprs)
366,652-1002-143-B
HA8KAZ(6 oprs)
343,684- 959-146-B
HA5KKB(4 oprs)
186,300- 550-138-B
HA1KZZ(5 oprs)
165,521- 670-103-B
HA7KMW(5 oprs)
158,286- 500-138-B
HA5KHG(5 oprs)
124,758- 549- 87-B
HA5KAI(4 oprs)
101,024- 460- 88-B
HA9KPU(3.oprs)
79,450- 442- 70-B
HA8KWO(3 oprs)
59,059- 767- 77-B
HA5KHS(5 oprs)
56,304- 328- 69-B
HA7KTM(2 oprs)
12,520- 150- 40-B
HAØKLL(4 oprs)
7764- 219- 12-B
IØMGM(+IØJX)
1,837,173-3095-221-C
LA1K(LA3GW,LA6s MP MU QV ZT,LA9UX,oprs)
339,066-1153-117-C
LZ1KOZ(Multiop)
165,191- 705- 97-C
LZ2KSU(2 oprs)
28,304- 231- 58-C
OE3ALW(+OE2VEL)
40,200- 251- 67-B
OH2AA(OH2s BQS BRW,oprs)
595,972-1602-146-C
OH2AC(OH2s BQG BSJ CR DT, oprs) 426,880- 995-184-B
OH5AB(OH5s KH RO UO ZN, oprs) 46,299- 272- 69-C
OHØAA(OH1JI,OH6DM,oprs)
3456- 71- 24-B
OK1MMW(+OK1DFW)
1,508,166-3015-198-C
OK3KTY(OK3CQW,OLØCLB, oprs) 1,025,728-2250-176-C
OK3VSZ(Multiop)
997,214-2000-197-C
OK3KTP(Multiop)
272,320- 771-148-B
OK3KKF(Multiop)
211,117- 638-137-C
OK1KQJ(Multiop)
124,416- 860- 64-B
OK1KRQ(Multiop)
98,296- 423- 88-B
OK1ONC(Multiop)
93,508- 422- 97-B
OK1KTW(Multiop)
64,935- 403- 65-C
OK1KOK(Multiop)
22,800- 160- 57-B
OK3KYR(Multiop)
15,742- 165- 34-B
OK1KYS(OK1s DEY FRF FVA, oprs) 7714- 142- 19-C
OK1OFK(Multiop)
5852- 114- 22-B
OK3KXR(Multiop)
5357- 85- 24-B
OK2KQO(Multiop)
2880- 163- 6-B
OZ7TST(OZ1s AXG DCR DEA EST,oprs) 68,574- 436- 66-C
PAØGN(PA3ADC,PAØs ERA GIN OOS,oprs)
985,362-2097-174-B
SP8KAF(Multiop)
338,575- 967-145-C
SP1KKO(SP1s ACA BBT JPS, oprs) 39,151- 349- 49-C
SP6PAZ(SP6s OVP FJG,oprs)
3620- 124- 10-B
SP7KTE(SP7s AW IFM,oprs)
12- 4- 1-B
UK4WAB(5 oprs)
758,676-1665-204-B
UK1AFA(3 oprs)
498,780-1457-153-B
UK3ABF(4 oprs)
471,306-1112-193-B
RK3AAC(UA3AMW + 2 oprs)
398,700-1149-150-B
UK3VBD(3 oprs)
52,266- 332- 62-B
UK3WAC(3 oprs)
49,984- 365- 64-B
UK3DBV(UA3s DFO DPM,oprs)
26,023- 253- 53-B
UK2FAD(UA2FBI + 2 oprs)
37,351- 433- 41-B
UK5IBM(UB5IHL,INO,oprs)
553,427-1888-173-B
UK5IAZ(3 oprs)
465,658-1066-191-B
UK5DAA(UB5s DBC VK, UT5DL,oprs)
417,760-1145-140-B
UK5QBE(3 oprs)
243,289- 855-113-B
UK5UBB(RB5NCA,UB5RCA, oprs) 206,708- 698-124-B
UK5UBF(3 oprs)
131,199- 558-101-B
UK5MAF(UB5s MNM MNX, RB5MUV,oprs)
12,606- 171- 33-B
UK5LAK(3 oprs)
6688- 110- 22-B
RK2AAB(3 oprs)
434,860-1078-170-B
UK2AAG(3 oprs)
88,508- 346-116-B
UK2WAR(3 oprs)
35,298- 298- 53-B
UK2PAP(UP2s BCI OX,oprs)
1,381,205-2444-217-B
UK2BAB(UP2s BDA BGP,oprs)
253,724- 789-137-B
UK2GDZ(UQ2s GAE GBQ, oprs) 957,600-1844-190-B
UK2GJL(UQ2GAV + 1 opr)
351,500-1022-148-B
YO6KAF(YO6s AWR EZ UX, oprs) 200,340- 678-126-B
YU3DKR(4 oprs)
6960- 107- 24-B
YU2CBV(Multiop)
3240- 216- 5-B

North America

KL7HFV(+KL7IDT,N6IV)
125,089- 679- 67-C
VP2KAH(W6s KG QL,oprs)
1,120,500-2428-156-B

DX - CW

Multioperator Multi-Transmitter

Asia

JA7YAA(JG1UJD,JA7s KPK WBW,JH7s AEF DAG HWR LIS WTC,JR7OMD,JA9PPC,oprs)
1,089,465-2095-195-C
JA7YAF(JH7s CJY SJH TMM WKQ,JR7s GGO KIQ QWW, oprs) 461,312-1256-136-B

Europe

SK2IV(SM2s AGJ CDF IVR, oprs) 166,320- 361-198-B

Check Logs

DK3OI,DL9HN,HA3GA,HA7MW, HC1BI,HK1AMW,JAØNI, JA8CJY,JT1AN,K4LDI,KA2BID, KA2CIW,KA9COE,KH6CKJ, LA4LG,LA7SP,LZ1KFZ,LZ1UA, LZ2JF,LZ2KSK,N1NN,N2BJB, N6OB,N6UW,OH2BSS,OH3WH, OH5YX,OH6GD,OK1DMU, OK1MHI,OK1MZO,OK1TJ, OK2KVI,OK2PDN,OK2YN, OK3TCA,OL6AUL,OZ1CCB, OZ6SF,PAØPLM,PAØUV, RK3AAH,RU2RGM,RW3HV, RY5AO,RZ3AGF,RZ3AIR, RZ3AJU,RZ3AKE,RZ5UBI, RZ5UWG,SMØBDS,SM1FPE, SM3CJA,SM3DXV,SM5AKT, SM5APS,SM5BDV,SM6AOQ, SM6AYM,SM6BZE,SM7AAQ, SM7FH,SM7FHJ,SM7FPZ, SP2BRZ,SP2GKQ,SP2GMA, SP2GRT/9,SP3AIJ,SP7DTB, SP7EKU,SP7KLD,SP8GSC, SP9BAI,SP9DTH,U3ACM, UAØFCH,UAØKBC,UAØKBV, UAØLDI,UA1AUA,UA1OAI, UA1OBQ,UA1OCT,UA1QBM, UA1ZCZ,UA3ADO,UA3DFV, UA3DIN,UA3DNK,UA3ONV, UA3ECB,UA3VFI,UA4ABO, UA4BI,UA4CDC,UA4FAZ, UA4FCZ,UA4FDJ,UA4HFR, UA4NDV,UA4PAU,UA4WAG, UA4YAT,UA6AJG,UA6AKO, UA6EAE,UA6LDF,UA6LFQ, UA6YR,UA9CHQ,UA9FHK, UA9KAI,UA9MY,UA9NW, UA9OBJ,UA9QBS,UA9SBM, UA9UAR,UA9UOZ,UB5AAF, UB5ACL,UB5EES,UB5IDL, UB5LCN,UB5MDP,UB5RAF, UB5UBU,UB5UCF,UB5UDU, UB5UGO,UB5ZBG,UC2SE, UH8EAD,UI8ADQ,UI8GAJ, UKØAAB,UKØFAD,UK2BAS, UK2BBF,UK3DCC,UK3QAE, UK4HAW,UK5JKR,UK5WAA, UK5ZAC,UK9OAZ,UL7EAT, UP2BBC,UK2BEI,UP2BFI, UP2BV,UT5BP,UT5LF,UW6CV, UW9SG,W1PWK,W2AFM,W2YKQ, W4KO,W5UJY,W6HBP, WAØWWW,Y21DC,Y21DH, Y22TD,Y23RJ,Y24ER,Y24GE, Y25TG,Y26EI/P,Y26IL,Y26TL, Y26JL,Y27IL,Y41ZM,Y46WF, Y53XM,Y67XL,Y75OL,YO2VB, YO3KWF,YO4ZF,YO8BQO, YU1PCC,YU2CDS(YU2RTM,opr) YU4WST,YU7ADA

Operating News

Conducted By John F. Lindholm,* W1XX

Hurricane Hurts vs. Hertz

Amateur Radio has its share of *hurts*, but none perhaps causes more agony than some of the recent hurricane emergency net operations. Were *hertz* defined as cycles per *season*, then use of the term *hertz* would be appropriate here, for criticism of the Amateur Radio response to hurricane devastation is cyclic and thus predictable from one season to the next.

Thus, a flood of mail is received every summer at Headquarters citing case after case of inept handling of hurricane-related traffic and disgust with those causing interference to emergency communications. Every summer, nature hurls its full fury at the Caribbean islands and the Gulf Coast states, playing havoc with communications and bringing a host of well-intentioned but untrained operators out of the woodwork. Everybody wants to help. But the uninitiated immediately reach for the mike button to "get on the toll," rather than standing by and listening for direction. To maintain order, transmitting is only by invitation of a competent control station.

Many correspondents decry the lack of enforcement by FCC. Others sadly note our inability to adequately police our own frequencies. The truth is that the FCC enforcement division *does* monitor and has proceeded in several such cases in recent months. And amateur-FCC teamwork is about to get another boost: Upon input from the members, the ARRL's Board of Directors has authorized an Interference Task Force. Its job will be to coordinate an educational program, to assist in the formation and guidance of local interference committees, and to funnel information on hard-core interference directly to the top level of the Field Operations Bureau in Washington. We hope the local committees will be able to solve cases of inadvertent, careless or even harassing interference cooperatively, leaving only the toughest 5% or so for FCC. Impatience with the slow-turning wheels of justice should not discourage us. Though we amateurs can point with justified pride to our long and admirable record of self-policing, it should be understood that the role of the Official Observer does not include attempts to effect compliance by those who cause malicious interference. The OO can help only those who want to be helped.

After calm has been restored to both nature and the airwaves, *QST* historically has followed with a scathing critique, landing hard on the QRMers and taking to task those who were "just trying to help." The latter then feel maligned and angry. This is followed by 11 months of "how to do it right" articles in the public service pages of *QST*. But the educating all too often gets lost in the shuffle of more-interesting reading, such as DXCC totals and antenna articles. Unfortunately, preparation is not given another thought until the wolf is again at the door. The cycle is then repeated the following year, in Xerox manner, with no apparent improvement in the competence level of amateurs.

It doesn't have to be that way. It requires preparation throughout the year to have both station and operator at a high state of readiness. Station preparation may require antenna modification or a source of emergency power. But the best equipped station on the continent doesn't make a hoot of difference if the operator is not properly trained in the discipline of net operation.

The hurricanes of the summer of '79 taught us well. The response then was woefully lacking; this in spite of the ARRL-sponsored National Traffic System, dedicated and disciplined to cope with just such situation. And yet at the initial stages, NTS was not plugged into the program. From those early hours of vacillation was born the International Assistance Net, operated on 14,303 kHz and spearheaded by W4PPC. NTS interface was accomplished by NTS gateway stations regularly checking in to provide liaison to the vast pool of operators of the System for both delivery and origination. Discipline, order and strict adherence to the autocratic rule of the control station followed. Chaos dissipated. No longer did the station in Fargo, North Dakota, have to remain on frequency for hours awaiting an answer to his welfare request. The System would funnel the reply to the originator through normal net sequencing.

This summer, when Hurricane Allen drove barometers to all-time lows, a cadre of dedicated amateurs on 14,303 kHz was ready to meet the task and to provide the interface to NTS. With the discipline in evidence, the hoots and whistles passed virtually unnoticed.

Perfect? Not by a long shot. Delays were caused by those "just trying to help." There were still unidentified transmissions and false distress signals. But with calm and cool expertise, the chaos of other 20-meter frequencies was not to be heard.

*Communications Manager, ARRL

W1AW Schedule

October 26, 1980-April 25, 1981 **MTWThFSSn = Days of Week** **Dy = Daily**

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

UTC	Slow Code Practice	MWF: 0300, 1400; TThS: 0000, 2100; Sn: 0300, 2100
	Fast Code Practice	MWF: 0000, 2100; TTh: 0300, 1400; S: 0300; Sn: 0000
	Cw Bulletins	Dy: 0100, 0400, 2200; MTWThF: 1500
	RTTY Bulletins	Dy: 0200, 0500, 2300; MTWThF: 1600
	Voice Bulletins	Dy: 0230, 0530
EST	Slow Code Practice	MWF: 9 A.M., 7 P.M.; TThSSn: 4 P.M., 10 P.M.
	Fast Code Practice	MWF: 4 P.M., 10 P.M.; TTh: 9 A.M.; TThSSn: 7 P.M.
	Cw Bulletins	Dy: 5 P.M., 8 P.M., 11 P.M.; MTWThF: 10 A.M.
	RTTY Bulletins	Dy: 6 P.M., 9 P.M., 12 P.M.; MTWThF: 11 A.M.
	Voice Bulletins	Dy: 9:30 P.M., 12:30 A.M.
CST	Slow Code Practice	MWF: 8 A.M., 6 P.M.; TThSSn: 3 P.M., 9 P.M.
	Fast Code Practice	MWF: 3 P.M., 9 P.M.; TTh: 8 A.M.; TThSSn: 6 P.M.
	Cw Bulletins	Dy: 4 P.M., 7 P.M., 10 P.M.; MTWThF: 9 A.M.
	RTTY Bulletins	Dy: 5 P.M., 8 P.M., 11 P.M.; MTWThF: 10 A.M.
	Voice Bulletins	Dy: 8:30 P.M., 11:30 P.M.
PST	Slow Code Practice	MWF: 6 A.M., 4 P.M.; TThSSn: 1 P.M., 7 P.M.
	Fast Code Practice	MWF: 1 P.M., 7 P.M.; TTh: 6 A.M.; TThSSn: 4 P.M.
	Cw Bulletins	Dy: 2 P.M., 5 P.M., 8 P.M.; MTWThF: 7 A.M.
	RTTY Bulletins	Dy: 3 P.M., 6 P.M., 9 P.M.; MTWThF: 8 A.M.
	Voice Bulletins	Dy: 6:30 P.M., 9:30 P.M.

No 0300 UTC code practice on November 15, 1980 and February 14, 1981 (Frequency Measuring Test nights).

Code practice and cw bulletin frequencies: 1.835, 3.58, 7.08, 14.08, 21.08, 28.08, 50.08, 147.555 MHz.

RTTY bulletin frequencies. 3.625. 7.095, 14.095, 21.095, 28.095, 147.555 MHz.

Voice bulletin frequencies: 1.835, 3.99, 7.29, 14.29, 21.39, 28.59, 50.19, 147.555 MHz.

On Monday, Wednesday and Friday, 1400 through 2200 UTC, transmissions are beamed to Europe on 14, 21 and 28 MHz.

Slow code practice is at 5, 7-1/2, 10, 13 and 15 wpm.

Fast code practice is at 35, 30, 25, 20, 15, 13 and 10 wpm.

Code practice texts are from *QST* and the source of each practice is given at the beginning of each practice and at the beginning of alternate speeds. For example, "Text is from February 1980 *QST*, pages 9 and 82" 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 82.

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

Cw bulletins are sent at 18 wpm; Teletype bulletins are sent at 60 wpm with 170 Hz shift, then repeated on 110 baud ASCII.

W1AW is open for visitors Monday through Friday from 7:30 A.M. to 1 A.M. EST and on Saturday and Sunday from 3:30 P.M. to 1 A.M. EST. If you desire to operate W1AW, be sure to bring your license with you. W1AW is available for operation by visitors between 1 and 4 P.M. Monday through Friday.

In a communications emergency, monitor W1AW for special bulletins as follows: voice on the hour, RTTY at 15 minutes past the hour, and cw on the half hour.

W1AW will be closed on November 27, December 25-26, January 1, February 16 and April 17.

Station staff: Chief Operator/Asst. Communications Mgr. C. R. Bender, W1WPR; Chris Schenck, W1EH; Charles Chadwick, K8AXL.

How can we break the cycle? Since mother nature is not likely to mend her destructive ways, we amateurs surely can. We can exhibit restraint by transmitting less and listening more. We can adopt the structured discipline that such an emergency situation dictates by active participation in the National Traffic System year-round. This doesn't mean each and every day. On the contrary, NTS functions on the principle of many hands sharing the load. The ironman is not needed. There is room for everybody to whom discipline appeals. Your entry is as near as your 2-meter-fm local net or hf section net.

Will we be suffering from a case of the "hurricane hurts" come the summer of 1981? Or will our radios be tuned to the "hurricane hertz" for a communications response that is a credit to our service?

Let's continue to work on it for the next 11 months.

SCM ELECTION NOTICE

To all ARRL members in the Montana, Mississippi, Iowa, Arizona, Ontario, Orange, Northern Texas, Arkansas, Kentucky and Wyoming sections: You are hereby solicited for nominating petitions pursuant to an election for Section Communications Manager. 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*. No member may sign more than one petition. It is advisable to have a few more than five signatures on each petition.

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

(Place and date)

Communications 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 Communications Manager for this Section for the next two-year term of office. (Signature . . . Call . . . City . . . ZIP . . .).

An SCM candidate must have been a member of the League for a continuous term of at least two years and a licensed amateur of General class or higher (Canadian Advanced Amateur Certificate) immediately prior to receipt of petition at Headquarters.

Petitions must be received at Headquarters on or before 5:30 P.M. Eastern Local Time, Dec. 5, 1980.

Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on January 2, 1981, returns counted February 17, 1981, and SCMs elected as a result of the above procedures will take office April 1, 1981.

If only one valid petition is received for a section, that nominee shall be declared elected without opposition for a two-year term beginning April 1, 1981.

If no petitions are received for a section by the specified closing date, such section will be resolicited in April *QST* and an SCM elected through the resolicitation process will serve a term of 18 months.

Vacancies in any SCM office between elections are filled by appointment by the communications manager.

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

John F. Lindholm, W1XX
Communications Manager

REPEAT SCM NOMINATING SOLICITATION

Since no petitions were received for the Idaho, North Dakota and West Indies sections as a result of notices in the April and May *QST*, nominating petitions for these sections are herewith resolicited. See the above notice for details on how to nominate.

SCM ELECTION RESULTS

The following elections were conducted for two-year terms of office beginning October 1, 1980:

Balloting Results: In the Minnesota Section, Helen Haynes, WBØHOX, received 550 votes and Patricia T. Harrison, AFØO, received 393 votes. Ms. Haynes is declared elected.

In the Oklahoma Section, Leonard R. Hollar, WA5FSN received 417 votes and Lloyd Colston, WB5AXH, received 221 votes. Mr. Hollar is declared elected.

In the Southern Florida Section, Woodrow Huddleston, K4SCL received 1042 votes and Edward Hart, Jr., N4KB, received 851 votes. Mr. Huddleston is declared elected. QST

OSCAR Operating Schedule

	OSCAR 7			OSCAR 8			
DATE (UTC)	*Orbit No.*	*Time UTC HR MN*	*Eqx W. Long. Degrees*	*Orbit No.*	*Mode*	*Time UTC HR MN*	*Eqx W. Long. Degrees*
1 Oct.	26,889	0044	84.2	13,118	X	0032	62.6
2 Oct.	26,902	0138	97.8	13,132	A	0037	63.9
3 Oct.	26,914	0037	82.7	13,146	A+J	0042	65.1
4 Oct.	26,927	0132	96.3	13,160	J	0047	66.3
5 Oct.	26,939	0031	81.1	13,174	J	0052	67.5
6 Oct.	26,952	0125	94.7	13,188	A	0056	68.8
7 Oct.	26,964	0024	79.6	13,202	A+J	0101	70.0
8 Oct.	26,977	0119	93.1	13,216	X	0106	71.2
9 Oct.	26,989	0018	78.0	13,230	A	0111	72.4
10 Oct.	27,002	0112	91.6	13,244	A+J	0116	73.7
11 Oct.	27,014	0012	76.4	13,258	J	0120	74.9
12 Oct.	27,027	0106	90.0	13,272	J	0125	76.1
13 Oct.	27,039	0005	74.9	13,286	A	0130	77.3
14 Oct.	27,052	0059	88.4	13,300	A+J	0135	78.6
15 Oct.	27,065	0154	102.0	13,314	X	0140	79.8
16 Oct.	27,077	0053	86.9	13,327	A	0001	55.2
17 Oct.	27,090	0147	100.5	13,341	A+J	0006	56.4
18 Oct.	27,102	0046	85.3	13,355	J	0011	57.7
19 Oct.	27,115	0141	98.9	13,369	J	0016	58.9
20 Oct.	27,127	0040	83.8	13,383	A	0021	60.1
21 Oct.	27,140	0134	97.3	13,397	A+J	0025	61.3
22 Oct.	27,152	0034	82.2	13,411	X	0030	62.6
23 Oct.	27,165	0128	95.8	13,425	A	0035	63.8
24 Oct.	27,177	0027	80.6	13,439	A+J	0040	65.0
25 Oct.	27,190	0121	94.2	13,453	J	0045	66.2
26 Oct.	27,202	0021	79.1	13,467	J	0049	67.5
27 Oct.	27,215	0115	92.6	13,481	A	0054	68.7
28 Oct.	27,227	0014	77.5	13,495	A+J	0059	69.9
29 Oct.	27,240	0108	91.1	13,509	X	0104	71.2
30 Oct.	27,252	0008	75.9	13,523	A	0109	72.4
31 Oct.	27,265	0102	89.5	13,537	A+J	0113	73.6
1 Nov.	27,277	0001	74.4	13,551	J	0118	74.8
2 Nov.	27,290	0055	87.9	13,565	J	0123	76.1
3 Nov.	27,303	0150	101.5	13,579	A	0128	77.3
4 Nov.	27,315	0049	86.4	13,593	A+J	0133	78.5
5 Nov.	27,328	0143	100.0	13,607	X	0137	79.7
6 Nov.	27,340	0043	84.8	13,621	A	0142	81.0
7 Nov.	27,353	0137	98.4	13,634	A+J	0004	56.4

Orbit predictions by Project OSCAR, P. O. Box 1136, Los Altos, CA 94022. To keep abreast of the latest developments, tune in to the regular phone and cw bulletins over W1AW, AMSAT bulletins transmitted around 29.490 MHz on Mode A, 145.960 MHz on Mode B, and 435.160 Mode J, during O 7 and O 8 reference orbits, and AMSAT nets (East Coast at 0100 UTC Wednesdays; Mid States at 0200 UTC; West Coast at 0300 UTC, all on 3850 kHz lsb); (international net at 1800 UTC Sundays on 14,280 kHz usb and 1900 UTC Sundays on 21,280 kHz).

O 7 progresses an average of 28.7374° W. per orbit in a period of 114.9419 minutes.
O 8 progresses an average of 25.8018° W. in a period of 103.2000 minutes.

O 8 modes of operation are Mondays and Thursdays — Mode A. Tuesday and Friday — Mode AJ. Saturdays and Sundays — Mode J. Wednesdays are for experimental use on Mode A or J or recharge Mode D.
Mode A+J is simultaneous operation of both transponders.

Spacecraft Frequencies

Spacecraft	*Uplink*	*Downlink*	*Beacon*
O 7			
Mode A	145.850-145.950 MHz	29.400-29.500 MHz	29.502 MHz
Mode B	432.125-432.175 MHz	145.975-145.925 MHz	145.972 MHz
O 8			
Mode A	145.850-145.950 MHz	29.400-29.500 MHz	29.402 MHz
Mode J	145.900-146.000 MHz	435.100-435.200 MHz	435.095 MHz

Formulas for calculating approximate downlink frequencies. x = downlink frequency.

OSCAR 7

Mode A — x = uplink frequency − 116.450 MHz ± Doppler shift
Mode B — x = uplink frequency − 578.100 MHz ± Doppler shift

OSCAR 8

Mode A — x = uplink frequency − 116.458 MHz ± Doppler shift
Mode J — x = uplink frequency − 581.106 MHz ± Doppler shift

Note: A minus sign in front of the downlink frequency indicates that the passband of the satellite is inverted in that mode. This means that signals transmitted up to the satellite at the low end of the uplink passband will appear at the high end of the downlink passband.

Additionally, upper-sideband signals transmitted on the uplink will appear as lower-sideband signals on the downlink.

Mode J Club

Become a member of the Mode J Club. Complete eight Mode-J contacts. QSL cards are not required. Just list the call sign of each station worked, date, orbit number and station equipment used. Send this information along with $3 in U.S. funds, a one-time charge to cover the certificate and newsletter costs, to Mode J Club, c/o Larry Roberts, W9MXC, 3300 Fernwood, Alton, IL 62002.

OSCAR 8 QSL

To receive an OSCAR 8 QSL card, send a copy of the telemetry from the 29.402- or 435.095-MHz beacons. Please send your report, along with an s.a.s.e., to ARRL hq.

Further information on the radio amateur satellite program can be obtained free of charge from ARRL hq.

Public Service

Conducted By Robert J. Halprin,* K1XA

Handling a Hurricane Net

The following thoughts on hurricane net operation, contributed by James M. Jones, W5HMR, address a matter of great concern in the amateur community in the light of recent events.

Amateur Radio, in its quest to be of public service, has suffered setbacks in the wake of certain hurricane net operations. The solution is through communication — not simply delivering a signal from one point to another, but rather communication of *purpose*.

One of the problems inherent in these types of emergencies stems from individual amateurs trying to use a net for something other than its intended purpose. A station in California or Michigan, for example, wanting hurricane coordinates on a storm near Haiti, interrupting the traffic flow from the affected areas, is wasteful. To avoid these repeated requests, a net could establish a schedule during which information is to be disseminated; say each quarter hour. Regular announcements of this procedure will deter the out-of-order requests.

Often, a multitude of operators seeks to send health-and-welfare inquiries into the stricken area (even right after the disaster when amateur circuits are just getting set up to handle priority governmental and relief traffic). A statement of purpose, made each half hour, will advise what kinds of information and traffic the net specializes in, avoiding time-wasting interruptions. Frequencies of nets specializing in health-and-welfare traffic should be announced simultaneously.

Propagation on hf usually necessitates relay stations to assist the net control. This creates a condition where operators, eager to help, all begin shouting at the net control, resulting in duplication and confusion. Specific relay stations should be designated by the net control, and only these designated stations permitted to relay from weak stations, and only upon request by the net control. The NCS must maintain forceful leadership.

In the case of recent hurricanes, the *initial* impact in no way involved the States. A procedure where the net control calls for stations only in the affected countries or islands appears most suitable. Other checkins would be ignored unless they were specifically asked to transmit. Of course, the *modus operandi* should include a regular standby for distress calls and emergency traffic.

In essence, a net policy and a firm schedule must be followed. Variance should not be allowed. All those listening must be continually advised of the purpose and ground rules of the net. All stations on board must be made fully aware of the need to maintain silence unless requested to transmit. The NCS must shun responding negatively to an operator who has violated the ground rules and must avoid lamenting the ground rules or engaging in filibusters or dissertations in response to an amateur who has violated those rules. A regular announcement of the net's purpose avoids antagonizing the well-meaning operator who doesn't understand, but may ultimately have meaningful input for the net.

Be they bogus or real, distress calls dictate the use of the aforementioned designated relay stations. The information should be gathered in an orderly fashion and relayed to proper authorities. Amateurs should at all costs avoid "opinions" as to the validity of the distress call or other dangers present to any particular area, and stick to the facts as known. Expression of these opinions creates an immediate desire for other operators to render their opinions, without invitation.

The percentage of the amateur population that will deliberately interfere with an ongoing emergency net is minimal. But any comment by the net control or others gives the perpetrator some recognition and feeds his desire to continue. Totally ignoring the interference will minimize the problem. Angry outbursts exacerbate the problem. It may be necessary, at times, to postpone the traffic at hand and move on to other matters temporarily: "This is W5HMR, I am unable to copy you at this time; please stand by and we will return to you when conditions have improved." The interfering station can not particularly discern that his signal is causing the difficulty.

North American amateurs have a vital role when the Caribbean area is hit by hurricanes. That job can be performed in a professional manner, with limited disarray, through proper, purposeful net communication and effective net control. When this occurs, all amateurs can feel pride in the way in which they and their fellows have served.

LOUISIANA LIGHTNING

☐ I just received a phone call from a very happy and excited amateur. Derald Shurtleff, WD5CQO, has been working very hard on a program to help deaf people, and his endeavors are beginning to pay off. On July 2, 1980, a deaf person in Baton Rouge, Louisiana, talked with another deaf person in Phoenix, Arizona, through an Amateur Radio phone patch. The contact was carried out via Teletype and may have been the first of its kind ever.

Derald is looking for other amateurs to assist him in making phone patches between deaf persons a nationwide activity. He would appreciate any help he could get. Derald's address is 4121 Jefferson, Baker, LA 70714. — *Jim Bonnough, WB5TPG, SEC Louisiana*

☐ Wanted — aspiring traffic handlers, beginning cw operators and certificate collectors. The Louisiana Slow Speed CW Net (LSN) operates Monday through Friday on 3703 kHz at 0030 UTC. LSN has a dual purpose — it functions as a training net and for the passing of message traffic. Please support the net with your QNI and by passing the word. Questions should be directed to the net manager, Steve Genusa, WD5EAE, 2106 Park Ave., Monroe, LA 71201. An s.a.s.e. would be appreciated. This information via WD5EAE.

PUBLIC SERVICE DIARY

☐ Prince Rupert, British Columbia — November 30, 1979. Fire destroyed telephone cables between isolated island groups, and hams set up emergency communications on repeater VE7PRP and on 75 meters. (VE7FB, SCM British Columbia)

☐ Atlantic Ocean — December 7, 1979. The *SS Young America/WGLW* and the U.S. Coast Guard in Boston used 80 and 40 meters to help coordinate a search for a sinking yacht. (W6RKT)

☐ Toledo, Ohio — December 15, 1979. Members of the Greater Toledo ARC used 2 meters to provide communications during a hospital move. The Medical College of Ohio moved 100 patients, to a new facility 14 miles away. (W8IEP)

☐ Annapurna Peak, the Himalayas — October 7, 1979. When an American mountain climber fell and suffered a back injury, hams called in a helicopter to transport him to a hospital. (LU2ASM/W2)

☐ Imperial Valley, California — October 15-16, 1979. In the wake of an earthquake that measured 6.4 on the Richter scale, Southern California Army MARS members handled traffic for the California State Emergency Center and the Army Corps of Engineers. (WB6PDO/AAR9UG)

☐ Southfield, Michigan — December 25, 1979. K8CJX and his family were in the process of adopting a son, Dexter, from Costa Rica. On Christmas Day, W9CPM/TI2 allowed Dexter to talk with his new family via ham radio. (K8CJX)

☐ Cloverdale, California — December 25, 1979. A light plane crashed, and the occupants were unharmed. Hams relayed the good news to relatives in Washington after attempts to make contact by telephone failed. (N6BLG)

☐ East Liverpool, Ohio — December 31, 1979. K8HDI used the WR8AJI autopatch to report a house fire. The local fire department responded and saved the building. (K8HGY)

☐ Portland, Oregon — January 9-13. A severe ice storm struck the area, downing phone and power lines and making travel dangerous. Members of the Hoodview ARC and the Tektronix Employees Radio Amateur Club worked with local emergency agencies to provide communications. Hams also helped deliver food, blankets, clothing and fuel to people stranded by the storm. (WB7NBP)

☐ Vallarta, Mexico — January 16. KA6ERH/mm and WD9DVA used 20 meters to arrange for the delivery of medicine for treatment of KA6ERH's wife. (WD9DVA, EC Vanderburgh Co. Indiana)

☐ Livermore, California — January 24. RACES members provided 2-meter communications for the local hospital, school district, Red Cross and emergency center after a series of earthquakes knocked out telephones and power. (WA6OHB)

☐ Phoenix, Arizona — February 15-22. When flooding interrupted normal communications, hams stepped in to provide emergency communications via W7EX/R for the Red Cross, the Salvation Army, local police and emergency agencies. (N6HJ, EC Maricopa Co. Arizona)

☐ Las Vegas, Nevada — February 23. WA2CWT was watching takeoffs and landings at the Las Vegas International Airport when he saw large chunks of rubber fall from a left-side wheel of a departing Delta DC-8. He used 2-meter hand-held to relay the information to another ham who contacted Delta by phone. The DC-8 crew was notified and took appropriate safety measures upon landing. The plane landed safely, and inspection showed that a left-side tire had lost its cap. (WA2CWT)

☐ Maui, Hawaii — February 25. WH6ACT's sloop lost its main halyard, and he was unable to get to shore. He called for help on WR6AGD and WR6AMB. Maui ARES members responded and notified the Coast Guard. Before the Coast Guard could launch their rescue boat, however, a large sailboat came upon the disabled sloop and towed it to shore. (KH6H, EC Maui Co.)

☐ Haverstraw, New York — March 2. Members of the Rockland Repeater Association used WR2AJH to help the Red Cross relocate victims of an early morning hotel fire. (WA2ONQ)

☐ Mt. San Jacinto, California — March 6. A mountain climber became separated from his friends on the north slope. The local ARES/RACES organization set up 2-meter communications for the local sheriff's department and the Riverside Mountain Rescue Unit. After more than 19 hours, the lost climber was found

*Assistant Communications Manager, ARRL

and airlifted to a hospital. (WB6VXC)

☐ Port Louis, Mauritius — March 12. When a cyclone forced the *USS California* to leave port with only half of her crew on board, the ship radio officer used 15 meters to keep in touch with the men left on shore. (WA2LOI/mm)

☐ East Glacier, Montana — March 14. An Amtrak train derailed, injuring 50 people. Members of the Highline Amateur Radio Klub set up communications between the depot and the disaster site via WR7ALL. (W7DPK, PIO)

☐ Carribean Sea — March 22-23. Florida hams helped rescue six people aboard a vessel that had been adrift for two weeks. The ship's skipper called into the RV net on 40 meters requesting assistance, and K4ZI and W4RHD relayed the information to the Coast Guard. (W4RHD)

☐ Saskatoon, Saskatchewan — April 6. VE5BBD discovered a burning tank truck on the highway and contacted VE5IX via repeater VE5SCA. VE5IX notified the local fire department, and the tanker was saved. (VE5WM, SE Saskatchewan)

☐ Northeastern Oklahoma — April 7. A tornado struck four small communities, and local hams established a net on WA5ICW/R to handle traffic for police, the Red Cross and Civil Defense. (WB5AXH, Asst. Dir., West Gulf Div.)

☐ Rio Sedra, Panama — April 9. HP2XMJ called into the 14.313 MHz Coast Guard Net requesting medical assistance for a woman who had suffered a snakebite. Severe swelling had developed at the site of the bite, and the woman's temperature had reached 104 degrees. HI7XFH, a medical student, gave advice from his experience with snakebites, and WB5GQB contacted the Poison Control Center in Houston, Texas. WB5GQB and WA3HLP relayed medical instructions from the Poison Control Center to HP2XMJ. Meanwhile, HP1XJZ arranged for an aircraft to transport the patient to a Panama City Hospital. (WB5DWN)

☐ East Liverpool, Ohio — April 13. A substation transformer and underground power lines blew up, causing a major power outage in the downtown section of the city. The Triangle ARC provided emergency communications for the fire department through WR8AJL. (K8HGY)

☐ Boundry, Alaska — April 18. Hams provided emergency communications when an injured man needed medical evacuation from a remote construction site. (Lt. James Williams, Oregon State Police)

☐ Orange Park, Florida — May 6. WB4CGD discovered K4BT in a weakened state from loss of blood and summoned help using the Orange Park autopatch. Members of the Orange Park ARC were later credited with saving K4BT's life through their quick action. (KA4KLQ)

☐ Tompkins County, New York — March 29. The Tompkins County ARC provided 2-meter communications for the Etna White Water Canoe Races. When one canoer fell into the water and was trapped by his canoe, WA2EOW jumped in and pulled him to safety. (AF2A)

☐ Owensboro, Kentucky — May 4. Owensboro ARC members coordinated with DES, fire department and rescue squad officials investigating a possible ammonia spill. (W4OYI, Asst. Dir., Great Lakes Div.)

☐ Caribbean Sea — May 21. KA5FYI, KH6JTI and WD6FKT heard a cw SOS on 14.322 MHz. They copied information about a ship on fire and sinking fast near Costa Rica and relayed the information to the Coast Guard. (KA5FYI and WD6FKT)

☐ Tishomingo County, Mississippi — June 28. WB5MFK was cooking for the local Field Day operation when an urgent call on 2 meters interrupted him. A young woman was trapped and bleeding to death in an automobile accident. WB5MFK contacted the local sheriff via 2-meter autopatch, and the police arrived at the accident site within five minutes. (WB4CXD)

AMATEUR RADIO EMERGENCY SERVICE REPORTS

☐ Owensboro, Kentucky — October 15, 1979. When an elderly hunter with a heart condition lost his way in tough, wooded terrain, the department of emergency services contacted the local ARES group to coordinate search teams. The hams used 2-meter simplex and K4HY/R to organize the search by small groups of neighbors, rescue squads and volunteers. The hunter was found unharmed 10 hours later. (W4OYI, Asst. Dir., Great Lakes Div.)

☐ Imperial Co., California — October 15-16, 1979. In the wake of an earthquake measuring 6.6 on the Richter scale, hams handled traffic for the OES and local fire departments through W6PDA/R and WB6PMF/R. (W6JHG, EC Imperial Co.)

☐ Saline, Kansas — October 18, 1979. Tornadoes, hail and high winds struck the area, injuring 12 people. Hams activated the Primary Tornado Watch Group to help the local civil preparedness agency spot twisters and give warning to residents. They used 75 and 2 meters to keep in contact, and they handled three messages. (WDØCFZ, EC Zone 14)

☐ Marshfield, Massachusetts — October 21, 1979. A fire in the telephone exchange building knocked out all telephone service in the area. Hams used WR1AAI to back up police and fire department communications, and they directed people to special mobile telephone vans in the area. (W1XA, EC Bellingham)

☐ Little Rock, Arkansas — October 30, 1979. Local hams used 80, 40 and 2 meters to provide communications for the National Weather Service during a weather alert and flash flood warning. (WD5IRP, SEC Arkansas)

☐ Moundsville, West Virginia — November 7, 1979. Fifteen inmates escaped from prison, and hams were alerted to stand by in case the state police needed help with communications. (K8AN, SEC Ohio and WD8PQG, EC Marshall Co., West Virginia)

☐ Holland, Michigan — November 12, 1979. More than 1200 people were forced to leave their homes when a train carrying hydrogen fluoride derailed. Local and state officials began moving residents to evacuation centers at the Holland Civic Center and the National Guard Armory, and Holland ARES members set up 2-meter communications between the evacuation centers and civil defense headquarters. (WB8BZF, EC Ottowa Co.)

☐ Hugo, Oklahoma — November 12, 1979. Food poisoning affected about 300 students and teachers at the junior high school. The local hospital could not handle the load, so ARES members provided communications for the transfer of victims to other area hospitals. The hams also handled H&W inquiries from anxious parents via 75 meters and 2-meter repeaters WR5ALX, K5PS/R and WB5TTU/R. (WA5FSN, SCM Oklahoma)

☐ Salt Lake Co., Utah — November 18-26, 1979. An L-188 transport plane carrying radioactive material crashed, spreading its wreckage over a four-square-mile area. The area was sealed off, and hams supplied communications via WR7AIU for FAA, DOT and civil defense officials. Hams manned their posts for 210 hours, until the radioactive material was found. (WB7FCB, SEC Utah)

☐ Richmond, Virginia — January 5. Local ARES members provided communications and transportation for emergency medical personnel at the Medical College of Virginia after a winter storm dumped 16 to 21 inches of snow in the area. (N4NK, ASCM Virginia)

☐ Slidell, Louisiana — April 2-3. When the Pearl River went to 7.5 feet above flood level, ARES members handled traffic for the civil defense and Red Cross on 80, 40 and 2 meters. (WB5TPG, SEC LA)

☐ Glenrock, Wyoming — April 7. A 20-inch-diameter oil pipeline ruptured, sending about 340,000 gallons of oil into the North Platte River. Oil flowed down the river for 63 miles. When Environmental Protection Agency (EPA) officials responded to monitor the clean-up, they found that their communications capability was inadequate. Local ARES members provided communications for several days until EPA received supplemental equipment. (C. Alvin Yorke, Emergency Planning and Response Branch, EPA)

☐ Lee County, Alabama — April 14. After a tornado damaged 70 homes and injured 13 people, the Lee County Civil Defense called on ARES to help with communications. Using K4RY/R, the hams reported damage to the EOC. (W4KCT, EC Lee County)

☐ Tampa Bay, Florida — May 9. ARES members were called in to provide communications assistance for the Red Cross and the Salvation Army when a ship struck the Skyway Bridge. Hams provided a link between the disaster scene and Red Cross and Salvation Army headquarters via 2-meter simplex and W4TAS/R. (N4BKD and K4DYB, EC Manatee County)

☐ Central Oklahoma — May 11. Tornadoes and high winds struck two small towns in the area. ARES members set out to investigate, and they relayed information to the Red Cross in Oklahoma City via 2 meters. (KB5BS, EC Oklahoma County)

☐ North Central Missouri — May 12-13. Three major storms and a tornado swept through the area, causing heavy damage. The Missouri Sideband Net held emergency sessions handling H&W traffic, and the ARES monitored the weather situation using 2 meters. (WBØSPT)

☐ Licking County, Ohio — June 1. A tornado hit the small village of Croton, knocking out utilities and causing property damage. ARES members were called into service to provide communications among the civil defense director, the Red Cross and the fire department. (K8WIX)

☐ Danville, Illinois — June 3-10. ARES and RACES members provided communications via K9PD/R and 2-meter simplex during the search for the victim of a boating accident. (WB9YIF, EC Vermillion Co.)

ARRL SECTION EMERGENCY COORDINATOR REPORTS

☐ For July, 29 SEC reports were received, denoting a total ARES membership of 13,418. Sections reporting were Ala, Ariz, Colo, Del, Ill, Ind, Iowa, La, Me, Mar/NFld, Mich, Minn, Mo, Mont, Nev, NC, NFla, Ohio, Ont, Org, SV, SDgo, SJV, SCV, SFla, VA, WVa, WMass, Wis.

COMMUNICATIONS SERVICE OF THE MONTH

On February 16-18, a series of storms brought exceptionally heavy rains to Ventura County, California, causing flooding of low-lying areas. The flood waters cut off highways and roads, stranded motorists in their cars and forced the evacuation of homes in Ventura, Sant Paula, Fillmore, Oxnard and Ojai.

Amateurs provided communications for Red Cross shelters and conducted damage surveys. The survey information resulted in a federal disaster declaration. The Red Cross Chapter House and ARES Communications Center in Ventura had to be evacuated by all except ARES members and police officials when the catch basin above the dam threated to overflow.

AG6A provided the only communications for eight families cut off in the Malibu Canyon area. He saw a neighbor's house float past, reported two fatalities and relayed information which resulted in the Los Angeles Sheriff's Office saving the life of a seven-year-old girl trapped in a car in flood waters.

In all, more than 50 local hams handled 200 pieces of traffic for the Red Cross and the Ventura County Office of Disaster Services via WR6AOX and WA6VNV/R. — *W6RIC, EC Ventura County*

REPEATER LOG

According to reports received between July 21 and August 21, the following repeaters and simplex frequencies were involved in the delineated public service events.

	Weather Emergency	Criminal Activity	Medical Emergency	Vehicular Emergency	Search and Rescue	Fire	Public Safety Events	Drills/Alerts	Power Failures	Total
N2MD							1			1
K3PSP							2			2
K4FKJ	1									1
K4HY	1						1			2
W4OAU							1			1
W4ULH	1									1
W4URG							1			1
WC4ABD	1									1
WR4AGD	1									1
WR4AUE	1									1
N5AAY	1									1
N5DD					1					1
WA5FYI					1					1
WA5KZA				1			1			2
WR5ABA					3					3
WR5ABE					1					1
WR5ABI					5					5
WR5ABY					8					8
WR5APK					1					1
WR5AOQ							1			1
WA6YXV							1			1
WR6AEN			1		25					26
WR6ACB									1	1
WR6AZO						1				1
K7CC				2	24	2	1		3	32
WR7AEL	1									1
KB8KG	1								1	2
WB8UIN			1							1
WR8ABI	7									7
K9PQP	1									1
K9XA	1									1
W9LFH					4	1				5
WBØSBH	2						1			3
WRØAFT	3						1			4
WRØAPG			1							1
WRØAPJ						1				1
VE1LCR							1			1
VE3MOT							1			1
VE3TOR							1			1
VE3TTY							1			1
VE5KE					1					1
Simplex	2						1	13		16
Total	25		3	3	74	4	3	28	0 5	145

NATIONAL TRAFFIC SYSTEM

Liaison between evening and daytime sessions of RN7 really working well, reports W7VSE. The "bi-modal" gang is hanging in there seven days a week! RN7 will miss KL7P and KL7Q who have relocated to Florida; they did the lion's share of the liaison work to Alaska. W2RQ thanks W2ZOJ, WB2IQJ, WB2TDN, KB2HM and WA2KOJ for their extra efforts on 2RN-D. Central Area Staff met in Oklahoma City in late July; summary forthcoming. Eastern Area Staff met informally at the 2RN picnic at W2MTA's. CAN-E certificates (maximum annual — 10): W9DND (10), WØSS (9), W5GHP (8), K5GM (8), K5RG (7), W9EI (6), N9TN (5), WB5FHA (4), W9FC (4), KØEZ (4), N4MD (3), WØOTF (3), W9TG (2), KØEVH (2), AA5J (1), K5OAF (1), N5RB (1), AF4T (1), WB9JSR (1), WB9UYU (1), AEØR (1), WBØSND (1), NØSM (1), WDØACG (1); new certificates to WDØBEV and KAØX. 2RN-E annuals to W2MTA (12), W2RQ (11), W2HR (10), W2TZ (10), W2ZEP (9), N2IC (7), WA2ICB (7), W2BIW (6), W2SQ (6), WA2ELD (6), K2UF (5), N2YL (5), WA2CJY (5), WA2ZJP (5), K2VX (4), K2PL (4), W2CQB (4), W2WSS (4), WB2EUF (4), WB2QIX (4), K2HD (3), N2EF (3), WA2SPL (3), WB2BNY (3), K2GCE (2), K2PH (2), K2LIE (2), W2UEZ (2), W2XD (2), WA2MFV (2), WA2CUW (2), WB2ZCM (2), WB2RMI (2), W2AHV (1), N2APB (1).

July Reports

Area Nets

1	2	3	4	5	6	7
EAN	62	2595	41.9	.950	93.0	
CAN	93	1464	15.7	.387	98.9	
PAN	62	1836	29.6	.678	97.5	
Region Nets						
1RN	103	666	6.5	.405	69.1	87.1
2RN	142	866	6.1	.420	85.6	91.9
3RN	92	575	6.3	.349	92.0	91.9
4RN	122	1194	9.8	.359	86.5	93.5
RN5	89	851	9.6	.339	87.2	100.0
RN6	124	1271	10.3	.362	87.5	98.4
RN7	124	1277	10.3	.873	100.0	98.4
8RN	110	692	6.3	.383	80.5	93.8
9RN	152	971	6.4	.367	98.0	97.6
TEN	91	374	4.1	.163	62.2	99.2
ECN						
TWN	93	531	5.7	.265	91.2	91.9
TCC						
TCC Eastern	195[1]	880				
TCC Central	140[1]	602				
TCC Pacific	99[1]	783				
Sections[2]	6877	27,644	4.0			
Summary	6336	45,072	5.4			
Record	5724	38,704	15.2			

[1]TCC functions not counted as net sessions.
[2]Section and local nets reporting (214): ABN AKSN (AK), AENB AEND AENJ AENS (AL), APN ARN OZK (AR), ATEN HARC SWN (AZ), NCN NCTN SBARES SCN (CA), HNN (CO), CN CPN NUTMEG RASON WESCON (CT), DEPN DTN (DE), BEN FAST FMTN FPON FPTN GCTN GN MEN NFPN PBTN PEN QFN QFNS SPARC SWFTN TPTN (FL), CGVN CVEN GARESN GCN GERN GSN GSSBN GTFCN (GA), I75MN TLCN (IA), IMN MTN (ID/MT), ILN (IL), ICN ITN QIN (IN), KPN KSBN QKS (KS), 4DARES 5DARES BARES KNTN KRN KTN KYN MKPN SEKEN (KY), LAN LRN LSN (LA), EM2MN EMRI EMRIPN EMRISS HHTN NEEPN WMPN WMN (MA/RI), MEPN MMN MTN WRIN (MB), MDD MEPN (MDC), AEN CMEN MPSN MSN PTN SGN SPSN (ME), MACS MITN MNN QMN UPN (MI), MSN MSPN (MN), ACE MEOW MON (MO), MTN (MS), CMN CNCTN JFK M2MEN NCSSBN PCTN RARS2MN THEN (NC), CN CNN (NC/SC), DATA (ND), NCHN NMPN NSN PVTN WNN (NE), GSFM (NH), JSARS MCN NJN NJPN NJSN NJVN OBTTN UGETN (NJ), NMRRN SWN (NM), NSN (NV), BAVTN CDN CNYTN HVN NLI NLIP NLIVHF NYPON NYS OCTEN SDN STAR WDN (NY), BN BNR BRTN O6MN ONN OSN OSSBN TSRAC (OH), OAN OFON OLZ ONON OTWN (OK), CMN LN NBN OLN OPN OSN (ON), 16/76 AREST BSN JARES OSN PDXARES PTTN SOFM (OR), EPA EPAEPTN LVN NCARES NWPATMTN PTTN WPA WPA2MTN WPAPTN (PA), WQV/UHF (PQ), SCSSBN (SC), NJQ SDEN SDMN SDN TSEWN (SD), PWXN RARA SATN SPN (SK), TN TNVHF TPN TSN (TN), TEX TSN TTN (TX), BUN UCN (UT), VLN VN VNTN VSBN VSN (VA), WSN (WA), WINS (WE/IN), BEN BWN NWTN WIN WSBN (WI).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVERAGE
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

Transcontinental Corps

1	2	3	4	5
TCC Eastern	217	89.9	2187	880
TCC Central	155	90.3	974	602
TCC Pacific	93	89.3	1721	1167
Summary	465	89.8	4638	2649

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (July): Eastern Area (N2YL/W4SQQ, Directors) — W1s KX NJM OD QYY XX, WA1ZAZ, K1s BA EIR GN SSH XA, W2s CQB CS EFU FR GKZ MTA RQ ZOJ, K2s NY PL, N2YL, WA2s ICB MFV SPL SYR, AJ3R, W3s FAF PQ, WA3WQP, WB3GZU, K3s KW NGN, N3SJ, W4s JK MEE SQQ UQ, WA4CCK, WB4PNY, K4s BKX KNP, N4s KB NK, KB4N, KB6FR/3, W8PMJ, WB8WTS, K8s AAZ KMQ OZ, KC8C, VE3s CWA GOL JIR SB. Central Area (W5GHP/W9JUJ, Directors) — W4s OGG ZJY, WD4HIF, N4MD, W5s KLV RB SBE, WB5s NKC NKD YDD, WD5HHK, KA5s AZK BSN, K5s AJM GM KJN PE, N5s RB TC, W9s CXY DND HOT JUJ NXG, N9TN, WB9WGD, WD9FDB, WØs AM HI, WAØTNM, KØCW. Pacific Area (W5KH, Director) — N5NG, W5KH, N6s GW PZ, W6s EOT OA SX VZT YBV, WB6PVH, W7s DZX EP GHT LYA VSE, K7s HLR MC, WA7GYQ, KØBN, VE7ZK.

Independent Nets (July 1980)

1	2	3	4
Amateur Radio Telegraph Society	31	1028	342
Central Gulf Coast Hurricane	31	119	1915
Clearing House	31	122	483
Early Bird	31	714	344
Empire Slow Speed	29	73	297
Hit and Bounce	31	312	487
Hit and Bounce Slow	31	95	268
IMRA	27	490	1237
Mission Trail	31	340	1319
New England Novice	31	115	252
New England Teleprinter	13	110	59
North American SSB Traffic	19	40	112
Piconet All Day Watch	129	272	2348
West Coast Slow Speed	31	149	344
20-Meter ISSB	27	368	463
75-Meter ISSB	31	481	928
7290 Traffic	48	605	2648

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll July 1980

This listing is available to amateurs whose public service performance during the month indicated qualities for 60 or more total points in the following nine categories (as reported to their SCM). Please note maximum points for each category: (1) Checking into cw nets, 1 point each, max. 30; (2) Checking into phone/RTTY nets, 1 point each, max. 30; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned NTS liaison, 3 points each, max. 12; (6) Delivering a formal message to a third party, 1 point each, no max.; (7) Handling an emergency message, 5 points each, no max.; (8) Serving as emergency coordinator or net manager for the entire month, 5 points, max. 5; (9) Participating in a public service event, 5 points, max. 5. This listing is available to Novices and Technicians who achieve a total of 40 or more points.

622
KA9CPA
170
WB7WOW
157
WDØBQG
142
W7VSE
141
WB3GZU
139
WA4PFK
131
WA7MEL
WD8KZX
WD8LRT
WA4CNY
127
W1GUX
126
KB2HM
W2ZOJ
125
WD4HIF
123
KY4K
KZ4K
121
N2APB
118
W9JUJ
WB2PJU
117
AF2L
KB3DT
WA2SPL
115
KA1BJY
WB2IQJ
114
W2XD
WA2MFV
WB5MMI
113
W4MEE
WA2MVQ
WA3NAZ
WB5YDD
112
WB4FVV
111
KA8CPS
W5KLV
WA2UWA
WA3PXA
WD4AWN
110
AA2H
AG2R
N3AIU
WB8YRY
109
WØOYH
108
N6AWN
WA4JDH
WA5RVT
WD8NYN
107
VE3GOL
106
W2UEZ
WA4STO
WA6LVO
105
AJ3R
K7GXZ
N4ET
WB2TQC
104
K2GCE
KB7JW
WB5NKC
103
WA2ZJP
WB4VVL
102
W6NTN
W7GHT
WA1TBY
WA4CCK
WD5EUE
101
KB5TC
N4CCT
VE1WF
WB2ZCM
100
VE3ATU
WA4SRD
99
K2VX
K3JL
K4DZM
W2SQ
98
KA1EO
KA2CEF
97
W1RWG
96
KA2CTU
KB5EK
WD8DTG
WD9IUX
95
K3JSZ
KB4OZ
W5HMR
WB1DXR
94
AF8V
K8OZ
KA1BTU
KA4LNA
WB2BNY
WB8YDZ
93
W1TN
92
K1BSO
KA4GFU
N5BT
WB6PVH
91
KG5L
VE3KK
W2AET
W4JK
WAØTNM
WA2AFE
WA3WIY
90
KA1FE
VE3DPO
W4CKS
WDØBQG
89
KØPIZ
N5TC
W9DM
WA3WQP
WB3FEH
WB4NCH
88
VE5WM
W8VPW
87
AA35
W7FJZ
W9NXG
86
AA4WJ
KE8X
N3EE
WB8MTD
85
AFØO
KB3LF
N4PL
W5VMP
W6JXK
WD9BCM
84
K4EV
KB2GT
N8ABA
W4GPL
W7LNE
WB9WGD
WD5DQR
82
VE3HTL
WA2CUW
WB8YTD
WD4CNQ
81
W6RE
WB3CAI
80
WØFT
WD4COL
79
W3EGJ
WB6QBZ
WD4CNR
77
AE5I
K6YD
KF2T
WD9DVA
76
N2BKK
WA2KOJ
WB1BYR
75
AI6E
N2CR
N3AKC
N4AXN
W5JOV
WA4EYU
74
N6RD
WA2EQW
WB1ANT
WB4WYG
73
K7JV
WØOTF
W1EOF
WA1IOG
WA5QFD
72
AA5J
KA6A
N6GW
W2YJR
W9XD
71
K9BVE
KA6LSC
W2TCA
W7EP
WA7IHS
WD5JYI
70
K6INK
KA5AVQ
W5CTZ
WA8GMT
WB3JYZ
WB8WTS
69
K9PNG
KA1DEU
VE3DUK
WA1MJE
WB5PIL
68
N8CW
WB3GUR
WB4APC
67
AK5N
KA1KD
KB9IT
N4AZI
W4FMN
W8GGX
WB1CPF
66
KB4N
KB6FC
KCØT
N4WA
VE3JLL
WØHZU
WD8KBW
65
AA3B
AG9G
N5RB
N6WP
VE3GT
VE5AE
WØOUD
W5VMY
W9HOT
WB5CIT
WB7TQF
64
K4VHT
K5QEW
KA4BBA
KA7AOB
KCØZ
N2BDW/T
N6ANL
W1BJ
WB2PKG
WB2IDP
63
W2MTA
W8UE
WBØHOX
WD4CFZ/T
WD8DYW
W4ZJY
62
KB4OW
KB6OT
N4LE
N9AUG
W5BGE
WAØTFC
61
KA1KP
KB5NX
KB5UL
W9JIJ
WA4LJI
WB3GZV
WB5NKD
WD5IDB
60
KØJCF
W1TM
W4NQL
WB9JSR
58
KA2DBW/T
52
KA1CMX/N
WA2WUL/T
WD8BHE/N
51
KA1CGP/I
49
WD5EAE/N
47
WD8ILX/T
46
KA2GTE/T
45
WB1EZT/T
WB2RMJ/T
WB7CFH/T
43
KA4IKH/N
WD8PMW/T
41
N2BGR/T

Brass Pounders League July 1980

BPL Medallions (see April 1979 *QST*, page 77) has been awarded to the following amateur since last month's listing: W6DXL.

The BPL is open to all amateurs in the United States, Canada and U.S. possessions who report to their SCM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

1	2	3	4	5	6
W3CUL	640	936	1299	49	2924
NØBQP	0	1005	239	505	1749
KA9CPA	47	772	128	568	1515
WØWYX	40	736	283	453	1512
WAØHJZ	30	662	16	469	1177
WA4JDH	2	566	533	7	1108
W9JUJ	3	507	506	12	1028
WB5NKC	93	334	519	20	966
WA3WQP	3	451	463	0	917
W6NL	4	444	439	9	896
WB7WOW	58	278	342	69	747
W5KLV	2	387	306	25	720
W7VSE	17	373	289	41	720
W3VR	206	217	271	10	704
W7DZX	24	323	324	4	675
W4MEE	7	320	295	24	646
VE3CWA	61	244	299	34	638
WAØAUX	77	248	306	3	634
KB7JW	107	211	267	15	600
WB3GZU	76	220	256	40	592
N6ANL	8	280	288	0	576
WA2SPL	101	199	252	21	573
K4TH	14	254	179	115	562
W2ZOJ	7	280	247	25	559
WA4STO	118	166	275	0	559
KØONK	1	412	114	15	542
KA7AOB	107	171	256	6	540
VE3ATU	18	248	234	29	529
VE3GOL	9	242	269	5	525
W6JXK	31	247	236	11	525
W4JK	0	246	274	2	522
WA4PFK	14	245	204	38	502
WA4BZY (June)	496	34	504	10	1044

BPL for 100 or more originations plus deliveries:

WA2MVQ	191	N2MA	113
WØFQB	166	WB6EIG	110
W4LX	140	K7NTS	107
N4AET	116	WA2MFU	105
WØFIR	114	KA6LSC	101

Multioperator stations:

W6LFJ	476	WA6WZO	215

Contest Corral

A Roundup of Upcoming Operating Events

Conducted By Tom Frenaye,* K1KI

OCTOBER

4-5

VK/ZL/Oceania DX Contest, phone, Sept. *QST*, page 84.
California QSO Party, Sept. *QST*, page 84.

7

W1AW Qualifying Run, 10-35 wpm at 0200Z Oct. 8 (10 P.M. EDT Oct. 7). Transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 147.555 MHz. Underline one minute of the highest speed you copied, certify that your copy was made without aid and send to ARRL for grading. Please enclose your full name, call (if any) and complete mailing address. A large self-addressed envelope will help expedite your award/endorsement. The complete W1AW schedule appears in the "Operating News" column of this issue and is available for an s.a.s.e. to ARRL.

11-12

ARRL CD Party, for Communications Department appointees and ARRL Officials. Details in the Fall issue of *QCD*.
VK/ZL/Oceania DX Contest, cw, Sept. *QST*, page 84.
RSGB 21/28 MHz Contest, phone, Sept. *QST*, page 84.
9-Land QSO Party, sponsored by Ill Wind Contesters, from 1800Z Oct. 11 until 2359Z Oct. 12. Operate no more than 24 hours. Work Indiana, Illinois and Wisconsin stations. 9-land stations exchange signal report, county and state. Others exchange signal report, state/province/country. The same station may be worked once per band per mode. Stations changing counties may also be worked again. 9-land stations count two points per QSO, multiply by the sum of states, provinces, countries and 9-land counties. Others count two points per 9-land QSO, multiply by 9-land counties worked for final score. Suggested frequencies — cw: 1805 and up 60 kHz from the low end; phone: 1815 3895 7230 14,280 21,355 28,600 vhf; Novice: 3725 7125 21,125 28,125. Send results with a large s.a.s.e. to Ill Wind Contesters, c/o John Sikora, WB9IWN, 8155 Woodlawn St., Munster, IN 46321.
Montana QSO Party, sponsored by Gallatin Ham Radio Club, from 1800Z Oct. 11 until 2300Z Oct. 12, with a rest period from 0500 to 1400Z Oct. 12. The same station may be worked on each band each mode. Exchange signal report and state/province/country (county for MT stations). Count three points per QSO. MT stations multiply QSO points by sum of MT counties, states, provinces and countries worked for final score. Others multiply QSO points by MT counties worked (max. 56) for final score. Suggested frequencies — cw: 1810 and 55 kHz from the low end; phone: 1820 3935 7235 14,280 21,380 28,575; Novice: 3730 7130 21,130 28,130. Plaques to the highest MT and non-MT stations. S.a.s.e. for results. Mail by Nov. 15 to Gene P. Shea, KB7Q, Gallatin Ham Radio Club, 417 Staudaher St., Bozeman, MT 59715.

15-16

YL Anniversary Party, Sept. *QST*, page 84.

18-19

QRP International QSO Party, sponsored by QRP ARC International, from 2000Z Oct. 18 until 0200Z Oct. 20. QRP ARCI members exchange signal report, state/province/country and QRP number. Others exchange power input instead of QRP number. Work stations once per band for QSO and multiplier credit. Count two points for nonmember QSOs, three points for members and four points for non-W/VE QSOs. Multiply QSO points by the sum of states, provinces and countries per band. Multiply that total by the power multiplier (× 10 if one watt or less input, × 6 if 1.1 to 3 watts, × 4 if 3.1 to 10 watts, × 2 if 10.1 to 30 watts, × 1.5 if 30.1 to 100 watts) for final score. Add 300 bonus points if all QSOs made with solar or wind power source (100%), *or* add 100 points for 100% battery power. Suggested frequencies — cw: 1810 up 60 kHz from the low end and 50,360; phone: 1810 3985 7285 14,285 21,385 28,885 50,385; Novice: 3710 7110 21,110 28,110. Full log info, including power used and bonus proof, must be received by Nov. 20. Send a large s.a.s.e. to QRP ARCI Contest Chairman, Edwin R. Lappi, WD4LOO, 203 Lynn Dr., Carrboro, NC 27510.
WA-Y2 Contest, sponsored by the Radioclub of the German Democratic Republic, from 1500Z Oct. 15 until 1500Z Oct. 16. Phone and cw, single or multioperator. 80-10 meters. Do not use first 10 and last 25 kHz of 3.5 and 14 MHz. Y2-9 stations send signal report and two-digit number indicating "Kreiskenner." Others send signal report and serial number. Score three points per Y QSO. Multiply by sum of different districts worked on each band (phone and cw separate). Maximum of 15 per band. Districts are indicated by the last letter of the call sign (letters A through O). Include statement (signed and dated) that all contest and licensing rules were followed. Awards. Mail before Nov. 20 to Y2-Contest-Bureau, RKDDR, Hosemannstr.14, DDR 1055 Berlin, German Democratic Republic.
Jamboree-on-the-Air, sponsored by the World Scout Bureau and the Boy Scouts of America. Look for activity all weekend on cw (3590 7030 14,070 21,140 28,190) and ssb (3740 3940 7090 14,290 21,360 28,990).
AC-DC Contest, sponsored by Canadian Ladies ARA from 1800Z Oct. 18 until 1800Z Oct. 19. Open to both YL and OM amateurs. Each station may be worked twice, either once on cw and once on phone or on two different bands. Exchange signal report, QTH and name. Non-CLARA members count one point per YL QSO (three points if a bonus station). CLARA members count one point per QSO, YL or OM, (three per bonus stations). Multiply by number of Canadian provinces/territories worked for final score. Suggested frequencies: phone: 3775 3900 7200 14,160 14,280 21,300; cw: 3690 7035 14,035 21,035. Mail entries by Dec. 31 to Diana VanderZande, VE7DTO, SS 3 Jansen Rd., Prince George, BC V2N 2S7, Canada.

19

High Speed Code Test, sponsored by the Connecticut Wireless Association, at 0115Z Oct. 20 (Sunday evening). Call-up begins at 0115Z, at 0130Z complete instructions will be sent, and at 0150Z the first transmission will begin at 40 wpm. Subsequent transmissions at 45, 50, 55 and 60 wpm will begin exactly at 0200Z, 0210Z, 0220Z and 0230Z, respectively. Five minutes of plain English text will be sent at each speed; if you copy one minute consecutively solid at any speed you can qualify for a certificate. W1NJM will transmit simultaneously on 3636 and 7085 kHz. A West Coast station may also be active on 3690 and 7025 kHz. Watch the semiweekly W1NJM code practice sessions (Sunday and Wednesday, same time and frequency as above for more information and practice). Mail to George Hart, W1NJM, 66 Highland St., Newington, CT 06111.

25-26

CQ World Wide DX Contest, phone, sponsored by *CQ Magazine*. 48-hour period UTC. 160 through 10 meters. Single op both single band and multiband, multiop (all-band operation only) with single transmitter and multitransmitter. Multi-single: only one transmitter and one band permitted during a 10 minute period. Exception — *one* other band may be used during the same period for working multipliers only. Exchange report plus CQ zone. A station in a call area different than that indicated by its call sign is required to sign portable. A multiplier of one for each different zone on each band and a multiplier of one for each different country contacted on each band. You may work your own country and zone for multiplier credit. CQ Zone Map, ARRL DXCC list, WAE country list and IARU WAC boundaries are standards. Contacts between stations on different continents are worth three points, between stations on the same continent but in different countries one point. Note: For North Americans only contacts between stations within the N.A. boundaries count two points. Contacts between stations in the same country are permitted for zone or country multiplier credit but have zero point value. Final score is the result of multiplying total QSO points by the sum of your zone and country multiplier. Single ops must show a minimum of 12 hours of operation to qualify for an award, multiops a minimum of 24 hours. A single-band log is eligible for a single-band award only. All transmitters must be within a 500-meter diameter circle or within limits of licensee address; transmitters must be directly connected to the antennas by wire. All entrants are required to submit cross-check sheets for each band on which 200 or more QSOs are made. All entrants are encouraged to do likewise. Each dupe found by the committee will result in a penalty of three additional contacts being removed. Logs, summary and zone maps available from CQ, send a large s.a.s.e. with sufficient postage. Original logs must be sent — recopies must be accompanied by photocopy of originals. Postmark entries no later than Dec. 1 for the phone section and Jan. 15 for the cw section (cw event scheduled for Nov. 29-30). Logs go to CQWW Contest Committee, 76 N. Broadway, Hicksville, NY 11801.

26

W1AW Qualifying Run, 10-35 wpm at 2400Z (7 P.M. EST). See Oct. 7 listing for more details.

NOVEMBER

1-2

ARRL Sweepstakes, cw, this issue, page 75.

5

West Coast Qualifying Run (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0500Z Nov. 6 (9 P.M. PST Nov. 5). Frequencies are approximately 3590/7090. See Oct. 7 listing for more details.

8-9

European DX Contest (WAE), RTTY, July *QST*, page 78.
Foreign Service Net QSO Party, sponsored by the Department of State ARC, from 2000Z Nov. 8 until 2400Z Nov. 9. Work members and affiliates of the US DOS ARC and Foreign Service Net in over 80 countries. 20-15-10 meters only. Exchange signal report and serial number. Foreign service stations will identify with "FS." U.S. stations also send their state (or DC for District of Columbia). Work stations once on each band/mode. Count 10 points for QSO with W3DOS (club station), three points for Foreign Service QSOs outside the U.S., two points for QSOs with FS stations in the U.S., and one point for all other QSOs. Multiply QSO points by total of countries and states (plus DC) worked on all bands. Suggested frequencies — phone: 14,316 21,416 28,616 (FS Net freqs.); cw: 14,050 21,050 28,050. S.a.s.e. for results. Mail by Dec. 15 to DOSARC, W3DOS, c/o VO, SA-2, Department of State, Washington, DC 20520.

*Assistant Communications Manager, ARRL

International Police Association Contest, sponsored by the IPARC British Section, from 0700-1000Z and 1400-1800Z on both Nov. 8 and 9. Non-IPA members work IPA stations only. Exchange signal report and serial number, IPA members send "IPA." Count two points per QSO on 80 and 40 meters, except eight points for DX QSOs. Count four points per QSO on 20-15-10. Multiply QSO points by sum of IPA states/countries for final score. Suggested frequencies — phone: 3650 3775-3800 7075 14,295 21,295 28,650; cw: 3575 7025 14,075 21,075 28,075. Mail entry by Dec. 31 to Richard A. Ridley, G3UTX, 23 Greenacre, Worlebury, Weston-Sup-Mare, BS22 9SL, Great Britain.

OK-DX Contest, sponsored by Central Radio Club, for 24 hours UTC on Nov. 9. (1980 rules not received, assumed to be the same as last year.) Phone and cw, 160-10 meters. Exchange signal report and ITU zone. One point per QSO, except OK QSOs count three points. Contacts with your own country count for multiplier only. Multiply QSO points by sum of ITU zones worked on each band. Categories: Single operator, all bands; single operator, single band; multioperator. Separate logs for each band. Usual declaration. Awards. Mail by Dec. 31 to Central Radio Club, P. O. Box 69, Praha 1, Czechoslovakia.

Delaware QSO Party, sponsored by Delaware ARC, from 1700Z Nov. 8 until 2300Z Nov. 9. Exchange signal report, serial number and ARRL section/country (county for DE stations). DE stations count one point per QSO, multiply by sum of sections plus countries worked for final score. Others count five points per DE QSO, multiply by sum of DE counties worked on each band, each mode. Suggested frequencies — phone: 1815 3975-7275 14,325 21,425 28,650; cw: 1805 and 60 kHz from low end; Novice: 3710 7120 21,120 28,120. WDEL certificate for working all three counties (address label and 30 cents in stamps). Mail entry with s.a.s.e. by Dec. 15 to Charlie Sculley, AE3H, 103 E. Van Buren Ave., New Castle, DE 19720.

12

W1AW Qualifying Run. 10-35 wpm at 0300Z Nov. 13 (10 P.M. EST Nov. 12). See Oct. 7 listing for more details.

15

ARRL Frequency Measuring Test

15-16

ARRL November Sweepstakes, phone, this issue, page 75.

22

ARRL Midnight Special

29-30

CQ WW DX Contest, cw

DECEMBER

6-7

ARRL 160 Meter Contest

13-14

ARRL 10 Meter Contest

Standard Contest Guidelines

1) Make sure your log details the date, time, band, call sign and complete exchange sent and received, for each QSO claimed for the contest credit.

2) Your summary sheet should indicate your score, including how you figured it, and a declaration that you followed FCC/DOC regulations and the contest rules. Your name, call sign and complete address should be typed or printed in block letters.

3) Crossband, crossmode and repeater contacts are usually not permitted. Contacts with the same station on different bands are usually permitted.

4) Your log should be checked carefully for duplicate QSOs and, if more than 200 QSOs are made, dupe sheets should be included with your entry.

5) Your log may be considered a checklog or disqualified if it is incomplete or if too many errors are detected by the contest committee.

6) Avoid standard net frequencies.

7) International contests generally offer awards to top scorers from each U.S. call area and each country; state QSO parties to each state/province.

8) Your summary sheet should include the following statement: "I have observed all competition rules as well as all regulations established for Amateur Radio in my country." The declaration should be signed and dated. QST

Club Corner

Conducted By Sally O'Dell,* AE8P

Q & A ON YOUR CLUB GOBLIN PATROL

Have you ever heard of a Goblin Patrol? Have you ever participated in one? What are the possibilities of your club taking responsibility for a Goblin Patrol? Now is the time to start planning the one that your club is going to sponsor this Halloween. Here are some of the questions you might already be asking yourself.

1) *What is a Goblin Patrol?* Unfortunately, every year around Halloween, some "kids" overstep the bounds of good reason and cause trouble. The trouble could range from mischief (malicious or otherwise) to something more serious. Many amateurs organize themselves into a group that patrols the community, particularly those areas that might present more trouble than another, and watch for the mischievous or those children in need of help.

2) *How is a Goblin Patrol organized?* First, your president appoints a "Goblin Coordinator." Then, *everyone* in the club volunteers to participate (or assist) in the patrol. The coordinator assigns teams of two to each car and clearly defines the "rules of the game." Each team will be ready to roll on Halloween night.

3) *Where do the police come into the picture?* Your Goblin coordinator should contact the local police or sheriff's office as soon as he/she is appointed. The coordinator can then explain the club's willingness to assist on Halloween night and the steps the club is taking. Be prepared to present the following information: (a) the number of people who will volunteer their time and cars, (b) the fact that the local club is willing to set up a base station at the police station (with approval) giving the operators and therefore the police, direct communications around the area, and (c) that your people are well trained and self-disciplined operators who know the limits of their authority.

4) *What bands will you be using?* All cars in the group should use the same frequency for communications. Usually, a 2-meter repeater is used because it is available; but 6 meters, 10 meters or even the low bands can be used if enough of the group are equipped to operate mobile. Keep the chitchat off the primary frequency and use simplex for the wisecracks. Make the official channel as "professional" as possible.

5) *Do I get to play policeman and wear a police hat?* No Way! We, as hams, are *not* law officers and do not take the law (or any weapons for that matter) into our own hands. We have no police authority, nor should we seek it. What we do have is eyes and ears, *and* mobile communications. After you call in a report, move away and stay away until the police apprehend the suspect. The purpose for this patrol is to inform, not enforce.

On a recent Halloween eve, Steve, WB1EYI, and his Explorer Scout partner were driving around trying to spot any disturbances before they became a problem. As they passed a ladies clothing store which was locked for the night, they noticed someone moving around. They stopped the car and were looking in when they realized the person inside had a gun. They immediately drove far enough away that they could observe, but get away fast if they needed to. Then Steve called his base station located at police headquarters. The police cruiser arrived shortly and all problems were solved. When the man with the gun was questioned, it turned out that he owned the store and was protecting it from vandals. But why take chances? If this man had not been the owner . . . well, we don't need to print the consequences here.

6) *Where will the patrol take place?* The patrol should cover your home area as well as it can using all the available people. A map of the area will help you divide the city into sections, or neighborhoods. Then, assign each car to a well-defined neighborhood knowing that you'll be able to locate a particular car because you know what area it is in.

7) *How long will our club be patrolling?* As long as you wish. Some clubs operate from 5 to 11 P.M. If this is too long for your crew (and it can be tiring), stop at a local hamburger joint for a coffee or shake. Plan an after-patrol party where *all* participants share their war stories from the evening and relax.

8) *How much public relations is necessary?* The police will probably want to tell as many people as possible that they will be receiving additional assistance from Amateur Radio operators. When Halloween is over, plan on an interview with the police chief. This is the type of PR that you can submit to the newspaper and both groups will benefit from the exposure.

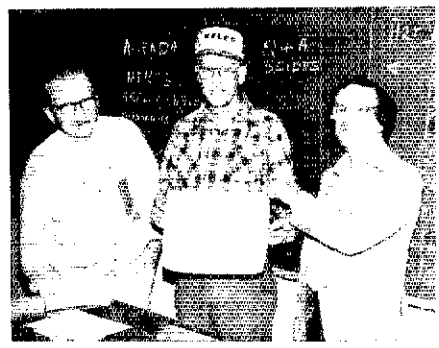
9) *Who will decide on partners?* Your Goblin coordinator can assign partners, or you can draw straws. One idea might be to pair each driving adult with a Scout from the local Explorer Post as the Tompkins County (New York) ARC does.

After you decide to sponsor a Goblin patrol, take the following steps: (a) appoint your coordinator, (b) poll your members to determine who and how many will participate, (c) contact the police, and (d) determine operating frequencies.

You can show the local law enforcement agencies that Amateur Radio operators are well-organized, dedicated volunteers. Go out now, catch those "goblins" and Happy Halloween. QST

*Club Program Manager, ARRL

Strays



Michigan QRP Club Chairman Ralph Burch, W8LCU (center), receives an ARRL Charter of Affiliation from Great Lakes Division Director Leonard Nathanson, W8RC (right), as Michigan SCM James Seeley, WB8MTD, looks on.

MORE REHAB RADIO

☐ Paul Geiger, N2BJB, of Katonah, New York, is working on a most worthwhile Boy Scout Eagle project. Paul is setting up an Amateur Radio station in the Burke Rehabilitation Center, White Plains, New York. This station will be used like the one featured in the September 1979 *QST* article, "Rehab Radio," and also shown in the League's film, "The World of Amateur Radio." Can you help Paul with donations or equipment? Contact Paul at P. O. Box 154, Katonah, NY 10536. Checks can be made payable to Boy Scout Troop 166.

HEAVY HITTER MAKES GOOD

☐ Dave Jollymore, WA1RWO, a member of the Heavy Hitters Traffic Net of eastern Massachusetts, received his Bachelor's degree in History from Northeastern University (NU) in Boston last month. Active in the ARRL National Traffic System, Dave spent a large amount of his free time operating at W1KBN, the NU club station. Dave, who is sightless, is a former member of the legendary New Ham Band (a defunct musical collaboration of the highest mediocrity made up of Boston-area hams). Dave has perfect pitch and enjoys cw, which he sends with his unique two-key system. Good luck, Dave. (Why do you think they call them Heavy Hitters, anyway?) — *Rick Palm, K1CE*

Section Activities

A-1 OPR ✗ EC ✗ DXCC ✗ RCC ✗ WAS ✗ STM ✗ OES ✗ OTS ✗ NM
SCM ✗ ARES ✗ OVS ✗ SEC ✗ OBS ✗ TCC ✗ OO ✗ NTS ✗ WAC ✗ CP ✗

CANADIAN DIVISION

ALBERTA: SCM, E. Roy Ellis, VE6XC — SEC: VE6XC, NMs: (APSM) VE6AFO (ATN) VE6ABC, VE6HO answered an emergency call on 2-M from VE6JI to learn the town of Barons was cut off completely by telephone — a call to telephone company in Lethbridge did the trick. Congrats to VE6ASL and the Border Club for their work putting on the Waterton Hamfest. Traffic: VE6HO 71, VE6ABC 12, VE6ARN 5, VKE6XC 5, VE6BAZ 2.

MANITOBA: SCM, Peter Guenther, VE4PG — Asst/SCM: VE4JP. SEC: VE4TR. STM: VE4RO. NMs: VE4s VJ NM TE AEJ. Both the Phone nets suffered a loss with the passing of VE4OJ. Not to many can claim the activity and contribution he made. The first DEC appointment was made to VE4BO at Flin Flon and he is a welcome addition to the northern area. Summer is still having its effects on all the nets, but there are now signs of increased activity . . . MMN QNI 336, QTC 31, sess 31. MTN QNI 61, QTC 29, sess 18. WRIN QNI 69, QTC 1, sess 4. MEPN QNI 627, QTC 22, sess 31. Traffic: VE4PG 57, VE4AEJ 25, VE4CR 25, VE4LB 18, VE4RO 14, VE4JA 7, VE4NE 7, VE4AEO 6, VE4ADS 4, VE4GB 4, VE4FK 3, VE4LN 2, VE4NM 2.

MARITIME — NFLD: SCM, D. R. Welling, VE1WF — A/SCM, VO1FG. NM: VO1JN VE1WF. SEC: VE1ASW. STM: Open. VE1ASW has resigned as SEC. Thanks for all the help in the past. Urgently require volunteers to fill many appointments that are open. ECs are urgently needed for all areas. SET will be held weekend of October 18th. VE1LCR participated in Natal Day Parade in Halifax, special credit for assistance with this activity goes to VE1AI VE1AMC and VE1FQ. Many amateurs enjoying vacations in the section. New Repeater in Newcastle, N.B., call VE1NCR on 147.750/150. APN: 31 sessions, QNI 167, QTC 82, QTR 393 mins. Traffic: (July) VE1WF 286, VE1LCR 30, VE1EJ 22, VE1AUL 22, VE1XF 19, VE1KR 13, VE1OC 12, VE1BMN 10. (June) VE1EJ 24.

ONTARIO: SCM, Larry Thiviergе, VE3GT — A/SCM: VE3BMG. SEC: VE3GV. STM: VE3GOL. My sincere thanks to all those club bulletin editors and their staff who send me a copy of their publication each month. It's a great assistance — keep 'em coming please. I'd like to announce the appointment of VE3GV as the section's new SEC. He can be reached at 512 Pinetree Dr., London, Ont., N6H 3N1. The following have been appointed ECs: VE3EFX Bruce Co.; VE3IHX Ottawa/Carleton; VE3WM London. Former SCM VE3BUX now VE3ZU. Welcome to the following new League Life Members: VE3s DYC FGV HSF HTC KDI and TM. Repeater VE3STP completed a successful move to a new location close to the original site. As a result, the repeater has greatly increased coverage throughout the Ottawa Valley. Many thanks to all who participated in the tasks associated with the move. The Champlain Mini-Net, sponsored by VE3STP, now starts at 6:45 local time. NM certificates have been issued to VE3s ATU GNW and KK. New Ont. Trilliums members are: VE3s LWV and MCO. New calls from the London area include: VE3s LSA LSB LSD LSE and MCA, ex-VE7. CARTG's 20th annual WW RTTY DX "New Decade" Sweepstakes will take place on Oct. 18 0200Z to Oct. 20 0200Z. At the same time, the annual SET will be held on Oct. 18 and 19th. The London ARC has become a League affiliated club — how about your's? New repeater at Penetang is VE3PEN 147.75 MHz in and 147.15 MHz out. VE3KR has a new vertical. An agreement has been signed between the Ontario Section ARRL and the Ontario Division of the Canadian Red Cross Society that will serve as a broad framework within which volunteer personnel of the ARPSC may coordinate their facilities and equipment with the Ont. CRC for communications in disaster relief. Traffic: (July) VE3CWA 638, VE3ATU 529, VE3GOL 525, VE3KK 342, VE3JLL 173, VE3GNW 148, VE3GT 120, VE3HTL 89, VE3DPO 82, VE3ISW 74, VE3DUK 51, VE3BVG 49, VE3CYR 45, VE3BB 44, VE3DVE 42, VE3GFN 42, VE3IXB 40, VE3KXB 33, VE3ABG 21, VE3ANJ 12, VE3EWD 12, VE3FPI 12, VE3JPP 10, VE3AYZ 5, VE3MCO 4. (June) VE3ISW 87, VE3BVG 51, VE3KXB 42, VE3FPI 27, VE3GYD 27, VE3IXB 4.

QUEBEC: SCM, Harold Moreau, VE2BP — SEC: VE2DEA. STM: VE2FFE. New appointee VE2FSA as Net Manager for the Western Quebec VHF/UHF ARES Net. VE2EHG now VE2XB. VE2XB Field Day group set up in Hamstead Park and participating ops were VE2s SH XB BAB EGO EWI FFI and Marty an SWL, all had a great time and pledge to improve their score next year. The Montreal Hamfest was well attended by hams from Lac St. Jean area, Quebec city, Trois Rivieres, Eastern Townships, Hawkesbury Ont. and W/K 1.2-Land. Plusieurs Amateurs des regions suivantes etaient au Hamfest de Montreal; Quebec, Trois-Rivieres, Chicoutimi, Cantons de l'Est ainsi de Hawkesbury et E.U. c'etait bon de se voir. Avec regret i'ai a vous annoncer le deces de VE2ZZ, nous manquerons tous Georges. Traffic: (July) VE2BP 51, VE2EKC 30, VE2FFE 28, VE2EC 26, VE2APT 12, VE2FSA 10. (June) VE2FFE 48.

SASKATCHEWAN: SCM, Norm Waltho, VE5AE — STM: VE5XC. SEC: VE5WM. NMs: VE5DC VE5HG VE5SF VE5WM. SATN: 31 sess, 319 QNI, 17 QTC; SPN: 31 sess, 782 QNI, 36 QTC; SKTN 2-M: 31 sess, 163 QNI; RARA 2-M, 29 sess, 300 QNI, 1 QTC; PWXN, 31 sess, 375 QNI. Good luck to SCM VE5AE whose job has taken him to Region 2 for two months. SK QSL manager, VE5JI, had a stay in hospital in July. Good to see you up and around again. The Prince Albert ARC provided 2-meter communications for the Celebrate Saskatchewan Festivities along with a ht display for the public on July 1st weekend. Welcome back to VE5KZ from a 2 year course in W7-Land and to VE5DC from a month's holiday in G-Land. Traffic: VE5WM 19, VE5XZ 15, VE5HG 12, VE5NJ 6, VE5XS 4, VE5LC 3.

ATLANTIC DIVISION

DELAWARE: SCM, Roger F. Cole, W3DKX — SEC: W3PQ. STM: WA3WIY. PSHR: K3JL 99, WA3WIY 91, N3AKC 75, W3AKC 75, W3DKX 55. The ARRL annual SET has been announced for October 18-19. All Del. hams are encouraged to participate. DARC class graduates KA3FPE and KA3FPF are due congratulations. More New Castle Co. stations needed for DTN and DEPN. DTN: QNI 289, QTC 59; DEPN: QNI 46, QTC 5. Amended June DEPN rpt. QNI 44, QTC 7. Traffic: (July) W3PQ 136, W3QQ 115, WA3WIY 55, WB3DUG 49, N3AKC 48, K3JL 45, W3DKX 30, WA3YTB 15, W3FEG 6, W3WD 6, WA3ZBI 4, WB3ILX 2, WA3RTX 1. (June) W3PQ 120.

EASTERN PENNSYLVANIA: SCM, Karl W. Pfeil, W3VA — SEC: WA3PZO. STM: WB3JYZ. NMs: AG3R AJ3R AA3B WA3WQP. Net reports: EPA QNI 512, QTC 275, in 59 sessions; EPAEPTN QNI 433, QTC 235, in 31 sessions; PFN QNI 264, QTC 335, in 26 sessions; ATN (2) QNI 89, QTC 9, in 9 sessions; LVN (2) QNI 31, QTC 12, in 4 sessions; LVN QNI 6, QTC 3, in 3 sessions. OBS reports: WB3CAI WB3JYZ W3VA W3CL AJ3R and K3EBZ. 00 reports: K3TX W3FAF and W3GOA. OVS reports: KA3DZD W3HK W3GOA and N3CP. PSHR reports: N3AIU K3RHI WB3GUR AJ3R K3JSZ WB3JYZ W3DP KB3LF W3GOA WB3FEH WA3WOP WB3CAI AA3B WB3GZV and W3BUR. BPL: WA3WQP. FD reports received by WA3PZO from W3KT WA3RCA W3AWA and W3CS. EPAEPTN welcomes N3BFL and N3AIU, who recently acquired ssb gear. K3NB and K8KNL have DX-CC. New appointments: N3BHF to OTS and WB3FVJ to OBS, congrats gals. The annual FRC Awards Dinner was a booming success and this years trophy went to a well deserving N3ED. A special plaque was presented to our Atlantic Division Director, W3KT and his XYL Inez for their many years of meritorious service to the FRC and ham radio. 9Y4VU is now KA3E. N3BEJ now KB3LF. KA3FYC new ham in Jim Thorpe and will be operating /SV0 in Athens, Greece for the next 18 months. KA3AFY now on 2-m with new rig and 11 element beam. KA3FKO new Novice in Plains. K3JSZ reports in person. W3TB is leaving the section for NJ. PWA Banquet is scheduled for Oct. 17. AA3B, NM for EPA cw net, recently married. Good luck. N3AIU reports NCARESN got off to a fine start with 65 QNI, 6 QTC, in 4 sessions. W3EU reports lots of space between stations on 75. WB3JYZ is a member of NE Pa String Band. W3ID planning some new antennas. N3BHF studying for big A. KB3LF operated W3OK at Bethlehem Hamfest. Carbon ARC annual banquet listed for Nov. 9. WA3VIL reports long wire antenna and home brew tuner works FB. K3SIO now Advanced Class and waiting new call. New Novice ops in the Hazleton area are KA3FRK KA3FRL KA3FRN KA3FRO KA3FRQ and KA3FRT. Hats off to HARC for their FB Novice classes and a new class to start in Oct. Contact WB3KNJ for details. TAARA received charter from ARRL and planning QSO Party for fall season. WA3YOE, EC for Luzerne County, reports unannounced drill on 2 mtrs a great success with 42 amateurs participating. FRC now celebrating its 50th anniversary. Traffic: WA3WQP 917, AJ3R 394, KB3LF 231, KB3LF 231, W3IPX 212, N3AIU 166, WB3FEH 158, K3JSZ 136, WB3GUR 132, AA3B 129, W3FAF 103, WB3JYZ 98, W3DP 85, W3BI 79, N3CD 77, WB3CUF 61, W3VA 59, WB3CAI 55, K3EIP 54, WB3GZV 43, WA3VIL 39, WA3OFD 27, AD3X 25, N3BHF 21, W3ADE 20, K3EBZ 18, K3NGN 17, W3CL 16, W3ID 12, K3RHI 12, W3TB 12, N3CP 7, KA3BOD 5, KA3BER 3, AF3Z 2, K3AKN 1, W3HK 1, K3TX 1. (June) W3ID 11, W3TB 10, N3CD 2.

MARYLAND — DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — SEC: WA3TAI. Sorry to report W2HXT/3 and K3BA are Silent Keys. Both were MDD old timers. N3AFM, our resident 6-meter expert, expects to slow down a bit and attend the 6 harmonics. K3DI returns to 00 and IW work. He warns to watch the top of 20 meters for out-of-band USB. N3SJ did okay in June, but the July heat slowed him down a bit. W3JPT made the VHF QSO party. W3MR is back to 00 work after the European trip. WB3JRW has work getting in front of hamming. WB3LTA puts his bulletins on 2 meters. KB3AP sold the old house, bought a new one and keeps thinking of stacked monobanders! W3CDQ entertained visitors from I-Land. W3MSN has 10 transceivers on 160 meters thru 450 MHz plus a few extras. KA3T is now established at the new QTH in Howard County. W3ECN tried the cw net and liked it. W3EOV is now a scuba diver looking for his own pool. KA3DXZ and the MARC provided the communications support for the Rockville 4th of July fireworks. W3GXK says the BRATS Hamfest the best ever. New prexy, N3IC, and the BARC provided the communications for the Baltimore Canoe Club races. Other BARC officers: N3ARL, vice pres.; KA3HF, treas.; WB3KZX, secy., and K3RMX, corres. secy. N3II says the XYL call is N3BKB. At the MEPN picnic there were 41 net certificate winners announced. AA3S provided home made peach ice cream. AK3X says N3AQV/EA is about ready with the beam. K3ORW is back to regular working hours. W3AKO is 81 years young and active. K3TEZ moves to Hawaii. W3DQI took a month off to do the USA in his RV. WB3GZU teamed up with KB3AP to get the Baltimore fireworks on time during the 1812 Overture! WB3CES says ho-hum to summer so far. With the nets:

Net/Manager	sessions/Traffic/QNI	average
MDD/W3PQ	60/171/8.6	Top Brass W3QQ K3JL and W3FA.
July: MDC	PON/W3OYY	5/11/19.2.
WR	PON/W3DFW	22/28/26.
MEPN/WB3GZU	30/128/22.	Toppers W3ADO and WB3BFK. Others were N3AGM K3ONU and AA3S.

Wash County Net/W3FZT 50/15. Net meets every Tuesday at 7 P.M. local on the Hagerstown repeater. Traffic: WB3GZU 592, W3FA 161, AK3X 82, AA3S 54, N3SJ 44, KA3DXZ 22, KA3T 20, W3ECN 13, WB3LTA 9, KB3AP 2, WB3CES 2, WB3JRW 2. (June) N3SJ 150, KA3T 14, W3ECN 7, W3ZNW 2, WB3LTA 1.

SOUTHERN NEW JERSEY: SCM, Bill Luebkemann, WB2LCC — SEC: W2HOB. STM: WB2GTW. The 1980 Leadership Officials bulletin released by League Headquarters shows Southern New Jersey has again placed number ONE in our category (1-9 ECs). This is the third year in a row that SNJ has had 100% SEC/EC reporting. This is a real accomplishment, as a look at the rankings shows that we are alone, nationwide, in this achievement. Part of the reason for our continued success is the design philosophy of our SEC, W2HOB. He has constructed the ARES structure by counties, with one EC for each county. Each EC appoints assistant ECs as desired, and for the functions they feel are necessary in their respective counties. By giving each EC a specific and equal area of coverage, with a clearly defined responsibility and lots of room in which to work, it is easier to keep up their interest. In SNJ we feel that strength is in the ability and willingness of the appointees to do the job. And every day that goes by makes us more sure we are right! Are you in ARES? Why not contact your county EC now and volunteer your services. Give me a call if you don't know who your EC is. SNJ needs YOU. Traffic: WB2IQJ 355, AA2H 164, WA2ONW 126, WA2CUW 121, WB2LCC 59, KC2A 58, W2ZQ 52, KB2OE 46, WB2HUV 44, WA2WUL 38, WB2PKG 30, WB2GTW 25, N2AEP 20, KA2GTE 20, WA2HEB 18, K2YBN 18, WA2GTJ 7.

WESTERN NEW YORK: SCM, Lonnie J. Keller, WA2AOG — STM: W2MTA. SEC: W2BCH. BPL this month to W2ZOJ and WA2MFU. PSHR to W2ZOJ N2APB WA2MFV WA2ZJP KA2CTU W2AET WA2AFE KB2GT WA2KOJ and W2MTA. July net reports as follows (all daily):

Net	Freq	Time	Sess.	QNI	QTC
NYS(E)	3677	7:00 P.M.	31	503	283
NYS(L)	3677	10:00 P.M.	31	393	199
NYPON	3913	5:00 P.M.	31	428	160
GNYTN	90/30	9:15 P.M.	31	479	126
OCTEN	34/94	6:30 P.M.	30	317	78
STARN	99/39	7:30 P.M.	29	163	53
WDN	04/64	9:30 P.M.	31	1001	132

Welcome to new OTS appointees W2AET N2APB KA2CLT WB2EOX WB2QIX and W2GJ (OES, too). 73 to WA2DHZ after many years of service as Chemung Co. EC, and welcome to his successor WA2OVT, as well as new Erie Co. EC, WA2LWH. KF2T has announced the formation of the "Radio Club Into Net" which meets on 3983 at 8 P.M. each Thursday. All clubs are urged to send a representative to the net to swap ideas and information. WB2NAO (EC, OES) has been appointed Radio Officer for St. Lawrence Co. RACES. WB2RWW back after a duty tour in Saudi Arabia where he operated HZ1AB (and paid 23c a gallon for gas!). Traffic: W2ZOJ 559, WA2MFV 322, WA2ELD 303, WA2HSB 248, WA2MFU 243, N2APB 234, W2MTA 206, W2FR 135, KA2CLT 120, WA2ZJP 107, K2GWN 94, N2BXB 73, WB2OWD 73, W2AET 72, WA2KOJ 72, KA2CTU 71, WB2IDS 64, WA2AFE 62, WB2FHE 51, WB2QIX 36, KB2GT 31, WB2EOX 27, AF2K 21, WB2RWW 20, W2PPS 16, KA2HAC 8, K2VR 5, WB2VSJ 4.

WESTERN PENNSYLVANIA: SCM, Otto L. Schuler, K3SMB — ASCM: N3FM WA3JBQ. STM: N3EE. NMs: W3NEM W3KUN W3MML WA3PXA & WB3JDI.

Net	Sess.	QNI	QTC	kHz	Time/Day
WPA	31	325	142	3585	8:00 P/Dy
WPAPTN	30	431	148	3983	6:15 P/Dy
WPA2MTN	31	693	119	146.28/88	8:00 P/Dy
NWPA2MTN	27	291	11	146.04/64	9:30 P/Dy

I am sorry to announce that WA3VUP has resigned as SEC for Western Penna. after three years in this position. Both K3CHD and I want to thank him for the fine job he has done, not without some problems which he overcame, he will be too busy with other career goals. The new SEC will be WA3JBQ who has been the EC for Allegheny County and has done a fine job there. The Breeze-shooters new officers for 1980-81 are WB3CEW, pres.; K3CHD, checker; K3KSY, treas.; K3GP W3OVM W3GVI WA3PHY and WB3HND, board. I have been approached by various amateurs about the possibility of the section holding the Atlantic Div. Convention perhaps in 1983 or around that time. I would like to hear from the clubs and individual amateurs in the section what they think about it. It has been many years since it was held here. New Novice KA3GCZ, new Generals WA3EKH. Remember the SET October 18 and 19. W3DGK is the new EC for Allegheny County. He is also the R.O. for the county. Traffic: W3EGJ 310, WA3PXA 221, KB3DT 209, N3FE 194, W3SMV 149, N3FM 96, WA3UNX 66, W3GWJ 62, AC3N 57, K3SMB 57, WB3JGD 47, W3AS 37, W3RUL 37, W3KUN 33, W3MML 33, N3WS 33, K3HCT 28, kWA3JBQ 24, KA3DXP 23, W3UHL 22, W3TDW 21, WB3JDI 16, N3KB 12, W3TTN 12, WB3BOB 9, W3KMZ 9, WA3VRE 9, W3EXC 8, KA3BGC 7, AF3B 6, W3SN 4, K3VQV 4, N3ALL 3, K3GP 3, W3SGJ 2, W3LOD 1.

CENTRAL DIVISION

ILLINOIS: SCM, Edmond A. Metzger, W9PRN — Asst. SCM: W9RYU. SEC: W9OBH. NMs WA9KFK and WB9JSR. Cook County EC: W9HPG.

Net	Freq.	Times/Days	TFC.	Sess.
ILN	3690	0030/0400 Dy	252	62
ILL Phone	3915	2130 Dy	no	report
NCPN	3915	1200/1700 M-S	71	27
IEN	3940	1400 Su	9	4
W9VEY			7	4
Mem St			7	4

The newly elected officers of the Lamoine Emergency Amateur Radio Club are AG9Y WB9MWO KA9EKL WB9HVD and WD9FQD. KA9EHQ is a new Technician. KA9HKP is now KB9OH and KA9EMX is now N9BKP. Our sympathy to the families and friends of W9EVF and W9LYI who have recently joined the ranks of the Silent Keys. Also our sympathy to Robert Booth, W3PS, general counsel of the League, upon the death of his wife. She had attended many of the League's functions and conventions and will be missed by her many amateur friends. The 9RND report for 60 sessions in July passed 298 messages. Illinois participation was 100%, and the Illinois stations checking in were W9JIJ W9NXG WB9FDB WB9WGD W9YCE K9UN K9BVE WA9SHE WB9NVV and K9JGH. W9YCE's new QTH is Hot Springs, Arkansas. W9LNQ has been DXing with a 2 watt HW8. W9RYU has a new Kenwood TR 7600 and Yaesu FT 202R. Many reports were received of amateurs participating in the weather watch for severe wind and tornados. All with FB results. WD9ANN now KB9OV and WD9GSW now KB9FZ. KA9EKH and WBØVTM are now General Class licensees. The CAND had traffic of 1750

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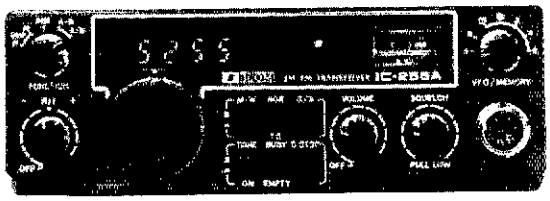

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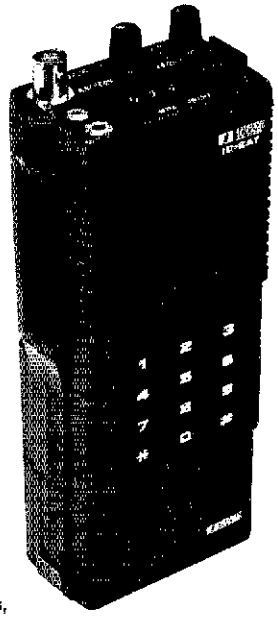

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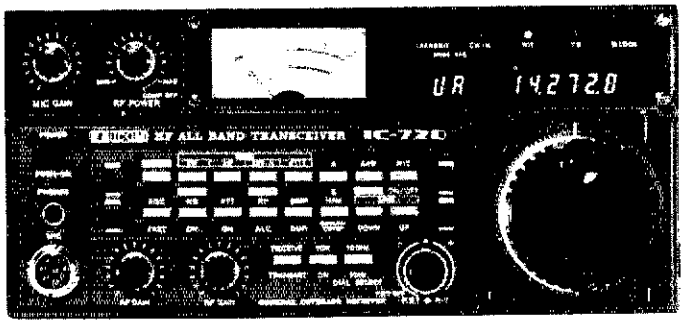

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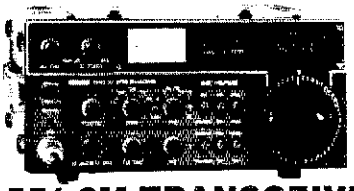

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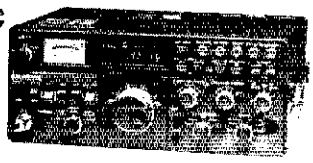
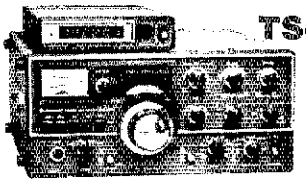


TS-520SE



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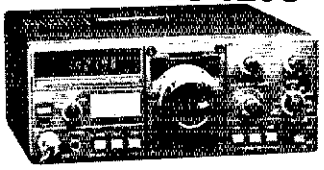

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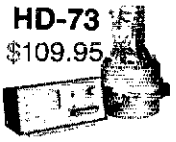

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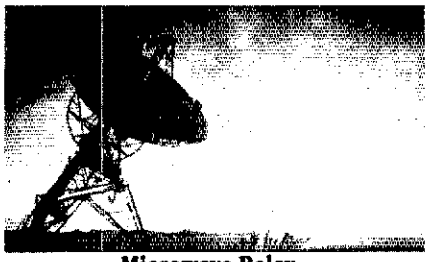

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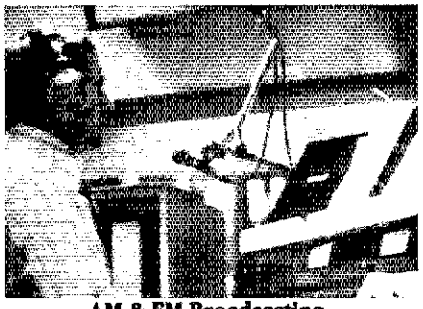

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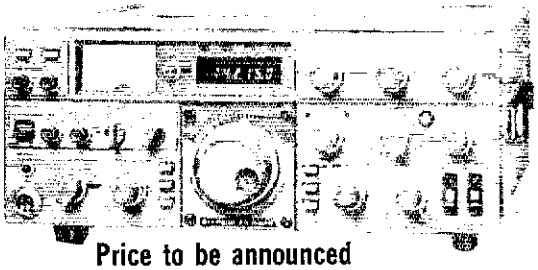

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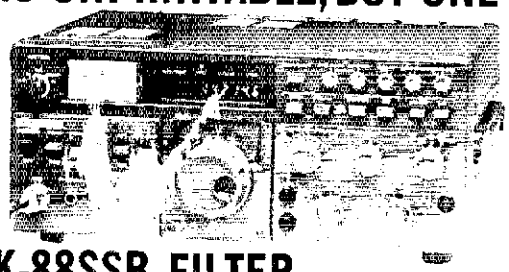

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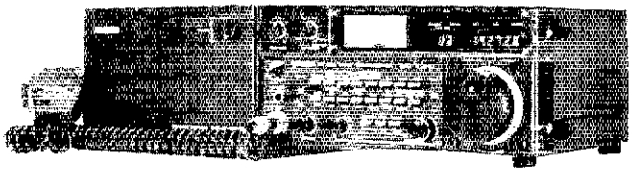

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- Direct Reading Power Meter: Two meter scales from 0 W to 250 W and 0 W to 2500 W; front panel switch selects FWD or Reflected Power. (Illuminated panel meters)
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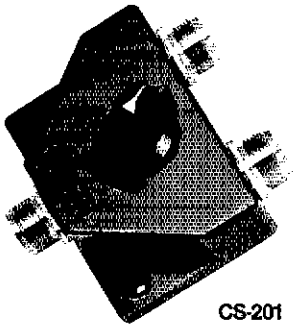
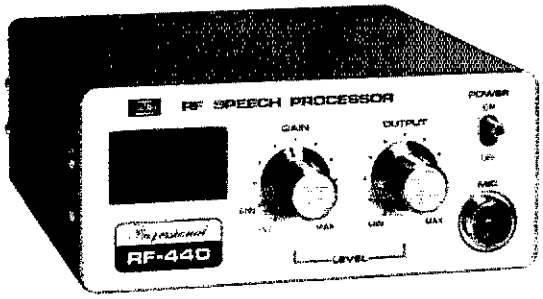
Model CN-1001

Frequency Range: 3.5–30 MHz (Including WARC Bands)
Power Rating: 500 Watts PEP
Internal Dummy Load: 50 Watts/1 Minute
Impedance Matching: 15–250 Ohms to 50 Ohm Resistor
Input Power Required for Automatic Tune: 1, 5 or 10 Watts (Set by rear panel switch)
Tune-up Time: 45 Seconds Max
Power Requirement: 13.8 VDC/2 Amp



CS-201



RF Speech Processor
Model RF-440

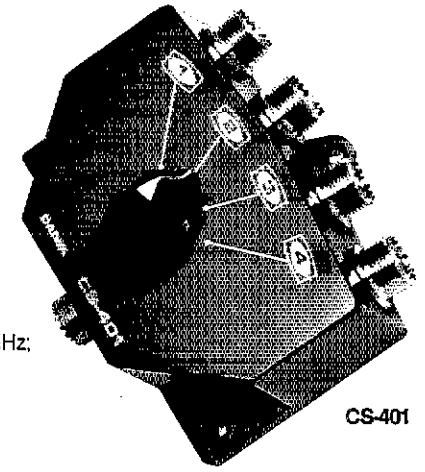
Increases talk power with splatter free operation. RF clipping assures low distortion. Simply install between microphone and transmitter.

Talk Power: Better than 6 dB
Clipping Threshold: Less than 2 mV at 1 kHz
Panel Meter indicates clipping level
Bandwidth: 2200 Hz at 6 dB down
Frequency Response: 300-3000 Hz at 12 dB down
Distortion: Less than 3% at 1 kHz, 20 dB clipping
Output Level: More than 50 mV at 1 kHz
Power Requirement: 115V AC, 60 Hz, 1 W, for self contained AC power supply; or 13.5 V DC, 55 mA for alternate external power
Dimensions: 150 x 70 x 150 mm; 6 x 2.5 x 6 in.

Coaxial Switches
2 Position/Model CS-201
4 Position/Model CS-401

Professionally engineered cavity construction.

Power Rating: 2.5 kW PEP, 1 kW CW
Impedance: 50 Ohms
Insertion Loss: Less than .2 dB
VSWR: 1:1.2
Maximum Frequency: 500 MHz
Isolation: Better than 50 dB at 300 MHz; better than 45 dB at 450 MHz; adjacent terminal
Unused terminals grounded
Connectors: SO-239



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Exclusive USA agent for these units; inquiries invited.

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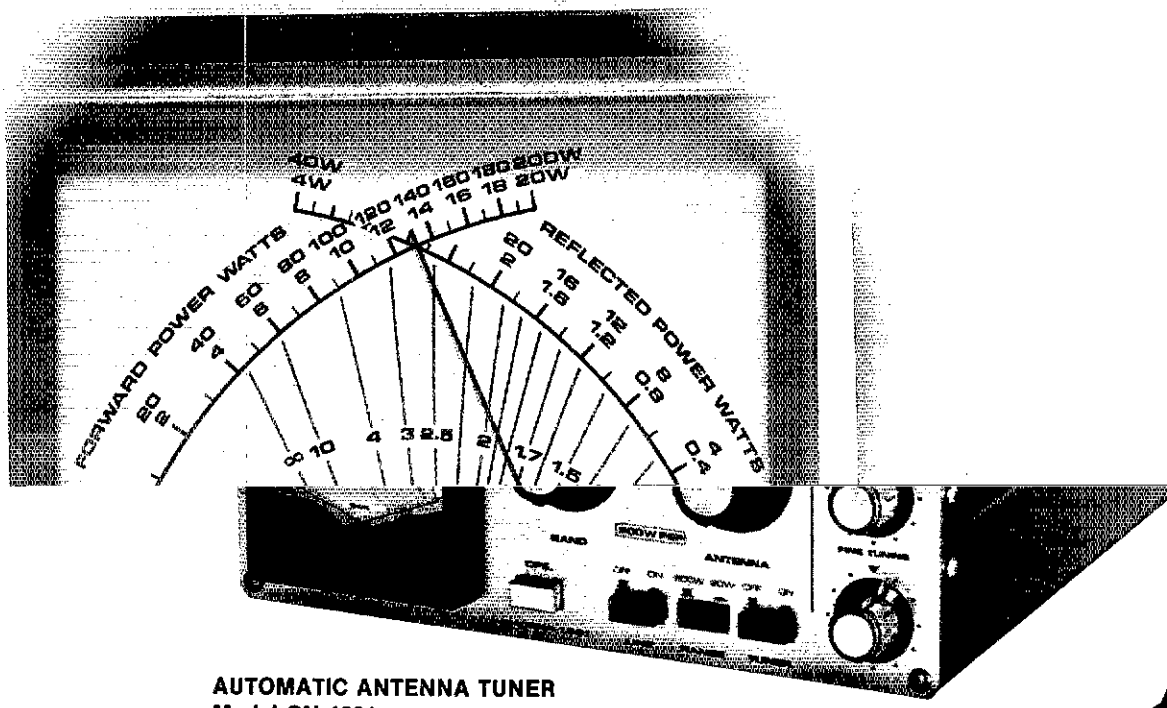

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Power Rating: 500 Watts PEP
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Tune-up Time: 45 Seconds Max
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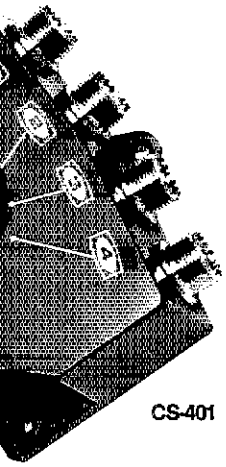
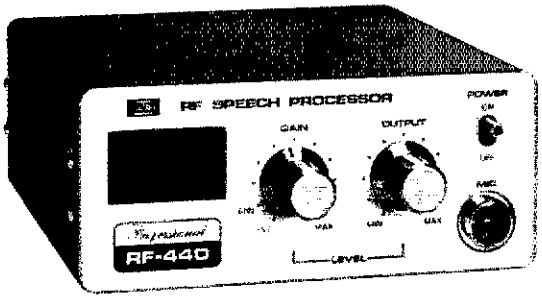


CS-401



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Isolation: Better than 50 dB at 300 MHz; better than 45 dB at 450 MHz; adjacent terminal
Unused terminals grounded
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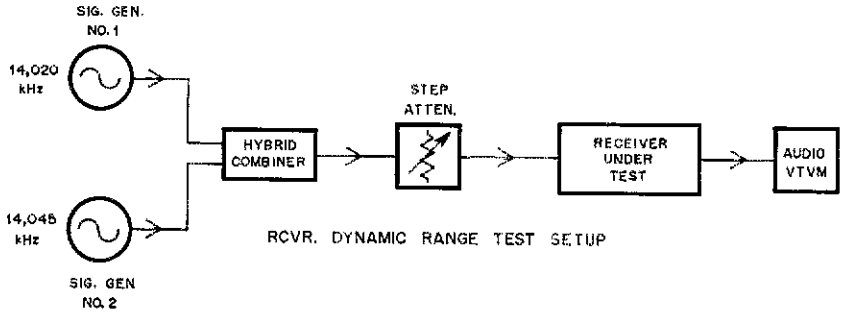
QST DATA FILE NO. 1

RECEIVER DYNAMIC RANGE



RCVR. DYNAMIC RANGE TEST SETUP

If you've been following the trends in receiver performance you're probably aware that "dynamic range" is the watchword of today. Is this a parameter of importance to radio amateurs? The answer comes as an emphatic *yes*! Why must we amateurs be concerned with receiver dynamic range? Well, this can be answered best by defining this performance characteristic in simple language: Dynamic range is a measure of the receiver's relative immunity to overloading from strong signals. A receiver with mediocre or poor dynamic range will become desensitized (gain compression) when a strong signal is present within the passband of the receiver front end. This means that the signal being listened to will appear weaker when the interfering signal is present, even though the operator may not hear the unwanted signal. Also, poor dynamic range will show up as severe cross-modulation of the desired signal. When this happens the interfering signal becomes superimposed on the signal of interest, making the copy impossible at times.

Still another serious effect results from poor dynamic range: Intermodulation distortion (IMD) products are generated in the rf amplifier and mixer stages (and sometimes beyond). These unwanted products cause audible spurious responses which appear at specified frequencies in the receiver tuning range. The net effect is one of a faulty transmitter being used by the transmitting station. *QST* product reviews contain the significant numbers relating to dynamic range, and Wes Hayward (W7ZOI) defined dynamic range in his comprehensive *QST* article for July 1975.

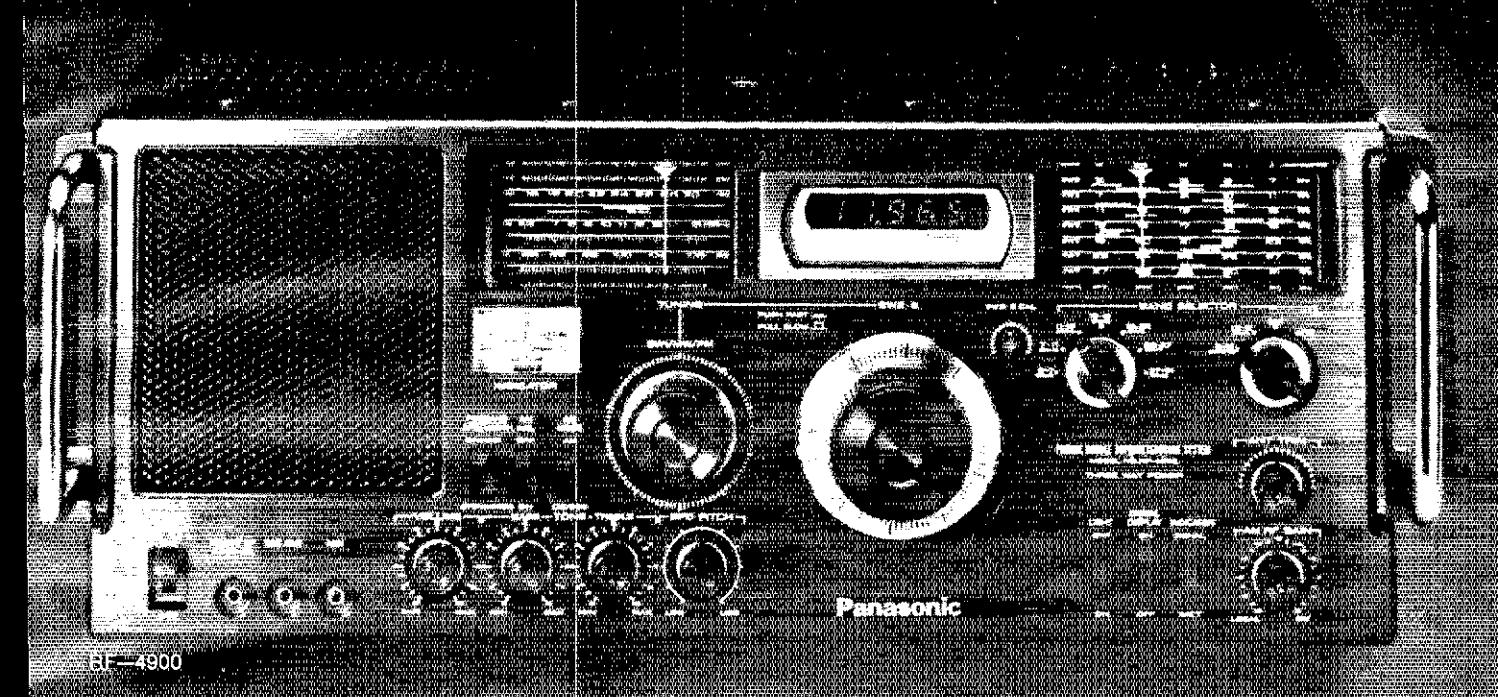
You may be wondering just what effect all of this has on you, in your particular location. Well, if you live near other amateurs, or close to commercial transmitters (even fm and TV stations), your receiver has probably been "crunched" by the large signals entering your receiver front end. We might add that the myth about tubes being better than transistors in handling large signals is pure balderdash! Many modern solid-state receivers far exceed the older tube-type receivers in dynamic range. The real name of the game in designing a good receiver is "gain distribution" and the proper choice of front-end devices. If this strikes you as an over-simplification of the cure for poor dynamic range, don't subscribe to that philosophy. Actually, the answers can be found in the receiving chapter of our vastly updated *Handbook* for 1981. Not only is there a plain-language discussion of dynamic range and how to achieve it, there are practical examples of circuits you can build to produce your own high-performance ham-band receiver — an excellent workshop project for the long months ahead.

For the adventurous amateur, information exists for measuring the dynamic range of your commercial receiver. It can be done with simple equipment, and all of this is outlined in detail in the measurements chapter of the 1981 *Handbook*. The concepts and design procedures in our 1981 *Handbook* for high dynamic range can even be applied to commercial gear, if the owner is willing to attempt modifications to the receiver front end.

Our revised measurements chapter contains an improved Operating Impedance Bridge, a Modulated RF Noise Bridge, 600-MHz Frequency Counter and a Modern Marker Generator with 100-, 50- and 25-kHz resolutions. Even though you may not be interested in building equipment or revising commercial gear, you should be anxious to test and service your own equipment. The 1981 *Handbook* contains the data you'll need to become involved in this interesting and absorbing facet of our pastime. In fact, the entire *Handbook* should be of interest to all radio amateurs, and the revised edition is waiting to take its place on your library shelf. — *Doug DeMaw, W1FB*

For more information and how to order *The 1981 Radio Amateur's Handbook*, see pages 118 and 119.

Yesterday you could admire all-band digital tuning in a short wave receiver.* Today you can afford it.



Tune in the Panasonic Command Series™ top-of-the-line RF-4900. Everything you want in short wave at a surprisingly affordable price. Like fluorescent all-band readout with a five-digit frequency display. It's so accurate within 1 KHZ-10 be exact you can tune in a station even before it's broadcasting. And with the RF-4900's eight short wave bands you can choose any broadcast between 1.6 and 30 MHZ. That's all short wave bands. That's Panasonic.

And what you see on the outside is just a small part of what Panasonic gives you inside. There's a double superheterodyne system for sharp reception stability and selectivity as well as image rejection. An input tuned RF amplifier with a 3-gang variable tuning capacitor for excellent sensitivity and frequency linearity. Ceramic type ceramic filters to reduce frequency interference. And even an antenna trimmer that enhances the front end capacitance of reception of weak broadcast signals.

To help you control all that sophisticated circuitry, Panasonic's RF-4900 gives you all these sophisticated controls. Like an all-gear-drive tuning control to prevent "backlash". Separate wide/narrow bandwidth selectors for crisp reception even in crowded conditions. Adjustable calibration for easy tuning to exact frequencies. A BFO pitch control. RF gain control for improved reception in strong national areas. An ANL switch. Even separate bass and treble controls.

And if all that short wave isn't enough, there's more. Like SSB single sideband amateur radio. All 40 CB channels. Ship to shore. Even Morse communications. Accessory operation. And with Panasonic's 4" full range speaker, the big sound of AM and FM will really sound big. There's also the Panasonic RF-2900. It has most of the features of the RF-4900 but it costs a lot less.

In the Command Series from Panasonic, if you had short wave receivers as good, you wouldn't still be reading. You'd be listening.

Short wave reception will vary with antenna, weather conditions, operator, geographic location, noise interference and use. Antenna may be required for maximum short wave reception.

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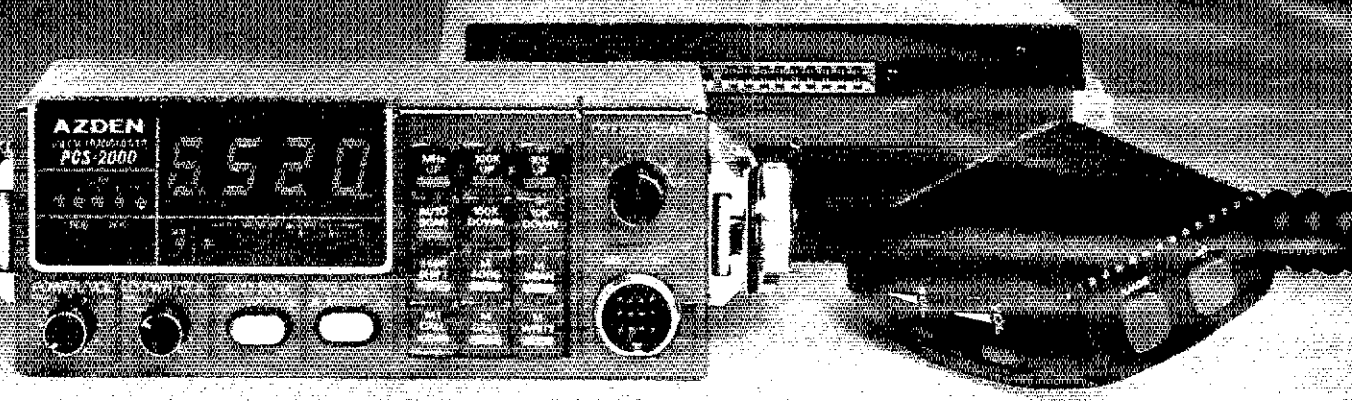

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- **FREQUENCY RANGE:** Receive and transmit: 144.00 to 147.995 MHz, 5Khz steps + MARS-CAP CAPABILITY BUILT IN (142-149.995 MHz).
- **ALL SOLID STATE-CMOS PL DIGITAL SYNTHESIZED.**
- **SIZE:** UNBELIEVABLE! **ONLY** 6 3/4" x 2 3/8" x 9 3/4". **COMPARE!**
- **MICROCOMPUTER CONTROLLED:** All scanning and frequency-control functions are performed by microcomputer.
- **DETACHABLE HEAD:** The control head may be separated from the radio for use in limited spaces and for security purposes.
- **SIX-CHANNEL MEMORY:** Each memory is re-programmable. Memory is retained even when the unit is turned off.
- **MEMORY SCAN:** The six channels may be scanned in either the "busy" or "vacant" modes for quick, easy location of an occupied or unoccupied frequency. AUTO RESUME. **COMPARE!**
- **FULL-BAND SCAN:** All channels may be scanned in either "busy" or "vacant" mode. This is especially useful for locating repeater frequencies in an unfamiliar area. AUTO RESUME. **COMPARE!**
- **INSTANT MEMORY-1 RECALL:** By pressing a button on the microphone or front panel, memory channel 1 may be recalled for immediate use.
- **MIC-CONTROLLED VOLUME AND SQUELCH:** Volume and squelch can be adjusted from the microphone for convenience in mobile operation.
- **ADDITIONAL OFFSETS:** Provides three additional offset values: + 0.4 MHz, + 1 MHz and + 1.6 MHz. Other offsets may also be obtained.
- **25 WATTS OUTPUT:** Also 5 watts low power for short-distance communication.
- **DIGITAL S/RF METER:** LEDS indicate signal strength and power output. No more mechanical meter movements to fall apart!
- **LARGE ½-INCH LED DISPLAY:** Easy-to-read frequency display minimizes "eyes-off-the-road" time.
- **PUSHBUTTON FREQUENCY CONTROL FROM MIC OR FRONT PANEL:** Any frequency may be selected by pressing a microphone or front-panel switch.
- **SUPERIOR RECEIVER SENSITIVITY:** 0.28 uV for 20-dB quieting. The squelch sensitivity is superb requiring less than 0.1 uV to open. The receiver radio circuits are designed and built to exacting specifications, resulting in unsurpassed received-signal intelligibility.
- **TRUE FM, NOT PHASE MODULATION:** Transmitted audio quality is optimized by the same high standard of design and construction as is found in the receiver. The microphone amplifier and compression circuits offer intelligibility second to none.
- **OTHER FEATURES:** Dynamic Microphone, built in speaker, mobile mounting bracket, external remote speaker jack (head and radio) and much, much more. All cords, plugs, fuses, microphone hanger, etc. included. Weight: 6 lbs.
- **ACCESSORIES:** 15' REMOTE CABLE.....$29.95. CS-6R A/C POWER SUPPLY.....$49.95. TOUCHTONE MIC. KIT.....$39.95. EXTERNAL SPEAKER.....$18.00.

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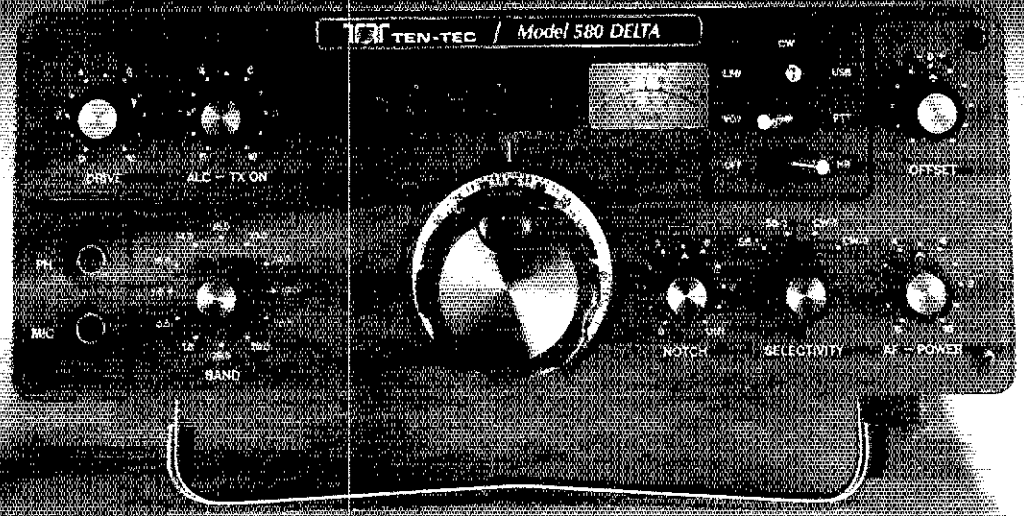
Move over imports, here's the new TEN-TEC

DELTA

the notable change in hf transceivers



All new, all nine hf bands and only $849!

DELTA — the symbol of change—the name of a great new TEN-TEC transceiver. A transceiver for changing times, with new features, performance, styling, size and value.

TOTAL SOLID-STATE. By the world's most experienced manufacturer of hf solid-state amateur radio equipment.

ALL 9 HF BANDS. First new transceiver since WARC. 160-10 Meters including the three new hf bands (10, 18 & 24.5 MHz). Ready to go except for plug-in crystals for 18 and 24.5 MHz segments (available when bands open for use).

SUPER RECEIVER. New, low noise double-conversion design, with 0.3 μV sensitivity for 10 dB S+N/N.

HIGH DYNAMIC RANGE. 85 dB minimum to reduce overload possibility. Built-in, switchable, 20 dB attenuator for extreme situations.

SUPER SELECTIVITY. 8-pole monolithic SSB filter with 2.4 kHz bandwidth, 2.5 shape factor at 6/60 dB points. And optional 200 Hz and 500 Hz 6-pole crystal ladder filters. Eight pole and 6-pole filters cascade for 14 poles of near ultimate skirt selectivity. Plus 4 stages of active audio filtering. To sharpen that i-f response curve to just 150 Hz bandwidth, 4-position selectivity switch.

BUILT-IN NOTCH FILTER. Standard equipment. Variable, 200 Hz to 3.5 kHz, with notch depth down to −50 dB. Wipes out interfering carriers or CW.

OFFSET TUNING. Moves receiver frequency up to ±1 kHz to tune receiver separately from transmitter.

"HANG" AGC. For smoother, clearer, receiver operation.

OPTIONAL NOISE BLANKER. For that noisy location, mobile or fixed.

WWV RECEPTION. Ready at 10 MHz.

"S"/SWR METER. To read received signal strength and transmitted standing wave ratio. Electronically switched

SEPARATE RECEIVER ANTENNA JACK. For use with separate receiving antenna, linear amplifier with full break-in (QSK) or transverters.

FRONT PANEL HEADPHONE AND MICROPHONE JACKS. Convenient.

DIGITAL READOUT. Six 0.3" red LEDs.

BROADBAND DESIGN. For easy operation. Instant band change—no tuneup of receiver or final amplifier. From the pioneer, TEN-TEC.

SUPER TRANSMITTER. Solid-state all the way. Stable, reliable, easy to use.

200 WATTS INPUT. On *all* bands including 10 meters (with 50 ohm load). High SWR does not automatically limit you to a few watts output. Proven, conservatively rated final amplifier with solid-state devices warranted fully for the first year, and pro-rata for *five* more years.

100% DUTY CYCLE. All modes, with confidence. 20 minutes max. key-down time. Brought to you by the leader in solid-state finals, TEN-TEC.

QSK — INSTANT BREAK-IN. Full and fast, to make CW a real conversation.

BUILT-IN VOX AND PTT. Smooth, set-and-forget VOX action plus PTT control. VOX is separate from keying circuits.

ADJUSTABLE THRESHOLD ALC & DRIVE. From low level to full output with ALC control. Maximum power without distortion. LED indicator.

ADJUSTABLE SIDETONE. Both volume and pitch, for pleasant monitoring of CW.

SUPER STABILITY. Permeability tuned VFO with less than 15 Hz change per F° change over 40° range after 30 min. warmup—and less than 10 Hz change for 20 Volt AC line change with TEN-TEC power supply.

VERNIER TUNING. 18 kHz per revolution, typical.

SUPER AUDIO. A TEN-TEC trademark. Low IM and HD distortion (less than 2%). Built-in speaker.

SUPER STYLING. The '80s look with neat, functional layout. "Panelized" grouping of controls nicely human engineered for logical use. New, smaller size that goes anywhere, fixed or mobile (4¾"h x 11⅜"w x 15"d). Warm, dark front panel. Easy-to-read contrasting nomenclature. Black "clam-shell" aluminum case. Tilt bail.

MODULAR/MASS-TERMINATION CONSTRUCTION. Individual circuit boards with plug-in harnesses for easy removal if necessary. Boards are mailable.

FULL ACCESSORY LINE. All the options: Model 282 200 Hz CW filter $50; Model 285 500 Hz CW Filter $45; Model 280 Power Supply $149; Model 645 Dual Paddle Keyer $85; Model 670 Single Paddle Keyer $34.50; Model 247 Antenna Tuner $69; Model 234/214 Speech Processor & Condenser Microphone $163; Model 215 PC Ceramic Microphone $34.50, Model 283 Remote VFO, Model 287 Mobile Mount, and Model 289 Noise Blanker available soon.

Experience The Notable Change In HF Transceivers. Experience DELTA. See your TEN-TEC dealer or write for full details.

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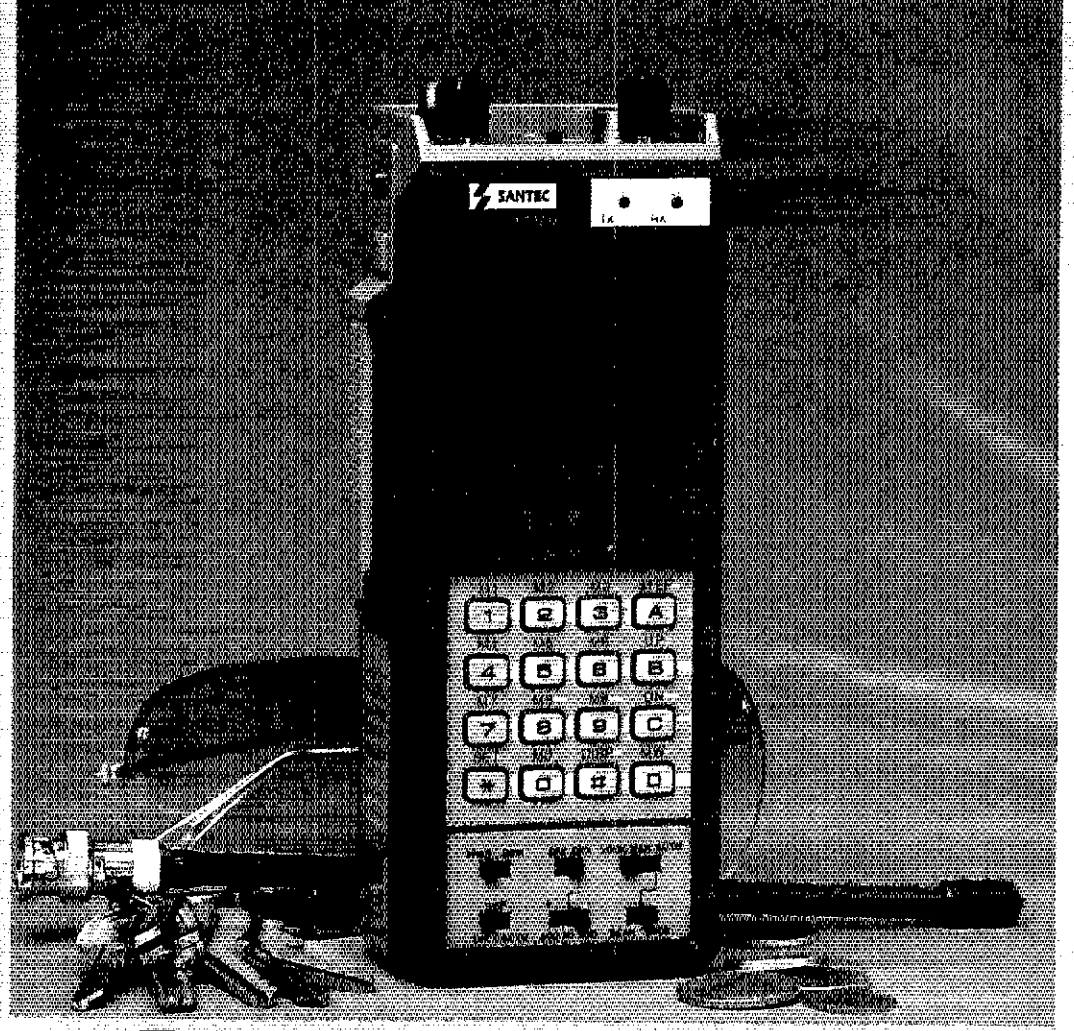
SEVIERVILLE, TENNESSEE 37862
EXPORT 9715 LINCOLN AVE., CHICAGO, ILL. 60646



The Majority Leader

In the race of popular demand for quality in fully synthesized, multifeature hand held transceivers, the Santec HT-1200 emerges as the commanding front runner. More than just handy, the Santec stands on a solid platform of big rig features which fully utilize the very latest microprocessor technologies.

When you choose Santec, you opt for 4 modes of automatic scan and search of 10 memories and the whole band. When you choose Santec, you opt for selectable output power of 3.5W or 1.0W, with only a 6ma drain for the optional continuous display of the bright LED readout. When you choose Santec, you opt for variable scan steps in any multiples of 5kHz. And when you choose Santec, you opt for a band range that covers most Army MARS, Navy MARS, and CAP frequencies and the ease of entering all frequencies from the integrated keyboard. Assuredly, when you choose Santec, you opt for the majority leader which hands over features hand over fist.

SUGGESTED RETAIL PRICE: $379.00

Check the price at your Authorized Santec Dealer today!

Encomm, Inc.
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Dallas, Texas 75234

☐ Please send me more information about the Santec HT-1200 and a list of Authorized Santec Dealers.

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CHECK HOW THEY STAND ON THE ISSUES:

SANTEC HT-1200	YAESU FT-207R	KENWOOD TR-2400
Texas Instruments TMS-1000 microprocessor	NEC-650	NEC-650
Rx on 143 to 149.995 MHz. Tx on 143 to 148.995 MHz (1200 channels with MARS coverage)	Rx & Tx on 144 to 147.995 MHz, Ham band only (800 channels)	Rx & Tx on 143.9 to 148.495 (800 channels with some MARS coverage)
Direct keyboard entry of all frequencies. Keyboard entry of 5kHz digit which stays in memory	Keyboard entry of 10kHz steps with a switch for 5kHz steps.	Direct keyboard entry of Ham band only. MARS frequencies must be entered into a memory by stepping and recalling.
10 programable memories with frequencies preloaded on cold boot.	5 programable memories. All memories loaded with 144.00 on cold boot.	10 programable memories. All memories loaded with 145.00 on cold boot.
Up/Down variable scan steps in any multiples of 5kHz over whole band or auto-scan of 10 memories. Scan (restart) or search (lock) modes for both band and memory modes.	Up/Down scan with 10kHz steps only. Misses every other 15kHz by 5kHz. Locks without restart.	Scans 10 memories only Restart only; lock mode not available. Continuous band scan/search not available.
Full 16 button TTP with LED display of number as it is dialed.	12 button TTP only.	Full 16 button TTP. Readout of the number dialed is not available.
9.6v 500mah battery (included)	10.8v 450mah battery (included)	9.6v 800mah battery (included)
Tx High: 3.5W (4W nominal) Tx Low: 1W	Tx High: 2.5W Tx Low Tx Low: 200mW	Tx at 1.5W only.
Readout: LED	Readout: LED	Readout: LCD
Volume: 543cc 170mm(H) x 68mm(W) x 47mm(D)	Volume: 664cc 181mm(H) x 68mm(W) x 54mm(D)	Volume: 640cc 192mm(H) x 71mm(W) x 47mm(D)

The Santec HT-1200 is approved under FCC Part 15 and exceeds FCC regulations limiting spurious emissions.

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ALPHA

Photo By RIC HELSTROM

THE VERY FINEST ANSWER TO YOUR NEED for one to two kilowatts of solid HF power: a superlative *ALPHA* linear amplifier—FIRST in performance, in convenience, in quality and durability.

Brute RF power without time limit. Whisper-quiet operation. Instant no-tune-up bandchanging, high speed break-in (QSK), the ability to cover any newly-assigned HF band—there's an *ALPHA* perfectly suited to YOUR requirements.

ALPHA: power in a class by itself. For complete details, contact your *ALPHA* dealer or ETO direct.

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KENWOOD
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TS-830S

"Top-notch"... VBT, notch, IF shift, wide dynamic range

The TS-830S has every conceivable operating feature built-in for 160-10 meters (including the three new bands). It combines a high dynamic range with variable bandwidth tuning (VBT), IF shift, and an IF notch filter, as well as very sharp filters in the 455-kHz second IF. Its optional VFO-230 remote digital VFO provides five memories.

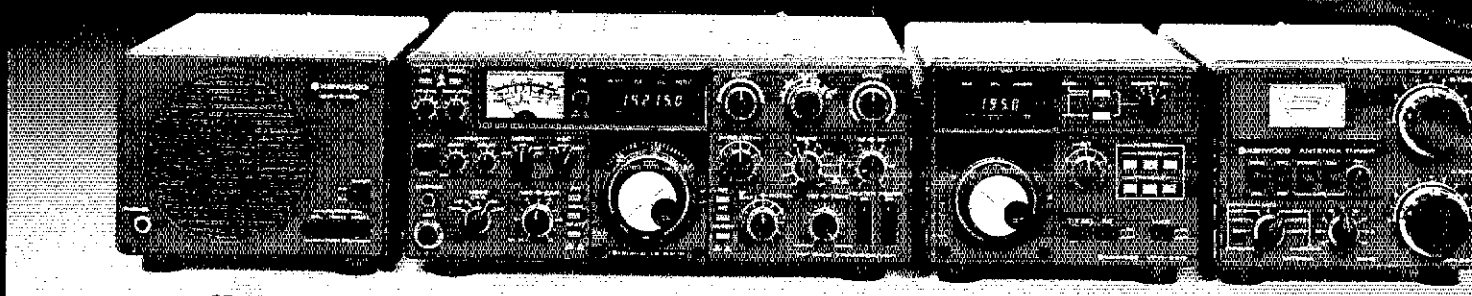
TS-830S FEATURES:

- LSB, USB, and CW on 160-10 meters, including the new 10, 18, and 24-MHz bands. Receives WWV.
- Wide receiver dynamic range. Junction FETs in the balanced mixer, MOSFET RF amplifier at low level, and dual resonator for each band.
- Variable bandwidth tuning (VBT). Varies IF filter passband width.
- Notch filter (high-Q active circuit in 455-kHz second IF.
- IF shift (passband tuning).
- Built-in digital display (six digits, fluorescent tubes), analog subdial, and display hold (DH) switch.
- Noise-blanker threshold level control.
- 6146B final with RF negative feedback. Runs 220 W PEP (SSB)/180 W DC (CW) input on all bands.
- Built-in RF speech processor.
- Narrow/wide filter selection on CW.
- SSB monitor circuit to check transmitted audio quality.
- RIT (receiver incremental tuning) and XIT (transmitter incremental tuning).

OPTIONAL ACCESSORIES

- SP-230 external speaker selectable audio filters.
- VFO-230 external digital with 20-Hz steps, five memories, digital display
- AT-230 antenna tuner/SW and power meter/antenn switch; 160-10 meters, including three new band
- YG-455C (500-Hz) and YG-455CN (250-Hz) CW filters for 455-kHz IF.
- YK-88C (500-Hz) and YK-88CN (270-Hz) CW fi for 8.83-MHz IF.

(VFOs for TS-830S, TS-13 Series, and TS-120S are compatible with all three series of transceivers.)



SP-230 TS-830S VFO-230 AT-230

TS-130S/V

"Small wonder"... processor, N/W switch, IF shift, DFC option

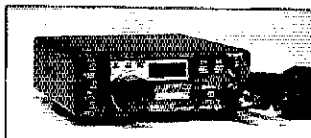
The compact, all solid-state HF SSB/CW mobile or fixed station TS-130 Series transceiver covers 3.5 to 29.7 MHz, including the three new bands.

TS-130 SERIES FEATURES:

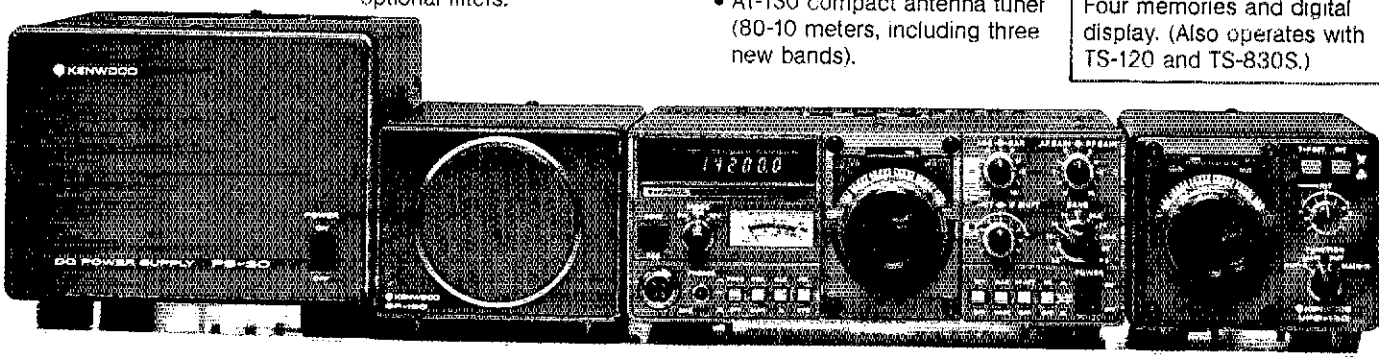
- 80-10 meters, including the new 10, 18, and 24-MHz bands. Receives WWV.
- TS-130S runs 200 W PEP/160 W DC input on 80-15 meters and 160 W PEP/140 W DC on 12 and 10 meters. TS-130V runs 25 W PEP/20 W DC input on all bands.
- Built-in speech processor.
- Narrow/wide filter selection on both CW (500 Hz or 270 Hz) and SSB (1.8 kHz) with optional filters.
- Automatic selection of sideband mode (LSB on 40 meters and below, and USB on 30 meters and above). SSB REVERSE switch provided.
- Built-in digital display.
- Built-in RF attenuator.
- IF shift (passband tuning).
- Effective noise blanker.

OPTIONAL ACCESSORIES:

- PS-30 base-station power supply.
- YK-88C (500 Hz) and YK-88CN (270 Hz) CW filters.
- YK-88SN (1.8 kHz) narrow SSB filter.
- AT-130 compact antenna tuner (80-10 meters, including three new bands).
- SP-120 external speaker.
- VFO-120 remote VFO.
- MB-100 mobile mounting bracket.
- PS-20 base-station power supply for TS-130V.



Optional DFC-230 Digital Frequency Controller
Frequency control in 20-Hz steps with UP/DOWN microphone (supplied with DFC-23 Four memories and digital display. (Also operates with TS-120 and TS-830S.)



PS-30 SP-120 TS-130S VFO-120

Subject to FCC approval

TRIO-KENWOOD COMMUNICATIONS INC.
1111 WEST WALNUT / COMPTON, CA 90220

TS-180S with DFC

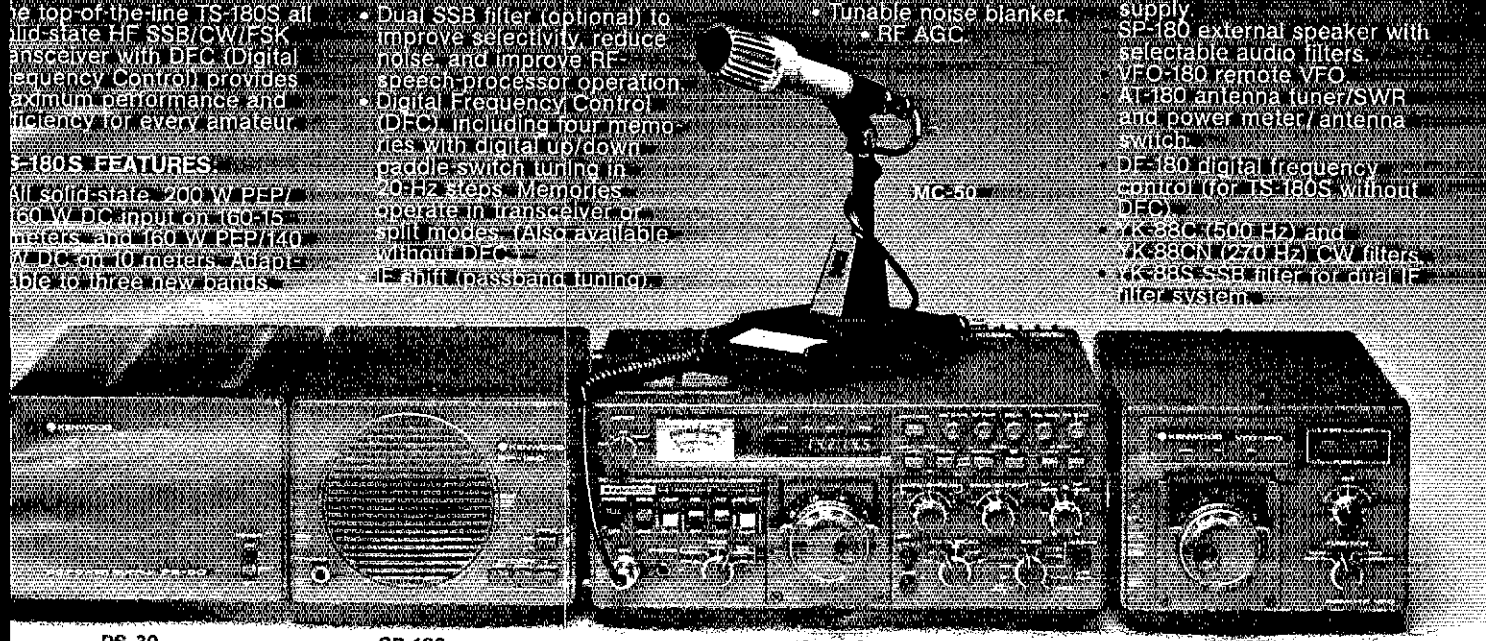
ligh quality...top performance, ith optimum features

e top-of-the-line TS-180S all lid-state HF SSB/CW/FSK ansceiver with DFC (Digital equency Control) provides aximum performance and ficiency for every amateur.

S-180S FEATURES:
All solid-state. 200 W PEP/ 160 W DC input on 160-15 meters and 160 W PEP/140 W DC on 10 meters. Adaptable to three new bands.

- Dual SSB filter (optional) to improve selectivity, reduce noise and improve RF speech-processor operation.
- Digital Frequency Control (DFC), including four memories with digital up/down paddle switch tuning in 20-Hz steps. Memories operate in transceiver or split modes. (Also available without DFC.)
- IF shift (passband tuning).
- Built-in digital display with differential function. Shows actual VFO frequency and difference between VFO and "M1" memory (or "hold" without DFC) frequencies.
- Selectable wide and narrow CW bandwidth.
- Tunable noise blanker.
- RF AGC.
- Automatic selection of upper and lower sideband (with SSB NORMAL/REVERSE switch).
- Dual RIT (VFO, memory/fix).

OPTIONAL ACCESSORIES:
- PS-30 base-station power supply.
- SP-180 external speaker with selectable audio filters.
- VFO-180 remote VFO.
- AT-180 antenna tuner/SWR and power meter/antenna switch.
- DF-180 digital frequency control (for TS-180S without DFC).
- YK-88CX (500 Hz) and YK-88CN (270 Hz) CW filters.
- YK-88SSE filter for dual IF filter system.



PS-30 SP-180 TS-180S VFO-180

TS-520SE

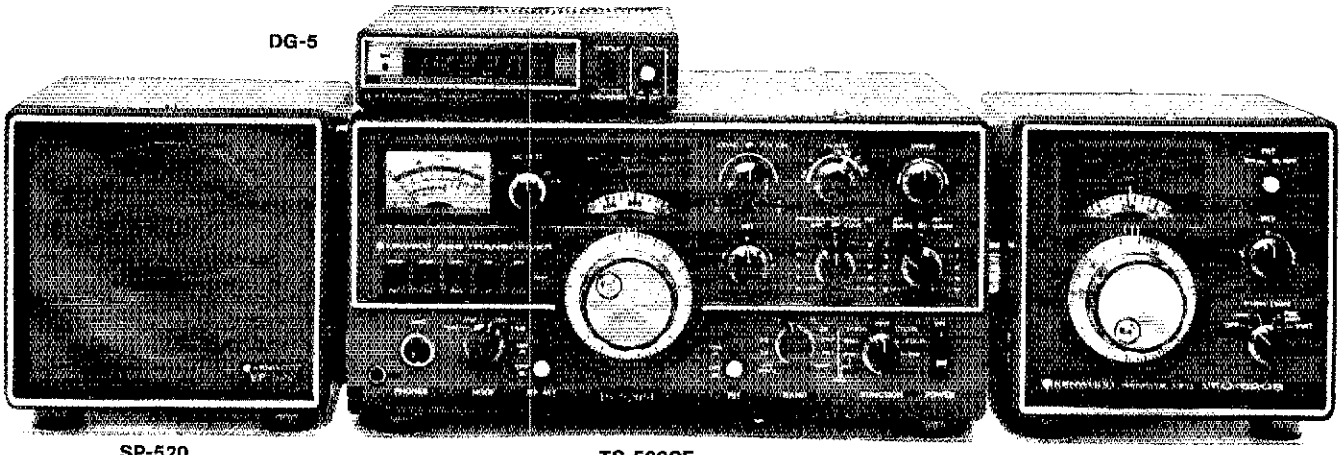
Cents-ability" in a quality 160-10 meter SB/CW rig

TS-520SE is an economical, featured 160-10 meter nsceiver, found in more ham cks than any other rig.

520SE FEATURES:
60-10 meters . . . and receives WV on 15 MHz.
00 W PEP (SSB)/160 W DC CW) input on all bands.

- CW WIDE/NARROW bandwidth switch for use with optional 500-Hz CW filter.
- Speech processor for extra audio punch.
- Effective noise blanker.
- 20-dB RF attenuator.
- RIT (receiver incremental tuning) control.
- Digital display with optional DG-5, showing actual operating frequency while transmitting and receiving.
- Eight-pole crystal filter for excellent selectivity.
- Built-in 25-kHz calibrator, adjustable to WWV.
- VOX and semi-break-in CW with sidetone.
- Built-in speaker.
- Solid-state, with tube driver and final.
- Amplified-type AGC circuit.
- Amplified-type ALC.
- Front-panel carrier level control.

OPTIONAL ACCESSORIES:
- SP-520 external speaker.
- DG-5 digital frequency display and 40-MHz counter.
- VFO-520S remote VFO.
- CW-520 500-Hz CW filter.
- AT-200 antenna tuner/SWR and RF power meter/antenna switch.



SP-520 TS-520SE VFO-520S

KENWOOD

...pacesetter in amateur radio

TR-7800

"Easy selection"...15 memories/offset recall, scan, priority, DTMF (Touch-Tone®)

Frequency selection with the TR-7800 2-meter FM mobile transceiver is easier than ever. The rig incorporates new memory developments for repeater shift, priority, and scan, and includes a built-in autopatch Touch-Tone® encoder.

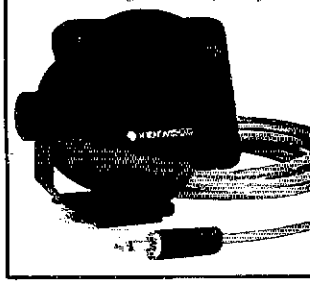
TR-7800 FEATURES:

- 15 multifunction memory channels, selected with a rotary switch. M1-M13 . . . memorize frequency and offset (±600 kHz or simplex). M14 . . . memorize transmit and receive frequencies independently for nonstandard offset. M0 . . . priority channel, with simplex, ±600 kHz, or nonstandard offset.
- Internal backup for all memories, by installing four AA NiCd batteries (not Kenwood-supplied) in battery holder.
- Priority channel (memory "0") and priority alert.
- Covers 143.900-148.995 MHz, in 5-kHz or 10-kHz steps.
- Built-in autopatch DTMF (Touch-Tone®) encoder.
- Front-panel keyboard for selecting frequency, transmit offset, and autopatch encoder tones, programming memories, and controlling scan.
- Automatic scan of entire band (5-kHz or 10-kHz steps) and memories.
- Manual scan of band and memories, with UP/DOWN microphone (standard).

SP-40

Compact, high-quality mobil speaker

- Matches all HF, VHF, and U radios for mobile operation
- Only 2-11/16 inches wide b 2 1/2 inches high by 2-1/8 inches deep.
- 4-ohm input impedance.
- Handles 3 watts of audio.
- Mounting bracket with ferr magnet. Adhesive-backed steel plate supplied for mounting virtually anywhe



- Repeater REVERSE switch
- Selectable power output. 25 W (HI)/5 W (LOW).
- LED S/RF bar meter.
- TONE switch to actuate subaudible tone module (r Kenwood-supplied).

OPTIONAL ACCESSORIES

- KPS-7 fixed-station power supply.

TR-8400

"Go synthesized on 440 MHz FM"... 5 memories, memory/band scan

The TR-8400 synthesized 70-cm UHF FM mobile transceiver covers 440-450 MHz in 25-kHz steps and includes five memories, automatic memory and band scan, UP/DOWN manual scan, and two VFOs.

TR-8400 FEATURES:

- Synthesized coverage of 440-450 MHz in 25-kHz steps.
- Five memories and memory backup terminal on rear panel.
- Two VFOs.
- Offset switch for ±5 MHz transmit offset and simplex operation. Fifth memory allows any other offset by memorizing receive and transmit frequencies independently.
- Automatic scan of memories and of 440-450 MHz band (in 25-kHz steps). Locks on busy channel and resumes when signal disappears. HOLD or mic PTT button cancels scan.
- Up/down manual band scan in 25-kHz steps with UP/DOWN microphone supplied with TR-8400.
- Only 5-3/4 inches wide, 2 inches high, and 7-5/8 inches deep. Weighs only 3.75 pounds.
- TONE switch to activate tone device (not Kenwoo supplied). DTMF (Touch-Tone®) terminal on rear pa
- Four-digit frequency disp and S/RF bar meter. Oth LEDs indicate BUSY, ON and REPEATER operation
- HI/LOW (10 W/1 W) RF output power switch.

OPTIONAL ACCESSORIES

- KPS-7 fixed-station powe supply.
- SP-40 compact mobile speaker.

TRIO-KENWOOD COMMUNICATIONS INC.
1111 WEST WALNUT / COMPTON, CA 90220

TR-9000

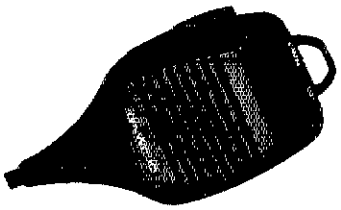
"New 2-meter direction"...compact rig with FM/SSB/CW, scan, five memories

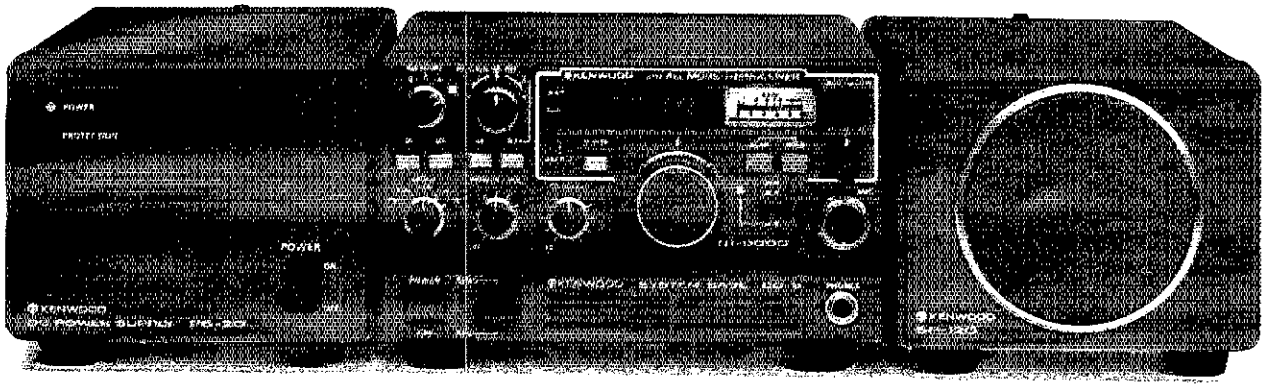
The TR-9000 combines the convenience of FM with long distance SSB and CW. It is extremely compact . . . perfect for mobile operation. Matching accessories are available for optimum fixed-station operation.

TR-9000 FEATURES:
FM, USB, LSB, and CW.
Only 6-11/16 inches wide, 2-21/32 inches high, 9-7/32 inches deep.

- Two digital VFOs, with selectable tuning steps of 100 Hz, 5 kHz, and 10 kHz.
- Digital frequency display. Five, four, or three digits, depending on selected tuning step.
- Covers 143.9000-148.9999 MHz.
- Band scan . . . automatic busy stop and free scan.
- SSB/CW search of selectable 9.9-kHz bandwidth segments.
- Five memories . . . four for simplex or ±600 kHz repeater offsets and the fifth for a non-standard offset (memorizes transmit and receive frequency independently).
- UP/DOWN microphone (standard) for manual band scan.
- Noise blanker for SSB and CW.
- RIT (receiver incremental tuning) for SSB and CW.
- RF gain control.
- CW sidetone.
- Selectable RF power outputs . . . 10 W (HI)/1 W (LO).
- Mobile mounting bracket with quick-release levers.
- LED indicators . . . ON AIR, BUSY, and VFO.

OPTIONAL ACCESSORIES:
- PS-20 fixed-station power supply.
- SP-120 fixed-station external speaker.
- BO-9 System Base . . . with power switch, SEND/RECEIVE switch (for CW), memory-backup power supply, and headphone jack.

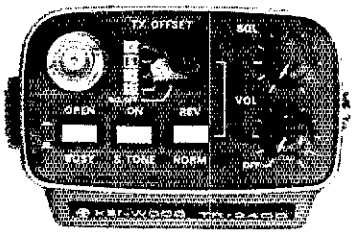




PS-20 TR-9000 BO-9 SP-120

TR-2400

"Hand-shack"...synthesized, big LCD, scan, 10 memories, DTMF (Touch-Tone®)



CONVENIENT TOP CONTROLS

The TR-2400 has the most convenient operating features desired in a 2-meter FM hand-held transceiver.

TR-2400 FEATURES:
- Large LCD digital readout. Readable in direct sunlight (virtually no current drain) and in the dark (lamp switch). Shows receive and transmit frequencies and memory channel. "Arrow" indicators show "ON AIR," "MR" (memory recall), "BATT" (battery status), and "LAMP" switch on.
- Keyboard selection of 144.000-147.995 MHz in 5-kHz increments. No "5-UP" switch needed.
- UP/DOWN manual scan in 5-kHz steps from 143.900 to 148.495 MHz.
- 10 memories. Retained with battery backup. "M0" memory may be used to shift transmitter to any frequency for nonstandard-split repeaters.
- Built-in autopatch DTMF (Touch-Tone®) encoder, using all 16 keyboard buttons.
- Automatic memory scan.
- Repeater or simplex operation. Transmit frequency shifts ±600 kHz or to "M0" memory frequency.
- Reverse switch. Transposes receive and transmit frequencies.
- Subtone switch (tone encoder not Kenwood-supplied).
- Two lock switches to prevent accidental frequency change and accidental transmission.
- External PTT microphone and earphone connectors.
- Rubberized antenna with BNC connector, NiCd battery pack, AC charger, PTT and mic plugs, handstrap, and earphone included.
- Extended operating time with LCD and overall low-current circuit design. Only draws about 28 mA squelched receive and 500 mA transmit (at 1.5 W RF output).
- High-impact case and zinc die-cast frame.
- Compact and lightweight. Only 2-13/16 inches wide, 7-9/16 inches high, and 1-7/8 inches deep. Weighs only 1.62 pounds (including antenna, battery, and hand strap).

OPTIONAL ACCESSORIES:
- ST-1 Base Stand (provides 1.5-hour-quick, trickle, and floating charges, 4-pin microphone connector, and SO-239 antenna connector).
- BC-5 DC quick charger.
- LH-1 leather case.
- BH-1 belt hook.
- PB-24 extra NiCd battery pack.
- SMC-24 speaker/microphone.

R-1000

"Hear there and everywhere"... easy tuning, digital display

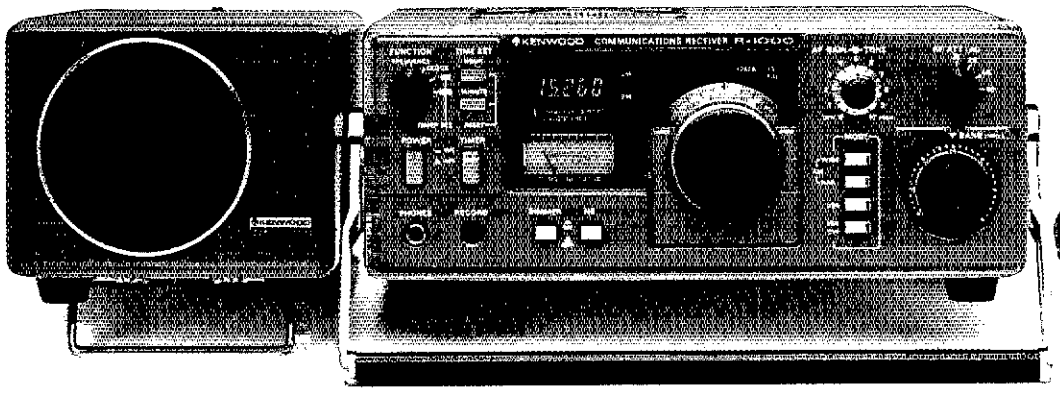
The R-1000 is an amazingly easy-to-operate, high-performance, communications receiver, covering 200 kHz to 30 MHz in 30 bands. This PLL synthesized receiver features a digital frequency display and analog dial, plus a quartz digital clock and timer.

R-1000 FEATURES:

- Covers 200 kHz to 30 MHz continuously.
- 30 bands, each 1 MHz wide.
- Five-digit frequency display with 1-kHz resolution and analog dial with precise gear dial mechanism.
- Built-in 12-hour quartz digital clock with timer to turn on radio for scheduled listening or control a recorder through remote terminal.
- Step attenuator to prevent overload.
- Three IF filters for optimum AM, SSB, CW. 12-kHz and 6-kHz (adaptable to 6-kHz and 2.7-kHz) for AM wide and narrow, and 2.7-kHz filter for high-quality SSB (USB and LSB) and CW reception.
- Effective noise blanker.
- Terminal for external tape recorder.
- Tone control.
- Built-in 4-inch speaker.
- Dimmer switch to control intensity of S-meter and other panel lights and digital display.
- Wire antenna terminals for 200 kHz to 2 MHz and 2 M to 30 MHz. Coax terminal fo 2 MHz to 30 MHz.
- Voltage selector for 100, 12 220, and 240 VAC. Also adaptable to operate on 13 VDC with optional DCK-1 ki

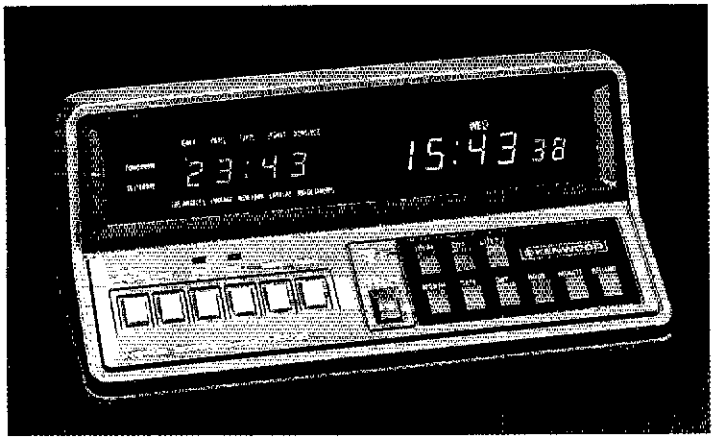
OPTIONAL ACCESSORIES:

- SP-100 matching external speaker.
- HS-5 and HS-4 headphone
- DCK-1 modification kit for 12-VDC operation.



SP-100 R-1000

HS-5



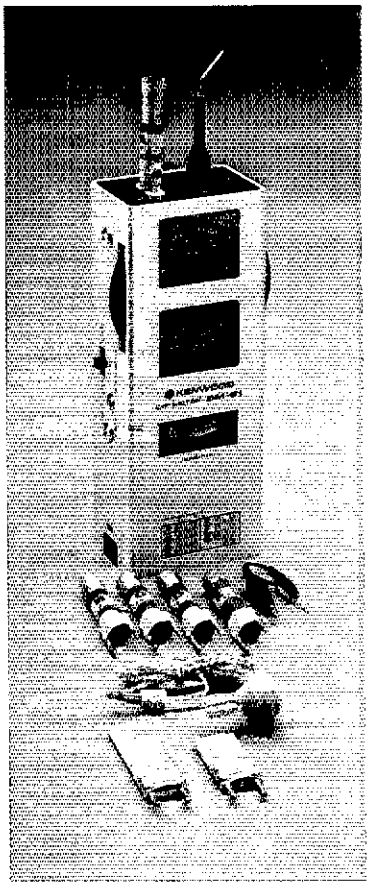
HC-10

Digital world clock with two 24-hour displays, quartz time base

The HC-10 digital world clock with dual 24-hour display shows local time and the time in 10 preprogrammed plus two programmable time zones.

HC-10 FEATURES:

- Two 24-hour displays with quartz time base. Right display shows local (or UTC) hour, minute, second, day. Left display shows month, date, world time in various cities, memory time (QSO starting time), and time difference (in hours from UTC).
- Preprogrammed time in 10 cities around the world, plus two programmable time zones.
- "TOMORROW" and "YESTERDAY" indicators.
- Memorization of present time. Can be recalled later, for logging purposes.
- High accuracy (±10 seconds/month).



DM-81

Dip meter performs many R measurements

The DM-81 dip meter is hig accurate and features, in ac tion to the traditional induct coupling technique, capacit coupling for measuring met enclosed coils and toroidal c

DM-81 FEATURES:

- Measuring range of 700 k 250 MHz in seven bands.
- Built-in storage compartm for all seven coils, capacit probe, earphone, and grou clip lead.
- All solid-state and built-in battery.
- HC-25U and FT-243 sock for checking crystals and marker-generator function
- Amplitude modulation.
- FET for good sensitivity.
- Absorption frequency met function.
- Earphone for monitoring transmitted signals.
- Capacitance probe for measuring resonant frequ cies without removing co shields, and also for meas resonant frequencies of toroidal coils.

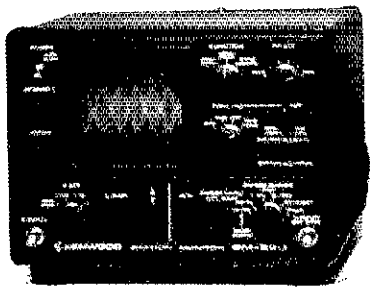
TL-922-A

Maximum legal power on 160-15 meters

he TL-922A linear amplifier provides maximum legal power on e 160-15 meter Amateur bands.

L-922A FEATURES:

2000 W PEP (SSB)/1000 W DC (CW, RTTY) input power on 160, 80, 40, 20, and 15 meters, with 80 W drive.
Excellent IMD characteristics.
Pair of EIMAC 3-500Z high-performance transmitting tubes.
- Safety protection.
- Blower with automatic turnoff-delay circuit.
- Variable threshold level type ALC.
- Two meters, one indicating plate current, and the other indicating grid current, relative RF output, and high voltage.



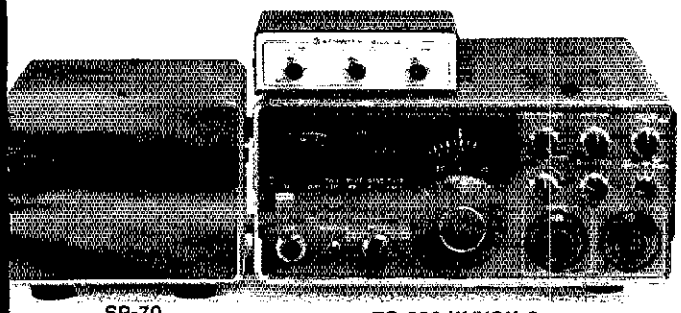
SM-220

High-performance oscilloscope for various monitoring functions

The SM-220 Station Monitor provides a variety of waveform-observing capabilities, and an optional pan display.

SM-220 FEATURES:
- Monitors transmitted SSB and CW waveforms from 1.8 to 150 MHz.
- Monitors signal waveforms in receiver's IF stage.
- Functions as high-sensitivity, wide-frequency-range (up to 10 MHz) oscilloscope.
- Tests linearity of linear amplifiers (provides trapezoid pattern).
- Allows observation of RTTY tuning points (cross pattern).
- Built-in two-tone (1000-Hz and 1575-Hz) generator.
- Expandable to pan-display capability for observing the number and amplitude of stations within a switchable ±20 kHz/±100 kHz bandwidth.

OPTIONAL ACCESSORIES:
- BS-8 pan-display module for TS-180S, TS-830S, and TS-820 Series.
- BS-5 pan-display module for TS-520 Series.



SP-70 TS-600 W/VOX-3

TS-600

All-mode, all solid-state 6-meter transceiver

he TS-600 is a 6-meter, all-mode, all solid-state transceiver ith VFO (and crystal-controlled) overage of the entire band.

S-600 FEATURES:

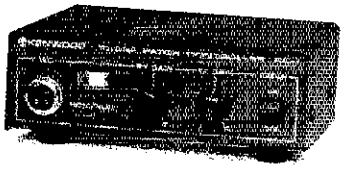
SSB (20 W PEP input), FM and CW (10 W output), and AM (5 W output).
Operates on 120/220 VAC, 50/60 Hz or 13.8 VDC.
VFO coverage of 50-54 MHz in four bands, with two-speed dial mechanism. Favorite frequencies may be crystal-controlled.
Effective noise blanker.
VOX operation with VOX-3 accessory (standard).

TS-700SP 2-meter, all-mode, all solid-state transceiver is also available . . . with similar features, plus:
- Digital frequency display, with 100-Hz resolution.
- VFO coverage of 144-148 MHz in four bands.
- Simplex and repeater operation, including all repeater subbands. REVERSE switch.

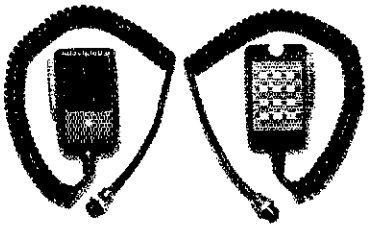
OPTIONAL ACCESSORIES:
- VFO-700S remote VFO (for TS-700S/SP).
- SP-70 external speaker.

ACCESSORIES

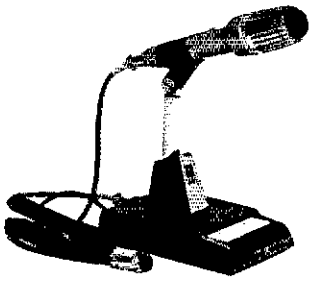
A wide selection of optional accessories is offered for optimum operating flexibility. In addition to the optional items listed with each piece of equipment described in this catalog, the following accessories are also available:



PC-1 phone patch with hybrid circuit and VU meter for null and audio gain measurements.



MC-45 Touch-Tone® (with automatic transmit) microphone.



MC-50 dynamic dual-impedance (50 kΩ/500Ω) desk microphone.

MC-30S (500Ω) and **MC-35S** (50 kΩ) dynamic noise-canceling hand microphones.

HS-5 deluxe 8Ω headphone set.

HS-4 8Ω headphone set.

NOTE: Prices and specifications of all Trio-Kenwood products are subject to *change without prior notice* or obligation.

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messages in 62 sessions and 9RN represented 100% *with Illinois stations* WD9FDB W9HOT W9NXG WB9WGD W9JIJ W9UV and WA9FYL participating. KA9HXC KA9HYZ KA9HZA and KA9IFA are new Novices of the Genois Amateur Radio Club. The St. Clair Amateur Radio Club and The Sangamon Valley Radio Club were awarded commendations for their help in the March of Dimes March. Traffic: (July) W9NXG 310, W9HOT 293, WB9WGD 282, N9TN 160, K9BVF 132, W9JIJ 95, W9OK 82, KA9ALR 75, WB9JSR 72, K9PNG 69, W9LNO 45, KN9BAM 34, W9TLU 32, N9BJQ 16, W9OBH 4, K4IZI 3. (June) N9TN 117, KN9BAM 104, K9EEA 87, K9UN 80, WD9BEX 26, N9BJQ 18.

INDIANA: SCM, Bruce Woodward, W9UMH — SEC: W9UMH. STM: W9JUJ. NMs: ITN W9QYY QIN WD9GXW ICN N9AEI VHF W9AEI VHF W9PMT. July net reports:

Net	Freq.	Time/UTC/Daily	QNI	QTC	Sess.
ITN	3910	1330/2300	2119	263	62
QIN	3656	1430/0100/1400	859	456	93
ICN	3708	0014	(no report this month)		
IPN	3910	2130	1276	118	31

VHF nets report for July: QNI 2656, QTC 168, Bulletins 25, Time 4527 minutes, for 20 nets. Indiana 100% for July 9RND stations. W9JUJ W9XD W9DLF K9FOV WD9CIS K9CGS W9URQ W9QLW WB9MIK WA9VJA. Indiana 100% CAND stations: W9JUJ K9CGS W9NGB WB9GTC W9QLW WD9CIS. Lightning Bolt certificates were issued to: K9CGS K9XA/RPT K9POP/RPT WB9AZN. I had a great time and a well attended meeting at the Logansport Hamfest. Thanks fellows. Appointments: EC: K9FVN Henry County, N9AWM Hamilton County, W9UNI Perry County, N9AMQ Franklin County, WB9ZNZ Morgan County; OTS: WD9CIV W9WKM WD9EPU W9UEM W9IOH WB9AWI WB9ZQE KA9DWD K9CGS AJ9C WD9JAB WB9UYU W9JUJ W9NAX WB9WRC N9ACG W9XD W9VAY W9FC W9KT WA9BVS WD9DWD WB9YAY K9RPZ W9ZGC K9DKB WD9JAA WD9ART; OBS: WB9VIW. The Indiana Radio Club Council presented their annual awards at the Indianapolis Hamfest to: Outstanding Amateur of the Year WA9KAG, Michigan City, Hoosier Courtesy Award: W9BS W9YEW WD9CXJ W9URQ W9JUJ W9PEV W9VMT WD9DGM K9POP K9RXK W9UMH. Meritorious Service Award: WA9BVS W9PMT. According to WA9OHX, there was only one nomination for the IRCC Outstanding Amateur of the Year. I think most radio clubs in Indiana choose an outstanding amateur of the year and it you don't you should. It follows then that your club secretary should automatically send a nomination to the IRCC secretary N9AHG. The new frequency coordinator for the Indiana Repeater Council is N9WB, RR 1 Spiceland, IN 47385. Congrats on the new baby girl. W9NTO reports E opening were good this month on six. I can report 2 FM open. I sure surprised some people around the state. WD9CIV reports that he is QSL manager for 5Z4NQ. Good DXing. Congrats to K9VDQ, new president of WVARA. This was county fair month. Congrats to Grant, Hendricks, Wabash, and Kosciusko County clubs for their fair activity and to anyone else I might have missed. Get well greetings to WA9TJS W9FVL K9RGF K9UZA WB9MPL CYL K9AGJ. Traffic: W9JUJ 1028, WB9UYU 224, W9QLW 156, WD9GWX 131, N9PS 79, KB9IT 61, W9DLF 60, K9WWJ 54, W9XD 50, WA9OCF 45, W9PMT 36, K9FZX 33, W9EI 30, WB9EAP 27, WB9WRC 27, WB9LCN 26, W9URQ 23, K9KTB 21, WA9OKK 21, W9HUF 17, WD9CSZ 16, W9WEI 14, W9EHY 13, WA9GJZ 13, WA9OHX 11, W9UPI 11, W9RTH 11, KA9EJT 10, W9IOH 10, WB9YAY 10, K9DIY 8, W9DZC 8, WD9JAB 8, K9RPZ 8, WB9ZQE 8, K9CGS 7, K9TKE 7, W9BDP 5, WD9CIV 3, W9DKP 3, W9UEM 3, K9FT 2.

WISCONSIN: SCM, Roy A. Pederson, K9FHI — SEC: W9OAK STM: K9UTQ. NMs: W9AYK WB9ESM WB9ICH N9AUG W9DM K9LGU. KA9CDR has General. N9AJQ has Extra. WA9RYT now KB9PO. KA9EOB has moved to St. Louis, MO. Sorry to hear W9KKK was a patient in hospital and had emergency heart operation, we wish you well. KA9HJW KA9DFK are Generals. Your Section Net Certificate is good for one year from date of issuance or endorsement. All ARRL appointments are good for two years from date of issuance or endorsement. ARL seven your SCM. Northwood Traffic Net had 598 checkins and handled 40 pieces of traffic. WB9LAB will be marrying the sister of K9GDF in October, congratulations. I hope all who worked 2-meters lately have had some fun working DX. BPL to KA9CPA. Please fellows and gals, send me your station activity reports and items of interest. Thanks to those stations participating in CAND and D9RN. Green Bay Two-Meter Net had 15 checkins and handled one piece of traffic. I still wonder why we have such low attendance at our WNA picnics, how about some feedback on this item, please. Any suggestions on making our nets better, let me know. Feedback, FLARC, Intercom, Traffic: KA9CPA 1515, WD9IUX 194, W9CXY 183, WB9YPY 176, W9YCV 143, N9AZI 134, WD9ESZ 95, K9FHI 92, K9AKG 85, WD9DHF 85, W9DND 72, W9DM 71, W9IEM 65, W9ICH 63, N9AUG 60, WB9ESM 60, W9UCL 56, K9UU 55, WD9BCM 47, K9AQ 40, WB9NRK 39, K9IHW 36, W9LDO 36, KA9EMF 35, AG9G 34, W9GKO 33, K9CPM 30, W9FDY 30, WB9BRE 29, KB9NG 29, W9CJE 26, KB9FM 25, K9JPS 25, WA9WYS 25, K9HDF 22, WB9PAW 22, W9UW 21, WA9DXW 20 W9SOJ 19, K9KSA 18, WB9WHO 18, WB7OJV 16, K9ANV 13, WB9YPZ 12, WD9AJA 7, N9BCX 7, AC9C 4, WA9WYI 1. (June) K9HDF 22, N9CP 13, K9UTQ 10, WD9AJA 6

DAKOTA DIVISION

MINNESOTA: SCM, Helen Haynes, WBØHOX —

Net	QNI	QTC	Sess.	Freq.
KØTS BARES	146	97	9	
KCØT St. Cloud Emergency Net	27	2	4	
KCØT Elk River		38		
KØJTA			4	96 36

WØVB reports a large sporadic opening for about 3 hours recently to the entire East Coast. Needless to say, WDØETA, WØGJM WBØCOR WØMDI, and WBØNHD and others were having a Field Day. Congratulations to WØVB, who was recently appointed Civil Defense Public Information Officer. This means he is the official spokesman through all news media for Olmsted County. We are proud of you WAØBAF decided that the grass was greener in Texas and is now a Texan. 5409 Rockwood Lane, El Paso, Texas 77913 is her official residence. We wish you the best. KØTKT and KØFVF were double op winners for Minnesota in the April Open CD Party. Other Minnesota participants were: KØII KØET KØBR. Good going guys. Let's cover the state next year and not leave it to St. Paul and Duluth. Congratulations to the upgrades: Novice to General: WDØGEL KØBTK now NØBTO KØDNR; Tech to General: WDØHQN;

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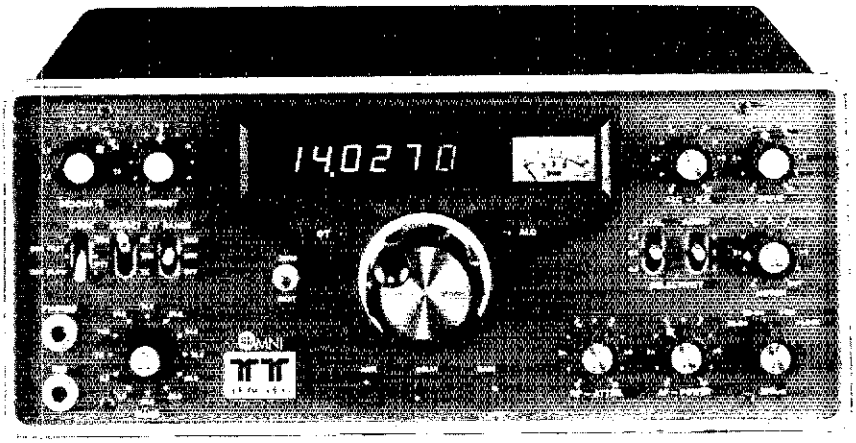

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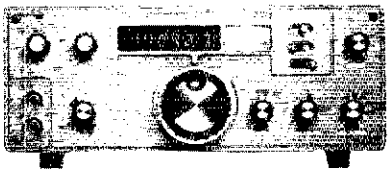
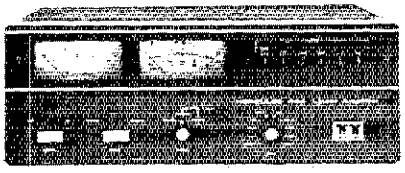
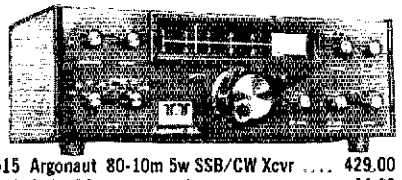
218 1.8 KHz 8 pole SSB filter 55.00
219 250 Hz 6 pole CW filter 50.00
645 Dual paddle ultramatic keyer 85.00
1140 18/24.3A DC circuit breaker 8.75



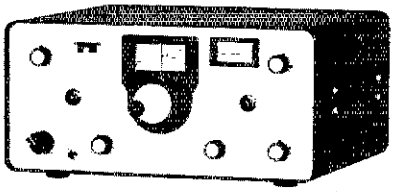
580 Delta 200w 9-band Xcvr 849.00
280 18A power supply 149.00
255 Deluxe 18A ps w/spkr 169.00
282 250 Hz CW filter 50.00
283 Remote VFO 179.00
285 500 Hz CW filter 45.00
287 Mobile mount ..... TBA
289 Noise blanker 39.00
645 Dual paddle ultramatic keyer 85.00
1140 18/24.3A DC circuit breaker 8.75



444 Hercules 1kw solid state amp 1575.00



515 Argonaut 80-10m 5w SSB/CW Xcvr 429.00
210 1A AC power supply 34.00
210/E As above, but 110/230vac 39.00
206A 25 KHz external calibrator 34.50
208A Notch/150 Hz external CW filter ... 39.00
212 29-29.5 MHz xtal for 515 ..... 5.00
213 29.5-30 MHz xtal for 515 ..... 5.00
670 Single paddle keyer 34.50



570 Century/21 80-10m 70w CW Xcvr..... $349.00
276 25 KHz external calibrator 29.00
277 1.8-30 MHz 200w tuner/SWR..... 85.00
670 Single paddle keyer 34.50
1170 5/6.75A DC circuit breaker 8.75
273 28.5-29 MHz Xtal 5.00
215P Ceramic microphone w/stand, plug ... 29.50
215PC As above, with coil cord 34.50
234 Speech processor 124.00
214 Electret microphone 39.00
247 1.8-30 MHz 200w antenna tuner 69.00
299 Speech readout 290.00
1102 Extra snap-up legs ..... pair 1.00

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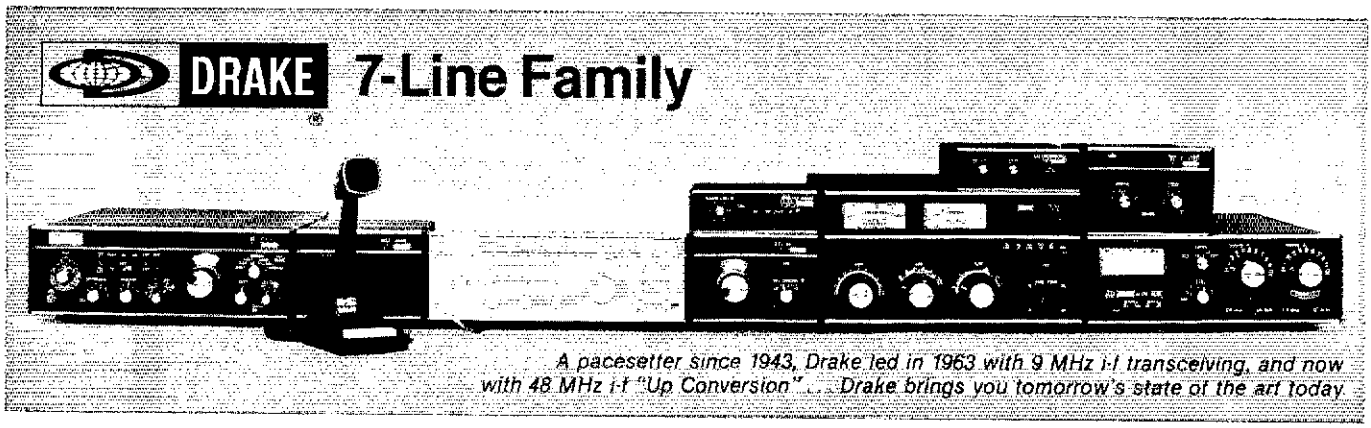
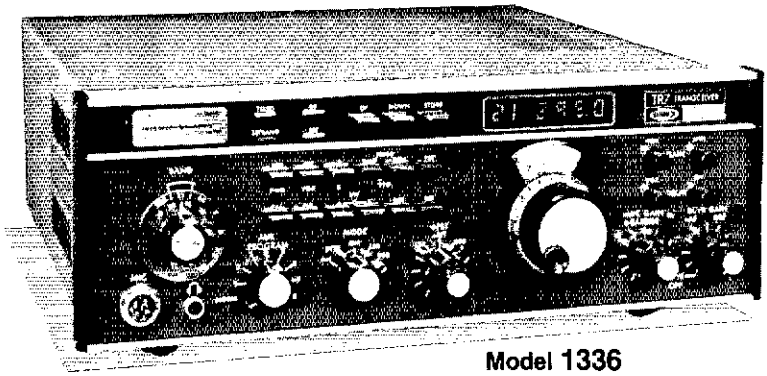
DRAKE 7-Line Family



A pacesetter since 1943, Drake led in 1963 with 9 MHz i-f transceiving, and now with 48 MHz i-f "Up Conversion" . . . Drake brings you tomorrow's state of the art today



Model 1336

TR7

solid state continuous coverage synthesized hf system

Continuous Frequency Coverage—The TR7 provides continuous coverage in receive from 1.5 to 30 MHz. Transmit coverage is provided for all amateur bands from 160 through 10 meters. The optional AUX7 Range Program Board allows out-of-band transmit coverage for MARS, Embassy, Government and Commercial services as well as future band expansions in the 1.8 through 30 MHz range.* The AUX7 Board also provides 0 through 1.5 MHz receive coverage and crystal-controlled fixed-channel operation for Government, Amateur or Commercial applications anywhere in the 1.8 to 30 MHz range.

Synthesized/PTO Frequency Control—A Drake exclusive: carefully engineered high-performance synthesizer, combined with the famous Drake PTO, provides smooth, linear tuning with 1 kHz dial and 100 Hz digital readout resolution. 500 kHz up/down range switching is pushbutton controlled.

Advanced, High-Performance Receiver Design—The receiver section of the Drake TR7 is an advanced, up-conversion design. The first intermediate frequency of 48.05 MHz places the image frequency well outside the receiver input passband, and provides for true general coverage operation without i-f gaps or crossovers. In addition, the receiver section features a high-level double balanced mixer in the front end for superior spurious and dynamic range performance.

True Passband Tuning—The TR7 employs the famous Drake full passband tuning instead of the limited range "i-f shift" found in some other units. The Drake system allows the receiver passband to be varied from the top edge of one sideband, through center, to the bottom edge of the opposite sideband. In fact, the range is even wider to accommodate RTTY. This system greatly improves receiving performance in heavy QRM by allowing the operator to move interfering signals out of the passband, and it is so flexible that you can even transmit on one sideband and listen on the other.

Unique Independent Receiver Selectivity—Space is provided in the TR7 for up to 3 optional crystal filters. These filters are selected, along with the standard 2.3 kHz filter, by front panel pushbutton control, independent of the mode control. This permits the receive response to be optimized for various operating conditions in any operational situation. Optional filter bandwidths include 6 kHz for a-m, 1.8 kHz for narrow ssb or RTTY, and 500 Hz and 300 Hz for cw.

Broadband, Solid State Design—100% solid state throughout. All circuits are broadbanded, eliminating the need for tuning adjustments of any kind. Merely select the correct band, dial up the desired frequency, and you're ready to operate.

Rugged, Solid State Power Amplifier—The power amplifier is internally mounted, with nothing outboard subject to physical damage. A Drake designed custom heat sink makes this possible. The unique air ducting design of this heat sink allows an optional rear-mounted fan, the FA7, to provide continuous, full power transmit on SSTV/RTTY. The fan is not required for ssb/cw operation, since normal convection cooling allows continuous transmit in these modes.

Effective Noise Blanker—The optional NB7 Noise Blanker plugs into the TR7 to provide true impulse-type noise blanking performance. This unit is carefully designed to maximize both blanking and dynamic range in order to preserve the excellent strong-signal handling characteristics of the TR7.

* NOTE: Transmitter coverage for MARS, Government, and future WARC bands is available only in ranges authorized by the FCC, Military, or other government agency for a specific service. Proof of license for that service must be submitted to the R. L. Drake Company, including the 500 kHz range to be covered. Upon approval, and at the discretion of the R. L. Drake Company, a special range IC will be supplied for use with the Aux7 Range Program Board. Prices quoted from the factory. See Operator's Manual for details. (Not available for services requiring type acceptance.)

TR7

ACCESSORIES

Model 1336	Drake TR7 General Coverage Digital R/O Transceiver
Model 1338	Drake RV7 Remote VFO
Model 1502	Drake PS7 120/240V Ac Supply for continuous duty operation (25 amps)
Model 1570	Drake PS75 120/240V Ac supply for intermittent duty (15 amps continuous, 25 amps intermittent)
Model 1553	Drake SP75 Speech Processor
Model 1230	Drake LA7 Line Amplifier
Model 1533	Drake CS7 Coax Switch
Model 7077	Drake Desk Microphone
Model 1520	Drake P75 Phone Patch
Model 1536	Drake Aux7 Range Program Board **
Model 1531	Drake MS7 Matching Speaker
Model 1537	Drake NB7 Noise Blanker
Model 1529	Drake FA7 Fan
Model 7021	Drake SL-300 Cw Filter, 300 Hz
Model 7022	Drake SL-500 Cw Filter, 500 Hz
Model 7023	Drake SL-1800 Ssb/RTTY Filter, 1.8 kHz
Model 7024	Drake SL-6000 A-m Filter, 6.0 kHz
Model 1335	Drake MMK-7 Mobile Mounting Kit
Model 7037	Drake TR7 Service Kit/Extender Board Set
Model 385-0004	Drake TR7 Service/Schematic Book

**Aux7 must be used with either Model 1546 RRM-7 Range Receive Module, or Model 1547 RTM-7 Range Transceive Module. Use one module per 500 kHz range. Modules plug directly into Aux7.

TR7 SPECIFICATIONS

GENERAL

Receive	
Without Aux7	1.5 to 30 MHz, continuous, no gaps.
With Aux7	Same, plus 0 to 1.5 MHz at reduced performance.
Transmit	
Without Aux7	1.8-2.0, 3.5-4.0, 7.0-7.5, 14.0-14.5, 21.0-21.5, 28.0-30.0 MHz.
With Aux7*	Above ranges, plus any eight 500 kHz segments from 1.8 to 30 MHz.
Modes of Operation	Usb, Lsb, Cw, RTTY, A-m equiv. (A-3H).
Frequency Stability	Less than 1 kHz first hour. Less than 150 Hz per hour after 1 hour warm up. Less than 100 Hz for ±10% line voltage change.
Frequency Readout Accuracy	
Analog	Better than ±1 kHz when calibrated at the nearest marker point.
Digital	15 ppm ± 100 Hz.
External Counter Mode	
Maximum Input Freq.	150 MHz.
Input Level Range	50 mV to 2 V, rms.
Power Supply Requirements	11-16 V-dc (13.6 V-dc nominal), 3A receive, 25A transmit.
Dimensions	
Depth	12.5 in. (31.75 cm), excluding knobs and connectors.
Width	13.6 in. (34.6 cm).
Height	4.6 in. (11.6 cm) excluding feet.
Weight	17.1 lb. (7.75 kg).

RECEIVER

Sensitivity	
Ssb, Cw	Less than 0.5 μV for 10 dB (S+N)/N.
A-m (30% Mod.)	Less than 2.0 μV for 10 dB (S+N)/N.
Selectivity	2.3 kHz at −6 dB and 4.4 kHz at −60 dB (1.8:1 shape factor).
Ultimate Selectivity	Greater than 100 dB.
Agc	Less than 4 dB output variation for 100 dB input signal change, referenced to agc threshold.
Intermodulation	Intercept Point, +20 dBm. Two-tone Dynamic Range, 99 dB (at spacings of 100 kHz and greater).
I-f Frequency	First i-f—48.05 MHz. Second i-f—5.645 MHz.
Image and I-f Rejection	Greater than 80 dB.
Spurious Response	Greater than 60 dB down.
Internally Generated Spurious	Less than 1 μV equivalent, except 3 μV equivalent from 5 to 6 MHz (reduced specs on internal osc frequencies).
Audio Output	2.0 watts @ less than 10% THD (4 ohm load).

TRANSMITTER

Power Input (Nominal)	
Ssb	250 watts PEP.
Cw	250 watts.
A-m equiv.	80 watts (carrier), plus upper sideband.
Load Impedance	50 ohms, nominal.
Spurious Output	Greater than 50 dB down.
Harmonic Output	Greater than 45 dB down.
Intermodulation Distortion	30 dB below PEP (24 dB below one of two tones).
Undesired Sideband Suppression	Greater than 60 dB @ 1 kHz.
Duty Cycle	
Ssb, Cw	100%.
Tune, SSTV, RTTY, A-m	w/o 1529 FA7 Fan—33%, 5 min. transmit, max. with 1529 FA7 Fan—100%.
Wattmeter Accuracy	±5% @ 100 watts (50 ohm load).
Carrier Suppression	Greater than 50 dB.
Microphone Input	High Impedance.

Specifications, availability and prices subject to change without notice or obligation.

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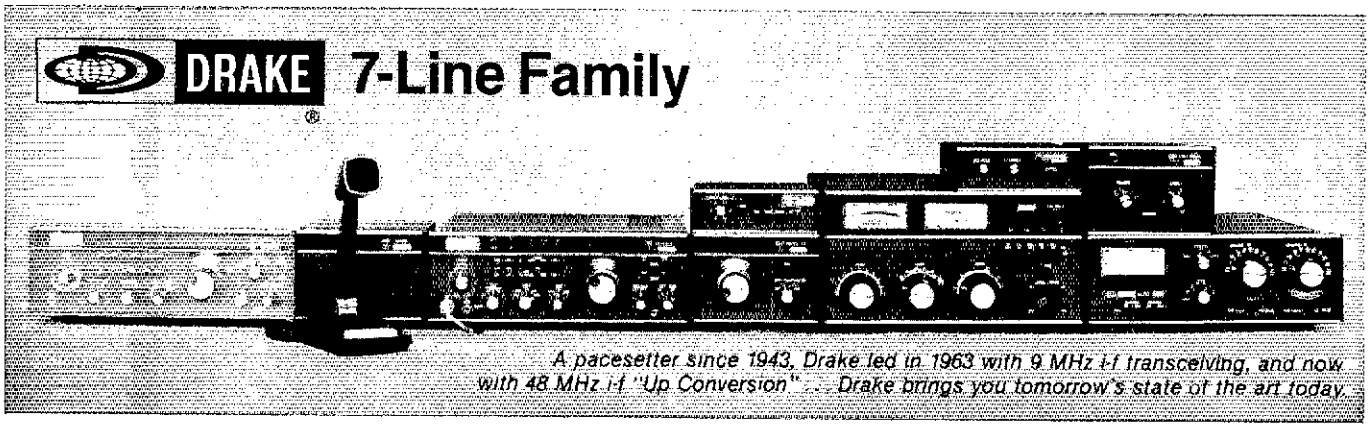
DRAKE 7-Line Family



A pacesetter since 1943, Drake led in 1963 with 9 MHz i-f transceiving, and now with 48 MHz i-f "Up Conversion" . . . Drake brings you tomorrow's state of the art today.

Model 1240

R7

Synthesized General Coverage Receiver

Full general coverage reception, 0-30 MHz, with no gaps or range crystals required.

Continuous tuning all the way from vlf thru hf. Superb state-of-the-art performance on a-m, ssb, RTTY, and cw—and it transceives with Drake TR7.

- **100% solid state broadband design,** fully synthesized with a permeability tuned oscillator (PTO) for smooth, continous tuning.
- **Covers the complete range 0 to 30 MHz** with no gaps in frequency coverage. Both digital and analog frequency readout.
- **Special front-end circuitry** employing the high level double balanced mixer and 48 MHz "up-converted" 1st i-f for superior general coverage, image rejection and strong signal handling performance.
- **Complete front-end bandpass filters** are included that operate from hf thru vlf. External vlf preselectors are not required.
- **10 dB pushbutton-controlled broadband preamp** can be activated on all ranges above 1.5 MHz. Low noise design.
- **Various optional selectivity filters** for cw, RTTY and a-m are switch-selected from the front panel. Ssb filter standard.
- **Special new low distortion "synchro-phase" a-m detector** provides superior international shortwave broadcast reception. This new technique permits 3 kHz a-m sideband response with the use of a 4 kHz filter for better interference rejection.
- **Tunable i-f notch filter** effectively reduces heterodyne interference from nearby stations.
- **The famous Drake full electronic passband tuning system** is employed, permitting the passband position to be adjusted for any selectivity filter. This is a great aid in interference rejection.
- **Three agc time constants** plus "Off" are switch-selected from the front panel.
- **Complete transceive/separate functions** when used with the Drake TR7 transceiver are included, along with separate R7 R.I.T. control.
- **Special multi-function antenna selector/50 ohm splitter** is switch-selected from the front panel, and provides simultaneous dual receive with the TR7. This makes possible the reception of two different frequencies at the same time. Main and alternate antennas and vhf/uhf converters may also be selected with this switching network.
- **The digital readout** of the R7 may be used as a 150 MHz counter, and is switched from the front panel. Access thru rear panel connector.
- **The built-in power supply** operates from 100, 120, 200, 240 V-ac, 50/60 Hz, or nominal 13.8 V-dc.
- **The R7 includes a built-in speaker,** or an external Drake MS7 speaker may be used.
- **Built-in 25 kHz calibrator** for calibration of analog dial.
- **Low level audio output** for tape recorder.
- **Up to eight crystal controlled fixed channels** can be selected. (With Drake Aux7 installed.)
- **Optional Drake NB7A Noise Blanker** available. Provides true impulse type noise blanking performance.

R7

Accessories available

Model 1531	Drake MS7 Speaker
Model 7021	Drake SL-300 Cw Filter, 300 Hz
Model 7022	Drake SL-500 Cw Filter, 500 Hz
Model 7023	Drake SL-1800 Ssb/RTTY Filter, 1800 Hz
Model 7024	Drake SL-6000 A-m Filter, 6.0 kHz
Model 7026	Drake SL-4000 A-m Filter. 4.0 kHz
Model 1532	Drake NB7A Noise Blanker
Model 1536	Drake Aux7 Range Program/Fixed-Frequency Board
Model 1548	Drake R7/TR7 Interface Cable Kit
Model 385-0005	Drake R7 Service/Schematic Book
Model 3506	Drake RP700 Receiver Protector
Model 1230	Drake LA7 Line Amplifier

R7 SPECIFICATIONS

Frequency Coverage, continuous tuning 0.01 to 30.0 MHz

Plus any eight additional 500 kHz segments between 0 and 30 MHz when programmed into Aux7 Board.

Crystal Controlled Fixed Frequencies: Up to eight crystal-controlled fixed frequencies within the 0-30 MHz range with Aux7 Accessory Board. Proper 500 kHz range for desired fixed frequency is also programmed into Aux7.

Frequency Stability: Less than 1 kHz first hour. Less than 150 Hz per hour after 1 hour warm up. Less than 100 Hz for ± 10% line voltage change.

Digital Readout Accuracy: (DR-7 installed) 15 PPM ± 100 Hz

Analog Dial Accuracy: Better than ±1 kHz when calibrated to nearest calibrator marker.

Modes of Operation: Ssb, cw, RTTY, SSTV, a-m.

Sensitivity (ssb): 1.8-30 MHz Less than .20μV for 10dB (S+N)/N with preamp on (typically .15μV) (Noise floor typically −134 dBm) Less than .50μV for 10 dB (S+N)/N without preamp (typically .30μV) (Noise floor typically −128dBm). .01-1.5 MHz Less than 1.0μV for 10 dB (S+N)/N

Sensitivity (a-m): 1.8-30 MHz Less than 1.2μV for 10dB (S+N)/N @ 30% modulation, preamp on. Less than 2.0μV for 10 dB (S+N)/N @ 30% modulation, preamp off. .01-1.5 MHz Less than 4.0μV for 10 dB (S+N)/N @ 30% modulation.

Selectivity (2.3 kHz filter supplied): 2.3 kHz at −6 dB, 4.4 kHz at −60 dB (1.8:1) shape factor. Optional 300 Hz, 500 Hz, 1800 Hz, 4 kHz, and 6 kHz filters are available as follows:

Accessory Crystal Filters

SL-300 cw filter: 300 Hz @ 6 dB, 700 Hz @ 60 dB
SL-500 cw, RTTY Filter: 500 Hz @ 6 dB, 1100 Hz @ 60 dB
SL-1800 ssb/RTTY Filter: 1800 Hz @ 6 dB, 3600 Hz @ 60 dB
SL-4000 a-m Filter: 4 kHz @ 6 dB, 8 kHz @ 60 dB
SL-6000 a-m Filter: 6 kHz @ 6 dB, 12 kHz @ 60 dB

Ultimate Selectivity: Greater than 100 dB

Intermodulation:

Two-tone dynamic range: 99 dB *	1.8-30 MHz
Third order intercept point: +20 dBm	preamp off
Two-tone dynamic range: 95 dB *	1.8-30 MHz
Third order intercept point: +10 dBm	preamp on

Blocking: >145 dB above noise floor

** (at tone spacings of 100 kHz and greater)*

I-f and Image Rejection: Greater than 80 dB (48.05 MHz 1st i-f) (5.645 MHz 2nd i-f) (50 kHz 3rd i-f)

Agc Performance; Less than 4 dB audio output variation for 100 dB input signal change above agc threshold. Agc threshold is typical .8μV with preamp off and .25μV with preamp on.

Attack time: 1 millisecond. Three selectable release times: Slow—2 seconds; Med—400 m sec; Fast—75 m sec. Also, "Off" position is provided.

Antenna Input Impedance: Nominal 50 ohms

Audio Output: 2.5 watts with less than 10% T.H.D. into nominal 4 ohm load.

Power Requirements: 100/120/200/240 V-ac ±10%, 50/60 Hz, 60 watts or 11.0 to 16.0 V-dc (13.8 V-dc nominal), 3 amps

External Counter Mode (DR-7 installed): Readout: to 100 Hz. Accuracy: 15 PPM ±100 Hz. Maximum input frequency: 150 MHz. Input level range: 50 mV to 2 V rms.

Dimensions/Weight:

Depth—13.0 in (33.0 cm) excluding knobs and connectors.
Width— 13.6 in (34.6 cm)
Height— 4.6 in (11.6 cm) excluding feet
Weight— 18.4 lbs (8.34 kg)

Specifications, availability and prices subject to change without notice or obligation.

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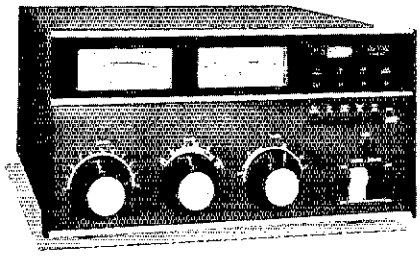


Model 1528

Drake L7

Continuous Duty 160-15* Meters

2kW Linear Amplifier

Temperature-controlled design for "key-down" operation over a wide frequency range.

2 kW PEP, 1 kW cw, RTTY, SSTV operation—all modes full rated input, continuous duty cycle.

160-15* meter amateur band coverage, plus expanded ranges for any future ht band expansions or additions within FCC rules. These ranges also include increased coverage for MARS, embassy, government, or other such services.

The Drake L7 utilizes a pair of Eimac 3-500 Z triodes for rugged use, and lower replacement cost compared to equivalent ceramic types.

Accurate built-in rf wattmeter, with forward/reverse readings, is switch selected. Calibrated 300/3000 watt scales.

Temperature controlled two speed fan is a high volume low noise type and offers optimum cooling.

Adjustable exciter agc feedback circuitry permits drive power to be automatically controlled at proper levels to prevent peak clipping and cw overdrive. Front panel control.

By-pass switching is included for straight through, low power operation without having to turn off amplifier.

Bandpass tuned input circuitry for low distortion and 50 ohm input impedance.

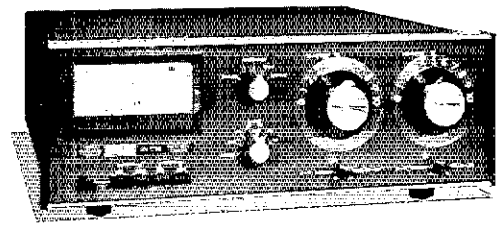
Amplifier is comprised of two units—rf deck for desk top and separate power supply.

Operates from 120/240 V-ac, 50/60 Hz primary line voltage.

DRAKE L7 SPECIFICATIONS

• **Frequency Coverage*:** Ham bands 160 through 15 meters*. Non-amateur frequencies between 6.5 and 21.5 MHz may be covered with some modification of the input circuit. • **Plate Power Input:** 2000 watts PEP on ssb and a-m. 1000 watts dc on cw, RTTY, and SSTV. • **Drive Power Requirements:** 100 watts PEP on ssb and 75 watts on cw, a-m, RTTY, and SSTV. • **Input Impedance:** 50 ohms. (Bandpass tuned input) • **Output Impedance:** Adjustable pi-network matches 50 ohm line with SWR not to exceed 2:1. • **Intermodulation Distortion Products:** In excess of −33 dB. • **Wattmeter Accuracy:** 300 watts forward and reflected, ±(5% of reading + 3 watts). 3000 watts forward, ±(5% of reading + 30 watts). • **Power Requirements:** 240 volts 50-60 hertz 15 amperes, or 120 volts 50-60 hertz 30 amperes. • **Tube Complement:** Two of 3-500Z or 8802/3-500Z or 3-400Z. • **Dimensions: Amplifier** 13.69"W x 6.75"H x 14.25"D (34.8 x 17.1 x 36.2 cm). **Power Supply** 6.75"W x 7.88"H x 11"D (17 x 20 x 28 cm). • **Weight:** Amplifier 27 lbs (12.25 kg), **Power Supply** 42.5 lbs (19.3 kg).

**Export model includes coverage of the 10-meter Ham Band.*



Model 1539

Drake Matching Networks MN7 and MN2700

Models 1538 and 1539

- **Frequency Coverage:** 1.8 - 30 MHz
- **Antenna Choice:** Matches antennas fed with coax, balanced line (use optional B-1000 Balun), or random wire.
- **Antenna/By-Pass Switching:** Allows matching unit by-pass regardless of antenna in use, and selects various antennas.
- **Extra Harmonic Reduction:** Employs "pi-network" low pass filter type circuitry for maximum harmonic rejection.
- **Built-in Metering:** Accurate Rf Wattmeter and VSWR Reading, pushbutton controlled from front panel.
- **Input Impedance:** 50 ohms resistive.
- **Power Capability:** MN7—250 watts average continuous duty (0-300 W scale). MN2700—1000 watts average continuous duty (2000 watts PEP). (0-200 or 0-2000 W scale).
- **Dimensions:** MN7—13.1"W x 4.53"H x 8.5"D excluding knobs and connectors (33.26 x 11.5 x 21.6 cm). MN2700—13.1"W x4.53"H x 13"D excluding knobs and connectors (33.26 x 11.5 x 33 cm).
- **Weight:** MN7—10 lbs (4.5 kg). MN2700—11 lbs (5 kg).

Drake MN7 and MN2700 Specifications

• **Frequency Coverage:** 1.8 to 30 MHz. Band Switch marked for 160, 80, 40, 20, 15, and 10 meter amateur bands; however, frequency coverage between amateur bands is possible by using the nearest band positions with a small reduction in matching capability. • **Input Impedance:** 50 ohms (resistive). • **Load Impedance:** 50 ohm coaxial with VSWR of 5:1 or less at any phase angle (3:1 on 10 meters). 75 ohm coaxial at a lower VSWR can be used. • **Balanced Feedlines:** With the Drake B-1000 accessory balun, which mounts on rear panel, tunes feed point impedances of 40 to 1000 ohms, or 5:1 VSWR referenced to 200 ohms (3:1 on 10 meters). • **Long-Wire Antennas:** Feed point impedances up to 5:1 VSWR referenced to 50 ohms. Also, 5:1 referenced to 200 ohms with the Drake B-1000 accessory balun (3:1 on 10 meters). • **Meter:** Reads VSWR or forward power. • **Wattmeter Accuracy:** ±5% of reading ± 1% of full scale. • **Insertion Loss:** 0.5 dB or less on each band after tuning. • **Front Panel Controls:** Provide for the adjustment of resistive and reactive tuning, antenna switching, band switching, VSWR calibration, and selection of watts or VSWR calibration, and selection of watts or VSWR functions of the meter. • **Rear Panel Connectors:** The rear panel has four type SO-239 connectors (one for input and 3 for outputs), three screw terminal connections (for long-wire and open-wire feeder systems), and a ground post.

Specifications, availability and prices subject to change without notice or obligation.

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DRAKE 7-Line Family

ACCESSORIES

A Model 7077 Dynamic Desk Microphone

• **Audio and level characteristics** custom designed to match the transmit audio requirements of the Drake TR7. • **Features both VOX and PTT** operation without modification. • **High Impedance** • **Includes coil cord and plug** wired for direct connection to the Drake TR7. • **Style and color** provide a beautiful match to the Drake 7-line • **Size** 4.3"W x 5.8"D x 9.3"H (10.9 x 14.7 x 23.6 cm). **Weight** 1 lb 7 oz (650 g).

Model 1553

C SP75 Speech Processor

Provides an increase in average power/readability of a single sideband voice signal during weak signal, high interference conditions. The SP75 is connected between the microphone and microphone input of the ssb transmitter, requiring no modification of existing transmitter or transceiver. A front panel switch allows the processor to be switched in or bypassed. Two additional inputs, such as a tape player or phone patch, may be front panel selected.

Rf envelope clipping adjustable between zero and twenty decibels. LED indicates proper audio input level.

Muting circuitry reduces gain during speech pauses, allowing VOX operation with the processor on.

SPECIFICATIONS • **Processing Type:** Preclipping audio compression followed by rf envelope clipping at the processor intermediate frequency. • **Rf Clipping Range:** Adjustable 0 to 20 dB from front panel control. • **Input Level (Microphone Input):** 3.5 mV minimum for full processing. Gain adjustable to accommodate up to 300 mV maximum. • **Input Level (Tape and Patch Inputs):** 15 mV minimum for full processing. 30 mV maximum. • **Input Impedance (Microphone):** 1 megohm. • **Input Impedance (Tape and Patch):** 50 kilohm. • **Output Level w/Processing:** 0-50 mV adjustable into 50 kilohm load. • **Output Impedance:** 50 kilohm. • **Muting (Microphone Input Only):** 10 to 20 dB attenuation during speech pauses. • **Frequency Response:** 400-6000 Hz@6 dB. • **Distortion:** Less than 5% T.H.D.@1kHz, 20 dB clipping. • **Power:** 11-16 V-dc@95 mA. • **Size:** 7"L x 6¼"W x 2¼"H (17.3 x 15.9 x 5.4 cm). • **Weight:** 1.4 lbs. (.63 kg).

Model 1520

D P75 Phone Patch

Hybrid Phone Patch for use with 7-line or other receiver/transmitter combination. • In/out Switching • Adjustable TX and RX level controls.

Model 1535

E CS7 Coax Switch

• Switches up to five coax-fed antennas via one main feed line. • Allows selection of up to five radios at other end of main feed line. • Minimizes amount of coax needed for multi-antenna installation. • Grounds unused inputs (both local and remote).

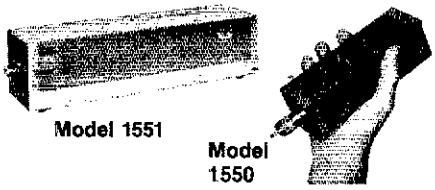
DRAKE CS7 SPECIFICATIONS • **Maximum Input Power:** 2000 watts PEP • **Frequency Range:** Up to 30 MHz, insertion of Switch changes VSWR no more than 1.05:1. From 30 MHz to 150 MHz; insertion changes VSWR no more than 1.5:1 (both switches). • **Operating Temperature Range:** −40°F. to 150°F. • **Supply Voltage:** 120 V-ac or 240 V-ac selectable, 50/60 Hz, 50 watts. • **Dimensions & Weight: Console**—5.25"H x 6.81"W, 7.06" cabinet depth (13.3 x 17.3 x 17.9 cm); 4.33 lbs (1.96 kg); **Remote Antenna Switch**—7.13"H x 5.88"W x 4.39"D (18.1 x 15.0 x 11.1 cm). 8.19" (20.8 cm) center to center mounting; 5 lbs (2.27 kg).

Model 1531

B MS7 Matching Speaker

• **Size:** 7.5"D x 6.9"W x 4.6"H excluding feet (19 x 17.5 x 11.6 cm). • **Weight:** 2.5 lbs (1.13 kg).

"Dry" Dummy Loads
—no oil required



Model 1551

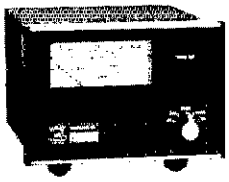
Model 1550

Model 1551 Drake DL-1000

• **1000 watts** for 30 seconds, with derating curve to 5 minutes. Accepts Drake FA7 cooling fan for extended high power operation. • **VSWR of 1.5:1 max.** 0-30 MHz • **SO-239 coax connector** • **Rubber feet** for desk or bench use • **Size** 14" x 3.6" (35.6 x 9.1 cm). **Weight:** 2 lbs (910 g).

Model 1550 Drake DL-300

• **300 watts** for 30 seconds, with derating curve to 5 minutes. • **Built-in PL-259** coax connector for direct connection to rear of transceiver or transmitter—no jumper coax necessary. • **VSWR of 1.1:1 max.** 0-30 MHz 1.5 max 30-160 MHz • **Ideal as bench test device** for amateur or commercial hf and vhf gear. • **Small size** fits conveniently in any field service tool box. 6.7" x 2.08" (17.0 x 5.3 cm). **Weight:** 11 oz (310 g).



WH7 Directional Rf Wattmeter

Model 1514

• Directional, in-line wattmeter. • Removable coupler provides remote metering. • Three calibrated scales (0-20, 0-200, and 0-2000 watts. • Fourth scale provides direct reading VSWR.

SPECIFICATIONS: • **Frequency Coverage:** 1.8-30 MHz. • **Line Impedance:** 50 ohm resistive. • **Power Capability:** 2000 W continuous. • **Jacks, Removable Coupler:** Two SO-239 input and output connectors. • **Semiconductors:** Two power meter rectifiers. • **Accuracy:** ±(5% of reading + 1% of full scale). • **VSWR Insertion:** Insertion of wattmeter in line changes VSWR no more than 1.05:1. • **Shipping Weight:** 3 lbs (1.4 kg). • **Dimensions:** 5.3"H x 6.9"W x 7.5"D (13.5 x 17.5 x 19 cm).

Model 1230

LA7 Line Amplifier

Line output, 1 mW nominal into 600 ohm balanced, adjustable by internal pre-set level control.

TV Interference Filters

High Pass Filters for TV Sets

More than 40 dB attenuation at 52 MHz and lower. Protect the TV set from amateur transmitters 6-160 meters.

Model No. 1603
Drake TV-300-HP

For 300 ohm twin lead. New terminals for easy installation.

Model No. 1610
Drake TV-75-HP

For 75 ohm TV coaxial cable; TV type "F" connectors installed.

Low Pass Filters for Transmitters

Four pi sections for sharp cut off above the hf amateur bands and to attenuate transmitter harmonics falling in any TV channel and fm band. 52 ohm. SO-239 connectors built in.

Model No. 1608 **Drake TV-3300-LP**

1000 watts max. below 30 MHz. Attenuation better than 80 dB above 41 MHz. Helps TV i-f interference, as well as harmonic interference.

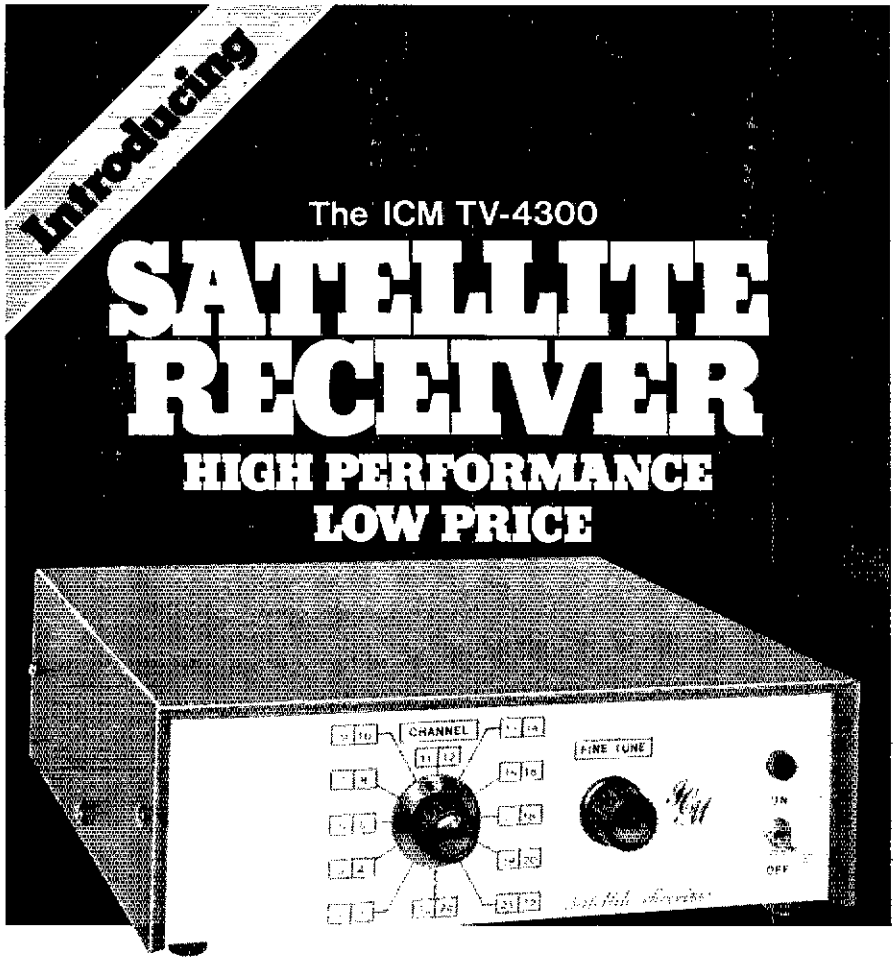
Model No. 1605 **Drake TV-42-LP**

A four section filter designed with 43.2 MHz cut-off and extremely high attenuation in all TV channels for transmitters operating at 30 MHz and lower. Rated 100 watts input.

Specifications, availability and prices subject to change without notice or obligation.

R.L. DRAKE COMPANY DRAKE

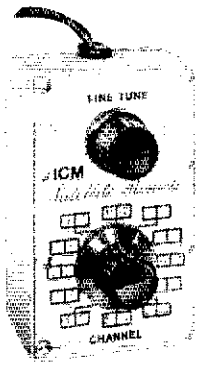
540 Richard St., Miamisburg, Ohio 45342, USA Phone: (513) 866-2421 • Telex: 288-017



International's TV-4300 is a high performance satellite receiver that tunes all channels within the 3.7 — 4.2 GHz band. Standard dual audio output provided at 6.2 and 6.8 MHz. Others available.

The TV-4300 is a fully packaged and assembled receiver complete with a built-in LNA power supply, built-in AFC, tuner, control circuitry and power cable. All output levels compatible with video monitor and VTR input. Easy to use! Simple tuning!

$995.00



Select These Options . . . .

Remote tuning control $99.50

Six frequency, crystal control, audio with stereo output. (Factory installed 6.2 and 6.8 MHz crystals supplied) $89.50

Other audio frequency crystals ..... $9.50 ea.

Model TV-4300A . . . supplied with remote control and six frequency, crystal control, audio with stereo output $1,149.00

Write for information.

INTERNATIONAL CRYSTAL MANUFACTURING CO., INC.
10 N. Lee, Oklahoma City, Oklahoma 73102, 405-236-3741

General to Advanced WDØAKS. It was just reported that over 700 persons took part in the St. Cloud Hamfest. A good crowd and a good fest denotes excellent planning and a lot of hard work. I would like to thank Hibbing and the Iron Range Clubs for the flowers, song and well wishes on my birthday at their excellent hamfest.

Net	Mgr	Time	Freq.	QNI	QTC
MSPN/N	WAØAIN	1705Z	3945	600	65
MSPN/E	KCØT	2245Z	3929	686	171
MSN/1	AFØO	2330Z	3685	189	55
MSN/2	KØPIZ	0300Z	3685	141	33
MSSN	KCØZ	2215Z	3710		
MNAWXN	WAØONE	2315Z	3929		

Traffic: WAØIFC 398, WBØHOX 137, WØHZU 132, KØPIZ 114, AFØO 86, KCØT 77, WAØAIN 43, WØHGY 40, WBØNZB 30, WØOPX 27, WØRIQ 26, KCØZ 26, KØJCF 22, WAØYVT 19, NØBRC 16, WBØSCN 16, KØTS 7, KØTO 6, WBØWXU 5, WDØCGM 4, KBØJA 1

NORTH DAKOTA: SCM, Lois A. Jorgensen, WAØRWM — SEC: WBØTEE. OBS: WØDM. NM: WAØCRH. OO: WDØCLB. Congrats to Novice KAØIVO AND KAØBOS; KAØHNZ to Tech and WBØUOR to General. WBØLPV was the ND Ham of the Year at the Peace Garden Hamfest. It was a very successful event with about 150 hams registered. Next year Devils Lake will be the hosts. Welcome to VE6KH who is moving to Bismarck. Congrats to WAØLPV and XYL on new harmonic. New officers at the Bismarck Radio Club are WBØSJG, pres.; WBØOFW, vice pres.; WØCFU, secy.; WAØCYW, treas.; WDØEUV, asst secy/treas. Congrats and have a good year. Haven't got all the result from the clubs for Field Day but sounds like good results considering the weather. Traffic: WAØRWM 105, NØAFP 27, WDØGMD 4.

SOUTH DAKOTA: SCM, Lydia S. Johnson, WØKJZ — ASCM: WØDVB. SEC: WAØTNM. NMs: WØs HOJ MZI WAØs TNM VRE WDØBMR. Congrats to WDØBMR for earning the first PSHR certificate in SD and WAØTNM with 94 points for PSHR. The following received Section Net Certificates: KØAIE WAØAUX KØBMM WAØBMG WØCTZ WBØFKI WØKUX WBØKUF KBØLM WBØPAI WBØRXF KØTXU WØNEO WAØVMI WAØVRD WBØWZZ WAØYIM WØYMU KØZBJ KØTXJ KØTVJ. The SD Hamfest held in Rapid City was well attended with 250 registered. Pre-register prize went to WBØZMW, and the main to KØSTF; the "Bachelor of Science" award to WAØYRI; code to KØFW WØSMV. New president for WAR WHOOPS is KØAS; WAØVRD, treas., WAØVRE, secy. Congrats to the Black Hills ARC members for a job well done! Traffic: WDØBMR 122, WØHOJ 84, KØFRE 77, WØMZI 77, WØDVB 76, WAØTNM 34, WBØOMF 29, WØKJZ 22, WAØVRE 15, WØIG 5.

DELTA DIVISION

ARKANSAS: SCM, S. M. Pokorny, W5UAU — SEC: K5TML. NMs: WA5LGN W5MYZ W5POH WA5ZWZ. Nets: OZK 3.760 0000/dy 147 25 W5MYZ; APN 3.937 1100/M-S 654 44 W5POH; M-Bird 3.928 2130/M-F 728 14 WA5ZWZ; ARN 3.995 2330/dy 883 67 WA5LGN; SCARC 28.765 0130/M-T 94 11 WA5VSV. Ft Smith ARC Field Day participants were 26 operators and loggers. Ft Smith ARC Novice class has about 25 students. NWAARC Prairie Creek cookout attneded by 40 club members, their families and friends July 11th. KA5GZK now Advanced with new call KC5AB. Razorback Chapter OCWA fall meeting will be at Harrison Ark. Oct 4th. OBs WB5KUI 6, K5DW 4, WA5LGN 4, W5UAU 2. Traffic: W5OFU 40, W5UAU 26, W5POH 25, K4DW 21, WA4LWJ 8, WB5GQH 7, W5EIJ 6, W5KL 4.

LOUISIANA: SCM: Jim Giammanco, N5IB — SEC: WB5TPG. Congrats to WD5EAE, who is the new manager of LSN. WD5FLM reports plans for a program on ham radio at the Lion's camp for handicapped children at Leesville. Net Control KB5YK and 12 other Baton Rouge area hams received commendation from the Baton Rouge c.d. and the National Weather Service for their work in the Weather Watch Net. It's been a busy time for WB5NAA, who has welcomed his 5BWAS, OXCC, and his new baby boy! SARA hosted a most enjoyable LA State Convention. One of the highlites was the presentation of an award to Ernest Ethridge of the National Weather Service for his support of ham radio in the Skywarn Program. Also, during the RACES and ARES forum, Al Bennett of the state c.d. office announced that William Armour is the new state RACES Officer. LA Council of ARC is making a compilation of repeaters in the state. Send pertinent info to W5MLE. Don't forget the emergency net, LEN. It's the best way to keep up with emergency organization within the state.

Net	Freq	Time	QNI	QTC	Mgr.
LAN	3615 kHz	7 & 10 P.M. Dy	170	95	N5RB
LTN	3910 kHz	6:30 P.M. Dy	—	—	N5FK
LSN	3703 kHz	7:30 P.M. M-F	132	36	WD5EAE
LRN	3587.5 kHz	6:30 P.M. Sun	4	5	N5RB
LEN	3910 kHz	8:00 P.M. Sun	—	—	WB5TPG.

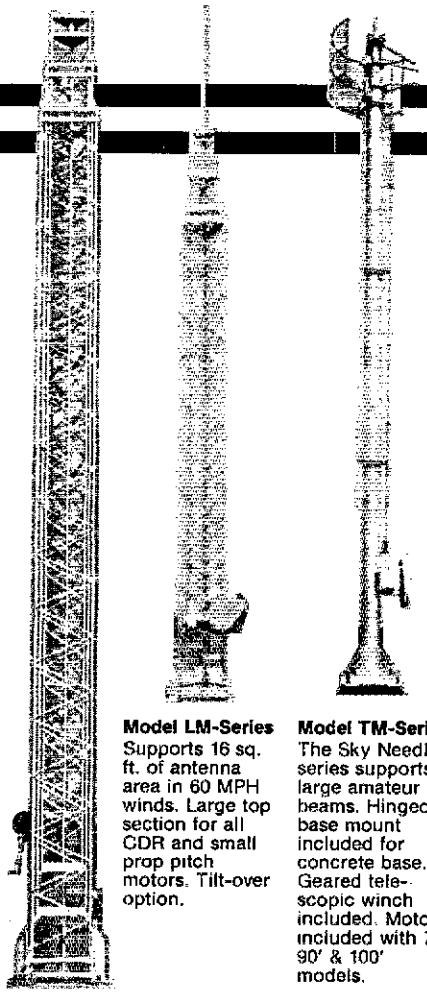
Traffic: N5RB 104, WD5EAE 98, W5VMY 77, WD5FLM 72, N5BFV 64, WB5TPG 46, N5IB 45, WB5QDJ 20, WD5GJB 9, WB5IKT 5, KA3BER/5 2.

MISSISSIPPI: SCM, E. Ed Robinson, W5XT — SEC: WB5FXA. Mid summer heat waves and thunderstorms are upon us. The first of this year's hurricanes is running wild in the Gulf and many hams are checking equipment, etc. hoping to be of help should the need arise. With vacation time in bloom as well as the hot temperatures, I get very little news to report. Please send me your news as this is YOUR column. CAND (W5KLV) sess 62, QTC 725, with DRN5 rep. 100% by Miss. station N5AMK. DRN5 (WB5NKD) sess 31, QTC 350, with Miss. rep. 100% by KA5AFT N5AMK W5EDT WD5EYM K5FI WB5HAS WA5OPT K5OBU. CGCHN (KC5M) sess 31, QNI 1915, QTC 119. MTN (K5OAF) sess 31 ONI 121, QTC 54. MSN (KA5GGG) sess 13, QNI 74, QTC 5. MN (K4JSB) sess 31, ONI 586, QTC 5. RACES (N5AMK) sess 4, ONI 153, QTC 1. Traffic: N5AMK 255, K5OAF 114, W5EDT 102, WB5SNB 26, W5XT 22, W5RIM 11, K5FI 7.

TENNESSEE: SCM, Earl Leonard, KB4G — SEC: W4NZW. STM: WB4PRF. List of nets:

Net	Freq. (MHz)	Days/	Time (UTC)	Mgr.
TEMPN	3.980	M-F	1140	WA4EWW
TMPN	3.980	M-F	1245	W4PFP
		SaSu	1400	
TFPN	3.980	Tu - Sa	0030	K4VM
TN	3.635	Dy	0100	W4ZJY
TSN	3.710	Tu - Sa	0000	WA4CNY
MTTMN	28.8	Tu F	0200	WB4CHS (W4GVC)
ETTMN	28.7	W F	0200	WB4NFI
	50.4	TuThSa	0000	WA4SXM
ET VHFN	145.2	W F	0200	WB4DZG
CCN	146.07/67	TuThSa	0200	W4IZG

Buy Direct from the Tri-Ex® Factory



Model W-Series
Supports 9 sq. ft. of antenna area in 50 MPH winds. CDR rotator mounting plate in top section. Rigid base mount included.

Model LM-Series
Supports 16 sq. ft. of antenna area in 60 MPH winds. Large top section for all CDR and small prop pitch motors. Tilt-over option.

Model TM-Series
The Sky Needle series supports large amateur beams. Hinged base mount included for concrete base. Geared tele-scopic winch included. Motor included with 70', 90' & 100' models.

Come to Tri-Ex for innovative tower design and engineering! Our towers are famous all over the world for their strength, stress and wind resistance. Now you can buy a superior Tri-Ex tower at FACTORY SAVINGS!

Choose your metal. Towers can be fabricated in steel to ASTM Specifications with hot-dipped galvanized finish (done after construction so that inside surfaces are zinc-coated, too). Or in Triexium™, our lightweight, corrosion resisting, high-strength light alloy.

Tri-Ex HAM towers are available self-supporting or guyed; take your choice. The W series of crank-up towers, the LM series of crank-up/tilt-over towers and the TM sky needles are self-supporting.

Use your charge power to buy your tower. Tri-Ex honors Visa and Master Charge credit cards. **If you have questions about tower accessories or which size tower is right for your antenna, call Bill Salerno, his technical sales know-how is ready to serve you.**

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Card # ..... Expires .....

Bank # ..... Signature .....

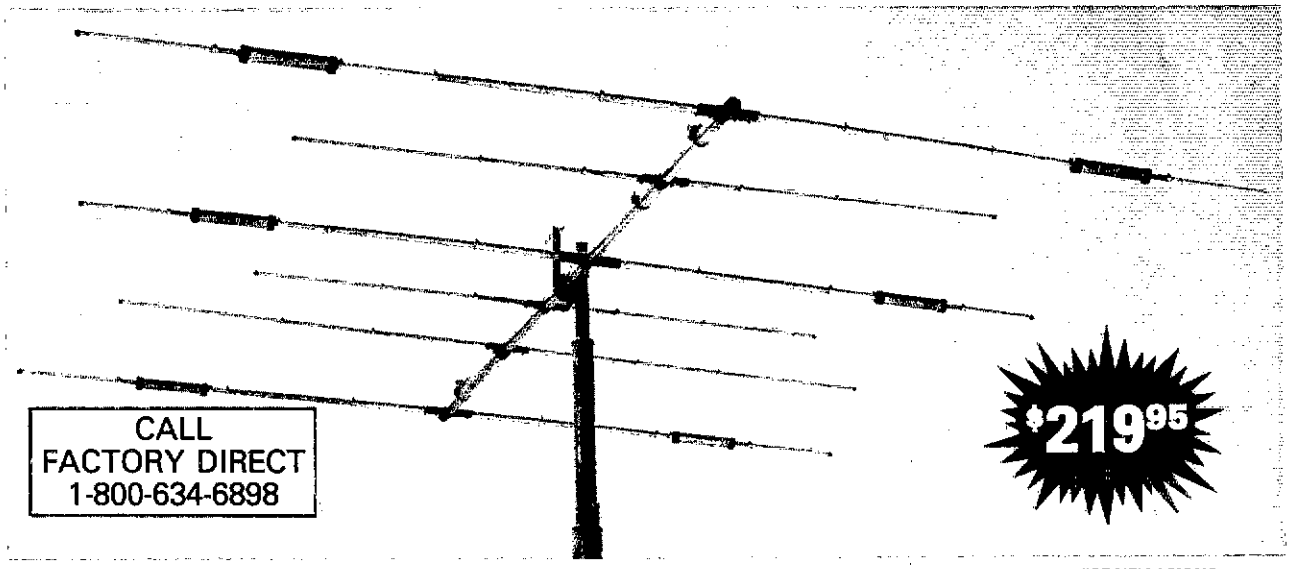
Model Number	Nested Height	Extended Height	Wind Load or 50 MPH Antenna Load	Factory Direct Price
ED 40*	13' 0"	40'	6.0 Sq. Ft.†	$ 492.00
MW 35**	20' 5"	35'	9.5 Sq. Ft.‡	435.00
MW 50**	20' 10"	50'	8.6 Sq. Ft.‡	668.00
MW 65**	21' 3"	65'	5.0 Sq. Ft.‡	913.00
W 36**	20' 6"	36'	9.0 Sq. Ft.	546.00
W 51**	21' 0"	51'	9.0 Sq. Ft.	844.00
WT 51**	21' 0"	51'	9.0 Sq. Ft.	923.00
W 67**	22' 0"	67'	9.0 Sq. Ft.	1,816.00
LM 237**	20' 6"	37'	16.0 Sq. Ft.	1,064.00
LM 354**	21' 0"	54'	16.0 Sq. Ft.	1,537.00
LM 470**	23' 6"	70'	16.0 Sq. Ft.	2,826.00
LM 470D** Motorized	23' 6"	70'	16.0 Sq. Ft.	3,221.00
TM 490** Sky Needle	28' 0"	90'	37.8 Sq. Ft.	10,560.00

*Triexium™
**Also available in Triexium. Please consult factory for prices.
†When properly guyed 2 positions.
‡Roof bracket or guyed at 1st level.

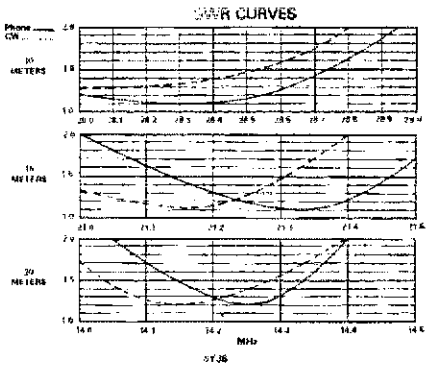
NOTE: All products FOB Visalia, CA. Prices and specifications subject to change without notice. Ninety day limited warranty. California residents add sales tax.

WILSON SYSTEMS, INC.

the SYSTEM 36



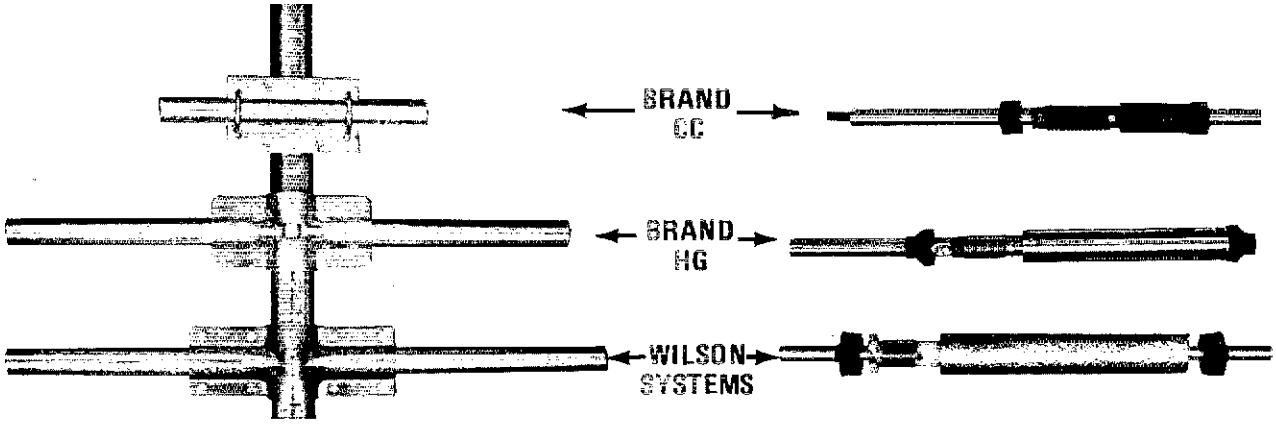
A trap loaded antenna that performs like a monobander! That's the characteristic of this six element three band beam. Through the use of wide spacing and interlacing of elements, the following is possible: three active elements on 20, three active elements on 15, and four active elements on 10 meters. No need to run separate coax feed lines for each band, as the bandswitching is automatically made via the High-Q Wilson traps. Designed to handle the maximum legal power, the traps are capped at each end to provide a weather-proof seal against rain and dust. The special High-Q traps are the strongest available in the industry today.



SPECIFICATIONS

Band MHz	14-21-28
Maximum power input	Legal Limit
Gain (dbd)	Call Factory
VSWR @ resonance	1.3:1
Impedance	50 ohm
F/B Ratio	Call Factory
Boom (O.D. x Length)	2" x 24'2½"
No. of Elements	6
Longest Element	28'2½"
Turning Radius	18'6"
Maximum Mast Diameter	2"
Surface Area	8.6 sq. ft.
Matching Method	Beta
Wind Loading @ 80 mph	215 lbs.
Mfaximum Wind Survival	100 mph
Feed Method	Balun (Supplied)
Assembled Weight (approx.)	53 lbs.
Shipping Weight (approx.)	62 lbs.

Compare the SY-36 with others . . .



Compare the size and strength of the boom to element clamps. See who offers the largest and heaviest duty. Which would you prefer?

Wilson Systems traps offer a larger diameter trap coil and a larger outside housing, giving excellent Q and power capabilities.

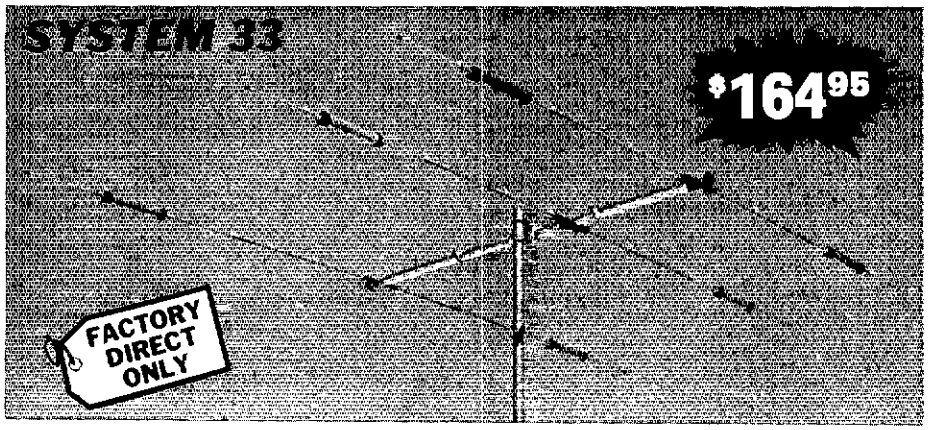
CALL
FACTORY DIRECT
1-800-634-6898

WSI WILSON SYSTEMS, INC.

4285 S. Polaris Ave., Las Vegas, Nevada 89103

Prices and specifications subject to change without notice.

WILSON SYSTEMS INC.



Capable of handling the Legal Limit, the *SYSTEM 33* is the finest compact tri-bander available to the amateur.

Designed and produced by one of the world's largest antenna manufacturers, the traditional quality of workmanship and materials excels with the *SYSTEM 33.*

The boom-to-element mount consists of two 1/8" thick formed aluminum plates that will provide more clamping and holding strength to prevent element misalignment.

Superior clamping power is obtained with the use of a rugged 1/4" thick aluminum plate for boom to mast mounting.

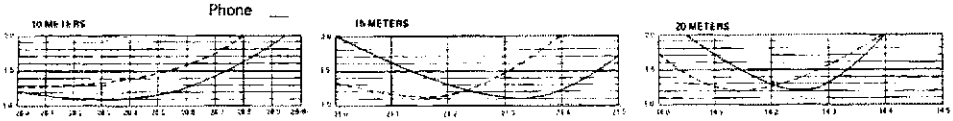
The use of large diameter High-Q Traps in the *SYSTEM 33* makes it a high performing tri-bander and at a very economical price.

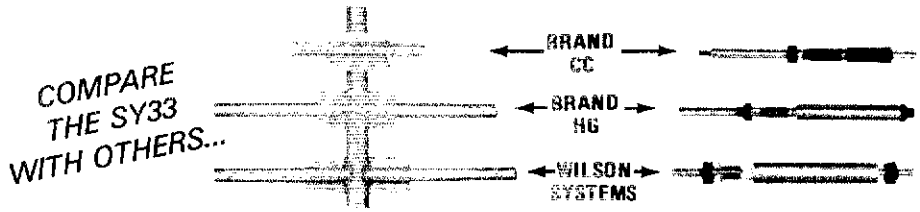
A complete step-by-step illustrated instruction manual guides you to easy assembly and the lightweight antenna makes installation of the *SYSTEM 33* quick and simple.

SPECIFICATIONS

Band MHz..... 14-21-28	Boom (O.D. x length) 2" x 14'4"	Wind load @ 80 mph .. 114 lbs
Max power input.... Legal limit	No. elements..... 3	Assembled Wt..... 37 lbs
Gain (dbd)..... Call Factory	Longest element..... 27'4"	Shipping Wt..... 42 lbs
VSWR at resonance..... 1.3:1	Turning radius..... 15'9"	Direct 52 ohm feed
Impedence..... 50 ohms	Max. mast diameter... 2" O.D.	no balun required
F/B ratio..... Call Factory	Surface area..... 5.7 sq. ft.	Max wind survival ... 100 mph

ACTUAL SWR CURVES





Compare the size and strength of the boom to element clamps. See who offers the largest and heaviest duty. Which would you prefer?

Wilson Systems traps offer a larger diameter trap coil and a larger outside housing, giving excellent Q and power capabilities.

ADD 40 METERS TO YOUR TRI-BAND WITH THE 33-6 MK

$64.95

— IN STOCK —

Now you can have the capabilities of 40-meter operation on the *SYSTEM 36* and *SYSTEM 33.* Using the same type high quality traps, the 40-meter addition will offer 150 KHZ of bandwidth. The 33-6 MK will fit your present SY36, SY33, or SY3 and use the same single feed line.

The 33-6 MK adds approximately 15' to the driven element of your tri-bander, increasing the tuning radius by 5 to 6 feet. This addition will offer a rotatable dipole at the same height of your beam.

WILSON SYSTEMS, INC.
4286 S. Polaris Ave., Las Vegas, Nevada 89103

Prices and specifications subject to change without notice

ORDER FACTORY DIRECT
1-800-634-6898

$64.95

WV-1A

4 BAND TRAP VERTICAL (10 - 40 METERS)

No bandswitching necessary with this vertical. An excellent low cost DX antenna with an electrical quarter wavelength on each band and low angle radiation. Advanced design provides low SWR and exceptionally flat response across the full width of each band.

Featured is the Wilson large diameter High-Q traps which will maintain resonant points with varying temperatures and humidity.

Easily assembled, the WV-1A is supplied with a base mount bracket to attach to vent pipe or to a mast driven in the ground.

NOTE:
Radials are required for peak operation or above ground mounting. (See GR-1 below)

SPECIFICATIONS

- 19' total height
- Self supporting — no guys required
- Weight — 14 lbs.
- Input impedance: 50 Ω
- Powerhandling capability: Legal Limit
- Two High-Q traps with large diameter coils
- Low angle radiation
- Omnidirectional performance
- Taper swaged aluminum tubing
- Automatic bandswitching
- Mast bracket furnished
- SWR: 1.1:1 or less on all bands

GR-1

GROUND RADIAL KIT

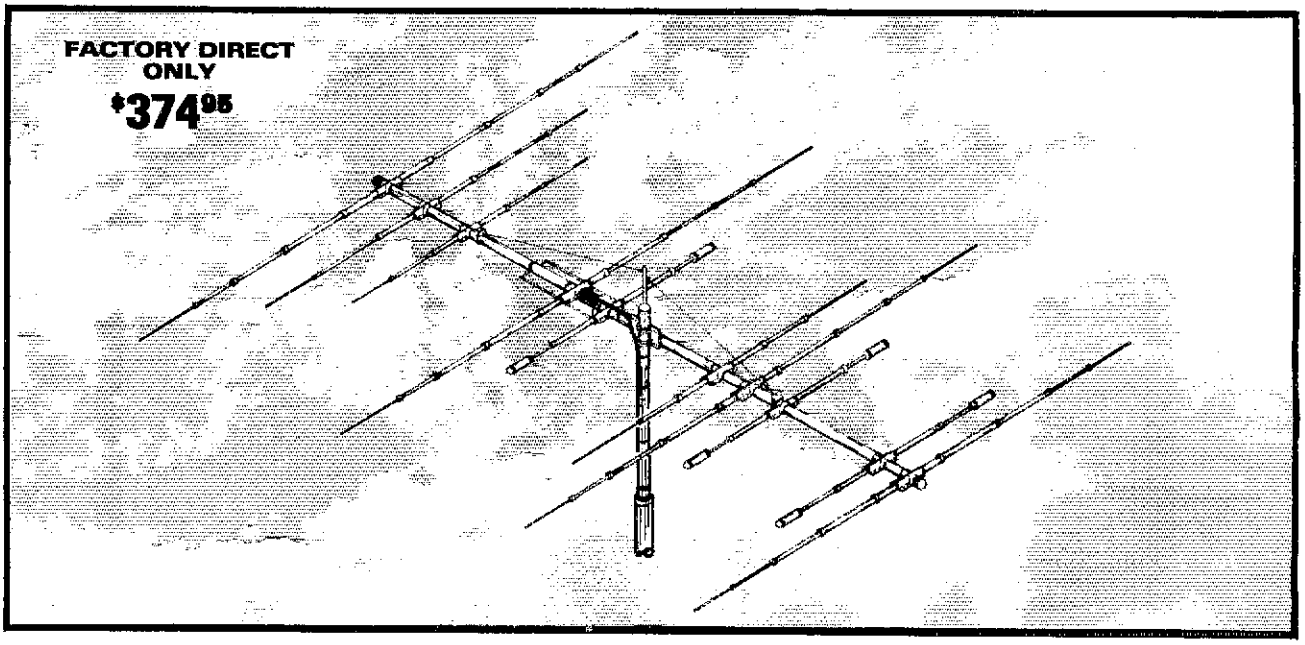
$14.95

The GR-1 is the complete ground radial kit for the WV 1A. It consists of 150' of 7/14 aluminum wire, heavy duty egg insulators and instructions. The GR-1 will increase the efficiency of the WV-1 by providing the correct counterpoise.

WILSON SYSTEMS, INC. PRESENTS

THE SYSTEM 40 TRIBANDER

3 MONOBAND ANTENNAS IN ONE — EACH WITH FULL MONOBAND PERFORMANCE

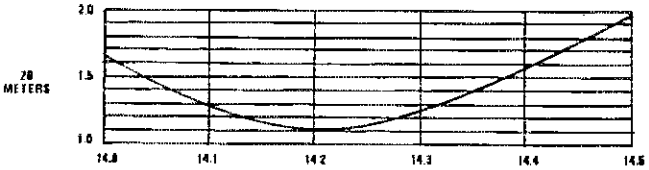


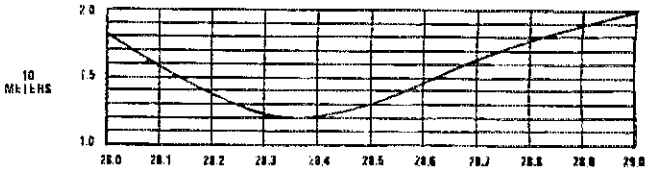
A NEW CONCEPT IN ANTENNA DESIGN USING A 26 FT. BOOM

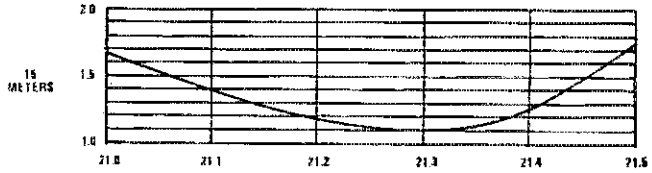
- FOR THE SERIOUS DXer WHO WANTS MONOBANDERS ON 10-15-20
- FOUR FULL SIZE 20 MTR ELEMENTS
- FOUR WIDE SPACED 15 MTR ELEMENTS
- FIVE WIDE SPACED 10 MTR ELEMENTS
- ONLY ONE FEED LINE REQUIRED
- HEAVY DUTY BALUN INCLUDED
- DESIGNED WITH NO INTERACTIONS BETWEEN ELEMENTS
- ALL DRIVEN ELEMENTS AND DIRECTOR ELEMENTS ARE INSULATED FROM BOOM
- SAME QUALITY HARDWARE AS USED IN ALL WILSON ANTENNAS

—SPECIFICATIONS—

Max. Pwr. Input	Legal Limit	Longest Element	36'
VSWR @ Res.	1.2:1	Turning Radius	22'6"
Impedance	50 ohm	Boom	26'
Feed Method	Coax Balun Supplied	Surface Area	12.1 sq. ft.
Matching Method	Modified Beta	Wind Loading @ 80 mph	309 lbs.
F/B Ratio	Call Factory	Assem. Weight	75 lbs.
Gain	Call Factory	Shipping Weight	99 lbs.







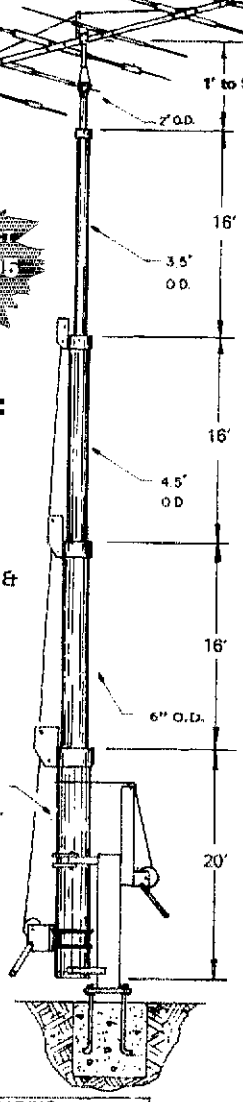
AVAILABLE ONLY
FACTORY DIRECT
CALL
1-800-634-6898 TOLL FREE

WILSON SYSTEMS, INC.
4288 S. Polaris Ave., Las Vegas, Nevada 89103

PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

WILSON SYSTEMS TOWERS

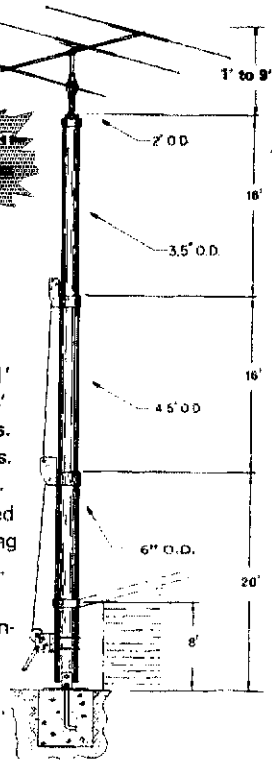
— FACTORY DIRECT —



FACTORY DIRECT $110.95

ST-77B Features:

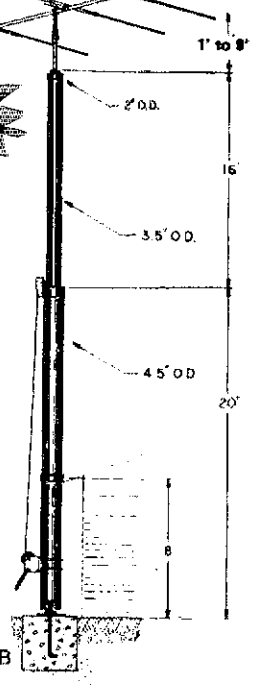
Max. Height: 77'
Min. Height: 24'
Weight: 700 lbs.
Winch: 1500 lbs.
Cable: 6400 lbs.
Requires RB-77B & will be totally freestanding



FACTORY DIRECT $619.95

MT-61B Features:

Max. Height: 61'
Min. Height: 23'
Weight: 450 lbs.
Winch: 1200 lbs.
Cable: 4200 lbs.
No Guys required when mounting against house.
For completely freestanding installation, use RB-61B or FB-61B below.



FACTORY DIRECT $399.95

TT-45B Features:

Max Height: 45'
Min. Height: 22'
Weight: 250 lbs.
Winch: 1200 lbs.
Cable: 4200 lbs.
No Guys required when mounting against eve of house.
For completely freestanding installation, use RB-45B or FB-45B below.

NEW! Wilson Electric Winch

Now you can raise and lower your Wilson Tower electrically. The electric winch will replace the hand operated winch. Available for use on the TT-45, MT-61 and ST-77 towers.

EW-45 (TT-45)
EW-61 (MT-61)
EW-77 (ST-77)

$249.95

BASE CHART		
TOWER	WIDTH	DEPTH
TT-45B	12" x 12"	30"
FB-45B	30" x 30"	4½'
RB-45B	30" x 30"	4½'
MT-61B	18" x 18"	4'
FB-61B	3' x 3'	5½'
RB-61B	3' x 3'	5½'
ST-77B	See Below	
RB-77B	3½' x 3½'	6'

WIND LOADING			
Tower	Height	Sq. Ft.	
ST-77B	69	16	Square Footage Based on 50 MPH Wind
	77	10	
MT-61B	53	18	
	61	12	
TT-45B	37	18	
	45	12	

Wilson Systems uses a high strength carbon steel tube manufactured especially for Wilson Systems. It is 25% stronger than conventional pipe or tubing. The tubing size used is: 2" & 3½"-.095; 4½" & 6"-.125; 8" -.134. All tubing is hot dip galvanized. Top section is 2" O.D. for proper rotor and antenna mounting.

The TT-45B and MT-61B come complete with house bracket and hinged base plate for against-house mounting. For totally freestanding installation, use either of the tilt-over bases shown below.

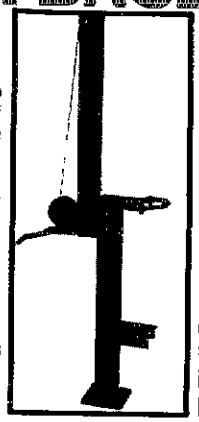
The ST-77B cannot be mounted against the house and must be used with the rotating tilt-over base RB-77B shown below.

TILT-OVER BASES FOR TOWERS

FIXED BASE

The FB Series was designed to provide an economical method of moving the tower away from the house. It will support the tower in a completely free-standing vertical position, while also having the capabilities of tilting the tower over to provide an easy access to the antenna. The rotor mounts at the top of the tower in the conventional manner, and will not rotate the complete tower.

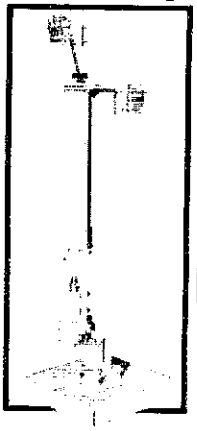
FB-45B.. 112 lbs... $189.95
FB-61B.. 169 lbs... $269.95



ROTATING BASE

The RB Series was designed for the Amateur who wants the added convenience of being able to work on the rotor from the ground position. This series of bases will give that ease plus rotate the complete tower and antenna system by the use of a heavy duty thrust bearing at the base of the tower mounting position, while still being able to tilt the tower over when desiring to make changes on the antenna system.

RB-45B.. 144 lbs... $269.95
RB-61B.. 229 lbs... $344.95
RB-77B.. 300 lbs... $514.95



Tilting the tower over is a one-man task with the Wilson bases. (Shown above is the RB-61B. Rotor is not included.)

ORDER FACTORY DIRECT
1-800-634-6898

Prices Effective 10-1-80 to 10-31-80

WSI WILSON SYSTEMS, INC.

4286 S. Polaris Ave. Las Vegas, Nevada 89103

WILSON SYSTEMS, INC.

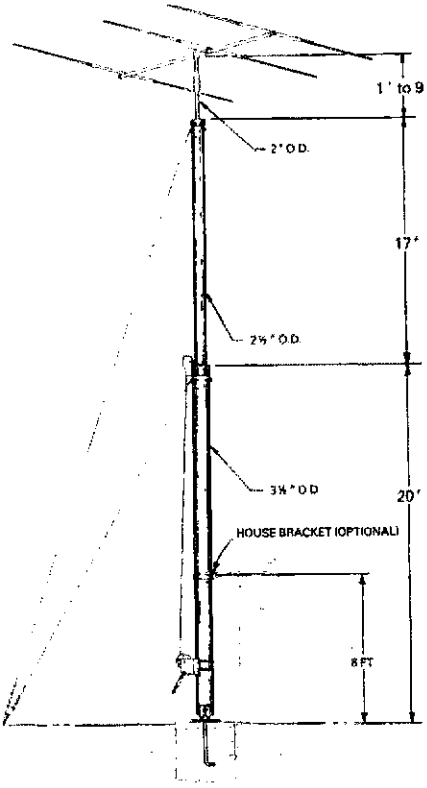
WILSON GUYED TOWERS

GT-46 234.95
46′ GUYED TOWER

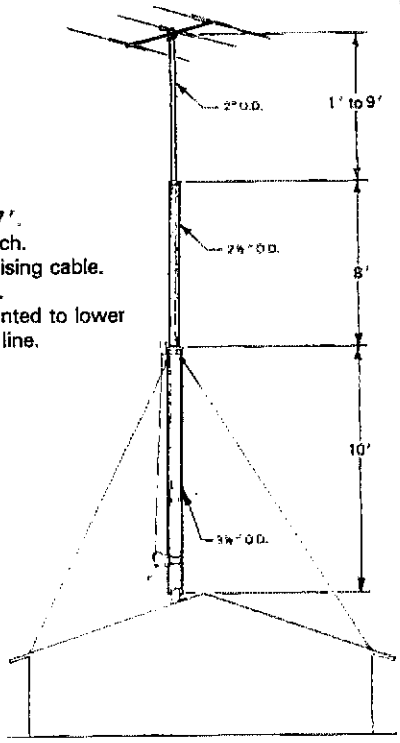
WIND LOADING			
Tower	Height	Sq. Ft.	Square Footage Based on 50 MPH Wind
GT-46	46	6	
	41	8	
	36	10	
TT-27	27	6	
	22	8	
	18	10	

(When Properly Guyed)

TT-27 159.95
27′ GUYED TOWER



TT-27 FEATURES:
- Maximum height, 27′.
- 800 lb. capacity winch.
- 2,000 lb. capacity raising cable.
- Total weight, 84 lbs.
- Can be ground mounted to lower antenna below roof line.



GT-46 FEATURES:
- Maximum height, 46′.
- 800 lb. capacity winch.
- 2,000 lb. capacity raising cable.
- Only one cubic ft. of cement required.
- Total weight, 117 lbs.

GENERAL FEATURES

All towers use high strength heavy galvanized steel tubing that conforms to ASTM specifications for years of maintenance free service. The large diameters provide unexcelled strength. All welding is performed with state-of-the-art equipment. Top sections are 2″ O.D. for proper antenna/rotor mounting. A 9′ push-up mast is included in the top section of each tower. Hinge-over base plates are standard with each tower. The high loads of today's antennas make Wilson crank-ups a logical choice.

WILSON SYSTEMS, INC. 4285 S. Polaris
Las Vegas, NV 89103 — (702) 736-7401

FACTORY DIRECT ORDER BLANK

Toll-Free Order Number
1-800-634-6898

Qty.	Model	Description	Shipping	Price
	SY40	10 Ele. Tribander for 10, 15, 20 Mtrs.	UPS	374.95
	SY36	6 Ele. Tribander for 10, 15, 20 Mtrs.	UPS	219.95
	SY33	3 Ele. Tribander for 10, 15, 20 Mtrs.	UPS	164.95
	33-6 MK	40 Mtr. Mod Kit for SY33 & SY36	UPS	64.95
	WV-1A	Trap Vertical for 10, 15, 20, 40 Mtrs.	UPS	64.95
	GR-1	Ground Radials for WV-1A	UPS	14.95
	M-420A	4 Elements on 20 Mtrs.	UPS	174.95
	M-515A	5 Elements on 15 Mtrs.	UPS	139.95
	M-415A	4 Elements on 15 Mtrs.	UPS	99.95
	M410A	4 Elements on 10 Mtrs.	UPS	74.95
		ACCESSORIES		
	T²X	Tail Twister Rotor	UPS	274.95
	HD-73	Alliance Heavy Duty Rotor	UPS	109.95
	RC-8C	8/C Rotor Cable	UPS	.12/ft.
	RG-8U	RG-8U Foam-Ultra Flexible Coaxial Cable. 38 strand center conductor, 11 guage	UPS	.21/ft.
	EW-45	Wilson Electric Winch for TT-45B	UPS	249.95
	EW-61	Wilson Electric Winch for MT-61	UPS	249.95
	EW-77	Wilson Electric Winch for ST-77	UPS	249.95

Qty.	Model	Description	Shipping	Price
	GT-46	46′ Guyed Tower	TRUCK	234.95
	TT-27	27′ Guyed Tower	TRUCK	159.95
	TT-45B	Freestanding 45′ Tubular Tower	TRUCK	399.95
	RB-45B	Rotating Base for TT-45B w/tilt over feature	TRUCK	259.95
	FB-45B	Fixed Base for TT-45B w/tilt over feature	TRUCK	189.95
	MT-61B	Freestanding 61′ Tubular Tower	TRUCK	619.95
	RB-61B	Rotating Base for MT-61B w/tilt over feature	TRUCK	344.95
	FB-61B	Fixed Base for MT-61B w/tilt over feature	TRUCK	269.95
	ST-77B	Freestanding 77′ Tubular Tower	TRUCK	1104.95
	RB-77B	Rotating Base for ST-77B w/tilt over feature	TRUCK	514.95
	GK-46	Guying Kit for GT-46	UPS-TRK	74.95
	GK-45B	Guying Kit for TT-45B	UPS-TRK	69.95
	GK-61B	Guying Kit for MT-61B	UPS-TRK	79.95
	GK-77B	Guying Kit for ST-77B	UPS-TRK	99.95
	WTB-1	Thrust Bearing for Top of Rotating Towers	UPS-TRK	59.95

NOTE:
On Coaxial and Rotor Cable, minimum order is 100′ and 50′ multiples.
Prices and specifications subject to change without notice.
Ninety (90) Day Limited Warranty—Shipping Not Included in Above

Prices Effective Oct. 1-31, 1980 — Nevada Residents add Sales Tax

Ship C.O.D. ☐ Check enclosed ☐ Charge to VISA ☐ MasterCharge ☐

Card No. _____ Expires _____

Bank No. _____ Signature _____

Name _____ Phone _____

Street _____

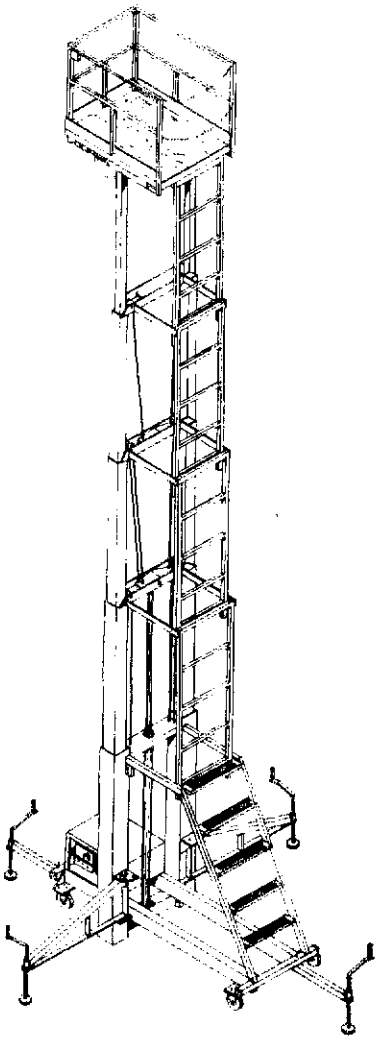
City _____ State _____ Zip _____

Prices and specifications subject to change without notice.

ATTENTION HAMS!

Earn a "FREE" Antenna, Tower or *BOTH!*

If you are employed by a company that could use a high lift work platform, as shown below, you may earn a new antenna system FREE.



With today's inflationary times, this may be the perfect opportunity to upgrade your station with no drain on the family budget.

Contact Jerry Flatt at *WILSON SYSTEMS* for the details on this offer ... call Toll Free (800) 634-6898.

WSI WILSON SYSTEMS, INC.

4286 Polaris Avenue
Las Vegas, Nevada 89103

(800) 634-6898

MTPSN	146.16/76	M-F	2330	N4BGA
CTSFMAN	146.19/79	M	0200	WA4HAM
TCDWN	146.31/91	W	0200	WA4BOC
WTVHFN	146.37/97	Dy	0030	WA4VVX
LEN	147.63/03	W	0130	WD4EOX
MCRN	147.7212	Dy	0130	WB4VXW
RCARESN	147.72/12	F	0200	W4EBT
METEN	147.90/30	Tu-Sa	0200	KD4C
PRN	3.980	M-F	0345	WB4YPO

I hope listing the nets will be helpful to all and don't forget SET is just around the corner. I am still elated after winning the Ten-Tec Delta and Pwr Sup at the Nashville Hamfest. I wish to express my thanks to all concerned. Traffic: WA4CNY 511, WB4BKF 170, W4ZJY 118, W4OGG 98, WA4FMR 77, WB4PRF 72, WB4LEH 57, WD4NJR 47, N4BGA 28, WB4ZSZ 24, KA4GSS 16, WA4CGK 12, K4AMC 11, K4WOP 11, W4DDK 10, W4EWR 9, AF4K 8, WA4FMQ 7, W4VJW 7, W4PSN 6, W4DPO 4, W4UIO 2.

GREAT LAKES DIVISION

KENTUCKY: SCM, Joseph Miller, K4DZM — STM: KZ4G. SEC: WB4ZML. Nets reporting. (*section net)

Net	QNI	QTC	Net	QNI	QTC
KT*	1124	154	CARN	116	14
KYN*	285	153	5-ARES	82	1
KNTN*	369	139	B-ARES	68	9
MKPN*	1142	80	4-ARES	50	6
KSN*	183	49	KPON	60	11
KRN*	494	38	SEKEN	35	0
PAWN	468	58	9RN-D	60%	298
TRI-ST.	324	35	EWPN	239	1

Anyone in Kentucky wishing to promote the use of 432 band, please contact W4QJU. Henderson ARC picnic was a big success. W4TBU was presented with an amplifier there. Remember the Louisville Hamfest Sept. 27/28. Traffic: WB4APC 158, K4JLX 117, KB4OZ 103, K4DZM 101, KA4AZT 83, KS4V 75, KA4GFU 73, WD4LXX 73, WA4EBN 71, WA4AVV 51, KA4IKH 48, KZ4G 38, WA4SWF 34, WA4JTE 33, WA4YPQ 32, WA4JAV 25, W4PKX 25, WA4GAL 24, WA4AGH 20, N4AOF 20, WB4AUN 20, WD4BSC 19, K4HOE 17, KA4MZY 14, WD4CQF 12, WD4CJQ 7, K4MHL 6, WA4IGD 5, K4AVX 4, KU4A 2.

MICHIGAN: SCM, James R. Seeley, WB8MTD — ASCM: WA8DHB. SEC: WA8EFK. STM: WB8YRY. NMs: N8ABA WD8BHE WA8DHB K8LNE K8KMQ WD8LRT WA8PIM AF8V WB8YDZ W8YIQ K8ZJU. DECs: WB8FLK K8RCT W8VWY.

Net	Freq	Time/Day	QNI	QTC	Sess.
MITN*	3953	1900 Dy	610	402	31
QMN*	3663	1800/2200 Dy	879	389	62
MACS*	3953	1100 Dy	717	232	31
GLETN	3932	2100 Dy	1052	228	31
UPN*	3922	1700Dy	727	104	35
MNN*	3722	1730/2000 Dy	387	72	62
BR	3930	1730 M/S	406	48	26
MEN	3930	0900 Su	152	10	4
WSSBN	3935	1900 Dy	481	27	28
MATW**	3953	1600 Su	22	2	4
VHF Activity 14 reports			1124	35	96

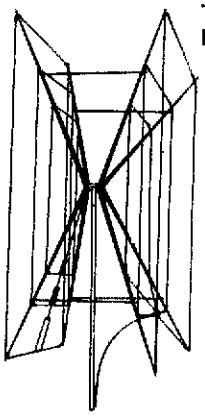
*NTS Section nets. **Mich. Amateur Traffic Workshop. Times EDT. Field appointments: ECs, K8BZ, Gladwin Co.; KA8EQP, Hillsdale Co.; WA2JOC, Monroe Co.; WD8RHU, Branch Co.; WB8TVD, Mecosta Co. OTS: KA8CPS KA8EPK. Upgrades: WD8BHE to General; WD8EAR KA8EPK to Advanced. K8DTG is new manager for GLETN. Silent Keys: W8KNN W8UKD. 00 reports: K8JH W8OG WB8RUQ AG8U KE8X. OBS reports: K8NKT WA8RNB AF8V. Workshops at UP Hamfest were successful, and the UP bunch continues to be among the most lively & friendly group of hams anywhere. We have, as of Aug. 1, 51 appointed Emergency Coordinators in Michigan. Some ECs serve an area of two or more counties. The EC is to ARES as the MN is to NTS — roughly. The local ARES group is very much a grass roots, at home thing, and the stature and effectiveness of local public sevice communications depends largely on the ECs leadership ability and effort. A good EC is strong in PR and sales, is a counselor and arbitrator, is technically knowledgeable and is a good communicator, and above all is a good administrator, one who "hires" the help needed to get the job done, and who somehow inspires or prods them into doing it. I've heard WA8EFK, our SEC say, "Hey, I don't do anything, it's the ECs who are on the firing line." He does plenty, but his point is well taken. My hat is off to the men and women who, with little or no thanks, devote so much of themselves to making ARES the success it is. Traffic: (July) WD8KZX 395, AF8V 355, WB8MTD 292, KA8CPS 210, N8ABA 192, K8DTG 180, WD8RNQ 178, WD8LRT 162, WB8YDZ 155, K8KMQ 147, WA8PIM 138, WB8YRY 129, W8UE 124, W8PDP 105, WB8POL 97, WA8DHB 96, W8VPW 94, K8UPE 80, W8CUP 72, N8BIK 70, K8RV 70, W8IHX 61, WA8WZF 61, W8YIQ 61, WA8VBF 60, WA0TAQ 51, KE8X 57, WD8BHE 51, K8BZ 50, W8WOJ 50, WD8EIB 45, WD8BSE 44, W8VIZ 40, WD8IBY 38, WD8IXZ 37, WB8ZIY 35, WB8ITT 34, WB8TTA 34, WD8JFF 33, W8DT 31, WD8JRT 30, WD8OSE 29, W8TBP 28, K8ZJU 26, WD8AGC 25, K8OCP 25, K8GXV 24, N8AUL 20, W8LCU 19, WD8NKT 18, WB8SYA 17, WA8QAF 16, WD8IYA 15, K8JED 15, W8JXJ 15, KA8GMJ 14, W9NXD 14, W8EOI 13, W8MOF 13, KA8ATV 11, WB8JUP 11, WD8RHU 11, WD8ROK 11, KC8B 10, W8LDS 9, WB8WYO 9, KB8GC 8, KB8O 8, KB8GT 7, N8AG 3, W8BEZ 3, KA8EPK 3, K8DD 2, WD8ECT 2, W8LOU 2, WD8OEP 2, WA8YBP 2. W8SCW 1. (June) WD8EIB 30, KB8GC 9.

OHIO: SCM, Harold C. Chapman, WB8JGW — Asst. SCMs: W8MOK AF8O. SEC: K8AN. NMs: K8AAZ WD8KBW WB8KWD K8OZ WD8PUH WB8YGW. Net reports:

Net	QNI	QTC	Sess.	Time (Local)	Freq.
BN	499	279	60	6:45/10 P.M.	3.577
BNR	120	19	31	6 P.M.	3.605
ONN	120	41	29	6.30 P.M.	3.708
OSN	225	110	31	6:10 P.M.	3.577
OSSBN	2471	790	93	10:30 A.M./4:15 & 6:45 P.M.	3.9725
06mN	236	41	29	9 P.M.	50.160

Congratulations and thanks to you in the Ohio Section: you the traffic handlers and Emergency Coordinators who placed the section at or near the top in all categories in 1979 (see SET-LO Bulletin Aug. 1980). Apparently we must generate another 25000 messages annually to unseat the top section — are you reporting ALL of your traffic? Keep in mind it's not always the volume of traffic which is important but the quality of the messages, the efficient manner of handling and the delivery rate involved. We were tops in the number of you reporting your traffic — keep it up! The section was

GEM-QUAD FIBRE-GLASS ANTENNA FOR 10, 15, and 20 METERS



Two Elements $159
Extra Elements $113

Price is F.O.B. Transcona

INCLUDES U.S. Customs Duty

KIT COMPLETE WITH

- SPIDER
- ARMS
- WIRE
- BALUN KIT
- BOOM WHERE NEEDED

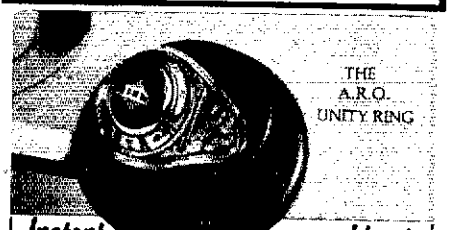
WINNER OF MANITOBA DESIGN INSTITUTE AWARD OF EXCELLENCE

Buy two elements now — a third and fourth may be added later with little effort.

Get a maximum structural strength with low weight, using our "Tridetic" arms.

GEM QUAD PRODUCTS LTD.

Transcona, Manitoba, Canada R2C 2Z5
Box 53 Telephone (204) 866-3338



Instant Identity

This beautiful fraternal ham ring is handcrafted in Sterling Silver, Silver Argentus and Lustrium for under $99.00. Also available in 10K Yellow Gold and 10K White Gold (prices on request). This exquisite ring is made exclusively for you by Josten's (world famous for their Superbowl and Stanley Cup achievement rings) with your call letters proudly displayed. Group III. is pleased to announce its third year of national and international sales. For detailed information and reusable ring sizer... Write:

No Obligation

Group III Sales Co.
351 W. 52nd Street
New York, N.Y. 10019

450 MHz for $5.00

Unique 450 MHz Base Station Antenna. Omnidirectional. Resonant at 456 MHz. Used by many hams throughout the Midwest. Now available for the first time nationally. Send check or money order for $5.00 plus $1.50 to cover shipping costs. Specify Model AV602 and send to:

Moonraker Electronics
340 Stewart Ave.,
Addison, IL 60101

Call for price and delivery for the new IC-720

One of this months many specials is the IC-701S w/speaker, power supply, and mike. Display model, $1,050.00.

RDC

ROSS DISTRIBUTING COMPANY
78 SOUTH STATE STREET, PRESTON, IDAHO 83263
TELEPHONE (208) 852-0830

Closed Monday at 7:00 p.m.

MFJ NEW PRODUCTS

exciting new ideas from the world's leading manufacturer of amateur radio accessories

NEW MFJ/BENCHER Keyer-Paddle Combo — "The Pacesetter"

MFJ-422 Combo $99.95 (+$4)

MFJ-422X Keyer only $69.95 (+$4)

The best of all CW worlds — a deluxe MFJ keyer in a compact configuration that fits right on the BENCHER iambic paddle! And you can buy the combination or just the keyer to fit on your BENCHER.

New MFJ keyer — small in size, big in features. Curtis 8044 IC, *adjustable weight and tone*, front panel *volume and speed controls* (8-50 wpm), built-in *dot-dash memories*, speaker, sidetone, and push-button selection of semi-automatic/tune or automatic modes.

Ultra-reliable solid-state keying: grid-block, cathode and solid-state transmitters (−300 V, 10 mA max; +300 V, 100 mA max). *Fully shielded*. Uses 9 V battery or optional AC adapter ($7.95 +$2)

Beautiful functional engineering. The keyer mounts on the paddle base to form a small (4⅛Wx2⅝H x 5½"L) attractive combination that's a pleasure to look at and use.

The BENCHER paddle is a best seller. Fully adjustable; gold-plated silver contacts; lucite paddles; chrome plated brass; heavy steel base with non-skid feet.

NEW MFJ 4 & 8-Band Mobile Shortwave Converters

MFJ-304 $59.95 (+$4)

MFJ-308 $79.95 (+$4)

Another MFJ "first," these low cost mobile SWL converters provide new excitement and variety for your driving/listening pleasure.

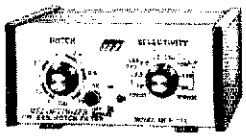
Two models to choose from. The 4-band "World Explorer I" (MFJ-304) offers complete *19, 25, 31 and 49 meter coverage* (the most popular HF bands due to their distance capabilities at various times of the day and year). Hear countries from Europe, Africa, Middle East, Asia, the Islands, North and South America. The 8-band "World Explorer II" (MFJ-308 adds *13, 16, 41, and 60 meter* bands) for even greater listening variety.

Compact and sensitive. The 4-band model measures just 5¼W x 1¼H x 4"D to *fit anywhere* in your vehicle (the 8-band version is just 1" wider and 1" deeper). Two dual-gate MOSFETS give these converters *excellent sensitivity and selectivity* when combined with your automotive receiver.

Easy to use, easy to install. Push a converter button to choose the band, tune in stations with your regular car radio. To install, just plug the car antenna into the converter and insert the converter cable into your car radio antenna jack; connect the power lead to 12 VDC.

Listen to the world on the road. Get the new MFJ mobile SWL converters — "World Explorers I & II."

NEW MFJ Active CW/SSB/Notch Filters



MFJ-722 $69.95 (+$4)

MFJ-723 $49.95 (+$4)

Two new super-selective filters. The new MFJ-722 "Optimizer" offers *razor sharp, no-ring CW filtering* with switch-selectable bandwidths (80, 110, 150, 180 Hz centered on 750 Hz), *steep-skirted SSB filtering*, and a *300-3000 Hz tunable 70 dB notch filter*.

The 8-pole (4-stage) active IC filter gives *CW performance no tunable filter can match*. (80 Hz bandwidth gives −60 dB response one octave from center and up to 15 dB noise reduction). *The 8-pole SSB audio bandwidth is optimized* for reduced sideband splatter and less QRM (375 Hz highpass cutoff plus selectable lowpass cutoffs at 2.5, 2.0, and 1.5 kHz, 36 dB/octave rolloff). Size: 5x2x6".

New model MFJ-723 is similar to the 722 but is for CW only, has a 60 dB notch tunable from 300-1200 Hz, and measures 2x4x6". Other models: **MFJ-721, $59.95,** like 722 but less notch; **MFJ-720, $39.95,** like 723 but less notch.

Versatile, all models plug into the phone jack, provide 2 watts for speaker or can be used with headphones. All require 9-18 VDC, 300 mA max (or 110 VAC with optional AC adapter at $7.95 +$2).

Enjoy pleasant listening and improved readability with one of these new MFJ filters.

NEW MFJ "Dry" 300W & 1KW Dummy Loads

MFJ-262 $49.95 (+$4)

MFJ-260 $26.95 (+$4)

Air Cooled, *non-inductive 50-ohm resistors* in perforated metal housings with SO-239 connectors; both rated to full load for 30 seconds; de-rating curves to 5 minutes included. Just right for tests and fast tune up.

Low VSWR. 300W: 1.1:1 max to 30 MHz, 1.5:1 max. 30-160 MHz. **1 kW:** 1.5:1 max to 30 MHz. **MFJ-260** (300W) is just 2½x2½x7"; **MFJ-262** (1kW) is 3x3x13".

NEW MFJ Shortwave Accessories

MFJ-1020 $79.95 (+$4)

MFJ-1040 $99.95 (+$4)

MFJ-1040 Receiver Preselector

Boosts weak signals, rejects out of band signals, reduces images. *Covers 1.8-54 MHz* with up to 20 dB gain from low noise MOSFET circuitry. *Works with 2 antennas and 2 receivers* (even XCVRS to 350W input).

Built-in 20 dB attenuator prevents receiver overload. Also includes auto-bypass, delay control, PTT jack. Operates on 9 V battery, 9-18 VDC, or 110 VAC with optional AC adapter, $7.95 +$2.

Model MFJ-1045, $69.95, is the same less attenuator, bypass, delay, PTT, 1 antenna & 1 receiver.

MFJ-1020 Indoor Active Antenna

"World grabber," rivaling or exceeding reception of outside long wires.

Unique tuned circuitry with amplification *minimizes intermod distortion, improves selectivity, reduces noise* outside the tuned band, even functions as a *preselector* with an external antenna. *Covers 0.3-30 MHz in 5 bands*. Telescoping ant.; tune, band, gain, on-off-bypass; Uses 9 V battery, 9-18 VDC, or 110 VAC, with optional AC adapter at $7.95 +$2. 5x2x6".

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master charge **800-647-1800** VISA

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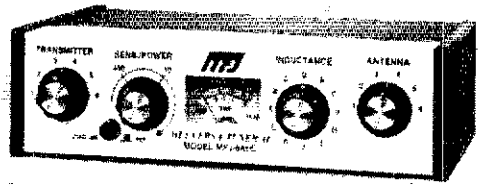
MFJ ENTERPRISES INCORPORATED

Box 494; Mississippi State, MS 39762

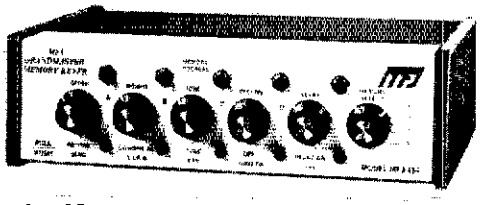
MFJ 941C Versa Tuner II



MFJ-941C
$84.95 (+$4)

Fastest selling MFJ tuner . . . because it has the most wanted features at the best price.
SWR + dual range wattmeter (300 & 30 watts full scale, forward and reflected power). *Sensitive meter* measures SWR down to 5 watts output.
More flexible antenna switch selects 2 coax lines, direct or through tuner, random wire/balanced line, or tuner bypass for dummy load.
12 position efficient airwound inductor for lower losses, more watts out.
Built-in 4:1 balun for balanced lines. 1000v capacitor spacing.
Matches everything from 160-10 meters: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balanced and coax lines.
Easy to use, anywhere. Measures 8x2x6", has SO-239 connectors, 5-way binding posts, finished in eggshell white with walnut-grained sides.
MFJ-945, $74.95, like model 941C but less ant. switch. Optional mobile bracket for either model is $3.

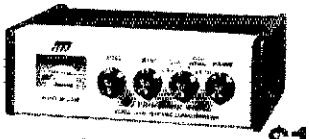
MFJ 484 "Grandmaster" Memory Keyer



MFJ-484
$139.95 (+$4)

Up to twelve 25 character messages plus 100, 75, 50 or 25 ch. messages (4096 bits).
Repeat any message continuously or with pauses of up to 2 min. LEDs show use.
Record, playback, or change messages instantly at touch of a button. Memories are resettable with button or touch of the paddle.
Built-in memory saver — 9 V battery takes over when power is lost.
Iambic operation with squeeze key. Dot-dash insertion. Optional BENCHER paddle $42.95 +$4.
Dot-Dash memories, self-completing, jam-proof spacing, instant start.
Panel controls: Speed (8-50wpm)/Record; Weight/Memories Combined; Tone/Tune; Delay (0-2 min.)/Repeat; rotary Vol/On-Off; Memory Select; Message Buttons select desired 25 ch. messages; Memory Reset button.
Ultra reliable solid state keying: grid block, cathode, solid state transmitters (−300 V, 10 mA max; +300 V, 100 mA max). Operates 12-15 VDC or 110 VAC with optional adapter, $7.95 +$2. Size 8x2x6". **MFJ-482, $99.95,** four 25 or 50+two 25 ch. messages; **MFJ-481, $89.95,** two 50 ch. messages. **Get the best seller keyers**-MFJ "Grandmasters."

MFJ 410 "Professor Morse" Code Generator/Keyer



NEW LOW PRICE
Save $20
MFJ-410 Now Only **$129.95** (+$4)

Use it to learn, use it to operate. It sends *unlimited random code* in random groups for practice; *never repeats* sequences. And when you're on the air, it's a *full feature keyer*.
Vary speed from 5-50 wpm; meter readout.
Vary spacing; give fast sound to low speed.
Alpha or alphanumeric with punctuation.
Built-in speaker and phone jack; tone and vol. Ideal for classroom or private use.
Full feature keyer includes vol., speed, tone and weight controls, tune switch, dot-dash memories, keys grid block, cathode, solid-state rigs. Optional BENCHER paddle $42.95 + $4. Operates on 9-18 VDC, two 9 V batteries or 110 VAC with optional adapter $7.95 +$2. Size 7x2x6". **Get "Professor Morse"** — you'll never outgrow it.

MFJ Dual Tunable SSB/CW Filter "Signal Enhancer"

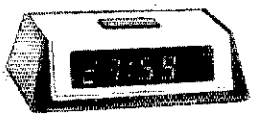
MFJ-752B **$84.95** (+$4)

Dual filters give unmatched performance.
The primary filter lets you *peak, notch, low pass or high pass* with extra steep skirts.
Auxiliary filter; *70 dB notch, 40 Hz peak.*
Both filters tune from 300 to 3000 Hz with variable *bandwidth from 40 Hz to nearly flat.*
Constant output as bandwidth is varied; linear frequency control.
Switchable noise limiter for impulse noise.
Simulated stereo sound for CW lets ears and mind reject QRM.
Inputs for 2 rigs, switch selectable. Plugs into phone jack. Two watts for speaker. OFF bypasses filter. 9-18 VDC, 300 mA or 110 VAC with optional adapter $7.95 +$2. 10x2x6". **MFJ 751, $59.95,** similar, primary filter only, less high pass & noise limiter.

MFJ BEST SELLERS

favorite products from the world's leading manufacturer of amateur radio accessories

GMT Clock/ID Timer



MFJ-101
$29.95 (+$4)

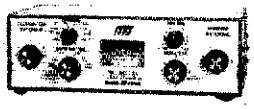
24 hour, solid-state, blue 0.6" digits, ID timer sounds every 9 min (also a snooze alarm), regular alarm for skeds or to awaken, power-out/alarm-on indicators, ready to use on 110VAC, 50-60Hz, 6x2x3".

KW Dummy Load With Oil

MFJ-250
$29.95 (+$4)

Rated at 1 kW CW or 2 kW PEP for 10 min., half that for 20 min., cont. at 200 W CW, 400 W PEP, non-inductive 50 ohm resistor, quality transformer oil (no PCB), VSWR under 1.2:1 to 30 MHz, 1.5:1, 30-300 MHz, 2:1, 300-400 MHz. Coax conn., vent cap., 7½"h x 6⅝" diam.

300 Watt Antenna Tuner



MFJ-949B
$129.95 (+$4)

Does it all! Built-in dummy load, SWR, forward and reflected power meter, antenna switch, balun, matches everything from 1.8-30 MHz (coax, random wires, balanced lines), coax conn., binding post, 10x3x7".

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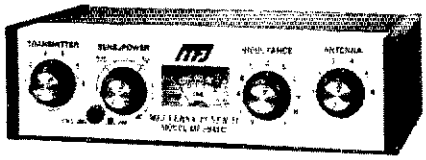
Box 494; Mississippi State, MS 39762

300 W Versa Tuners—Versatile Bargains



MFJ-941C **$84.95** (+$4)

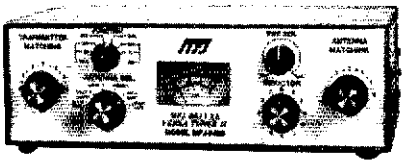
MFJ 941C Versa Tuner II
SWR + dual range wattmeter, 300 & 30 watts full scale, forward & reflected power. *Sensitive meter* measures SWR down to 5 W output.

6-position antenna switch selects 2 coax lines, direct or through tuner, random/balanced line, or bypass for dummy load.

12-position airwound inductor, *built-in balun.*

Matches everything from 160-10M, dipoles, vees, randoms, verticals, mobile whips, beams.

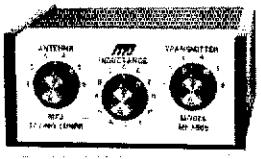
Easy to use anywhere. Coax conn., binding posts, size 8x2x6" in eggshell white, walnut-grained sides. Mobile bracket, $3.



MFJ-949B **$129.95** (+$4)

MFJ 949B Versa Tuner II
Matches everything from 1.8-30MHz, coax, randoms, bala ced lines, up to *300 W output,* solid-state or tubes.
Tunes out SWR on dipoles, vees, long wires, verticals, whips, beams, quads.
Built-in 4:1 balun; 200w, 50-ohm dummy load; SWR meter and 2-range wattmeter (300w & 30w).
6-position antenna switch, 12-position air-wound inductor; coax connectors, binding posts, black and beige case 10x3x7".
4 Other 300W Models: MFJ-940, $74.95, (+$4), like 941C less balun. **MJF-945, $74.95,** (+$4) like 941C less ant. switch. **MFJ-944, $74.95,** (+$4) like 945, less SWR/Wattmeter **MFJ-943, $64.95,** (+$4) like 944, less ant. switch.

200 W Economy Tuners do the job for less



MFJ-900 **$42.95** (+$4)

MFJ-900 — improved but still low cost. **Matches coax, random wires** *1.8-30 MHz.* **Handles up to 200 watts output;** efficient airwound inductor gives more watts out.

Works with any transceiver, solid-state or tube type.
Increases antenna bandwidth to operate all bands. SO-239 + binding post; 5x2x6".
2 OTHER 200W MODELS:
MFJ-901, $52.95, (+$4) like 900 but includes 4:1 balun for use with balanced lines.
MFJ-16010, $32.95, (+$4) *for random wires only.* Great for apartment, motel, camping, operation. Tunes 1.8-30 MHz.

1.5 KW Versa Tuners III — low cost power handlers

MFJ 962 VERSA Tuner III
Run up to 1.5 KW PEP, match any feed line from 1.8-30 MHz.
Built-in SWR/Wattmeter has 2000 and 200 watt ranges, forward and reflected.
6-position antenna switch handles 2 coax lines, direct or through tuner, plus wire and balanced lines.
Built-in 4:1 ferrite balun; 250 pf 6 kV capacitors; 12 pos. inductor; ceramic switches; black cabinet and panel.

MFJ-962 **$189.95** (+$10)

ANOTHER 1.5 KW MODEL
MFJ 961, $169.95, (+$10) similar but less the SWR/Wattmeter.

3 KW Deluxe Antenna Tuners — MFJ's best

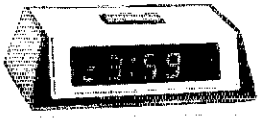
MFJ-984 **$299.95** (+$10)

MFJ 984 Versa Tuner IV
Up to 3 kW PEP and it matches *any feedline,* 1.8-30 MHz, coax, balanced or random.
Exclusive 10 amp RF ammeter assures maximum power at minimum SWR.
Separate SWR/Wattmeter, forward and reflected, with 2000 and 200 watt ranges.
18-position dual inductor, ceramic switch.
7-position antenna switch handles 3 coax lines through tuner and 1 coax through or direct to antenna, random wire, balanced line, and dummy load.
Built-in 200 watt, 50 ohm dummy load.
Built-in 4:1 ferrite balun; 250 pf 6 kV capacitors; 5x14x14" black & aluminum.
Compare this MFJ deluxe 3 kW tuner with any! You'll agree MFJ gives you more.
3 MORE 3 KW MODELS
MFJ 981, $199.95, (+$10) similar to 984 but less the 7-position antenna switch and 10 amp. RF ammeter. **MFJ 982, $199.95,** (+$10) similar to 984 but less 10 amp. RF ammeter and dual range SWR/Wattmeter. **MFJ-980, $169.95,** (+$10) similar to 984 but less antenna switch, RF ammeter and SWR/Wattmeter.

MFJ

World leader in Antenna Tuners 15 Models to choose from

Other MFJ Shack Favorites



MFJ-101 **$29.95** (+$4)

24 Hr Clock/ID Timer has blue 0.6" digits; GMT time; ID timer (also snooze alarm); regular alarm for skeds or to awaken; power-out & alarm-on indicators; ready to use on 110VAC, 50-60 Hz; 6x2x3" bargain.

MFJ-484 **$139.95** (+$4)

MFJ Grandmaster Memory Keyer has up to twelve 25 ch. messages plus 100, 75, 50 or 25 ch. messages (4096 bits) that repeat continuously or in adjustable pauses (to 2 min.); full controls; 8-50wpm; solid state keying; 12-15 VDC or 110VAC with adapter ($7.95 +$2).

MFJ-752B **$84.95** (+$4)

MFJ Dual Tunable SSB/CW Filter; primary filter has peak, notch, lowpass and highpass; aux. filter notches to 70 dB or peaks to 40 Hz; both tune 300-3000 Hz with bandwidth from 40 Hz to flat; constant output; noise limiter; 2 inputs; 9-18 VDC 300 mA; or 110VAC with adapter ($7.95 +$2) 10x2x6".

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MFJ

World leader in Electronic Keyers
11 Models to choose from

NEW MFJ/BENCHER Keyer-Paddle Combo — "The Pacesetter"

MFJ-422 Combo $99.95 (+$4)

MFJ-422X Keyer only $69.95 (+$4)

The best of all CW worlds — a deluxe MFJ keyer in a compact configuration that fits right on the BENCHER iambic paddle! And you can buy the combination or just the keyer to fit on your BENCHER.

New MFJ keyer — small in size, big in features. Curtis 8044 IC, *adjustable weight and tone,* front panel *volume and speed controls* (8-50 wpm), built-in *dot-dash memories,* speaker, sidetone, and push-button selection of semi-automatic/tune or automatic modes.

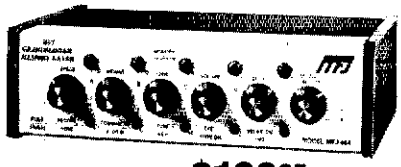
Ultra-reliable solid-state keying: grid-block, cathode and solid-state transmitters (−300 V, 10 mA max; +300 V, 100 mA max). *Fully shielded.* Uses 9 V battery or optional AC adapter ($7.95 +$2)

Beautiful functional engineering. The keyer mounts on the paddle base to form a small (4⅛Wx2⅝H x 5½"L) attractive combination that's a pleasure to look at and use.

The BENCHER paddle is a best seller. Fully adjustable; gold-plated silver contacts; lucite paddles; chrome plated brass; heavy steel base with non-skid feet.

For CW with compactness, convenience and class, order the new MFJ "Pacesetter."

MFJ-484 Memory Keyer



MFJ-484 $139.95 (+$4)

Ham radio's most popular — up to twelve 25 character messages plus 100, 75, 50 or 25 ch. messages (4096 bits).

Repeats continuously or with pauses that are adjustable up to 2 minutes.

Record, playback or change messages instantly, at the touch of a button.

Built-in memory saver — 9 V battery takes over when power is lost.

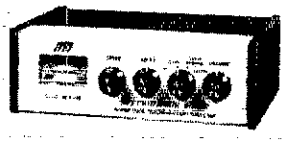
Iambic operation with squeeze key. Dot-dash insertion.

Dot-Dash memories, self-completing ch., jamproof spacing, instant start.

Full controls: Speed (8-50wpm)/Record; Weight/Memories Combined; Tone/Tune; Delay/Repeat; Vol/On-Off; Memory Select; Message buttons; Memory Reset button.

Solid state keying; grid, cathode, solid-state xmtrs (−300 V, 10 mA max; +300 V, 100 mA max). 12-15 VDC or 110VAC w. optional AC adapter $7.95, (+$2). 8x2x6". Optional BENCHER paddle $42.95 (+$4). **MFJ-482, $99.95,** (+$4) four 25 or 50 + two 25 ch. messages; **MFJ-481, $89.95,** (+$4) two 50 ch.

Code Generator/Keyer



Save $20

MFJ-410 Now Only $129.95 (+$4)

"Professor Morse," — never outgrow it.

Use it to learn and to operate. Sends *unlimited random code* in random groups for practice; *never repeats sequences.* When you are on the air, it's a *full feature keyer.*

Meter readout of speed (5-50 wpm).

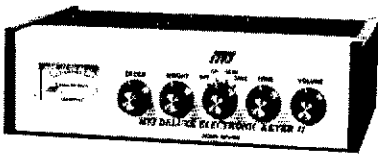
Vary spacing for fast sound at low speed.

Alpha or alphanumeric with punctuation.

Built-in speaker and phone jack, ideal for classroom or private use; tone & volume.

Full feature keyer: vol., speed, tone & weight controls, tune sw., dot-dash memories, keys grid, cathode, solid state rigs, uses two 9 V batteries, 9-18 VDC or 110 VAC with optional adapter $7.95 +$2. Optional BENCHER paddle $42.95 +$4.

Value Leader Deluxe Keyers



MFJ-408 $79.95 (+$4)

MFJ-408, more for less.

Iambic, automatic, semi-auto or manual.

Speed meter reads to 50 wpm.

Dot-dash memories, self-completing, jamproof, RF proof, instant start.

Front panel controls: speed (8-50 wpm), weight, tone, vol., function.

Built-in speaker for class or private use.

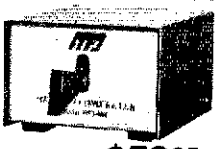
Curtis 8044 IC, proven in use by thousands.

Accessory socket permits using external Curtis memory, random code generator, keyboard (from Curtis Electro Devices).

Solid-state keying; grid, cathode, solid-state (−300V, 10mA max; +300V, 100 mA max).

Portable, uses 4 "C" cells, 6-9 VDC, or 110 VAC with optional adapter $7.95 + $2. 8x2x6". **MFJ-406, $69.95,** (+$4) same less meter; Optional BENCHER paddle $42.95.

MFJ 'Econo' Keyers Save $



MFJ-404 $59.95 (+$4) **MFJ-400 $49.95 (+$4)**

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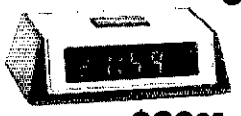

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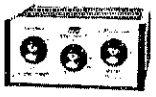

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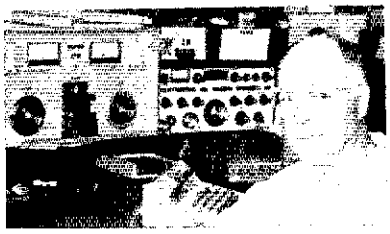

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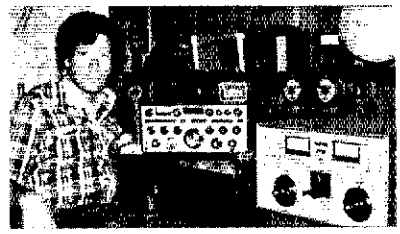

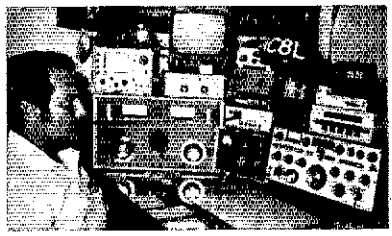

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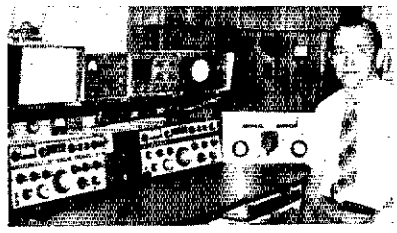

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also tops in Class I (30 or more Emergency Coordinators) with reports to the Section Emergency Coordinator. Again congrats and thanks to you. Field Day was a huge success if reports of participation and articles in club bulletins were any indication. The Ohio State Fair is here again with no expectations of any decrease in traffic. SET 1980 will be here before you know it! Get your emergency power sources in shape; if you are an EC plan an exercise which will create interest and enthusiasm among your group; if you are an ARES member participate to the fullest extent possible; if you are a traffic handler be prepared for the overloads and assist as liaison to other nets when you can. Good luck! WD8PUH, ONN manager, is headed for college this fall. WD8QMP will be his successor effective Sept. 1. Good luck to you both. Appointments: EC N8AEH/ Hancock, NM WD8QMP/PNN, OES WB8TXE.

Local Nets	QNI	QTC	Sess.
BARF	52	43	23
BRTN	336	140	31
COARES	96	20	4
FAROUT/MIAMSBG	36	0	4
HCARC	45	6	4
LC/NWOARES	168	32	20
MASER	82	5	4
TSRAC	675	96	34
VWCEN	18	2	4

Traffic: K8OZ 420, N2MA 257, WB8KWD 294, WB8WTS 202, W8PMJ 200 WA8GMT 199, WD8DTG 195, W8QEM 183, W8TH 176, WD8KBW 157, W8TP 142, K8AAZ 115, W8ENI 112, N8JR 112, WD8KFN 75, WB8JGW 72, W8QZK 72, K8AN 68, W8MOK 67, WB8DMF 66, WB8SIQ 62, WB8MEK 60, N8CW 57, WD8QZM 57, K8BYR 51, W8GGX 48, WB8YTD 48, KF8J 45, N8AKS 42, WA8SSI 41, WB8UBR 41, W8BHL 40, WB8OHV 40, WD8QMP 39, WB8TKU 39, KA8DJZ 38, W8MGA 35, WB8OFR 35, WD8PUH 35, WB8SRC 32, W8BYGW 31, WB8CJU 30, WD8DYW 30, AB8P 29, WA8HGH 28, K3RC 27, WD8QAC 26, W8WEG 26, K8CKY 23, WD8OYO 23, WB8MRL 22, WB8OXN 22, WD8PMW 20, WB8UWD 20, KA8CTC 19, WD8JIO 18, W8RG 18, WD8ILX 17, W8IM 14, W8DL 13, WB8MZZ 13, WD8PID 12, W8ZM 12, WB8TRK 11, WB8OHU 10, WD8EKI 9, WB8VLR 9, WB8WNH 9, W8EK 7, WD8EMS 8, W8OQL 7, WB8VZX 7, N8FU 6, WB8PIY 6, W8KN 5, W8UQY 4, WB8NHV 3, WB8NTR 2, WB8YUS 1.

HUDSON DIVISION

EASTERN NEW YORK: SCM, Paul S. Vydareny, WB2VUK — SEC: WB2NKN, STM: WA2SPL, ASCM: K2AY W2IT KB2KW, NM: W2WSS WA2HZM N2BDW WB2ZCM WB2EAG. Nets: NYPON 5 P.M. 3913: ESS (slow) 6 P.M. 3590; NYSPTEN 6 P.M. 3925; NYS 7 P.M. 10 P.M. 3677; CDN (Troy) 6:30 P.M. 34/94; HVN (Beacon) 7:30 P.M. M-F 37/97; SDN (White Plains) 9:30 P.M. S/T/T 66/06 M/W/F 615/015. Can anyone beat little Putnam County in the P/D??!! Looks as if it is impossible! Preparedness Duel results: Putn 11780 Alby 10692 West 9414 Uls 9390 Colu 8322 Sutc 7446 Tens 6207 Oran 5344 Sch 4389 SAR/WAR/WAS 4336 Sull 3186 Rock 62. SCM award: Putn. Congrats to KB2KW and crew again. Best error rate: Dutc. Congrats to N2ADJ and crew. Thanks to W2IT for a good one. Remember P/D during SET. Good group again up at W2MTA. Ulster RACES provided communications for medical teams at High Falls volunteer firemans parade; team included K3HA KC2L N2FS WA2s KLV MJX RUW IXJ WB2s EKR ACU W2XL. Eastern New York staff meeting Mon. evenings 10:15 on 3.825 MHz. All welcome. KB2KW-NCS. Messages can be gotten to me quickly thru N2BDW on HVN or thru KB2KW. HARC Convention only month away! Please bear with me a bit longer as I get things organized here. Hope to have all bugs worked out by next months column and get out all forms and cards many have requested. Thanks for patience! July PSHR: N2BDW WA2EOW WA2SPL W2YJR WB2ZCM. June PSHR: WB2ZCM. BPL: WA2SPL. Traffic: WA2SPL 573, W2EFU 172, K2MI 98, WA2EQW 92, WB2ZCM 75, AA2Y 69, W2ACO 67, N2BDW 57, W2YJR 48, KB2KW 37, WB2SON 35, WA2CJY 22.

NEW YORK CITY — LONG ISLAND: SCM, Paul A. Lindgren, WA2UWA — Asst. SCMs: Stephen Bloom, WB2IDP; Dwight Ernest, KA2CNN. STM: WB2BNY. The following are nets in and around the section.

Net	Time/Day	Freq.	NM
NLI*	1900/2200 Dy	3.360	WB2BNY
NSPN*	1815 Dy	3.928	WA2SEL
BAVTN*	2030 M-F	147.915/315	KA2DBW
ESS	1800 Dy	3.590	W2WSS

All times local. Nets denoted with an asterisk are NTS section nets. High QNI NLI: WB2TQC KA2CEF WB2EUF KA2CLY W2MLC; NSPN: WA2SEL WA2UWA KA2CEF WB2TQC WB2IDP. I regret to report WA2QAO as a Silent Key. He was active for many years in ARES, RACES and in general operating and will be missed. He leaves three licensed sons WA2SLY WA2RAT and WB2IDP. WB2LZN back in town for a short visit. KA2CNN and KA2DBW active in Diet Pepsi marathon team. KA2CNN reports he is off hi temporarily with rig problems. The American Red Cross station in Queens, WB2OBP, was active in the Hurricane Allen crisis. Many amateurs in Staten Island and NYC active in the search for the missing girl. Thanks go to the trustees of WR2ACH and WA2RXQ/Rpt for their help in this search. The nets welcome back WB2HIO after a long absence. Congratulations to KA2CEF on upgrading to Extra. Suffolk County Radio Club reports that WB2SGA handled several actual emergencies during Field Day. WB2IDP now has 131 countries worked and 67 confirmed toward his DXCC. I regret to report WB2QOT as a Silent Key. Very little activity this month. With fall and the SET coming up hopefully there will be more activity. Traffic: WA2UWA 187, K2GCE 120, K2GCE 88, WB2BNY 76, W2MLC 76, W2GKZ 72, K2HD 72, WB2TQC 71, KA2CEF 66, WB2EUF 64, WB2IDP 62, N2BKK 58, KA2CNN 54, KA2DBW/T 47, WA2SEL 37, W2DBQ 25, WA2PMW 20, N2BGR/T 17, N2NT 1.

NORTHERN NEW JERSEY: SCM, Robert E. Neukomm, WA2MVQ — SEC: WB2VUF, STM: W2XD. NMs: N2CR KB2HM W2PSU KA2GOQ W2TCA W2UEZ & WB2IOJ.

Net.	Freq.	Time/Days	Sess.	QNI	QSP
NJN/E	3695	7 P.M. Dy	31	444	204
NJN/L	3695	10 P.M. Dy	31	356	144
NJSN	3735	6:30 P.M. Dy	31	216	48
NJVN	49/49	10:30 P.M. Dy	30	292	196
NJPN	3950	6 P.M. Dy	35	506	257
UCETN	085/685	7:30 P.M. Dy			
OBTTN	72/12	8 P.M. Dy	31	583	154

KB2EI to Extra. KA2IIW WA2KZF and WA2PJX to General. New calls: WB2TOM now KF2T and SNJ STM WB2GTW now KF2U. It is with deep regret that I report WA2WTY of Freehold a Silent Key after a long struggle with Hodgkins disease. W2UEZ received the first PSHR

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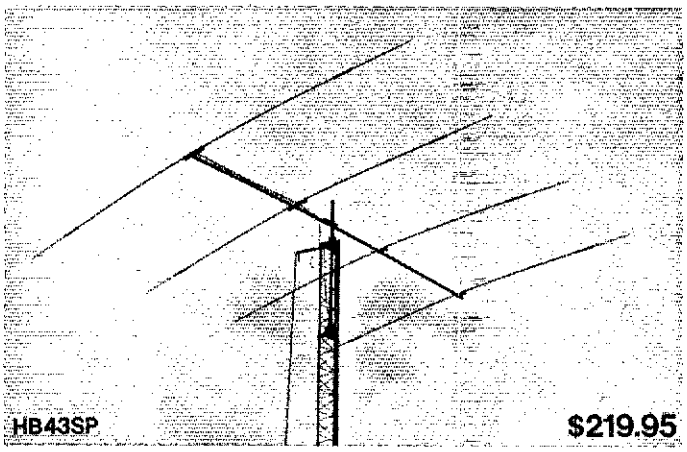

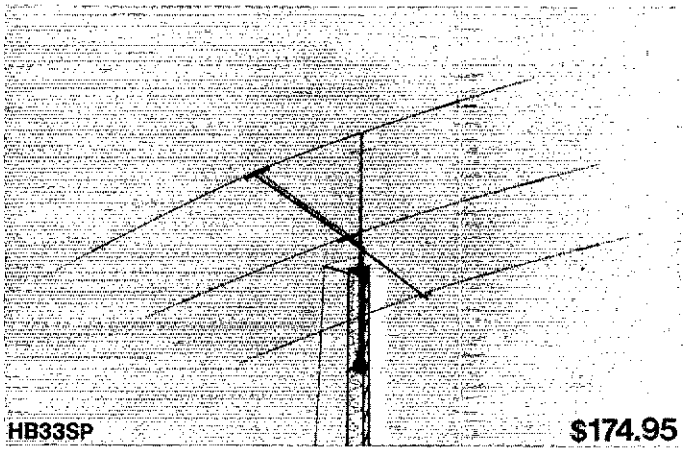

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HB33SP	14/21/28	3	3	2KW	BELOW 1.5	50 Ohm	27'	13' 2"	15'	4.73 sq.ft.	102 lb.	1 9/16"	1½-2"	27 lb.

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TH3JR	3-El. Triband Beam	$129
TH2MK3	2-El. Triband Beam	$109
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402BA	2-El. 40-mtr. Beam	$175
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155BA	5-El. 15-mtr. "Long John"	$145
105BA	5-El. 10-mtr. "Long John"	$ 94
204BA	4-El. 20-mtr. Beam	$175
203BA	3-El. 20-mtr. Beam	$ 99
153BA	3-El. 15-mtr. Beam	$ 64
103BA	3-El. 10-mtr. Beam	$ 54
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ATB34	4-El. Tribander	$219
ATV4	40-10 mtr. Vert.	$ 85
ATV5	80-10 mtr. Vert.	$ 90
20-3CD	3-El. 20 mtr. "Skywalker"	$165
20-4CD	4-El. 20 mtr. "Skywalker"	$239
15-3CD	3-El. 15 mtr. "Skywalker"	$ 82
15-4CD	4-El. 15 mtr. "Skywalker"	$ 98
10-3CD	3-El. 10 mtr. "Skywalker"	$ 59
10-4CD	4-El. 10 mtr. "Skywalker"	$ 75
A50-5	5-El. 6 mtr Beam	$ 59
617-6B	6-El. 6 mtr "Boomer"	$169
32-19	19-El. 2 mtr "Boomer"	$ 75
214B	14-El. 2 mtr "Boomer"	$ 59
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ARX-2	2-mtr "Ringo Ranger"	$ 34
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A144-10T	10-El. 2 mtr "Oscar" Ant.	$ 37
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certificate under the new rules. W2RQ's gang at FD reports setting a new QSO record of 10,670 using 15A highpower and the following antennas: 402BA at 80 ft, 204B at 55 ft and 155BA at 45 feet. WB2KLF reports with deep regret that W2GJC, his father, became a Silent Key. The Old Bridge Repeater Association has changed its name to Old Bridge Radio Association because it outgrew its repeater club classification with events like the Statue of Liberty Expedition, Olympic Torch Run, DXing, and a successful net "OBTTN." The combined NJN/NJPN nets had a very successful combined business meeting and picnic at Shark River Park, July 21. A former trafficker, ex-WB2NOM and now K1XA, joined us and brought along his very lovely YL friend. Sussex County ARC reports WA6YPX has a new repeater on 220 - 223.08/224.68. Col. Gildersleeve, Sussex County CD officer, has retired and the Sussex ARC salutes his retirement and thanks him for the many favors to the club including use of c.d. facilities for the club meetings. They also participated in FD with a total of 3676 points scored. W2XD gave a talk to Holmdel Amateur Radio Club on new NTS structure, and he states he's willing to give same talk to other clubs, so send him an invitation. From the Ramapo Forty-Niner KA2AYQ says that 144.300 MHz is a good "watering hole" for "Rag Chewers" over a good portion of the eastern seaboard with farthest DX being VE1UT in Nova Scotia and the net gets about 30 in a round-table with net closings as late as 3 A.M. That's a good one for you insomniacs! The HARC meeting was attended by K2BJG and WA2UPK. Don't forget the HARC Convention at the Pines Hotel, S. Fallsburgh, NY November 7-9. Make your arrangements NOW! From the Fairlawn ARC "QRZ:" FD was maintained in the 3A class despite some who were against going. WB2RLO, the club station, hung onto its tradition of participation. The usual summer doldrums have set in, but I'll be looking forward to hearing from many of the other clubs come the September report. Don't forget to get your classes started and five plenty of publicity to the SWLs out there! Let's get them along with the disgruntled CBers. THEN FOLLOW-UP WITH A GOOD "ELMER" PROGRAM. Traffic: (July) W2UEZ 351, WA2MVO 244, KB2HM 197, AF2L 196, W2COB 189, W2RQ 162, AG2R 150, K2VX 148, W2XD 119, N2CT 103, W2SQ 101, W2TCA 82, KF2T 77, WB2AIU/T 40, WB2RMJ/T 39, W2CC 39, W5DTR 28, K2PH 27, WA2UPH 18, WB2KLF 10, N2BLQ 3, N2BC 3. (June) W2RQ 238, K2PH 71. (May) W2RQ 282.

MIDWEST DIVISION

IOWA: SCM, Max R. Otto — WØLFF SEC: WØIYW. DEC: WBØAVW KØCY KØMST WBØVYG. Iowa Repeater Council officers: WBØGGI, pres.; WAØLHE, vice pres.; WAØYGJ, secy/treas.; WAØFYG, freq. coord. Central IA ARC officers: WDØEIF, pres.; WBØRMT, vice pres.; KAØEBA, treas.; NØAHJ, secy. Congrats to upgrades KAØBXI for General, and KØARO and KØUXA for Extra Class. WBØWOJ moved to LaCrosse, Ft. Dodge and Humboldt clubs gave assist to a canoe race via KØHGR KØGP WDØBPR NØBJL WAØWHZ WØLAR KØARA KAØCSI WDØGWN WDØGWN WDØAXF WØRCW. WBØJYF flushed the Cedar Valley fox. KØZQ/R is on 7.75/.15 at Atlantic and WBØZMY/R at Cedar Falls is on 144.77/145.37. WØQGI has 356 confirmed all barefoot. NTS-TEN 100% via WØYLS KØGP WØSS AEØR KAØX WBØUPF AIØQ NØSM WØFO WBØPYD and WØTIU. Likewise on DTRN via WAØAUX and KA5BDV/Ø. New calls: WDØBLA is KBØPC and NØAFS is KBØOZ. KAØIIT KAØIJG KAØIIN KAØIIR KAØIEU new in Mason City area and KAØIOR and KAØIZY new in Marshalltown. This is my swan song report to you. KØCY will finish out my term. Please give him the fine support I received. All club newsletters should go to him. The past six years have been very enjoyable. Happy Halloween.

Net	Freq	Time/Days	QNI	QTC	Sess.	Mgr.
Iowa 75M	3970	1730 M-S	1280	96	27	WBØAVW
Iowa 75M	3970	2300 M-S	1007	54	27	WBØAVW
Tall Corn	3560	2330 Dy 0300	331	99	62	WØYLS

Traffic: (July) WAØAUX 634, WØSS 94, WBØKHO 93, WØYLS 82, KAØX 73, AEØR 53, KØGP 48, WBØUPF 30, WØLFF 23, KØCY 18, WBØAVW 13, WBØMCX 11. (June) WBØPYD 47, KØHCO 4.

KANSAS: SCM, Robert M. Summers, KØBXF — SEC: WØKL. NMs: WØFT WØOYH WAØSZS. Welcome back to the state to KØBIX, who is now residing in Mission. The nets will be hearing this call shortly. June QKS report was QNI 276, QTC 106. The month of July has been a rather busy one for your SCM and from the amount of activity reported by each on the various nets etc, it has been busy more places than just here. Net reports for July: KWN, QNI 774, QTC 413; CSTN, QNI 1696, QTC 85. KPN, QNI 277, QTC 16; KSBN, QNI 1066, QTC 133; QKS, QNI 292, QTC 128. QKS-SS is still hanging on, however, it has been several months since we have received a complete report. Who would be interested in the net manager spot for the Slow Speed Net? A number of QVS stns reporting good Sporadic E openings that opened up the East Coast. Lots of contacts especially for NØLL and WØQOA. WDØCYX now radioing from Wichita, after moving from Lawrence. Jayhawk ARS set up station at the Wyandotte County Fair, and the Wichita hams participated in the Thunderboat races at El Dorado recently. Congrats to WØKL on receiving his 50 year QCWA award, and to WAØSEV on the Kansas RE Baker Ham of the year. Traffic: (July) WØFIR 129, WØOYH 124, WØHJ 90, WØFT 88, WDØACG 86, WAØLBB 66, WØCHJ 44, WØAM 42, KØBXF 40, WØPB 39, WØFDJ 31, WØHYC 28, WØKL 26, WDØCFZ 24, WBØLKA 18, WBØYLP 14, WØRT 5, KØFPC 4, WØMI 2. (June) WØFT 88, WBØLKA 16.

MISSOURI: SCM, L. G. Wilson, KØRWL — Asst SCM: Joe Flowers, WØOTF. SEC: WBØFKY. VP1A QSL's from the Kansas City DX Club are now going out. If you do not receive yours, contact WBØTNY/KBØU. Never satisfied, ABØI now has 3 100' towers and 1 150' tower complete with monobanders to add to his collection. WBØUXI, operating in the multi-single category in the IRAU contest logged over 2,000 QSO's. Great job. The Missouri State Fair station is again operational. Give them a workout. QSL to WBØFND. The PHD Hamfest has been designated the Missouri State Convention. The confirmed date is April 11-12, 1981. For more information contact WAØKUH. 250 persons attended Ham Radio Night on August 11 at the Royals-Orioles game. A good time was had by all. Glad to hear XYL of WAØKUH is out of the hospital and recuperating well after her recent surgery. Congratulations to WØUI on his recent retirement from Vista Corp after 40 years. Recent PHD Novice classes produced 20 new amateurs. Congratulations to the following upgrades: General, WBØZIX and WDØGXK; Extra, WBØOMC and WBØOQV. Our deepest sympathy

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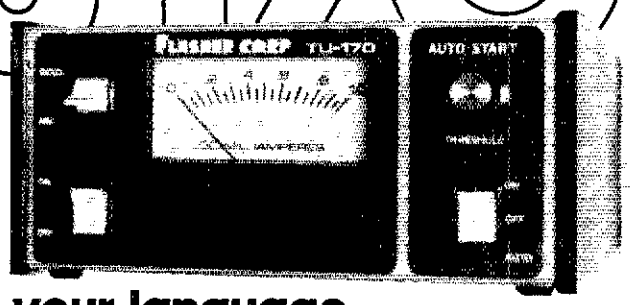

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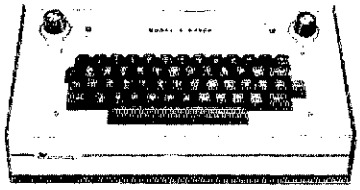

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to the family and friends to WBØOW who joined the ranks of the Silent Keys.

Net	QNI	QTC	Net	QNI	QTC
MOSSBN	499	95	HBN	274	38
NEMOE	112	3	MON	166	123
ACE	29	5	MON2	133	61

Traffic: (July) KØONK 542, WØOUD 176, KØPCK 167, WØBMA 154, WØBV 101, WØOTF 95, KAØE 44, WAØKUH 31, KØRWL 10. (Apr.) WØOUD 194.

NEBRASKA: SCM, Rex P. Greenwell, KØKP — SEC: WAØASM. Some fine news from Fremont, Nebr., the Pioneer ARC is now affiliated with the ARRL! This club has a long active history of FB service to the amateur fraternity and the community and it's wonderful to have them with the League! Congrats! Kudos to KØBRS, he again proved his frequency measuring techniques with Ø error in the May ARRL Frequency Measuring Test! I wonder what WØLEF has been gazing at with his "Funny Binoculars" he won at Victoria Springs? Reports have it that the beer bottles fashioned into binoculars give him a much needed new lookout on life! WØEUT reports a good turnout at the last QCWA meeting with 22 present and accounted for. Congrats to KAØIOJ who just went from Novice to Tech. in 2 weeks. The Lincoln ARC is asking area hams to contact their city councilpersons to help remove restrictive conditions from the City Tower Ordinance, check LARC for latest information.

Net	NM	QNI	QTC
Cornhusker	WBØGMQ	868	42
Morning Phone	WBØGWR	1199	37
Nebraska Storm	WAØLOY	1015	243
Pawnee ARC 2-Mtr	WØMKD	92	—
Platte Valley 2-Mtr	KAØBCB	53	2
QCWA	WØEUT	56	—
Western Nebr.	WØNIK	445	12

Traffic: WØFQB 332, WDØBQG 157, KØAIE 96, KØBRS 51, WBØGWR 42, WØHOP 30, WBØGMQ 29, WØZNI 23, KAØBCB 17, WAØOQX 13, WAØDXY 9, WAØQEX 9, WØHTA 8, KØSFA 8, WAØPCC 5, WØEUT 5, WØNIK 5, NØAJO 1, WAØLOY 1

NEW ENGLAND DIVISION

CONNECTICUT: SCM, Stan Horzepa, WA1LOU — SEC: W1SY. STM: WB1AIU.

Net-NM	Freq	EDST	Sess.	QTC	QNI
CN-K1EIR	3840	1900 + 2200	61	258	314
CPN-WB2OSY	3965	1800/1000 Su	30	82	236
NENN-WB1CPF	3720	1815	31	115	255
Nutmeg-WA1ELA	28/88	2130	31	94	369
RASON-WA1FSM	13/73	2100 MWF	13	17	120
WESCON-WB2PJU	78/18	2030	31	116	440

Hi QNI CN: WB1ESJ K1GF WB2PJU; CPN: KA1KD. Hi QTC Nutmeg: W1EFW. Tri City ARC members provided communications for Independence Day parades in East Lyme and Groton; N1AMD WB1DHZ and WBØFHT led the effort. New Milford Fair Days Amateur Radio display and message booth manned by KA1KD and KA1KP. Southington ARA Field Day results tallied by WB1ASH and his computer. New Generals: KA1BHQ WB1BPU KA1FFK and KA1FFL. WA1IXU's 220 repeater moves to new tower soon. W1CDC Dxpeditioned as VP2MM. Thomas Communications closed permanently. New Novices: KA1FDH KA1FRN KA1FRO KA1FRP KA1FRQ and KA1FRR via Bethel Middle School ARC; also KA1FSX. That call letter license plate, no longer needed on your mobile's front bumper, looks nice hanging in the shack. Candlewood ARA foxhunt won by team of WB1DSB WB1HCA and WA1KRX. Does anyone know the status of East Granby High School ARC, East Ridge Junior High School ARC, Greater Norwalk ARC, Hartford County ARA or UCONN ARC? . . . if so, please contact your SCM. W1AW/RPT has coordinated frequencies and will be on the air shortly. Try some public service . . . participate in the Simulated Emergency Test in October. CARWRS regrouping for fall and winter's onslaught; contact K1DFS for information. If you are Boxboro-bound, I hope to see you there! Traffic: WB2PJU 247, WB1CPF 234, K1GF 215, W1EFW 150, KA1KP 83, KA1CMX 68, KA1KD 66, W1DFT 65, W1BDN 64, WB1CRH 63, W1GVT 39, WA1LOU 39, W1OD 36, KA1DEU 35, K1EUW 29, WB1ESJ 27, K1AQE 26, W1IGF 26, WA1UAX 24, WA1WOG 22, KA1BHT 18, WB1DGR 6, W1QV 6, K1CE 5, W1CUH 4, K1XA 2.

EASTERN MASSACHUSETTS: SCM, Rick Beebe, K1PAD — STM: WA1TBY. SEC: WA1BLG. ASCM: WA8NEW.

Net	Mgr.	Freq.	Time (Loc)/Dy	QNI	QTC
EMRI	N1GQ	3.658	19/2200 Dy	368	252
EMRIPN	W1FJI	3.898	1730 Dy	301	99
EM2MN	WA1IFE	90/30	2000 MWF	96	28
EM2MN	WA1IFE	145.8	2000 TTh	—	
NEEPN	K1BZD	3.945	0830 Sn	68	21
HHTN	K1BSO	04/64	2230 Dy	520	140
EMRISS	KA1BJY	3.715	2030 Dy	75	47

ARRL Bulletin NR 79 outlined the League's conclusions on the new 10 MHz band which we in Eastern Mass had a large input to via our section newsletter "The Crossbander" (300 of the 600 responses were ours). As we suggested, they would like to see the band cw/RTTY only and limited to 250 watts. However, they would limit the band to General and above, not Novice and above as the majority of our responses indicated. They also would increase the phone band on 20 meters as one of our folks had suggested. But they went further and expanded the phone portion of 40 meters which I know some traffic handlers do not like because it eats into the cw band. There will have been another questionaire in the August Crossbander, but it will have only gone to regular subscribers since I already used my once per year mailing to all members. So if you have comments on this or want a questionaire, it's not too late. Drop me a line or radiogram with your comments. We have already proven that our ideas can make a difference if we're willing to put it on paper . . . K1POP on the Cape talked with HP9LMC who is the chap rowing across the Atlantic, got some good PR from it also. The annual SET is in October so contact your local EC to help or just check in to one or more of our nets listed above and send me a piece of traffic saving that you participated. Our EMASS emergency plan is being rewritten and a section added to include liaison with Red Cross. The Tall Ships effort in the spring played a large part in making this happen. Kudos to WA1IDA who headed up this effort. Billerica Club made 4480 points in class 3A during FD. Wellesley and Middlesex Clubs had a joint picnic. Massasoit Club lost W1MV in July. They had used his call on FD. W1ZR, EC for Littleton and Mitre Bedford member, left to work in Connecticut — good luck. Capeway Club member, K1LOE, visited club founder in Calif. WA1RWO graduated from Northeastern in Sept — so what you say! Try it with your eyes closed, he is sightless. Quite an accomplishment so congratulations.

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XV2-2	28-30	220-222
XV2-4	28-30	144-146
XV2-5	28-29 (27-27.4 CB)	145-146 (144-144.4)
XV2-7	144-146	50-52

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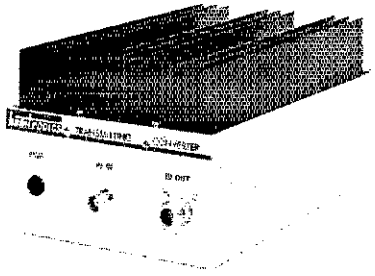

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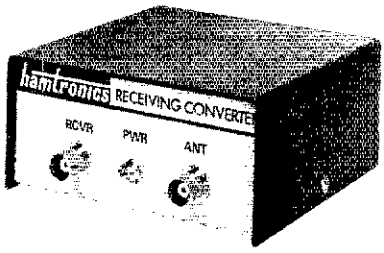

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CA50-2	50-54	144-148
CA144	144-146	28-30
CA145	145-147-or- 144-144.4	28-30 27-27.4 (CB)
CA146	146-148	28-30
CA220	220-222	28-30
CA220-2	220-224	144-148
CA110	Any 2MHz of Aircraft Band	26-28 or 28-30
CA432-2	432-434	28-30
CA432-5	435-437	28-30
CA432-4	432-436	144-148

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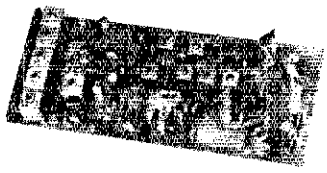

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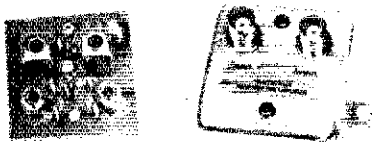

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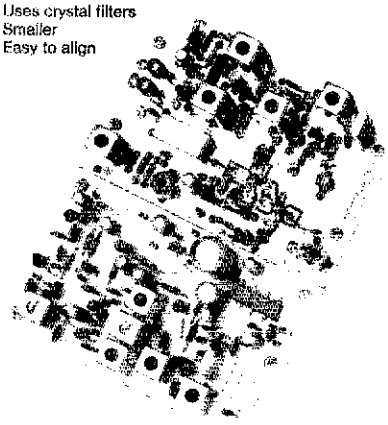

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Random letters, numbers and punctuation generated by computer in groups of five. Transcripts included for self-testing.

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- ☐ **Novice-Class Amateur Radio License Manual** - By Phil Anderson, WØXI. $3.95
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- ☐ **Federal Frequency Directory** - $12.95

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- ☐ **Novice** - Includes Novice manual, Super 5 WPM tape, Novice Study Tape and QSO Tape. $14.95
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MAINE: SCM, Cliff Laverty, W1RWG — STM: W1KX. SEC: WA4UJJ. Had the pleasure of eyeballing hams from one end of the state to the other at Abbott Village, and Maine hams came thru again in providing comms for Friendship Sloop Races. Want to encourage hams to check into section nets and bring traffic. SGN and PTN. Three active hams have become Silent Keys: W1GU W1BBE W1NND will be missed. PSHR: KA1EO W1RWG WB1BYR W1BJ. Sessions/QNI/QTC: MSN 13/42/7; PTN 31/290/123; SGN 27/1066/96; AEN 5/71/0; SPSN 8/61/12. Let's have more reports and more club activities and have them in to me by the fifth of the month. Traffic: W1RWG 115, WB1BYR 105, W1KX 76, W1BJ 63, W1HDC 49, AF1I 44, W1JTH 42, WA1JZP 40, KA1EO 37, W1AHM 32, K1GUP 30, W1BMX 18, W1MBO 8, W1NV 6, KA1CNG 4, WA1FCM 4, W1GKJ 4, WA1YNZ 4, KA1DDJ 2.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1NH — SEC: K1RSC. STM: W1TN. NMs: N1NH & AK1E. The NH Federation for the Blind Walk-A-Thon communications was provided by W1ALE W1CNK W1IN WA1WGR WA1VVX & WB1HHI. During outage of Telephone Trunk lines by lightning, W1BYS handled traffic between Concord and Salisbury. Congrats to XYL of W1GUE who is now KA1FMQ. First New Hampshire ham to receive Number 1 DXCC plaque is W1FZ. His QSO with 3C0AB made it 319. W1FYR M1NHJ WA2VNS WB2OYS KA1DX WA1YZN N1APA N1AOZ WA1UNN provided communications for annual Townsend canoe race. KA1DE held pool party afterward. K1OIO provided pictures of atop Mt. Washington for Granite Chips, the NH traffic handlers bulletin. Novice classes in Farmington area this fall. Contact W1FZ for details. W1GUX class of Novices at Sunapee High School inaugurated station on July 18. WA1OWC assisted by getting station a receiver. Seen on Hyways & Byways: WA1RRW WA1NGA & K1UQX. New WAS award to WB1HGO. The GSPN had 360 checkins and 42 traffic. NH traffic handlers held excellent get-together at Paulucaway State Park. Summer is over, get those antennas ready for winter. Traffic: (July) W1GUX 316, W1QYY 235, W1TN 146, AK1E 96, W1FYR 89, KA1BJ 50, K1OSM 37, W1ALE 34, WB1HGO 33, KA1BBI 32, W1BYS 14, W1GUE 14, WA1YAZ 12, K1UQX 11, WA1PEL 11, W1MHX 10, N1ALM 10, W1NH 9. (June) W1GUX 88, W1MHX 33.

RHODE ISLAND: SCM, J. Titterington, W1EOF — RIEM 2-meter Tfc Net totals: sess 22, QNI 175, TFC 38 — from WA1OSL, net mgr. New officers at Sub Signal (Raytheon) Club: WA1YTC pres., WB1FJZ, vice pres.; KA1EAL, secy.; KA1FOF, treas.; W1AXO, chief eng. Several RI hams participated in OSTAR-ARW for race ending in Newport — effort was headed up by WA2MPN and was a huge success. Our hurricane watch girl, WA1KKP, was in there and swinging against Hurricane Allen. W1JFF is retiring as NE Vice Director — sorry to see him go. We had a visit from a EME 2-mtr EME expedition — hams behind it were W1JR W1UHE K1KEC K1MNS AD1C K5UGM & K1ICM. Come again and stay longer, folks! K1AUN is recovering in Newport hospital & wkg 2 meters from bed. Autumn is here — how about taking an appointment? Traffic: KA1BTU 174, KA1FE 89, W1EOF 52, N1RI 41, W1BLS 6, AE1S 6.

VERMONT: SCM, Bob Scott, W1RNA — SEC: W1VSA. K1GYR and W1KJG are home from the hospital and hanging in there — as they say, kinda slow but coming. K1PED aided a motorist having an accident on Sand Bar Bridge by autopatch thru 146.01/61, calling the State Police and ambulance service. New RC in Rutland forming — the Green Mountain Wireless Society — expected to be ARRL affiliated. Jay Peak Repeater group held their annual meeting at Prouty Beach in Newport. The RC in Brattleboro is still having organization pains with successful conclusions expected shortly. GMN 27/499/54; Carrier 27/541/42; VTSBN 30/415/62; VTRFD 4/57/11; VPN 4/61/5; WA1ZMS NCS VTSBN on Tue. Traffic: K1BOB 113, N1ARI 35, W1RNA 18, W1KJG 2.

WESTERN MASSACHUSETTS: SCM, Art Zavarella, W1KK — ASCMs: K1BE W1BVR. SEC: W1JP. STM: W1TM. NMs: WA1MJE W1UD W1UPH. Agawam Novice class upgrading REACT to RACES. Veteran OVS K1SF reports continuing openings 6-M, "fantastic double hop." WMA reps into NE Teleprinter net, all pros W1NPL W1YI W1BKG W1ZPB: mucho QTC on 3620 MWF 1900 local. W1ZPB also "vacationing" with antennas, and intro. radio for Elder hostel. W1JP tweaking ARES to be all SET with new appointees: WB1HIH EC/Berkshire to replace W1KZS who asked out; mnl tnx fb job. W1GAJ promoted District EC Franklin/Hampshire; W1JTL promoted District EC/Worcester, with W1DOY/SoW, K1JHC/NoW; WA1YYW EC/Hampden. PSHR: WA1MJE 69, W1TM 60. Traffic: WA1MJE 325, W1TM 182, W1UD 176, K1SSH 120, W1YI 71, W1JP 59, K1IJV 58, WB1HIH 57, W1ZPB 38, W1EFC 36, W1KK 34, W1BVR 21, WA1OPN 21, WA1YYW 20, W1UPH 14, WB1CWH 5.

NORTHWESTERN DIVISION

ALASKA: SCM, Fred Wegmer, KL7HFM — ASCMs: AL7AC & KL7IBG. SEC: KL7EWQ. STM: AL7O. The Alaska gang made a good showing at SEANARC '80 and in addition to having a ball, won more than their share of prizes. Best of luck to KL7MF and KL7PJ on their European jaunt. The Alaska Code Net is up and running on 7060 daily at 0430Z and making good progress, tnx to AI7R etal for their hard work. The Alaska-Pacific Net (MTWThF) 14292 @ 1730Z needs Alaskan alternate NCS, contact KL7IBY for info and roll call sheets. Plans are being made for An Alaska QSO party. Tnx to Alaska DX Association. Details will be announced later. As usual most of Alaska "ham" activity in summer has turned into "fish" activity. Bet there will be a lot of tall tales this fall. Traffic: (July) KL7IYX 62, AL7O 38, KL7JFT 17. (June) KL7IYX 58, KL7JFT 32, AL7O 14.

IDAHO: SCM, Lem Allen, W7JMH — Club news: The Kootenai Club reports 66 members, 59 hams. K7PPV and K7UBC back from the coast. N7AVV married N7AKG July 4 — congrats! People and Things: W7GHT has new 50 ft. antenna poles — look for new sky hooks soon. KA7BTQ is new General — congrats! We were all rooting for W7AMS, now recovering from surgery. WA7UHW, Idaho SEC, reports Bonneville County c.d. hq has new Drake TR-7 for emergencies. He also reports the new Mt. Harrison ss repeater is due Sept. 1, they expect to add a 450 link to it. W7LAM put up new 75-m coax vee and 40-m dipole.

Net reports:

Net	Sess	QNI	QTC	Net	Sess.	QNI	QTC
Farm	31	1266	38	Mini Cassia	4	16	1

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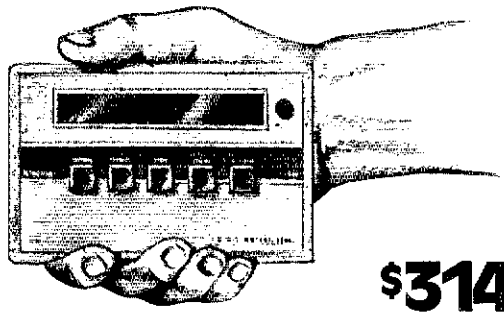

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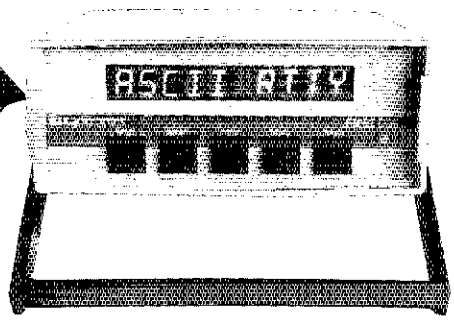

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IMN	22	194	89	Mt. Harrison 3		55	3
Goins Mt. 4		120	1				

Traffic: W7GHT 185, K7JV 22, AC7P 81, W7LAM 50, WA7CTS 39, W7JMH 22

MONTANA: SCM, Robert Leo, W7LR — MONTANA QSO PARTY, start 1800Z Oct 11, end 2300Z Oct. 12. Rest period 0500Z - 1400Z Oct 12. Sponsors Butte & Gallatin ARC's. You may QSO same stn each band & mode. Exchange RST & location. See QST Contest Corral for more details. W7LR wants to advise that he does not plan to run for SCM next time — too much engineering & consulting work, and time for new blood as SCM. See SCM solicitation in Oct & Nov QST. My term expires 13 Mar 1981. Clubs & others should plan new SCM candidates. MTN QTC 76, QNI 1192. WA7OBH reports lots of good DX. Some 2-mtr rptr corrections: no 31/91 Hardin; WB7CXR Havre 69/09 instead of 01/61; WB7VTS Ringsdale 34/94 to K7OZU 37/97 Saco; no 28/88 Gt Falls. IMN QTC 89, QNI 194, from WA7BDD. W7LBK reports he & K7ELW build 2-mtr antennas. FB summer hamfests in Seattle & WIMU W Yellowstone. MTN (June) QTC 78, QNI 871. W7DB sent bulletins. W1XX idea: have an OBS for each repeater area to copy W1AW and read bulletins on 2-mtr nets. KB7O OVS report: 6 Es July days 6 mtrs, wants list all Montana 6-mtr hams. N7ANR N7ATT KB7BJ KA7AYN worked Bannack DXpedition. KB7O reports results VHF path tests: QSO's between Butte, Bozeman, Billings from mtn peaks. KB7Q has 47 states on 6 mtrs. N7ATT OSY to Wyoming. WB7OYP W7GP KB7Q KB7BJ gave 24 hr/day QSO for Diabetic Camp nr Bozeman. Traffic: W7DEO 12, W7LR 6. (June) W7IXD 59.

OREGON: SCM, Dale L. Justice, K7WWR — SEC: K7OLN, STM: W7VSE. Section nets:

Net	Time/Days	Freq	QNI	QTC	Mgr.
BSN	0045Z Dy	3908	618	23	WB7POU
OSN	0130Z Dy	3587	253	494	KB7JW
	0500Z Dy				
PDXAARES	0230Z Dy	147.32	580	29	K7WWR
PTTN	0200Z Dy	146.76	679	124	W7LRB
OARES	0030Z Dy	3993.5			W7HLF
JCARES	0215Z Th-Sa	147.06	115	10	W7VSE
WCN	0200Z Dy	3702	344	149	K7ZIG
SOFM	0230Z Mo	146.64	95		W7FDU

Mt. St. Helens still is occupying most of the resources available in the Portland-Vancouver area. K7WWR took his portable repeater to a temporary location near Mt. St. Helens. K7UUH and W7ADV continue to coordinate radio support for the missions. WB7NAU WB7TKZ K7OSM and many others are devoting nearly full time to the effort. N7DB had an exciting month on six meters, with lots of Es and long haul and all night sessions. New NM is KB7JW. Oregon State Net is now holding two sessions, at 6:30 and 10 P.M. During the BSN picnic, WB7POU was reelected NM and W7FQ Asst. NM. Next year will see a joint OSN-BSN picnic. The Eugene Hamfair was a success, with good meetings and lots of swap-n-shop goodies. WB7BSD KB7CBH KB7ML KB7K and KB7NJ upgraded. KA7HOJ and KA7ILE are new Novices. Approval for a N.W. Division Convention in Seaside on June 6, 7, and 8, 1981 was made at the Seattle Convention. Lots of support will be needed to make this a success. Make an offer to help the committee. Traffic: W7VSE 720, KB7JW 600, KA7AOB 540, K7NTS 259, WA7IHS 149, W7FDU 31, WB7OEX 28, W7LNE 27, K7WWR 23, W7LT 6.

WASHINGTON: SCM, Bob Klepper, W7IEU — STM: W7DZX, SEC: WA7RWK. Nets reporting this month: NTN, QNI 1953, QTC 49; WARTS, QNI 2856, QTC 160; NWSSBN, QNI 665, QTC 49; WSN, QNI 525, QTC 184; PSTS, QNI 132, QTC 75; SCARES QNI 34, QTC 5. Mt St Helens and the weather cooperated to make SEANARC '80 a huge success with almost 3000 in attendance. It was good to see so many from headquarters here. K7RBT WB7UGF and other members of the Evergreen Amateur Radio Service (EARS) provided communications for the annual tour of Port Townsend Bike Race. W7AIB not handling much traffic but is heard occasionally checking into WSN and RN7. N7ABA now KB7NU. Don't look for W7BCS anymore, he says he must use N7CT. WWDX Club now has a membership of 560. Sorry to report that W7AA WB7ASF W7KYY W7LVZ W7OYO have become Silent Keys. WB7QWC participated in ARES program at the ARRL Convention. Mt. Baker ARC Repeater group announce the changing of their repeaters with a target date of Nov 1. The new frequencies will be 146.14/74 and 147.76/16. For those interested, the Washington Section ARES/EC Net has changed date and time to Sundays at 7 P.M. All ECs are requested to check in, and if you can't make it, have an alternate do it for you. Lower Columbia ARA members were involved in 2 successful S&R missions for lost youths. KL7HFM, SCM for Alaska, informs me that the Alaska CW Net is now in operation on 7050 kHz at 0430Z. RASC members provided communications for the Sedro Woolley Loggerodeo Parade. New officers for WARTS Net are: W7EQY, Mgr.; WA7RCR, asst Mgr.; W7BUN, secy/treas.; WB7TQF K7OBE WA7RCR K7CTP K7AJT, dirs. The new GE Repeater package purchased by the Clallam City ARC is in operation on 146.16/76 on emergency power with a back-up emergency system. BEARS working on plans to upgrade its repeater and are also planning on a 220 MHz repeater. In addition they are updating the antenna system at the clubhouse. The telephone installed at the clubhouse of the LCARA proved very helpful in handling emergency messages during Mt St Helens eruptions. Thanks to all of you who respond to the call from the ARES Net on 3900 when Mt St Helens erupts and also to those of you who just listen and respond only when you know you can be of help. You are as important to the operation as those of us who are on the air. Thanks for the cooperation. Traffic: WB7WOW 747, W7DZX 675, K7GXZ 181, W7FJZ 133, W7IEU 114, WB7TQF 111, WA7BDD 104, N7AFZ 100, W7GR 85, N7AJ 76, WB7CFH 74, K7CTP 57, WA7RCR 57, WB7FBP 42, N7AFY 41, W7APS 38, W7BUN 30, N7CT 12, WB7OWC 9, W7ERH 8.

PACIFIC DIVISION

EAST BAY: SCM, Bob Vallio, W6RGG — Asst SCMs: K6UWR W6ZF VE2AOV/W6. SEC: WB6KQU. Congrats to W6JXK on making BPL. It has been some time since I've been privileged to issue the BPL certificate. Lake County ARS held a breakfast meeting at Blue Lakes Lodge. MDARC mourns the loss of members KC6F & WA6ODA. Their pres., WA6MWU, suggests that the club provide a service to the families of deceased members in assisting them in disposing of Amateur Radio equipment. Such a policy would be of benefit for the survivors of any club's members. Congrats to their new and upgraded licensees: KN6M, Extra; KD6UY, Advanced;

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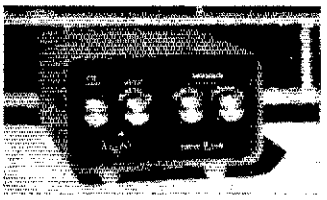

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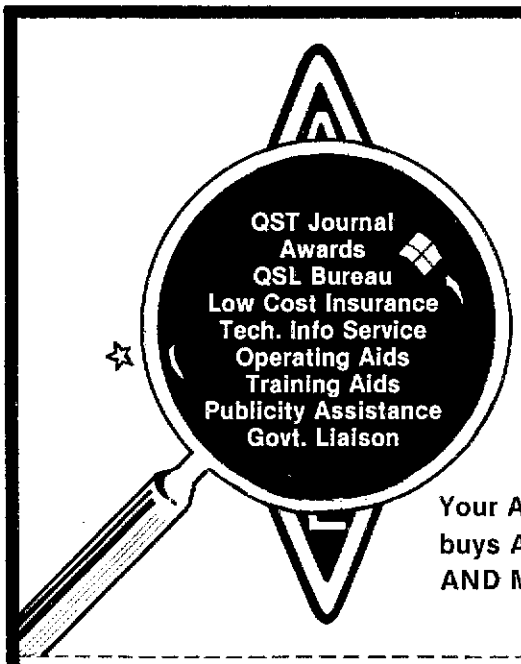

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KA6DPW & KA6IZK, General; KA6KSM KA6LCL KA6LLG KA6LBY KA6KSO & KA6LLH, Novice. SBARA member AA6SL slept with a three foot long snake on FD! EBARC members went on a tour of the US Coast Guard's SF Bay radar control facility and Search & Rescue Center on Treasure Island. LARK new officers are: WA6SYE, pres.; N6ARQ, vice pres.; KB6BD, secy/treas.; N6APB, act.; W6OA & WB6PDU, dir. Recent recipients of their much sought after "Klutz of the Month" award are: W6RGH N6APB KA6KZU N6ARQ & AD6X. Traffic: W6JXK 525, K6UGS 84, WB6UZX 26, KA6ERF 6.

PACIFIC: SCM, Pat Corrigan, KH6DD — STM: WØKON. SEC: KH6CKJ. The Honolulu DX Club hosted a social gathering of DXers from W. Coast and points East in Aug. At the Pan-Pacific SC Manahiki it was a week of great fun for all. Several KH6s were seen both at the ARRL National in Seattle and at ARRL Pac. Div. Convention in Santa Clara. At Seattle, local resident KH6HDA said hi to old KH6 friends and at Santa Clara KH6JWK from Kamuela got to see KH6s from Honolulu he doesn't see at home. Maui EC, KH6H, is planning public display of Amateur Radio during SET weekend, Oct. 18. Admirable project for Maui ARES. Big Isl. Emerg. Net 7125 kHz on Wed. 7:30 P.M. local. Honolulu ARC will be meeting at Prince Kuhio Fed. Bldg from now on. Traffic: (July) KH6HIJ 11, KH6H 10, AH6K 2. (June) KH6H 11.

SACRAMENTO VALLEY: SCM, Norman Wilson, N6JV — SEC: WB6GFJ ASCM AI6T. A new ARRL affiliated club in the Redding area is the Shasta Cascade ARS, WB6YRA, president. Welcome! New officers for the Mt. Vaca RC are K6JIK, pres.; W6DJQ, vice pres.; WA6ACF, secy., K6FO, treas.; WB6DQP, trustee; WA6APX WA6BAR and WB6PHQ, dirs. The Mt. Vaca RC and the J. T. Sabin Pioneer RC note the passing of W6BZBV. The North Hills RC will have an "Old Timers Nite" on Oct. 21 at the Carmichael Elks Lodge. WB6PHK can steer you to the activities of the Sacramento Ladies ARC. W6SX made DXCC. KA6EZF now KD6GY. WB6YUM and KB6GX with YLs have returned from OZ-Land. Denmark to CBers. W6DEF/6 is having trouble running coax from new shack. The shack of W6GO and K6HHD made Ch. 13 news when hurricane hit Texas. Traffic: W6SX 81, W6DEF/6 15.

SAN FRANCISCO: SCM, Art Samuelson, W6VV — SEC: WB6ZRK. STM: K6TP. Sonoma County Radio Amateurs and Humboldt ARC were each active in promoting Amateur Radio at fairs. N6CWY now KD6HU. W6VRG a Silent Key. Humboldt ARC and FWRA members are sporting new jackets. W6GGR was interviewed by a broadcast station, and had an opportunity to explain Field Day and boost Amateur Radio. K9AT and WB9LOZ reported an interesting visit to WWVH during their trip to KH6. Does your club have an active person involved in public relations to bring the story of Amateur Radio to the public? Traffic: (July) W6NL 896, W6LFJ 490, W6IPL 365, W6RNL 122, K6TP 94, W6CYM 9. (June) W6GGR 4.

SAN JOAQUIN VALLEY: SCM, Charles McConnell, W6DPD — SEC: WA6YAB. Asst. SCMs: W6TRP WA6YAK WA6HIN. W6RED a Silent Key. Appointment renewed: W6MRT, EC. WA6EWR is EC for Tuolumne County. WA6EXV is building microwave amplifiers. K6YK works cw while mobile. W6ILH N6OZ K6AYA WA6DEC K6YK K6UJG KA6CZR W6DPD W6XP K6XJ W6MND AF6Y AD6V W6BYH WB6VIN and N6BNW are chasing DX. WD6FRS has a phone patch; WA6CTR and KA6IFI have Tempo S-2; WB6QDN and N6BNW have TR2400s; WB6QDK and WA6JBF have TR7800s; N6AYI a FT720RU; WA6MNO a FT-7; WA6QNM a PCS-2000; N6COY a TR 9000. WA6YAB is chasing states on 10 meters. Interested in handling traffic? Try Mission Trail, Golden Bear, on NCN. See your net directory for details. Don't forget the SET this month. Contact your EC. There are 6 months until the ARRL Pacific Division Convention and Fresno Hamfest in May 1981. Plan to attend. Traffic: N6AWH 180, WA6YAB 28, N6AMA 21, W6DPD 13.

SANTA CLARA VALLEY: SCM, Jettie Hill, W6RFF — SEC: WB6IZF. Among those attending an ARES meeting called by the SEC, in San Jose, were: WB6LVD W6PLT WB6BPU N6CKV WA6EJV WA6YRB W6TOU WB6LZH W6ASH WB6IZF and W6RFF. There is a need for EC and ARES members in the north part of the section - interested? — contact WB6IZF or W6RFF. EC W6ASH busy with SPECS Net and hosted FARS for their picnic — 32 hungry hams and their families. W6SZN busy with DX and contest but found time to visit Nat'l convention in Seattle. WB6IZF reports lot of visitors to new QTH on Signal Hill. W6OII also went to Seattle, but is preparing for traffic from Monterey County Fair. As usual, W6AUC has many net skeds and helping KA7DWX with his cw. W6MKG had rig problems, but had a standby rig so didn't miss much on DX and skeds. His son, WB6HBL, says too hot to operate and that surfing is better. NCN members W6YBV W6KZJ and W6PRI report traffic activity is good even in the summer. NPS ARC new officers: KB6CG, pres.; WA6NEC, secy. WA7NEO upgraded to Extra Class. NPSARC reports K6LW is a Silent Key. Gabilan ARC added the following new members: AC6D WB7EHM AG6N K6LT and WA6EWP — was that odor from the smog or the Gilroy Garlic Festival? Newest members of PAARA are N6IG and W6VG. K6SMH operated KH6SP while on Naval Reserve duty. New officers for FARS are: WD6FMG, pres.; AG6D, vice pres.; WB6KZI, secy.; WA6EAA, treas. WB6IZF gave a talk on emergency communications and ARES to the SCCARA. The Pac Div convention was a huge success due to the efforts of SCCARA members. Traffic: (July) W6YBV 378, W6KZJ 120, W6RFF 46, W6AUC 32, W6PRI 31, W6OII 22, W6ASH 10. (June) W6ASH 16.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Bill Parris, AA4R — Asst SCM: N4UE. STM: K4VHT; SEC WA4BFT. Tar Heel Emergency Net (THEN) NM WD4CNR announced that 7232 kHz will be used during daytime as the alternate frequency to 3923 kHz in the event of an emergency. With hurricane season on us, clubs in Charlotte, Greensboro, Raleigh and Wilmington have set up working relationships with local Weather Bureaus. This is good practice for the SET to be held Oct 18-19 . . . has your EC set up his plans yet? Cape Fear ARS reports handling communications for the 4th of July River Race on 2 meters. Brightleaf ARC has begun testing new repeater on 96/36 and is looking forward to the 4-Land QSO Party which it is sponsoring Aug 30-31. Glad to have WD4PDU back on the air after a tour in the hospital. K4MOB and crew doing a great job with CVRA "Repeater Journal." Good turnout for the Cary Swaptest this year, a real treat for all. Be sure to note the times and frequencies for the section 75-meter nets for the upcoming SET Weekend.

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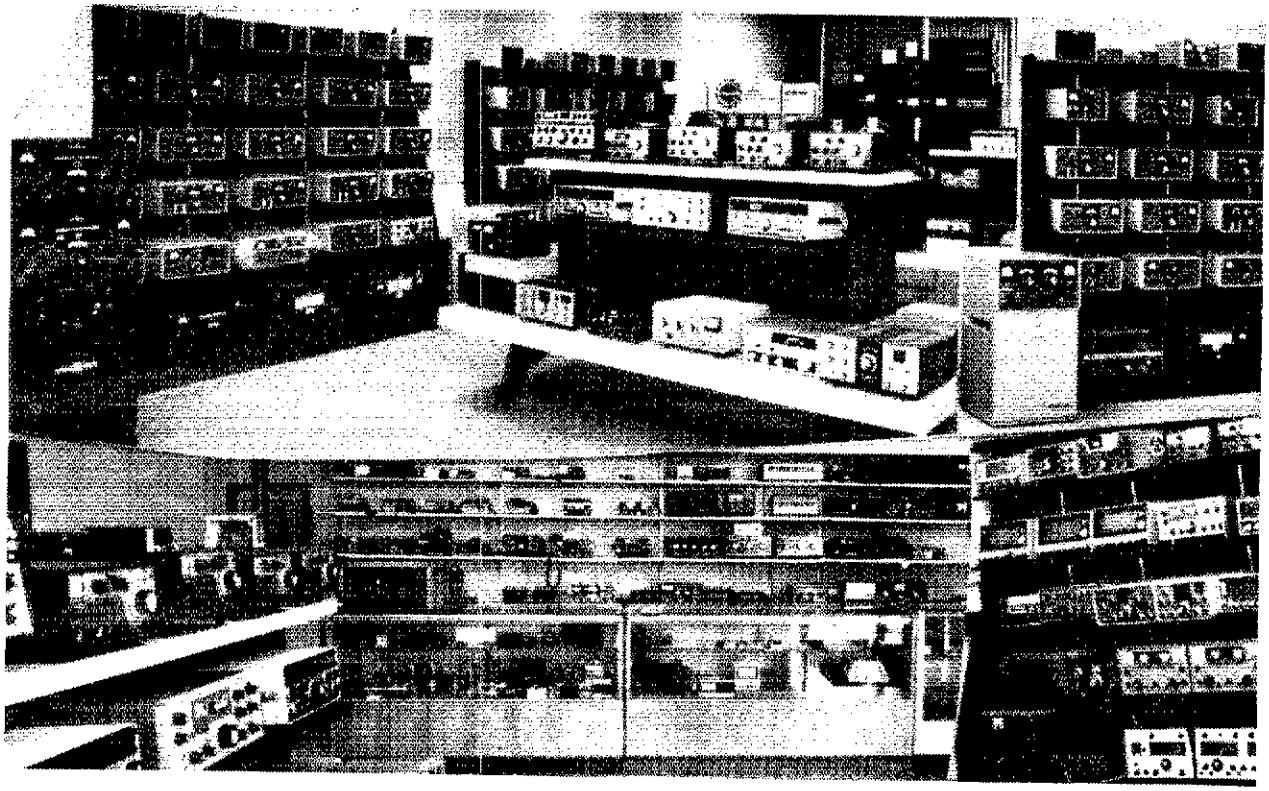

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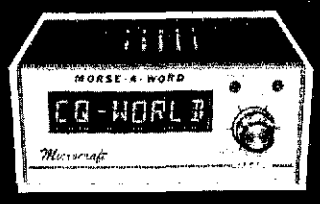

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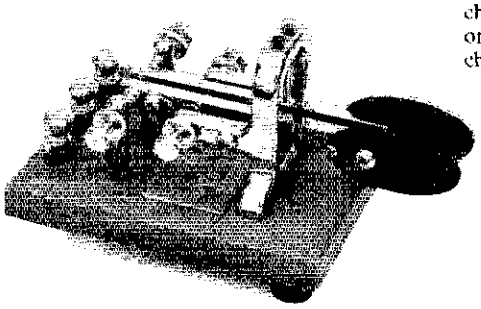

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JFK Net	1830	3923	WD4PDU
THEN	1930	3923	WD4CNR
NCSSBN	1930	3938	WB4CES

*Combined Section Net with SC. New appointees this month include: K4VHQ, EC Stokes; WD4IHH, EC Transylvania; K4DDY, EC Henderson; WA4QQN, OTS: WB4UJH, OBS. Traffic: K4GCN 480, WD8NYN 412, WD5CNQ 378, N4AET 276, WB4WII 220, AB4S 155, WB4VVL 142, WA4SRD 109, K4VHT 107, N4AGP 101, WA4BFT 99, W4EAT 93, WD4CFZ 88, K4FTB 79, AA4R 78, KU4W 77, WD4CNR 69, WB4CYN 69, WA4OBR 57, K4NLK 56, W4HKB 53, WD4JJK 50, KZ4A 45, WD4RDT 44, WB4UJH 34, WD4NAO 30, K4VHQ 30, KC4AM 29, WD4AIE 28, WB5CES 28, K4DHX 24, WB4VQZ 22, W4FMN 21, WD4PDU 21, WA4QQN 20, WD4CNS 19, WA4UTC 18, WD4JNZ 15, KF4R 15, WA4CUD 13, WD4OCO 13, N4UE 13, N4ARY 12, N4BEX 12, N4CCK 12, KA4DNL 11, W4VTP 10, K4MG 8, WA4IHG 6, WB6OTS 6, WB4HRR 2.

SOUTH CAROLINA: SCM, Richard McAbee, W4MTK — Asst SCM: WB4UDK. STM: W4ANK. NMs: WA4SJS W4ODE. Thnks for all the good Field Day reports. Rock Hill Hamfest Oct 5. A new net, SCNoon Net, 7.250 Mhz. Won't you join it? The SC ARES plan complete, if you haven't got your copy, contact your SCM. Wish to thank all hams for their very good cooperation for the past year and a half. Checkins/traffic: SC SSBN 1266/153; BlueRidge 2-Meter Net 1085/49; CN 565/303; Western SC Emergency Net 173/15; Newberry County ARES Net 75/14; Carolina State Line Net 50/0; District 5 ARES Net 4/0; Laurens County 2-Meter Net 32/1; CNN 256/47; Trident ARC ARES Net 184/0; Dixie 6-Meter SSBN 18/0; SC 2-Meter SSBN 85/0; SC ARES Net 103/0; Islander ARA 32/0. Traffic: K4ZN 292, W4NQL 63, W4FMZ 58, WB4UDK 56, W4NTO 43, W4ODE 43, K4FRX 38, W4MTK 35, K4VIA 35, N4BCD 27, KA4AUR 18, AF4E 16, K4LYU 14, WA4VYS 11, WA4JWS 10, WD4OBZ 8, WB8TCT 8, WD4DOL 7, N4ATO 6, WD4EDM 6, N4EE 4, W4DRF 2, K4KEP 2, WB4QHF 2.

VIRGINIA: SCM, Rick Genter, K4BKX — ASCMs: W4YE & N4NK. STM: WA4STO. SEC: N4AZI. Chief OO: W4HU. Chief OVS: N4CD. Chief OBS: W4YE.

Net	kHz.	Time-PM	Sess.	QTC	QND	QNI	Mgr.
VSBN	3947	6:00	31	207	556	574	KY4K
VSN	3680	6:30	31	131	689	341	WB4KSG
VN-E	3680	7:00	31	185	608	377	KB4N
VN-L	3680	10:00	31	132	465	269	KB4N
VLN	3947	10:15	29	148	517	480	WA4YIU
VNTN	3907	Noon	30	124	484	309	N4LE

"Soapbox" de WA4STO: K4BAV is organizing ARES antenna installing teams. W4UQ's xmtr gave up ghost two days before vacation. W4SHJ is in Calif. and Nevada. W4NWM made 12 straight months of PSHR. WA4JUO's activity curtailed due to being in "travel status." WA4YIU has a new delta-loop up for 75/80. WB4NEE active with soapbox derby. KA4HLI is a new member of Winchester ARES and has new 2-mtr rig. W3BBN has a new TR2400. WA4STO sez short on comments, short on column. Wat sa gang. WA4FDV and K4BKX hope to be back on the air by the time you read this. Traffic: WA4STO 559, W4JK 524, WB4PNY 459, W4SQQ 384, WA4CCK 303, K4KNP 249, KB4N 234, KZ4K 219, W3BBN 198, KY4K 158, WA4LJI 156, W4NWM 135, WB4FLT 131, W4SUS 130, W3BBQ 100, WD4FTK 87, K4EJ 85, WA4YIU 77, W4UQ 71, N4RF 62, WB4UHC 56, N4AZI 54, KA4ETG 53, N4YO 53, AA4CK 52, WB4ZTJ 43, WA4QWC 39, W4JAZ 38, WD4DUU 32, WB4KIT 31, W4OKN 31, N4NK 30, WB4ODZ 30, KA4GBL 22, N4LE 21, W4SHJ 20, K4VWK 20, WB4NEE 19, WD4KQJ 18, W4YVG 18, AA4TC 12, N4BJX 11, WB4DQZ 9, KA4HLI 9, KC4HN 9, WA4RTS 8, WB4ZNB 8, KB4OF 6, WA1VRL 6, W4KXE 5, KB4OB 5, WA4PBG 5, WA4EGW 4, K4JRT 4, WA4JUO 4, WA2WDT 4, K4DHB 3, W4DM 2, WA4ISA 2, WA4WQG 2, KM4X 2, K4AXF 1, N4OT 1.

WEST VIRGINIA: SCM, Karl Thompson, K8KT — SEC: K8OEW. STM: KD8G. NMs: KD8G K8MHR W8FZP WD8LDY. Warm WX and a nice lineup of prizes greeted hams at the 3rd annual Jackson Co. H. F. on Aug 10. A nice time was had by all. KC8C has resigned as STM due to school load. New STM is KD8G. New reptr. at Martinsburg on 147.225+ (WB8VAZ/R) is doing FB job. Hams in Weirton-Steubenville area assisted with Hancock Co. Fair Aug. 6-9. Fone Net: 27 sess, 413 stations, 59 msgs. MD Net: 30 sess, 233 stations, 21 msgs. WVN: 29 sess, 170 stations, 51 msgs. Nvc Net: 21 sess, 48 stations, 19 msgs. WV Hillbilly Net: 4 sess, 159 stations, 42 msgs. Traffic: KC8C 160, KD8G 118, WB8TJN 64, N8AJC 35, K8KT 35, W8CKX 19, W8HZA 19, W8FZP 16, K8MHR 15, KA8ETV 14, N8II 13, AI8I 12, W8CNF 11, K8JQ 10, W8YP 10, WB8UDY 3, KD8X 3.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Robert W. Poirier, KØDJ — SEC: WØACD STM: WBØMCL NM: KØCNV WØHE WØHXB KBØZ WDØAIT. New OO's NØDV and NØST. The OO program in the section is anemic. Anyone who feels he would enjoy the job and meets the requirements please contact me. WØWYX reports some problems with QRM on CARWN. Loveland Repeater Association raised their antenna 40 ft. to increase the range. NØAWZ and KAØDXM planning to operate the Sept. VHF Contest on a nearby mountaintop. Boulder ARC swaptest plans being finalized. DNTS restructuring should have taken hold for most of the system by the time you read this. At this writing one area was holding out on the total implementation and hopefully all the problems will be worked out soon. A mock section emergency may be in the works for SET Oct. 18 and 19. Details will be provided as the time draws nearer. Columbine 27 sessions, QNI 889, QTC 79, informals 202, QNF 1054; HNN 31 sessions, QNI 1552, QTC 144, informals 250, QNF 1618. Traffic: NØBQP 1749, WØWYC 1512, WAØHJZ 1177, WØLAE 143, KØDJ 128, WØGO 46, KDØM 25, WØNFW 25, WØGW 2.

NEW MEXICO: SCM, Joe T. Knight, W5PDY — SEC: W5ALR NMs: WD5AHH & KG5L. Southwest Net (SWN) meets daily on 3583 kHz, at 1930 local and handled 184 msgs with 213 stations in. New Mexico Roadrunner Net (NMRRN) meets daily on 3939 kHz at 1800 local and handled 145 msgs with 966 stations in. New Mexico Breakfast Club meets daily on 3940 kHz at 0700 local, handled 99 msgs with 768 checkins. Yucca 2-Mtr Net handled 22 with 641 checkins. Sorry to report the passing of W5NXF/KH6FQB, a great DXer and long time ABQ/HON ham. Great to have N4KB and YL Pauline in ABQ for a weeks visit. Several good reports on the Ft. Tut Flagstaff Convention. National Appaloosa Horse Show comm. organized by W5XR whose heart attack

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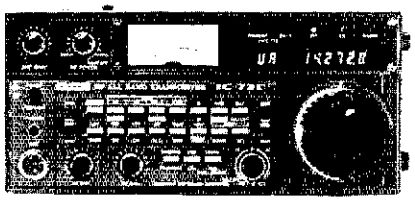

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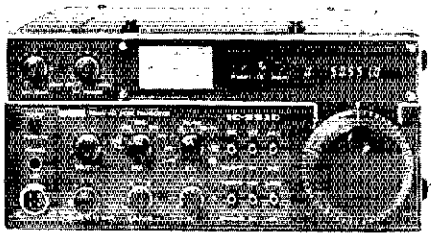

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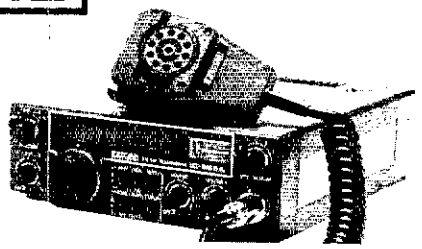

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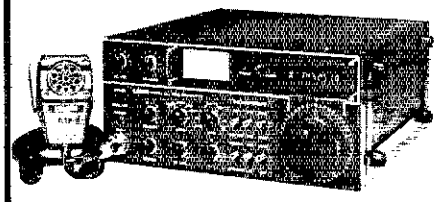

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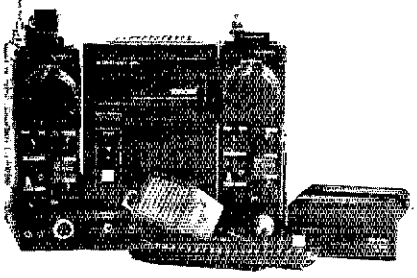

IC-202S (right) 2 meter portable SSB Transceiver. 3W PEP output. Uses regular "C" cells, optional Nicad pack/chgr or AC supply/spkr. With hand mic. whip antenna and strap.... **Regular $249.00**

IC-402 (left) 432 Mhz portable SSB Transceiver. Features same as IC-202S..... **Regular $349.00**

IC-502A 3W PEP 6m SSB portable..... **$229.00**

IC-20L 2m amplifier, 10W SSB/FM **98.00**
IC-30L 432 Mhz amp., 10W SSB/FM..... **105.00**
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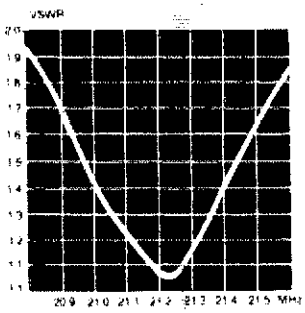

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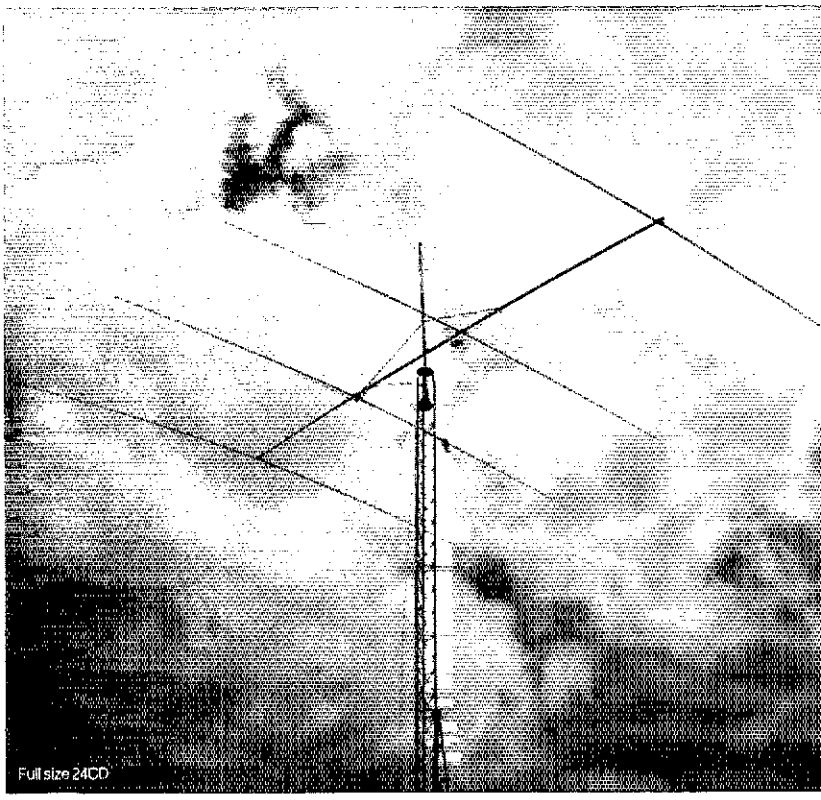
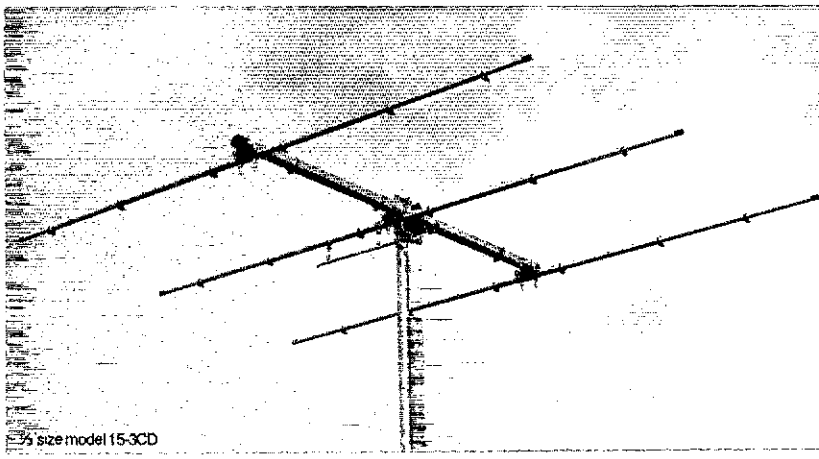
3 and 4 Element Single Band HF Yagis

More contacts, less waiting, less interference, and a better signal at the other end are yours with the Skywalker series of single band Yagis. The forward gain of the 4 element models will put you first in line. See the chart for all the details.

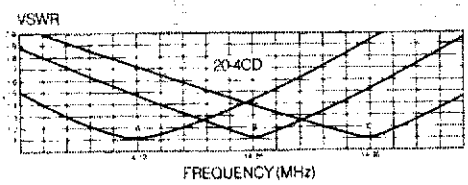
Heavy wall heat treated 6063-T832 aluminum tubing, ruggedly plated steel fasteners, and carefully formed aluminum brackets. Assembly is simple with the new Cushcraft Boom Assembly Marking System. The rugged yet light construction will result in easier assembly and installation and long life. Join the thousands that are moving up to Cushcraft Skywalkers now.

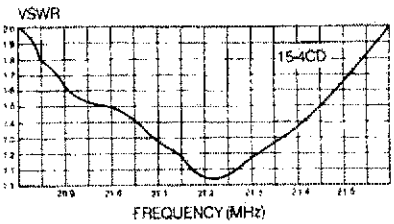

Full size 24CD

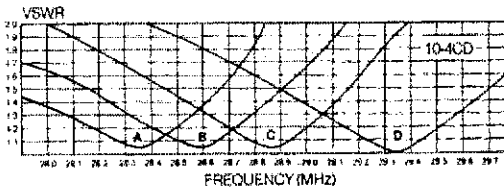

⅔ size model 15-3CD

Specifications

Model number	20-4CD	20-3CD	15-4CD	15-3CD	10-4CD	10-3CD
Frequency range (MHz)	14.0 – 14.35	14.0 – 14.35	21.0 – 21.45	21.0 – 21.45	28.0 – 29.7	28.0 – 29.7
Forward gain (dBd)						
Front to back ratio (dB)						
Boom length (ft) (m)	32 9.75	18 5.49	20 6.10	14 4.27	17 5.18	12 3.66
Boom dia. (in) (cm)	2¼"-1⅞" 5.4-4.8	2⅛"-1⅞" 5.4-4.8	2"-1⅝" 5.1-4.1	1⅞"-1⅝" 4.8-4.1	1¾"-1½" 4.4-3.8	1⅝"-1¼" 4.1-3.8
Longest element (ft-in) (m)	35-10 10.92	35-8 10.87	23-4 7.11	23-2 7.06	17-10 5.43	17-8 5.38
Element dia. (in) (cm)	1¼"-½" 3.1-1.3	1¼"-½" 3.1-1.3	1"-⅝" 2.5-1.6	1"-⅝" 2.5-1.6	⅞"-⅝" 2.2-1.6	⅞"-⅝" 2.2-1.6
E-plane B/width (deg)	60	56	57	56	57	56
Side lobe attenuation (dB)	40	40	40	40	40	40
1.5-1 VSWR Bandwidth	300 KHz	800 KHz	500 KHz	500 KHz	600 KHz	700 KHz
Turning radius (ft-in) (m)	20 6.10	23 7.01	15-4 4.67	13-6 4.11	14 4.27	10 3.05
Weight (lbs) (kg)	55 24.95	30 13.61	25 11.34	20 9.07	18 8.16	11 5.00
Windload (sq. ft) (sq. m)	8.1 0.75	5.5 0.51	4.5 0.42	3.4 0.32	3.1 0.29	2.3 0.21







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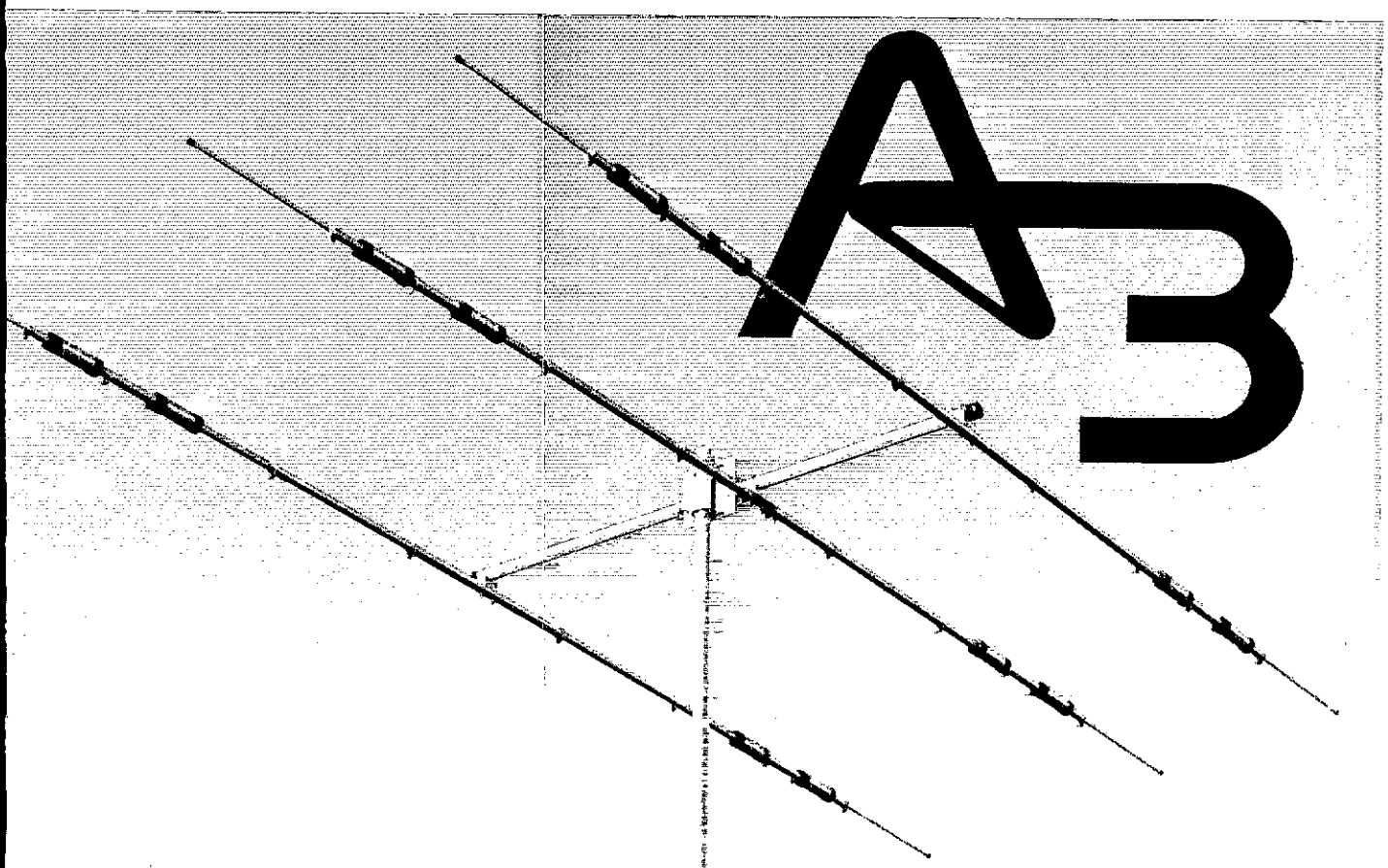

V.S.W.R.	1.2-1 Typical
Average Bandwidth	500 KHz
Power Rating	2000 w PEP
Feed Point Impedance	50 Ω
Connector	Twin terminal stainless steel takes all coax.
Boom	1⅝"-1½" x 14'
Elements/Longest	1⅛"-½" x 27'9"
Wind Sfc. area	5.6 Feet²
Weight	35 Pounds
Turn Radius	15'6"
Mast Diameter	1¼" min. 2" max.
Material	6063-T832 Seamless aluminum
Fasteners	Zinc Plated Steel
Telescope Method	Taper tubing with full circle clamps

UPS Shippable

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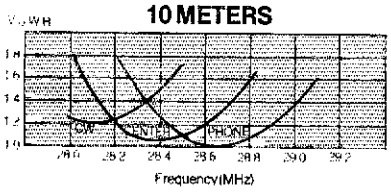
The full power, full performance 20-15-10 meter beam.

Enjoy the thrill of working rare DX with excellent A3 forward gain. Increase the pleasure of your daily contacts with A3 interference reducing front to back ratio. Use your linear amplifier with confidence in our new A3 high power traps.

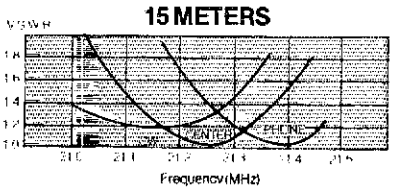
Make friends of your neighbors with A3 compact dimensions, low profile, and small turn radius. Satisfy your budget with A3 economy pricing.

The Cushcraft engineering team has again created that unique combination of quality materials, easy assembly and high performance with A3, the three band beam for the eighties.

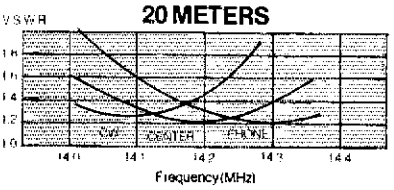
10 METERS



15 METERS



20 METERS



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- Digital Speed Readout
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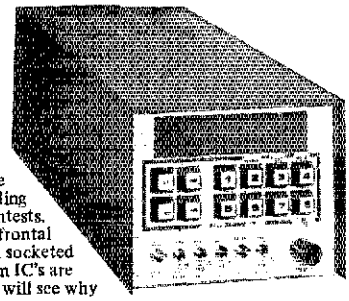

The Accu-Memory II is an improved version of the original Accu-Memory as described in the ARRL Handbook and now in use by thousands of amateurs. These improvements were made by the designer, WB4VVF, based on requests from DX'ers and contest users for additional capabilities and for an assembled version. Features such as large computer grade pushbuttons, not small round ones, and easy memory loading allow the memory to be used and not fought with during contests. An all metal case, 4x5x13 inches, was designed for minimum frontal area and maximum EMI protection. Plug-in main boards with socketed IC's and LED's assure easy maintenance. No expensive custom IC's are used. Compare these features and those listed below and you will see why your friends are using Accu-Memories!

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BELDEN

RG8/u Dbl. Shield

9888 56¢/ft.

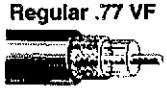
Part Number	MHz	db/ 100 ft.	db/ 100 m
9888	50	1.2	3.9
	100	1.8	5.9
	200	2.6	8.5
	300	3.3	10.8
	400	3.8	12.5

RG8/u Foam .81VF

8214 32¢/ft.

Part Number	MHz	db/ 100 ft.	db/ 100 m
8214	50	1.2	3.9
	100	1.8	5.9
	200	2.6	8.5
	300	3.3	10.8
	400	3.8	12.5

RG8/u Regular .77 VF



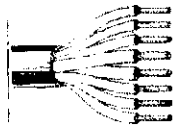
8237 28¢/ft.

Part Number	MHz	db/ 100 ft.	db/ 100 m
8237	100	2.0	6.6
	200	3.0	9.8
	400	4.7	15.4
	900	7.8	25.6

RG8/u Non-contaminating

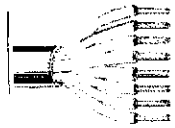
8267 36¢/ft.

Part Number	MHz	db/ 100 ft.	db/ 100 m
8267	100	2.0	6.6
	200	3.0	9.8
	400	4.7	15.4
	900	7.8	25.6



8448 24¢/ft.

No. of Cond. — 8
AWG (in mm) —
6-22, (7×30),
2-18, (16×30), (1.19)



9405 38¢/ft.

No. of Cond. — 8
AWG (in mm) —
2-16, (26×30)
6-18 (16×30), (1.17)

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gave hams to WD5KED N5GU WB5UWE WB5USB & W5JOV. Traffic: W5DAD 348, KG5L 178, W5UH 140, W5JOV 122, W5ENI 108, KA5DDW 105 & WA5MIY 24.

UTAH: SCM, Boyce Henningson, K7OEQ — SEC: WB7FCB. STM: W7OCX. WIMU, the Yellowstone National Amateur Radio convention, was held in West Yellowstone on Aug. 1, 2, 3 and attended by 415 amateurs and their families. There were activities for everyone including the non-ham members of the family. Dealer tables, swap tables, home brew contest, transmitter hunts, and time to meet the amateur you have talked to for years, but have never seen. All in all a fantastic get together. Thanks to WA7ZBO and group he put together for an excellent convention. Traffic: K7HLR 128, WA7MEL 75, WA7KHE 71, WA7JRC 28, W7OCX 14.

WYOMING: SCM, Chester C. Stanwaity, W7SDA — W7BKH WB7AHL and W7NKR with the aid of their two-meter radios were able to notify the Fremont County Sheriff's office of a boating accident on Morton Lake. The XYL of W7BKH served as nurse until the arrival of an ambulance and medics. The above was reported by W7BKI. Congrats to the following: KA7HCQ new Novice in Casper; KA7DDK new General in Sheridan; WB7VED now KB7NL. Welcome to WB7VCD and WB7VCI who are moving from Washington state to Casper. WB7NHR reports Wyoming Cowboy Net had 23 sess with 541 QNI and 8 QTC. WAØPFJ reports the Jackalope Net had 23 sess. with 336 QNI and 0 QTC. Traffic: W7LYA 359, WA7GYO 230, K7KSA 87, WB7NHR 46, KA7FKT 24, K7TFW 20, K7SLM 17, WA7SGG 10, W7SQT 8.

SOUTHEASTERN DIVISION

ALABAMA: SCM, James M. Bonner, K4UMD — SEC: W4IBU. The July hot weather has come and gone, more unpleasant weather is on the way. Hurricane Allen is potentially very dangerous, I hope it has blown itself out without damage. Our EC and DEC are as a whole doing a great job. More should be done. We need more EC reports to the SEC or your SCM. The N. Ala. Hamfest was a great success, everyone enjoyed the new quarters. Nice and cool inside. Muscle Shoals ARC (MSARC) reports that the EC, WB4NQH and DEC, N4CCT have a good emergency plan laid out for the AENJ Net, check with them on 01/61. The Chattaahhooche Valley ARC new Novices from their classes are KA4PZY KA4PZZ KA4QVA KA4QVB and KA4QVH. Look for them on the Novice bands. WA4RNP reports the annual Iron Man's Ski Classic was held July 19-20 at East Lake, in Birmingham, with 18 amateurs from BARC supplying communications for the 18 hr competition. K4TQR sez there were between 16 and 17 emergencies on 16/76 repeater WH4ACB in Birmingham. AL was represented in Gulf State Emergency State Net 100% by W4AZO KA4DJY KB4GA WD4LYX KA4NSV and W4USB, liaison thru AENB CW Net. CAND: 725 messages, 62 sess 100% by W4CKS. AENM: QNI 2415, QTC 149, 35 sess. AEND: 126 QNI, 47 messages, 28 sess. DRNS represented 100% by W4CKS WA4JDH WA4RAJ WB4VGG WA4WYQ. AENJ: 457 QNI, 31 sess. Congrats to W4HFU making MH, VOX "Amateur of the Year" from HARC. AENB CW Net: QNI 202, QTC 51, QTR 529 minutes. Traffic: WA4JDH 1108, N4CCT 99, W4CKS 99, K4AOZ 68, K4UMP 35, WD4DHI 28, WB4EKJ 24, W4IBU 25, KA4EWD 26, AA4J 24, WA4RMP 6, WB4TVY 6, K4HJX 2.

GEORGIA: SCM, Eddy Kosobucki, K4JNL — ASCM: K4VHC. SEC: K4SWJ. ASEC: WB4HXE. STM: WA3NAZ/4.

Net	Freq	Time (All EDT)	Mgr.
GCN	3995	0700 Dy 0800 Su	K4DMK
GSN	3595	1900 & 2200 Dy	W4WXA
GTN	7118	1815 Dy	Vacant
GSSBN	3975	1930 Dy	WB4ZVX
ARES	2975	1700 Su	WD4ADV
GA TFC "A"	7243	1200 Dy	W4GH
GA TFC "B"	3957	1830 Dy	W4GH
GERN (RTTY)	3620	2030 Fri	Vacant

Atlanta RC 1980-81 officers: K4NYK, pres, W4NJQ, vice pres.; AA4RM, secy.; WD4OPO, treas.; WB4HXE, act mg. WA4BZY earned BPL with Salvation Army centennial traffic. WA3NAZ now commercial rated instrument pilot. GSSBN Picnic another huge success. This is SET month. I hope that everyone is again well prepared to test our ability in times of emergency. Remember this is not a contest. Father Dave, CE9AE of Easter Island fame, recently entertained the Southeastern DX Club, Columbus ARC new officers are: W4FIZ, pres.; WB4MUL, vice pres.; N4ATL, secy.; WA4AHA, treas.; WD4PYP, act mgr. Remember the Warner Robins Hamfest on Oct. 11th & 12th. K4YGI convalescing after major surgery. Now that cool weather is here, net & ARES participation should improve. In 1979 the section ranked 27th in traffic handling with 22,184 reported pieces. Please report your traffic to me before the 7th of each month so it can be counted. New ARES net in North GA on 144.69/145.29, Mon nites at 9:30 local. After being a ham for 52 years, W4YWP finally won a first prize at the GSSBN picnic. N4DAH now KC4IN. Many clubs reporting public service activities, FB way to get good PR for the hobby. Clubs please report your new officers after elections. Am looking for an NM for the GTN. Won't one of you fine hams in the section please offer your services. See you during SET and please send me traffic that you are participating. Traffic: (July) W4WXA 137, WA3NAZ/4 131, W4GH 115, K4AZM 111, WD4ADV 62, WB4RUJ 42, W4AAY 31, K4EV 27, K4JNL 23, W4ELO 16, WA4LHT 11, K5TF 10, AK4I 9, WA4PUP 6, K4BAI 9, K4PIK 5 (June) WA4BZY 1044, W4PIM 82, WB4RUJ 50, W4ELO 39, W4AAY 12, WA4PUP 4, (May) W4PIM 84, (Apr.) W4PIM 27.

NORTHERN FLORIDA: SCM, Billy Williams, N4UF — SEC: WA2GIN. STM: N4WA. NM: WD4DNC N4BZH. WA2GIN is SEC. His QTH is 3535 Wellington Rd., Pensacola, FL 32504. Remember to send him your SET messages. WB2VZU is now KX4O and his YF is KA4PHV. W4IZ club station active sending traffic from Jax Hamfest with W4JL WB4DTS and WB4HBG operating. W4KIX active on RN5 for OFN. KB4T passed Radar Endorsement for his 1st Class FCC Phone exam. Hogtown Hammmers claiming 11K in FD 80. FB score! BARS now meets at Sea Episcopal Church. WA4EYU won NOFARS message contest. Jax Hamfest at OP Kennel Club very successful with over 3,000 in attendance. Interesting traffic forum on "Tricks of the Trade" with N4WA K4SCL and K4TH as guests. DBARA upgrading 76/15 repeater system. New officers of ACARC (St Augustine) are WA4EYY KA4HHV WD4MJS WB4WXW. They expect a club repeater on soon. OPARC repeater call now WB4CGD/R. RANGE implementing new computerized autopatch through efforts of KB4B WD4BIW and N4AEE. WD5HOV now K7AL. Very sorry to learn that W4LDM is a Silent Key. Eleven hams from TARS in-

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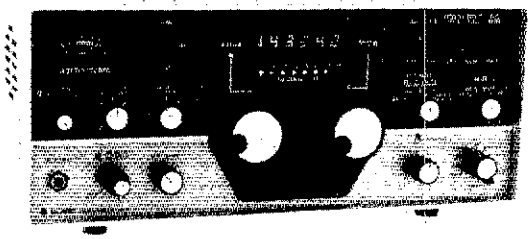

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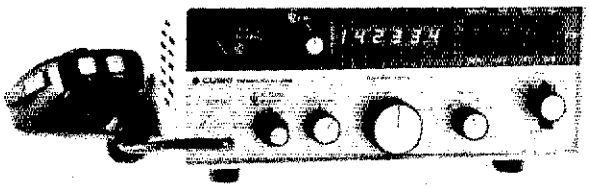

HF SSB Transceiver Featuring "VRS™" a Knob with a New Twist, and Over 100,000 Fully Microprocessor-Controlled Frequencies on Present or Envisioned "Ham" Bands.

There's a new name on two popular Amateur transceivers. CUBIC COMMUNICATIONS replaces SWAN on the front panel of both the ASTRO 102BXA and the ASTRO 150A. Swan Electronics actually has been part of the Cubic Corporation for years. With Cubic being a large, highly diversified, multi-million-dollar company, known and respected worldwide, this change seemed only logical.

The same people will be making these radios in the very same factory. You're assured of continued superb performance. Performance that has made both ASTRO models outstanding choices for today's demanding Amateur.

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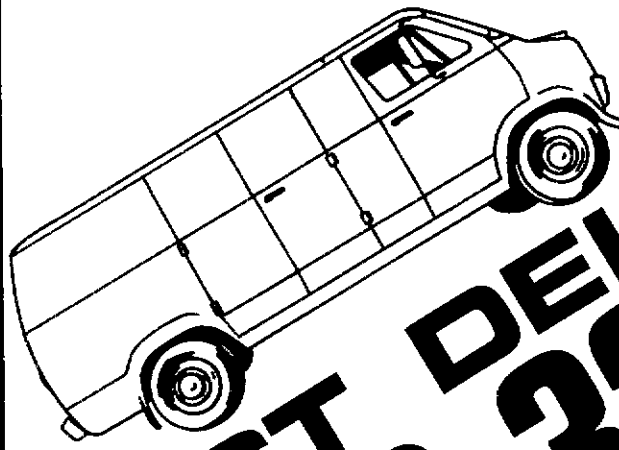

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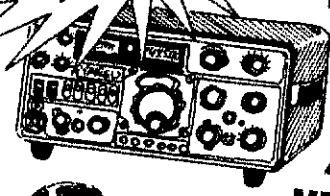

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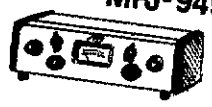

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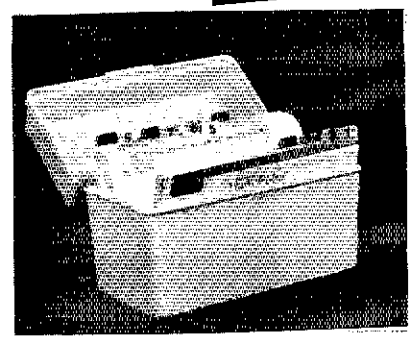

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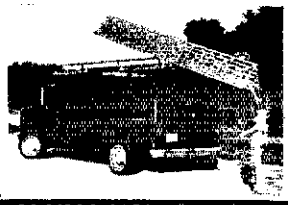

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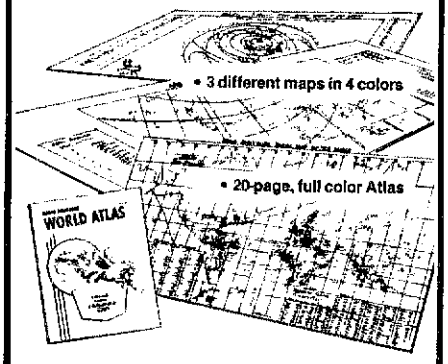

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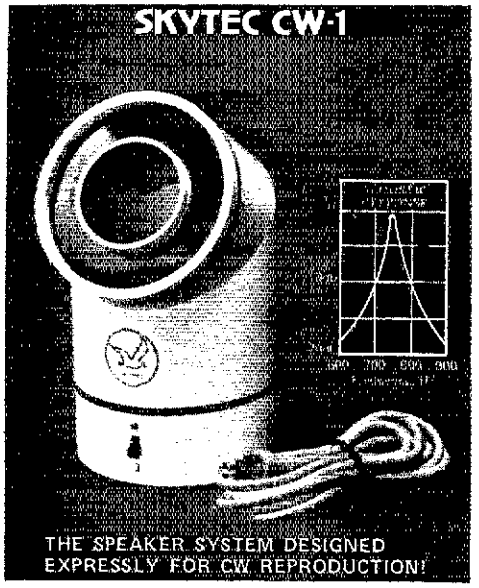

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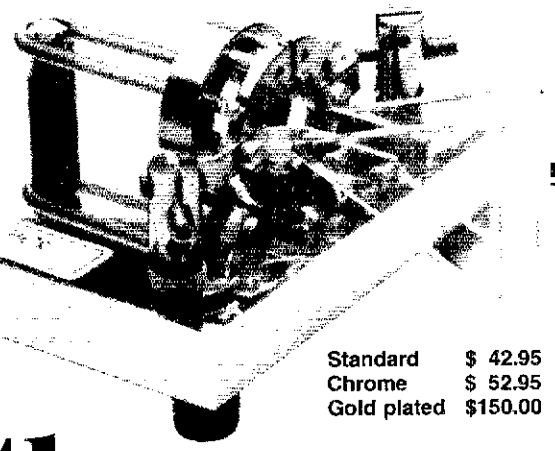

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volved in emergency drill under Leon Co. EC; KC4N. E. Pasco Co ARES Net now meets M-F on 28/88 repeater. Brooksville repeater doing fine job on 145.115/715. W4UEA and WD4IED finished work on new emergency plan for Marion Co. FMTN now handling DNTS transmit functions and TPTN acting as recieve outlet. KA4HDI is new EC Lake Co. NOFARS pileup contest won by WD4ITK and KA4GVK. New OES appts to KB4LO and N4BFX. Traffic: (July) WD4HIF 479, N4PL 305, WD4DNC 247, WA4CRI 152, W4IZ 144, WA4EYU 134, N4WA 134, WD4IIO 96, W4KIX 92, N4UF 82, N4BZH 70, WA4STZ 70, W4MGO 59, WB4ADL 39, K4RNS 38, WB4DTS 36, W4JL 23, N4AXN 16, KB4T 14, KF4U 10, WB4WOO 9, WA4ZTS 4. (June) WB4ADL 82, W4KIX 55.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — Asst SCM: W4KGJ. SEC: AA4WJ. STM: K4TH. N4APE reports he is off the air while relocating to new QTH. WA4HKP enjoying a new Kenwood 7625. WA4HXU runs the message center at Senior Friendship Center, North Fort Myers, each Tuesday. Several stations receiving the new Public Service Honor Roll certificates. Hope there is a list published this issue. KA4BBA is now a Life Member of ARRL. W3CUL reports tower, beam and dipole all up at last while husband W3VR reports broke back this month on antenna. Hope he did not mean that literally! We journeyed to Jacksonville (Orange Park) for the Florida State ARRL Convention. It was a nice round of meetings, although attendance at the hamfest seemed low. Probably due to gasoline costs. Seems like everybody is working toward cooperation and good fellowship lately. This is very refreshing! Our first month of combined section nets under new management went off very smoothly. Looking forward to the Melbourne Hamfest Sept. 6-7. As we write this, we are watching the meanderings of Hurricane Allen, already the 2nd strongest storm to come out of the Atlantic in recorded history. It gave our section an opportunity for a preliminary preparedness exercise and all stations responded in exemplary manner. While I suppose an area receiving the brunt of such a storm could never be considered prepared for it, I suppose our section, as a whole, is about as ready as we can expect to be. Regarding the HX signals, everybody should study the article on p. 73 of August QST. We understand Headquarters wants to eliminate some or all the handling instructions. Anybody having any recommendations on this should inform K1XA. I get the message loud and clear from my constituents that the Headquarters staff and elected officials should be working for the members, and not vice versa, but the members have to tell the staff and officials what you want them to do. Traffic: (July) W3CUL 2924, W3VR 704, W4MEE 646, K4TH 562, WA4PFK 502, WD4AWN 389, K4SCL 334, WB4FVV 304, W4LX 288, W4NFK 266, W4GPL 204, WB4AID 130, WB4PIB 96, WB4WYG 95, WD4CGL 88, N4ET 88, W3TLV 77, WA4HXU 75, K4ZK 75, K4EUK 74, W4DVO 67, KA4FZI 59, KA4LNA 57, W4IRA 55, KB4OW 54, WD4CHO 52, WB4SNX 49, WA1IOG 41, WB4GCK 37, AA4WJ 35, WA4EIC 34, W4KMN 25, KA4BBA 16, WB4NGH 14, WB4NJU 13, W4SMK 9, N4APE 8, W4MML 4, WB4GSV 3, WD4LWT 2. (June) WA4HXU 36, WB4NJU 21.

WEST INDIES: SCM, Julio Negroni, KP4CV — WINS has a newsletter, entitled WINS Letter. Reports for June, 187 QNI and 89 QTC in 30 sessions. Ironman for the month is KP4DJ. Active during the month: KP4DJ WP2ABQ KP4ERK KP4U KP4FEY KP4ANG NP4AR WP4AWF KP4FBT WP4AJN WP4BCV KP4EFX. Congrats KP4DJ for a FB job. ARES, under SEC KP4BSQ, now under reorganization and wind up for hurricane season. Nets on Thursdays on 3900 kHz at 7:30 P.M. Soon nets will convene on Sundays on 7250 kHz right after the PRARC Net. Congrats to KP4DJ on his 50 years as a member of ARRL. Traffic: KP4DJ 63, KP4FBT 11, KP4DGT 1.

SOUTHWESTERN DIVISION

ARIZONA: SCM, W. L. Haskell, AG7D — SEC: N7EH. STM: W7EP. WA7DQE made a very comprehensive presentation on TFC handling at the Coconino Cty ARC. If your clubs are interested in hearing a good speaker relative to this sub. — ck with WA7KQE. KA7HHN, a new ham, is now on the air from Flagg and doing a FB job with her "Century 21." On July 17th, after some solar activity, there were apparently some good Two-Meter cw/ssb contacts to the East Coast! (so keep your ears on — it could happen agn). The deadline for registration of repeater for the next ARRL Directory is Nov 1, '80 — use CD-240 available for a s.a.s.e. from ARRL. W7KMA reports that after much hard work and perseverence he reached the pinacle of his ham radio objectives — 7 Band WAS, 6 thru 160 Meters. His XYL, WB7TOV, holds a six-meter WAS #207. To the best of my knowledge, I believe this is the second OM/XYL that have both obtained this honor on six — with ten watts or less!! If there are others, how about letting your SCM know about it? The new Net Directory is available thru ARRL — send 12 inch env with .40 cent stamps. W7KOY was honored with "The Ham of the Year Award" at the Ft. Tuthill Hamfest. Congrats from all of the Ariz. hams!! W7UV, formerly from Tucson, is now enjoying a new position, Radio Eng., in Las Vegas. Good fortune! It is with regret that I advise you of the following Silent Key, K7JKS formerly from Tucson. WA7VLA now KDØM. K7VXS had a severe heart attack during this rptg period and is presently in a nursing home. We all wish you a speedy recovery. A-10, QNI 989, QTC 118; Cactus, QNI 907, QTC 65. SWN, QNI 213, QTC 184. Traffic: W7EP 173, K7MC 91, WA7KQE 55, WA7OIF 41, K7NTG 40, KA5DDW 24, K7NMQ 18, K7JKM 18, WA7WEB 5, N7EH 5, WB7OOM 4, WB7VON 4, N7AUX 4, WA7NXL 3.

LOS ANGELES: SCM, Stan Brokl, N2YO — Two new appointments for July are WA6OCM, OTS and WB6VHS, DEC. K6MHA informed me of a new radio club "South Eastern ARC" based in Whittier. They have a portable 220 repeater and are anxious to help in emergency communications. I received club bulletins from the following clubs this month: San Fernando Valley RC, (W6SD); San Gabrial Valley RC (W6QFK); Pasadena RC (W6KA); So. Cal. ATV Club; Locheed Employees RC (W6LS). I will be looking forward to receiving more bulletins in the future as my address is circulated. K6KA continues his outstanding 00 reporting with over 65 00 reports sent out this last month. Keep up the good work. Included this month are some late reports from June. The deadline is the 7th of each month so please try to get them to me before then. Traffic: (July) K6INK 163, WA6LVO 157, KB6FC 140, KB6OT 101, K6OWA 66, N6PZ 63, WB5EKV 30, W6BRO 29, KA6CTI 28, K6CL 19, W6BWG 17, N2YQ 14, W6INH 11, AK6Y 9, N6HE 2. (June) KB6OT 140, N6PZ 95, K6OWA 94, KB6FC 88, WB6YID 77, N6NQ 38, WA6OCM 12, K6CL 10.

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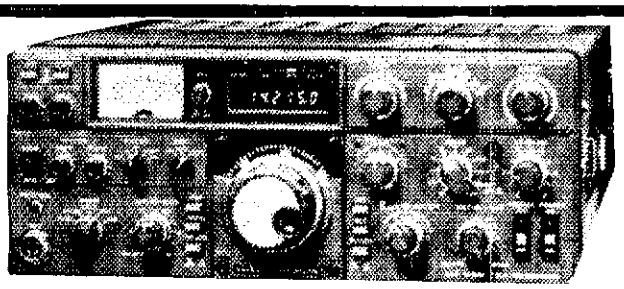

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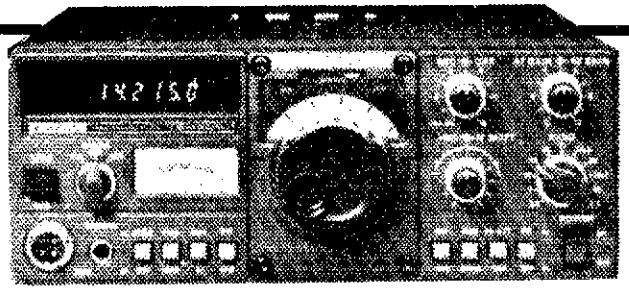

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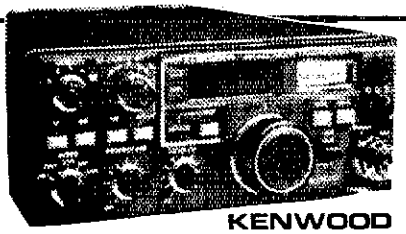

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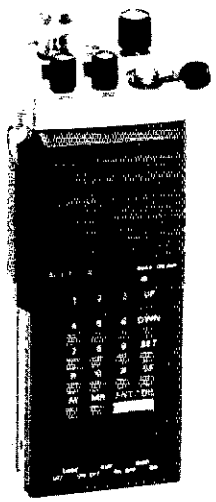

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FTS-32E 32 tone CTCSS encoder	40.00
LCC-7 Leather carrying case	35.00
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TA-2 19" telescoping whip antenna	9.40
YM-24 Speaker/microphone	32.00
FT-404 450 MHz crystal controlled HT	TBA
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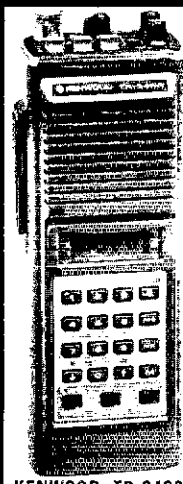

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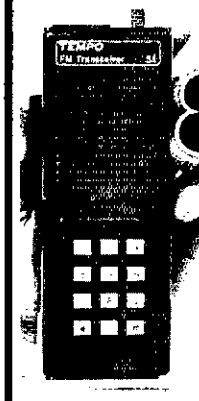

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S-5T As above, w/touchtone pad	**Reg.** 339.00
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S-80 2m FM 80w amplifier	149.00
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S-2T As above, with touchtone pad	**Reg.** 399.00
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HM-5 Speaker microphone w/belt clip	35.00
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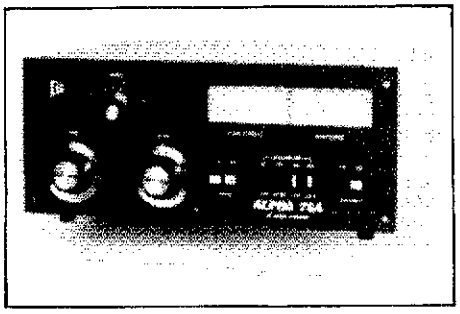

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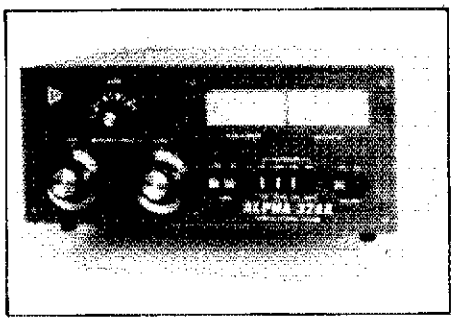

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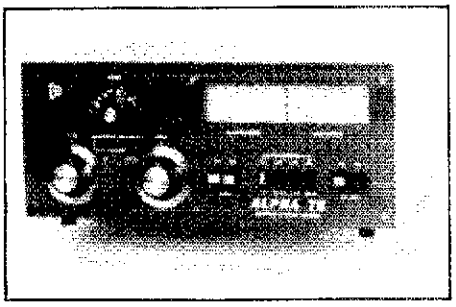

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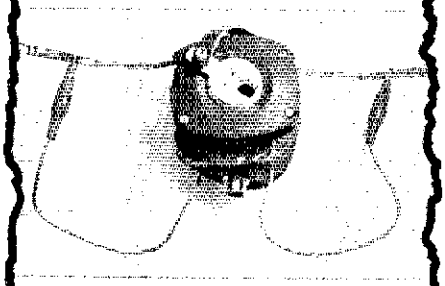

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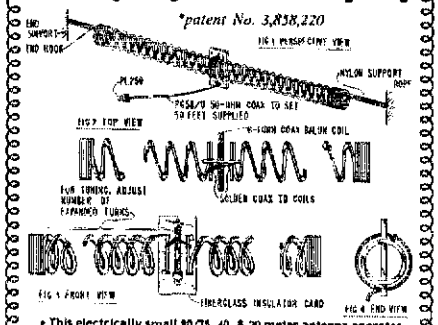

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218	1800Hz 8 Pole SSB Filter	52
219	250Hz 6 Pole CW Filter	48
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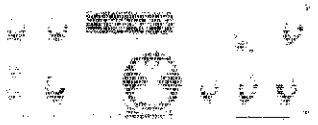

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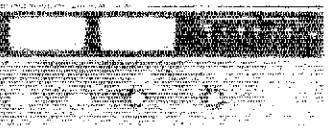

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WA6WZN. STM: KA6A. NMs: WB6AKR (cw), W6CPB (ssb), K6JT (RTTY), WA6QCA (fm). SEC: W6UBQ. DECs. K6GGS W6LKN, WA6TLE WB6YZY. For info on ARRL SET Oct. 18 and/or ARES contact your EC or DEC. Clubs, please invite your local EC to talk (before the SET!). We thx K6XI for his past service. Also, new OOs: WB6GCT WA6JQN KA6LSC; new OTSs: K6CZE KA6HNY KA6LSC KI6X; new OESs: WD6CSL WB6SKE WB6GCT. An OES section requirement is being an Asst. EC. EC WA6QMW appointed State EC for Air Force MARS. Asst. EC WD6CSL, reports that when Children's Hosp. of Org. County (CHOC) switchboard became disfunctional, KA6IIJ K6RTR WA6HNQ WA6WVJ WB6ARK WD6CSL & EC WB6JBI provided internal communications for over 3 hours. WB6ECB has been appointed Asst. EC. The Bishop ARC lists local repeaters of 146.34/.94 (WA6LKD) & 146.01/.61 (WA6KWV) and emergency freq. of 146.58 for No. Inyo County (EC W6TO) with 7245 kHz for county wide co-ordination. Barstow ARC appointed WB6KHK WD6BNG KA4FDX & EC WA6MBE to work with the city disaster council. New clubs in OC Council: Beach Cities Wireless Society, Foothill Hi. Sch. ARC, WIC ARC, and Catalina RA (WR6AAA). There were six entries for the annual FD plaque awarded by the O.C. Council ARO with the Western ARA claiming the highest score followed by Org. County ARC and Anaheim ARA. The SCM has slide pictures available of 12 FD sites he visited. The OC Fair booth sent over 200 messages including handling emergency traffic from KØCOM aboard the "Hona Like" with the aid of W6ELU KA6LSC WA6WZO & WA6WZN. At a joint meeting of Lake Elsinore V. ARC, Sun City ARC & Lee de Forest, the highlight was W6HA as longest Licensed (1908) ham present. KN6U (alias WB6USR) of the Riverside County ARC is organizing ham classes. Desert Waves ARC pres. WA6VHB reports effort to move solar powered repeater WA6HRE (146.22/.82) to Mt. Cunningham. Big Bear ARC pres. WB6ZBP reports club repeater (WB6RIW/R) has changed freq. to 144.78/145.38 MHz. WB6SHL is now a "CO" award check point. If you are looking for ATV action or info try 146.43 or 439.5 fm simplex; for DX info, try 145.62 or 145.48/144.88 (AD6P/R). The Mission Trail Net (3928 kHz 7 P.M. daily) is one of the best "independant" nets that handle formal traffic; contact WA6MAB for membership. Congrats to WB6EIG KA6LSC WA6WZO for BPL plus W6NTN with another perfect SCN/V checkin record

Net	Freq	Time/Dy	QNI	QCT	NM
SCN/1 FAST	3598 kHz	0230Z	356	244	N6YH
SCN/2 SLOW	3598 kHz	0430Z	345	186	K6YD
SCN/VHF	147.045/645	0500Z	450	367	WA6QCA
SCN/RTTY	3637 kHz	0400Z	5	2	WB5EKU

SCN Manager: N6WP. Asst Managers: WA6AMK & K5DY. Traffic: N6ANL 576, WA6WZO 442, WB6EIG 368, KA6LSC 357, WB6QBZ 318, WA6QCA 252, AI6E 172, W6NTN 169, W6RE 161, KA6LSB 106, KA6A 48, WA6WZN 29, K6ZI 26, KA6HNY 20, K6ZCE 18, K6WI 15, W6CPB 14, K6JT 10, KI6X 10, K6GGS 4.

SAN DIEGO: SCM, Arthur R. Smith — W6INI — STM: N6GW. SEC: W6INI. Asst SEC: N6RD. A once-in-a-lifetime opening on 220 MHz found WB6NMT working KH6IAA on 223.5 MHz recently. On July 27-28 WD6AZE N6BUK WA6JCG WB6LUD WA6LWL and WB6TQF provided fire camp-to-headquarters communications for the Cal Dept of Forestry. W6INI coordinated. You can improve your value for emergency communications by equipping yourself with an efficient portable antenna. It should include 20-30 feet of masting with stakes and guys, for hf a dipole, for vhf a gain omni and/or small beam, and 200 ft of low loss RG8 in 35, 65, and 100-ft lengths. OCWA's new officers are: K6AM, pres.; K6UV, vice pres., W6OSD, secy.; N6LY, treas. Upgraded: WB7SUA to Extra, KA7FPB to Tech. KD6FY returned from the Nat. Conv. with a new IC-3A(T). The officials of the annual Imperial Beach 'n' Sea parade were highly pleased with the communications provided by Southern District ARES members. W6INI attended a week-long Red Cross Disaster Institute. Traffic: (July) WB6PVH 452, N6GW 264, KM6I 119, W6HUJ 113, N6AT 71, N6RD 65, WB6MLB 60, WA6SKU 19, WB7SUA 14, WA6COE 6. (June) WB6MLB 68.

SANTA BARBARA: SCM, Robert Dyrutt, W6POU — Clubs: New affil: Cal Poly ARC, WA6FSP, pres. Simi Settlers re-elect WB6QNX prex Oct. Campout. P.S. COMM: Lompoc ARC Marathon & Flwr Fest; SBARC ARES Fiesta Parade, UCSB/OES "Air Crash;" Simi Valley ARES/ REACT DAT SET with Red Cross; Coastal ARES SET in SLO County — N6BSK NCS, led by K6FL. Silent Keys: W6UL W6TLD. Appointed: K6DZT — EC SLO County; WB6BWZ SEC: W6RIC DEC Ventura County. ARRL uhf contesters: W6OAL/WB9KMO Red Mtn; N6NB Mt. Pinos; K6TZ (SBARC) Santa Cruz Isle; WA6IJZ. SW Div Conv hospitality suites by Simi Settlers and SBARC. PSHR: K6YD 77, N6WP 65, W6POE 29, WA6RDI 22, K6SZT 20. Traffic: K6YD 146, N6WP 124, W6ZRR 122, WB6TRP 60, K6DZT 31, W6POE 30, N6YH 22, N6MA 17.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Phil Clements, K5PC — Asst. SCM: AE5C. STM: W5VMP. SEC: N5WB. NMs: AA5J AE5I N5BT W5HMR. At this writing, Hurricane Allen is bearing down on the S. Texas coastline, and it is hard to concentrate on paperwork with the 40-mtr band alive with priority and emergency traffic! I must congratulate the S. TX ARFS and RACES organizations on having all their "ducks lined up" well in advance of the storm; and on a fantastic and smooth job of public service work. As we receive the reports later, we will once again find that Amateur Radio has risen to the occasion and provided the necessary communication services that are unavailable from any other source in this type situation. Not only are the participating stations to be congratulated for a "job well done," but the thousands of stations who "rode out" the storm from afar, keeping the frequencies clear and their mouths shut; helping only when called upon; are to also be praised. It is this discipline in these times of emergency that makes Amateur Radio the finest emergency communications system in the world! PSHR for July: AA5J KA5AVQ W5CTZ WB5PIL WA5OFD WD5JYI AE5I WD5EUE KB5UL N5BT W5VMP and W6HMR. WB9PHM now KJ5O. W5TAH appeared on local Waco stn. to talk about ARES & Amateur Radio. WA5DTC new EC for Henderson and Kaufman Co's. He needs your support! W5ARV back from overseas duty to resume OO work. K5IS rpts fine openings on 6 & 2 mtrs during July. Traffic: N5BT 308, W5TI 247, WD5EUE 152, AA5J 110, WB5BKM 102, K5QKM 73, WA5QFD 71, W5VMP 57, W5HMR 51, WD5JYI 47, KB5UL 42, WD5IVD 37, W5CTZ 26, AE5I 26, WD5GFP 20, WA5EZT 19, K5PC 19, WB5PIL 19, N5CEK 17, WB5YYK 13, KA5AVQ 10, W5ERT 10, W5YK 8, KJ5O 2

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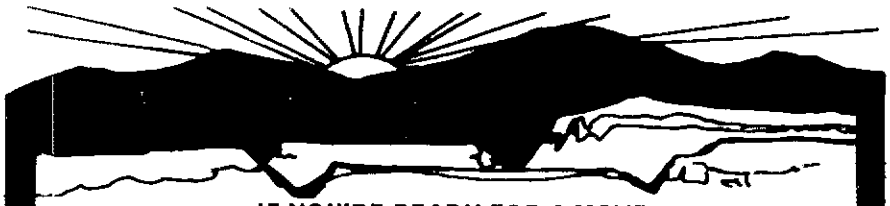

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2AAH AA Penlites	3.95
2CH C cell size	4.55
2DH D cell size	5.25

STARTER KITS-Include 1 wall charger, appropriate holder clip and 2 cells in the size listed. (1-9 volt)

PSAA AA Penlites	6.25
PSC C cell size	6.95
PSD D cell size	7.55
PS9 9 volt (1)	8.50

NEW 6 VOLT LANTERN Gel-Cel construction 4.5 AMPHR. Spring type contacts. Uses overnight charger.

Battery & Charger	18.75
Battery only	14.75

DSI COUNTER OWNERS—TAKE NOTE! Make your counter portable! Complete kit includes 6 C cell nicads all parts and instructions. Easy to install. Charges whenever AC adapter is plugged in. Will not overcharge. Models 3550, 3600, 5600. Others — write or call. 15.75 ea

PENLITES WITH TABS!! Replace bad cells in pre made packs, or the entire pack. 500mah. TR-2400 Owners?? 2.25 ea. 8 and up — 2.00 ea.

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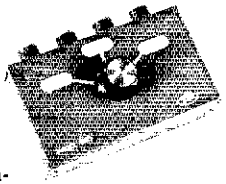
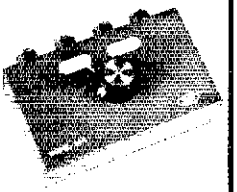
Model 593



- *Single Pole* 3 Position with grounding of all unused positions
- *Crosstalk* (measured at 30 MHz) is -45db between adjacent outlets and 60 db between alternate outlets

Model 594



- *2 Pole 2 Position*
- *Crosstalk* 45db (measured at 30 MHz)

Specifications for both switches

- *Power* 1 KW-2 KW PEP
- *Impedance* 50-75 ohms
- *VSWR* 1.2:1 up to 150 MHz
- *Dimensions* 1¾" high, 5" wide, 3" deep
- *Weight* 1 lb.
- *Mount* Wall or desk

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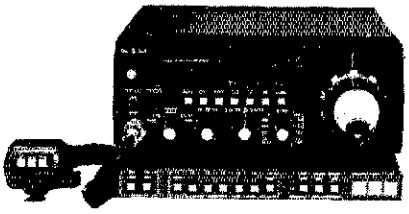
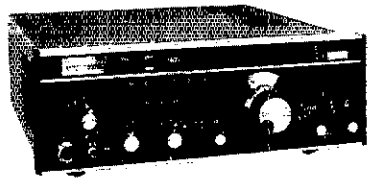
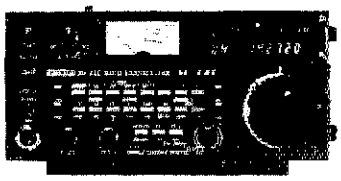


YAESU FT-707

FT-101ZD, FT-901DM, FT-227RB, FT-480R, FT-720R, FT-720RV/RVH, FT-107, FRG-7000



DRAKE TR-7 & R-7
L-7 2KW Linear Amplifier



ICOM Model -720

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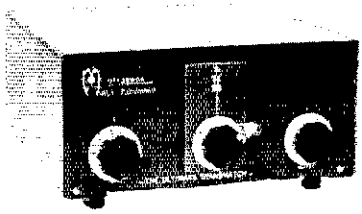
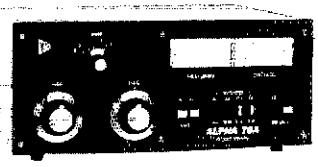
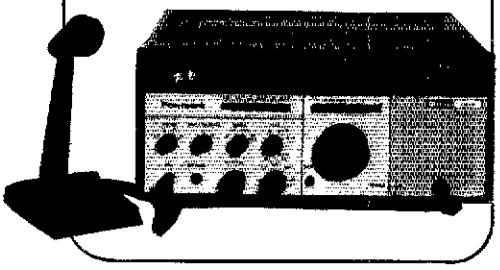


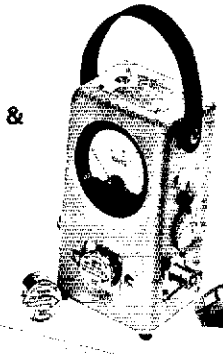
Murch Model UT2000A, UT2000B and UT2000A-LS



ETO Alpha 76A



HY-GAIN TOWERS



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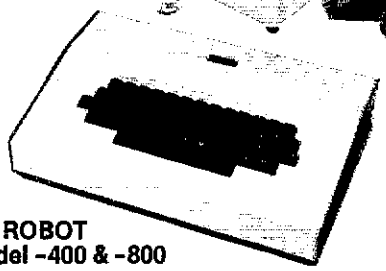

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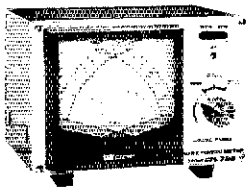

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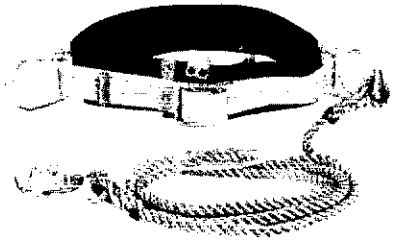

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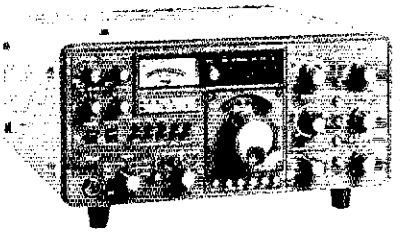

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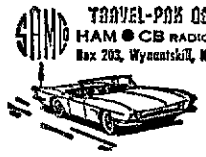

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OKLAHOMA: SCM, Leonard Hollar, WA5FSN — Net activities and participation down due to propagation and summer vacations. However, 30 PTS, 2 OO & 4 OBS reports were received. Ham Holiday is history, largest one yet and fine one. Sorry I could not spend more time visiting with each of you. WA5OUV and W5IQL were honored by National Weather Service for their participation in OTW Net. New officers for Oklahoma Repeater Society: K5FVL, pres.; W5ATO, vice pres.; WB5UOE, secy.; K5CAY, treas, give this group your support. We need them and they need you when it concerns vhf activities in Oklahoma. K5KXL KB5RS and W5ZTN recently helped handicapped persons with their amateur exams. FB, WA5SEC moving from Tulsa to Okla. City. WB5NKD, new Net Manager for DRN5. KB5EK up to Extra. Know there are others upgraded recently, but no definite reports. Hear rumor of a new Repeater in the Sellling area. That will be a big boost to 'Skywarn' in the N.W. part of the state. Shawnee put operators in balloons and an airplane to help coordinate some 'HOT AIR' balloon flights recently. Traffic: WB5NKC 966, K5OWK 252, KF5A 238, WD5IRB 186, K5CXP 162, WB5NKD 161, W5RB 142, KB5EK 134, K5JGZ 93, WA5OUV 71, WA5FSN 65, W5REC 62, W5VXU 52, WD5IFB 47, W5AS 45, WD5IDB 42, W5SUG 39, WB5FAY 36, WB5ELG 34, WA5HSU 32, K5CAY 31, W5UYH 31, W5VOR 28, WD5GLO 22, K5MGD 16, W5VLW 16, NØIN 10, WD5IRH 10, W5FKL 8, WA5SEC 6.

SOUTHERN TEXAS: SCM, Roger Coday, N5FN — Asst. SCM/STM: N5TC, SEC: AK5N. Congrats to upgrades: WB5CIT and KB5TC to Extra, W5YLP and WD5DWN to Advanced, and KA5GEX KA5IDC WD5IPG N5CDX to General. KAØCSM has returned to Texas and experienced trouble with power supply in rig. WD5HSN doing chaplaincy work at hospital while XYL received her Novice — KA5JKS. W5KLV, OBS still does the majority of bulletin work in section: 8 bulletins, 4 propagation forecasts, 2 satellite bulletins, 2 DX bulletins in 114 readings — great job. KD5D and XYL reporting the arrival of harmonic on July 8. KC5M working lots of DX of late and very close to DXCC. W5AYZ has confirmed #215. Katy ARS had first organizational meeting in May. Here's wishing the best to WB5VTZ who has moved from Angleton back to North Tex. WB5TAY experiencing trouble of late with rig in cw mode. WB5TAY WB5YRV W5SHN WB5YDD KA5BSN and W5KLV keeping STEX represented very well on CAND. K5RG attended Okla. State Convention and NTS Central Area Staff meeting where he was elected Chairperson of CAS. K5LA sends in a nice report of vhf activity in far West Texas, Guadalupe 13/73; Sierra Blanca 07/67; El Paso 96/36 two-meter repeaters linked together via 449.1/444.1. WD5HWH upgraded to General and will soon be leaving for the Netherlands. Traffic: (July) W5KLV 720, WB5YDD 394, K5HZR 244, WB5MMI 173, W5BGE 148, WB5CIT 146, W5SBE 142, N5TC 101, KB5TC 87, K5PE 84, K5QEW 70, WB5YRV 63, W5SHN 59, KA5BSN 57, WA5RVT 48, K5RG 39, KB5NX 30, AK5M 27, WD5GKH 26, WD5DOR 24, WB5TAY 21, AK5N 15, WB5VTZ 13, WB5EFJ 9, KAØCSM 3, WD5HSN 3. (June) K5PE 85, W5SHN 72.

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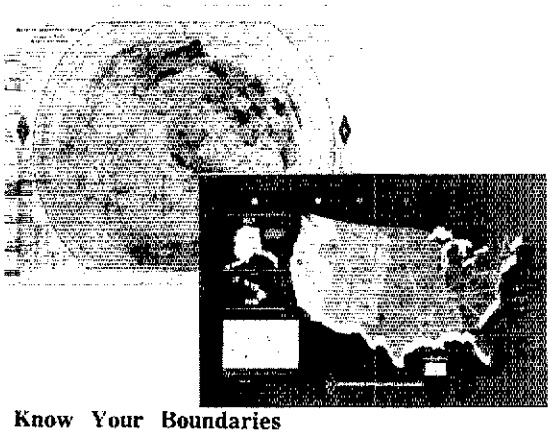

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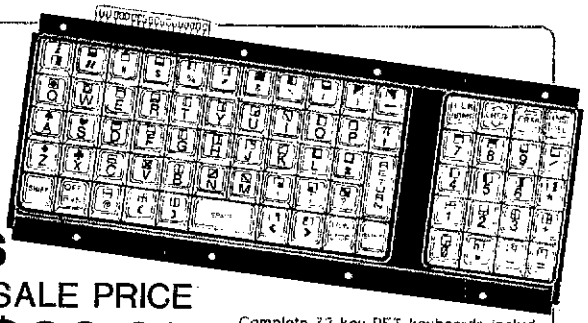

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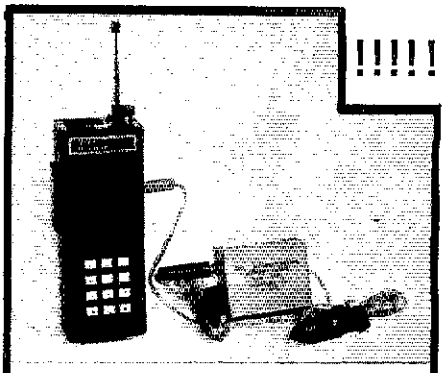

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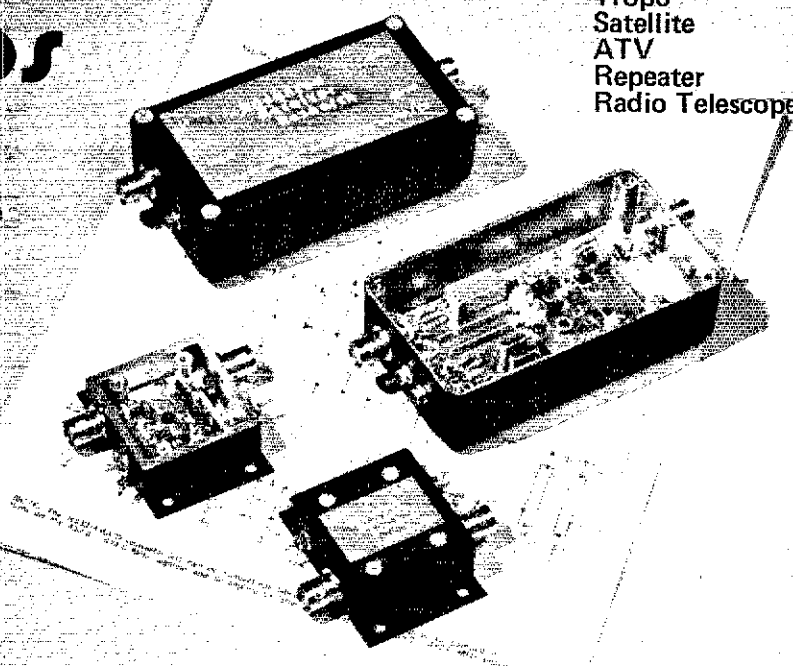

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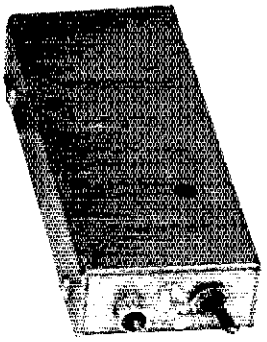

TYPICAL PERFORMANCE PA COMPARISONS

	dB G	dB NF	dBm 1 dB Comparison
PA144	10 dB	1.3 dB	+1 dBm
PAD144	22 dB	1.3 dB	+1 dBm
PAG144	26 dB	0.2 dB	+12 dBm
PA220	9 dB	1.9 dB	+1 dBm
PAD220	19 dB	1.9 dB	+1 dBm
PAG220	24 dB	0.2 dB	+11 dBm
PA432-2	16 dB	1.5 dB	-20 dBm
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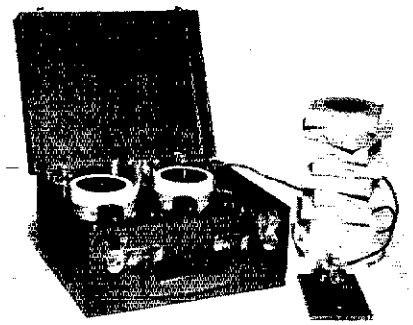

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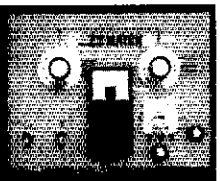

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(3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied. Submitted ads should be typed or clearly printed on an 8-1/2" × 11" sheet of paper.

(4) Closing date for Ham-Ads is the 20th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received August 21 through September 20 will appear in November *QST*.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permited in *QST* advertising.

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Clubs/Hamfests

QCWA Quarter Century Wireless Association is an international nonprofit organization founded in 1947. You are eligible for membership if licensed 25 or more years ago, and presently licensed. It is not necessary to have been licensed the entire 25 years. Members receive QCWA publications and participate in QCWA activities. Come grow with us! Write QCWA, Inc., 1409 Cooper Drive, Irving, TX 75061.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't., police etc. invited to join Society of Wireless Pioneers — W7GAQ/6 Box 530, Santa Rosa CA 95402.

CQ and QST 1950-1978 also 73 and Ham Radio issues for sale. Two dollar minimum order. Cost 50 cents each 1976 and later issues - all other 30 cents each including USA shipping. Send s.a.s.e. chronological order and payment to W6LS. 2814 Empire Ave., Burbank, CA 91504. Available issues and arefund sent within one month.

PENNSAUKEN NJ: The Greater Delaware Valley Hamfest by MSWW A.R.C. on October 19, 1980 at Nashville East Cotillion Ballroom, Rt. 73 about 5 miles from Tacony Bridge. 8 A.M. to 5 P.M. set-up begins at 2 A.M. Reserved indoor tables $5/table. Commercial displays, seminars, YL activities and outdoor flea market. Admission $2.50 at gate and $2 in advance (s.a.s.e.) Talk in 22/82 and 52/52. RV parking. Write or call GDV-80 Hamfest, 15 East Camden Avenue, Moorestown, NJ 08057 Ph.: 609-234-3926.

VIRGINIA State ARRL Convention — The Fifth Annual Tidewater Hamfest and ARRL Virginia State Convention will be in the great new Virginia Beach, Virginia Arts and Conference Center October 4 and 5, 1980. ARRL, Traffic, DX Forums, XYL free bingo and lounge. Admission $3.50 Advance admission okay. Award will be a Kenwood FM transceiver. Flea market spaces $3. day. Ticket and information — TRC, P. O. Box 7101, Portsmouth, VA 23707 s.a.s.e.

MUSEUM for radio historians and collectors now open. Free admission. Old time amateur (W2AN) and commercial station exhibits, 1925 store and telegraph displays, 15,000 items. Write for details. Antique Wireless Assn., Holcomb, NY 14469.

LIMA OH — Northwest Ohio Amateur Radio Club Annual Hamfest October 12 — Doors open 7 A.M. Dealer tables available — talk-in 52/52 07/67 Allen County Fairgrounds — Rte 309E — 1 mile off I-75. For info, write N.O.A.R.C. P. O. Box 211 Lima, OH 45802.

YAESU equipment owners — present or prospective. Join the 4600-member, 46-country, International Fox-Tango Club and receive valuable newsletters monthly, money-saving purchasing service and catalog, technical committee consultation, free advertisements, Fox-Tango Net, more. To join the Club send $7 (annual dues) to receive all 1980 Newsletters or $14 for 1980 and 1981. For airmail to U.S., Canada, and Mexico add $1 per year; for overseas add $3 per year. Or for complete information and sample Newsletter, send $1 (creditable towards dues) to Milt Lowens N4ML, Box 15944, W. Palm Beach, FL 33406.

THE Veteran Wireless Operators Association, a nonprofit organization of communications people founded in 1925, invites your inquiries and application for membership. Write V.W.O.A., 118 River Drive — Bay Ridge, Annapolis, MD 21403.

SAROC Annual Prestige Convention Dunes Hotel, Las Vegas, NV. Jan. 1-2-3-4, 1981. Cocktail party Friday night hosted by Ham Radio Magazine for Exhibitors and SAROC registered guests. Exhibits and technical sessions Sat. & Sun. Dunes Hotel Breakfast/Brunch Sat. &

desk & hand microphones

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	DESK MICROPHONES			HAND MICROPHONES		
	AMB 75	AMB 76	AMB 77	AMM 45	AMM 46	AMM 47
ELEMENT TYPE	DYNAMIC	DYNAMIC	DYNAMIC (AMPLIFIED)	DYNAMIC	DYNAMIC	DYNAMIC (AMPLIFIED)
POLAR PATTERN	OMNI	CARDIOID	CARDIOID	OMNI	NOISE CANC.	OMNI
IMPEDANCE (HIGH Z)	50K ohms	50K ohms	4000 ohms	50K ohms	50K ohms	
IMPEDANCE (LOW Z)	200 ohms	200 ohms		470 ohms	470 ohms	200 ohms
OUTPUT LEVEL (HIGH Z)	-55 dB	-58 dB	ADJUSTABLE TO 20 dB	-54 dB	-54 dB	
OUTPUT LEVEL (LOW Z)	-75 dB	-80 dB		-75 dB	-75 dB	-45 dB
FREQUENCY RESPONSE	200-8000 Hz	100-13000 Hz	150-5000 Hz	200-4000 Hz	200-4000 Hz	200-5000 Hz
CABLE	6 cond. 1 shield	6 cond. 1 shield	5 cond 1 shield	6 cond. 2 shield	6 cond. 2 shield	5 cond. 1 shield
POWER SOURCE			BATTERY PROVIDED			EXTERNAL DC

OUTPUT LEVEL MEASURED (0 dB = 1 Volt Per Microbar)

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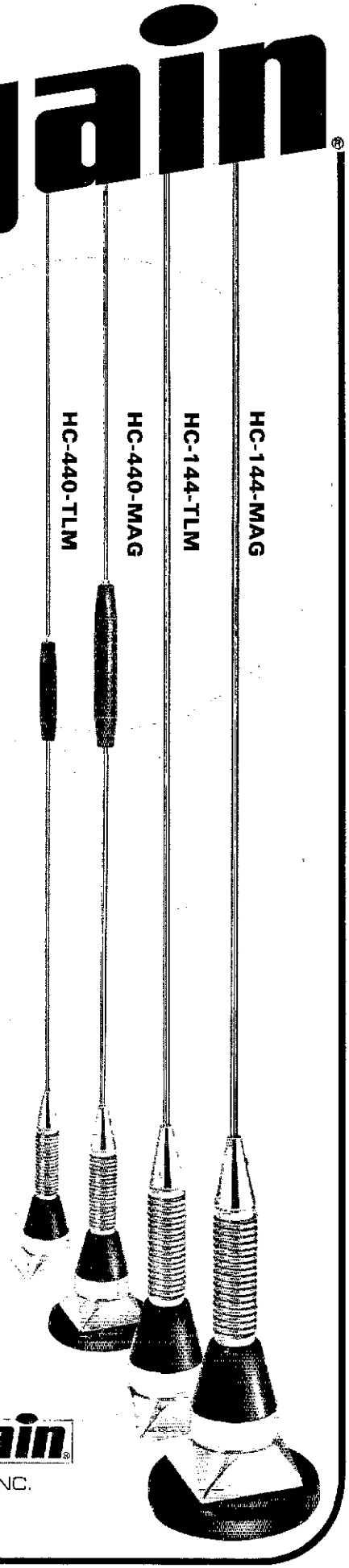

Hy-Gain's new HyCom series of UHF and VHF mobile antennas have been tested in actual use by amateurs across the U.S. for nearly two years with excellent results. The antennas have weathered the salt spray of the coast, the freezing rain and snow of the northlands, and the blazing sun of the desert southwest. HyCom's materials and workmanship have taken the worst that Mother Nature could dish out, and they still perform as if they were installed yesterday. If you want the finest mobile antenna that you can buy - with proven reliability - try a Hy-Gain HyCom.

HC-144-TLM (for 2-meters)
A 5/8 wave, trunk lip mobile antenna with less than 1.5:1 SWR across the 144-148 MHz band. Maximum power capability is a full 200 watts. Hy-Gain's exclusive screw-in antenna connector eliminates all installation soldering. Includes 18 ft. (5.5m) coax and connector.

HC-144-MAG (for 2-meters)
The same antenna as above except with a powerful 90 lb. (40.8kg) direct pull magnet mount with a neoprene gasket to protect your vehicle's finish.

HC-440-TLM (for 440-450 MHz)
This is a, trunk lip mount antenna featuring two 5/8 wave collinear radiators coupled with a moisture resistant phasing coil. SWR is less than 1.5:1 and maximum power capability is 200 watts. Antenna comes with Hy-Gain's exclusive screw-in antenna connector that eliminates all installation soldering and 18 ft. (5.5m) of coax and connector.

HC-440-MAG (for 440-450 MHz)
The same antenna as above except with a powerful 90 lb. (40.8kg) direct pull magnet mount with neoprene gasket to protect your vehicle's finish.

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SL-80	80	63'	$35.95
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Q20,15	10 Ft.	21	5.1 Ft.	20,15	$109.95
Q20	10 Ft.	18	5.1 Ft.	20	$105.95
Q15	7½ Ft.	18	4.2 Ft.	15	$ 95.95
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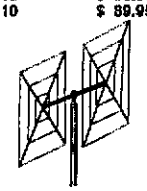

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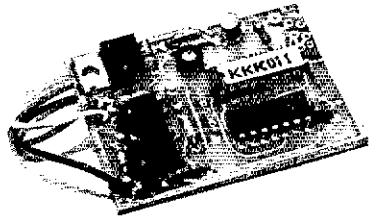

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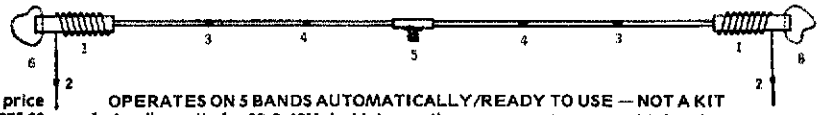

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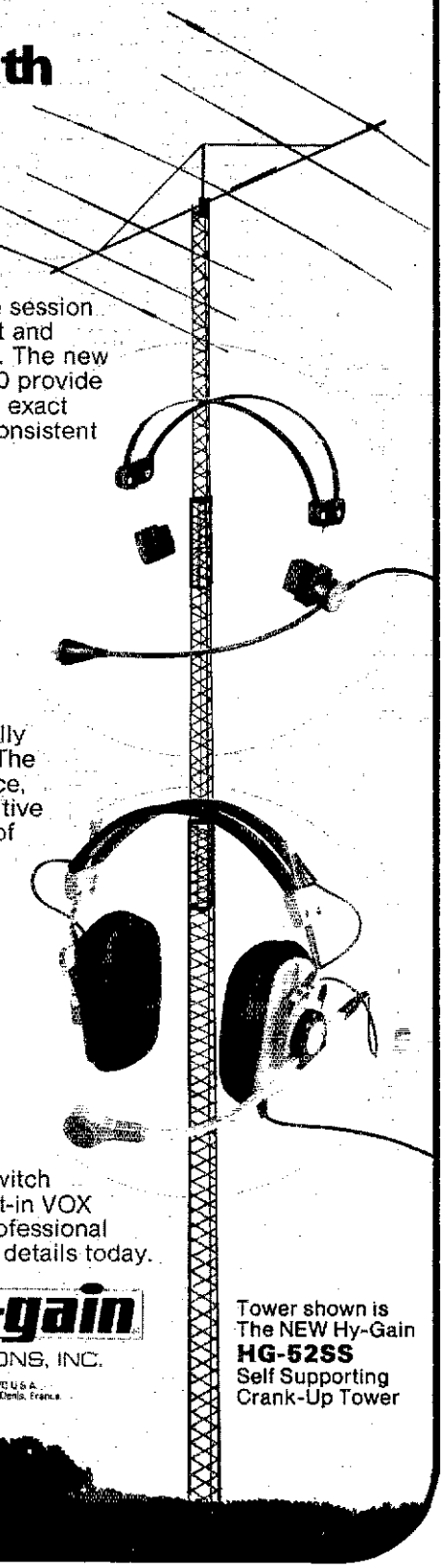

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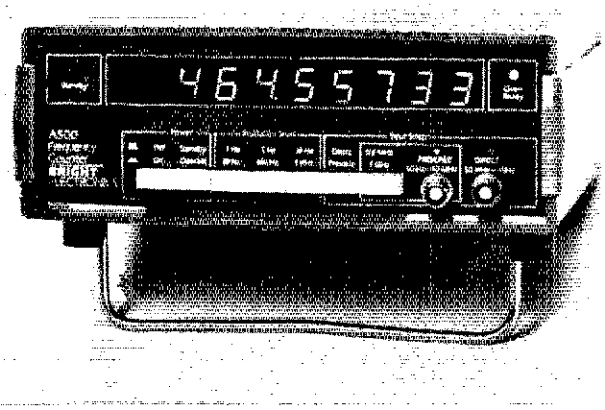

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Accuracy over Temperature	1 PPM 17°C.-30°C.	1 PPM 17°C -30°C.
Sensitivity 50Hz-50MHz 50MHz-500MHz 500MHz-1100MHz	1-10MV 10-50MV NA	1-10MV 10-50MV 50-100MV
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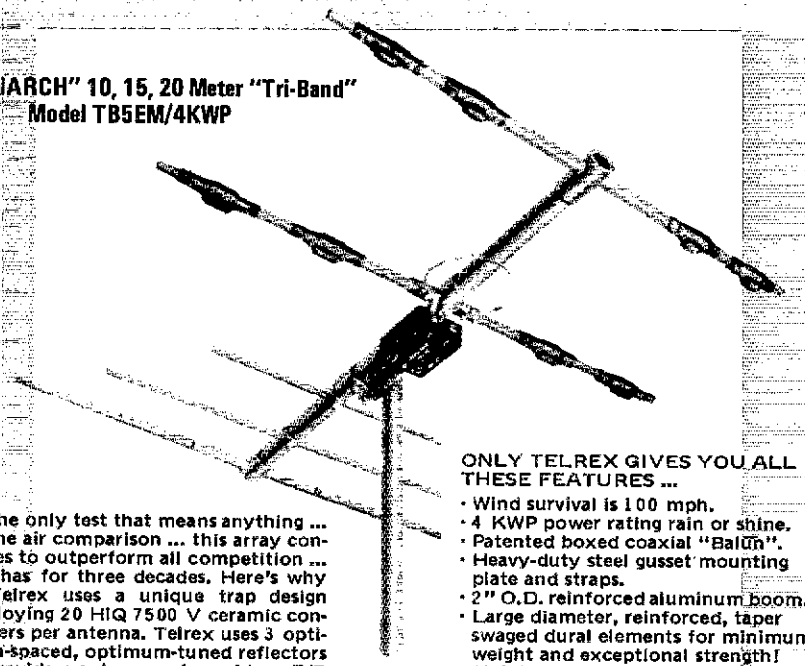

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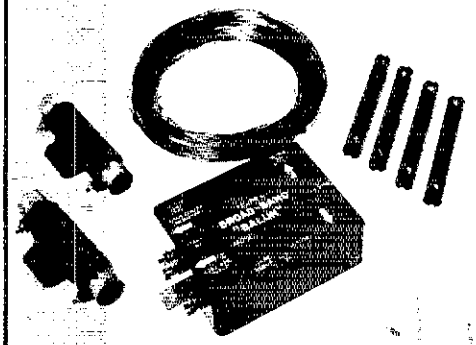

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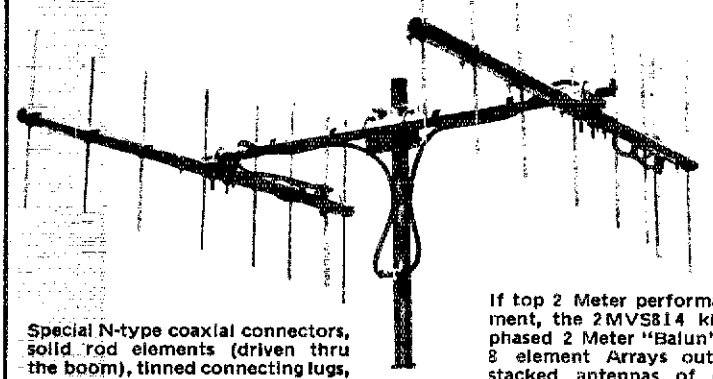

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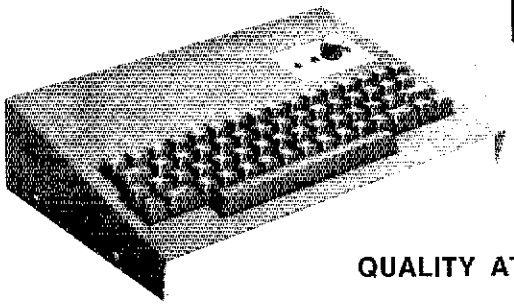

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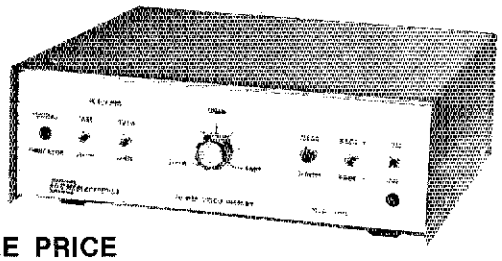

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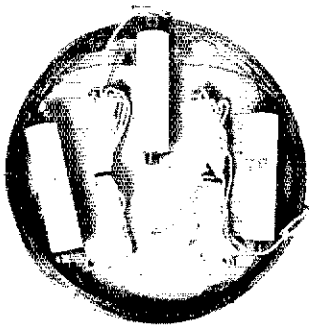

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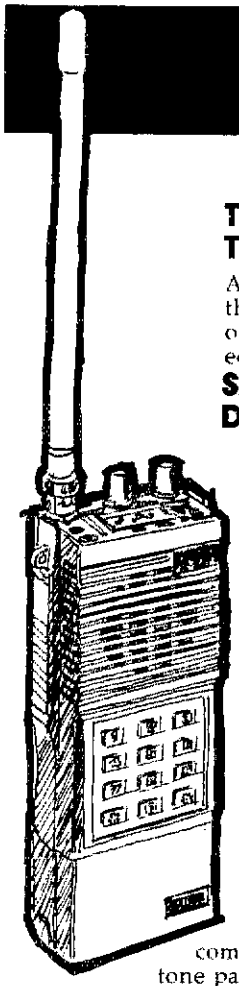

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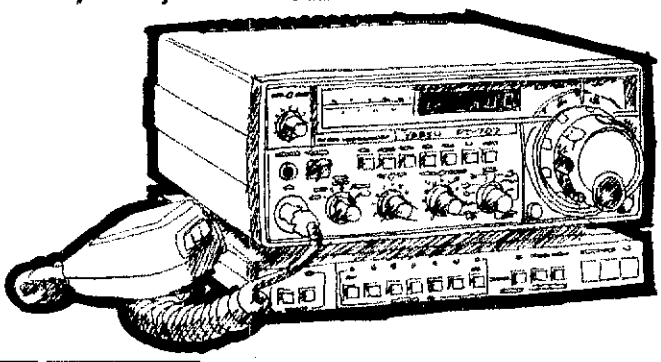

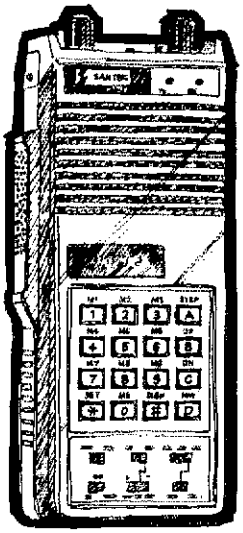

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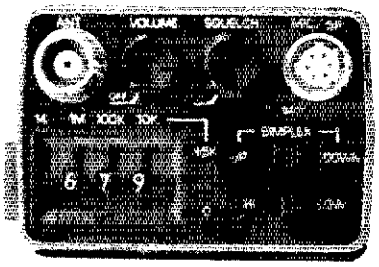

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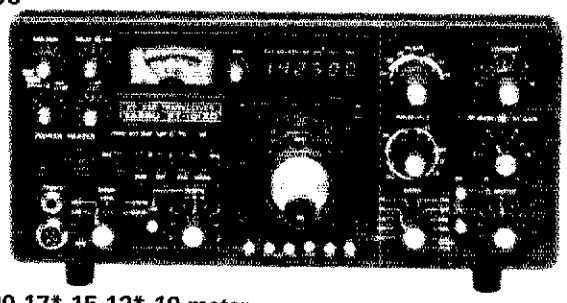

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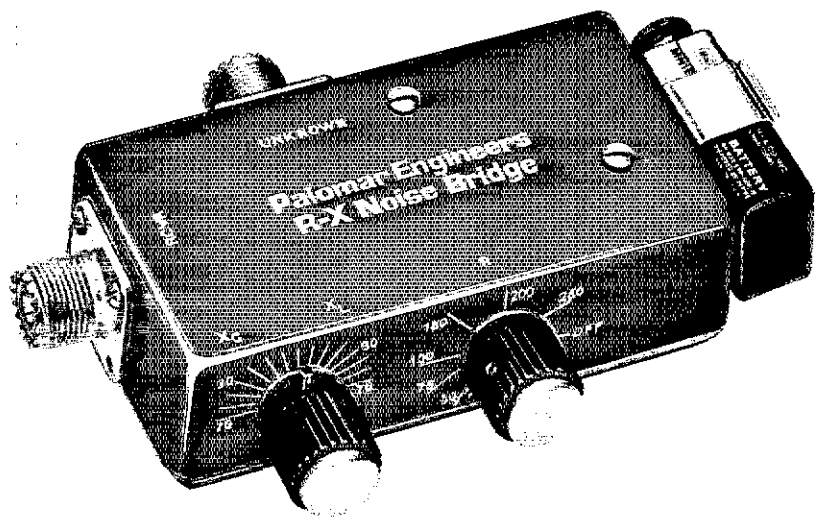

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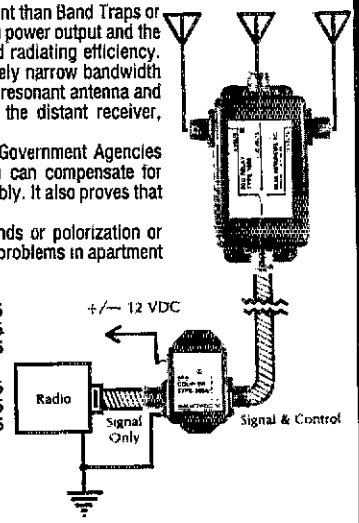

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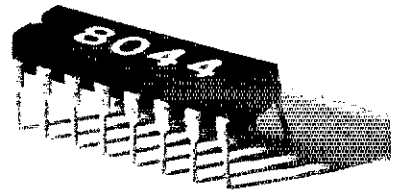

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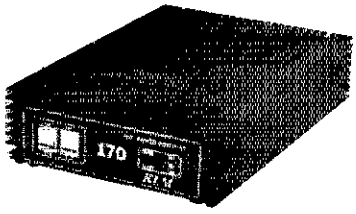

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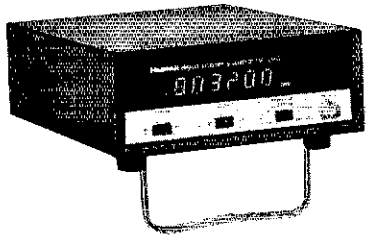

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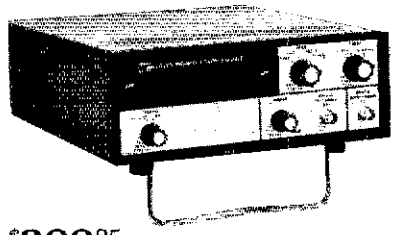

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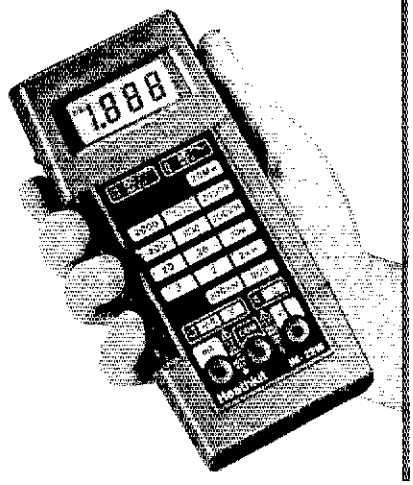

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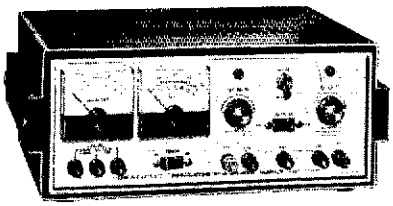

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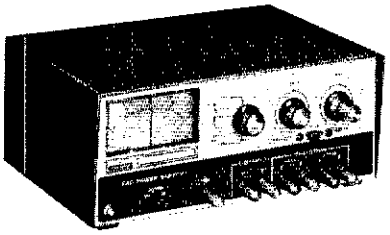

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- Fixed 5 VDC at 1.5A and two continuously-adjustable 0-20 VDC at 500mA
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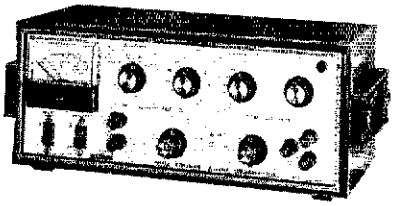

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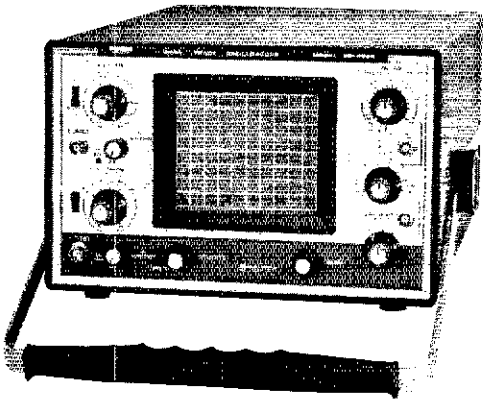

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- Two vertical input channels with 10 mV/cm sensitivity
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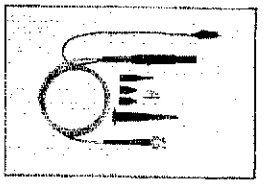
Combination x1, x10 Scope Probe

$29.95



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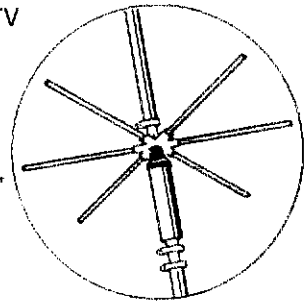

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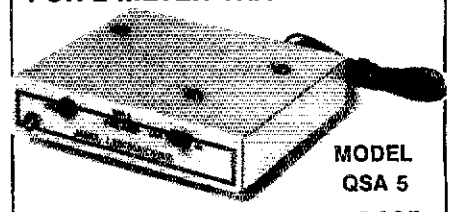

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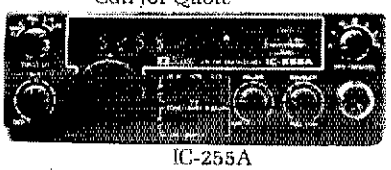

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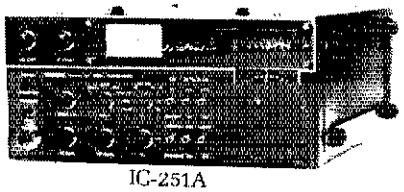

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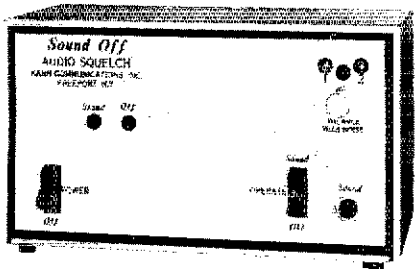

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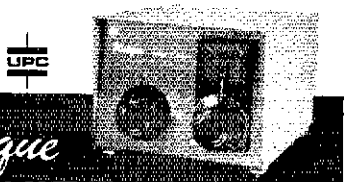

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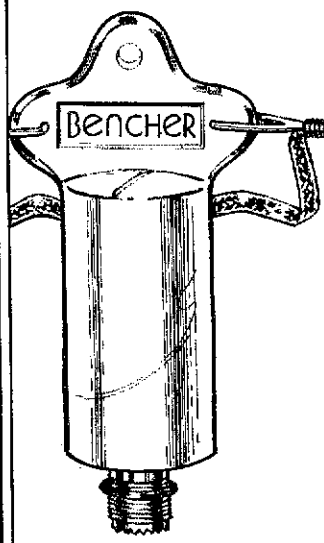

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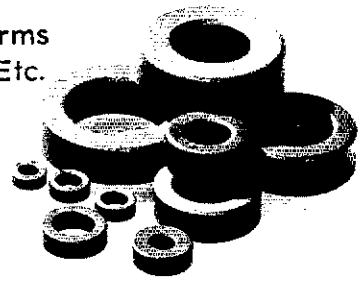

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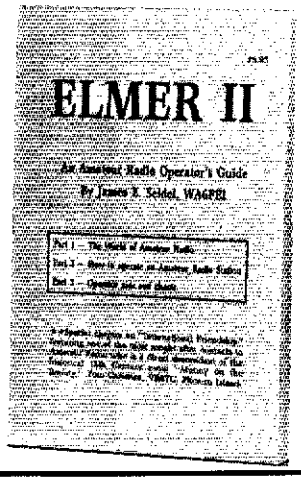

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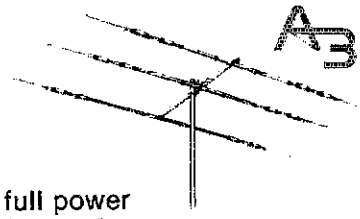

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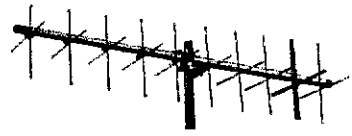

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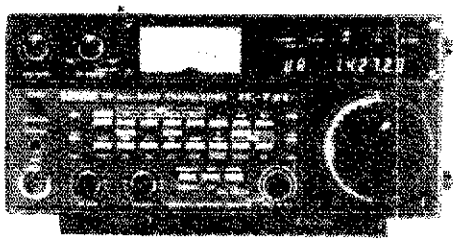

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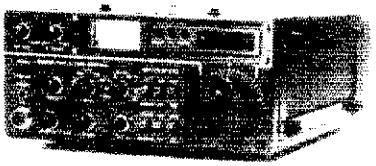

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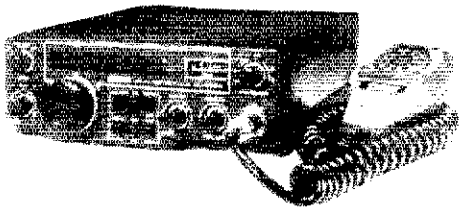

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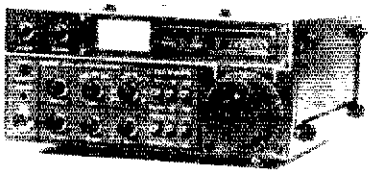

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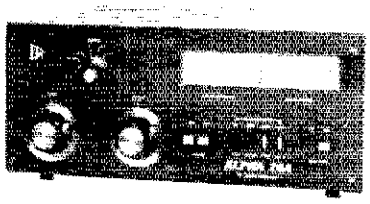

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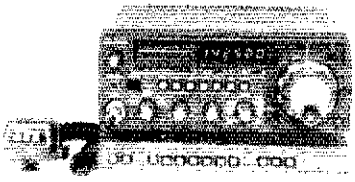

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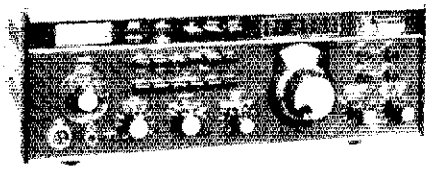

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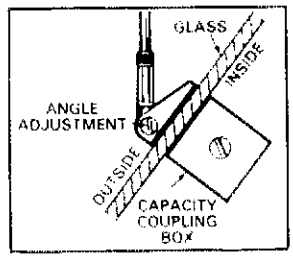

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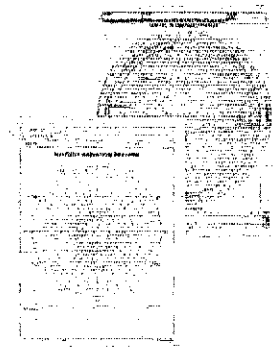

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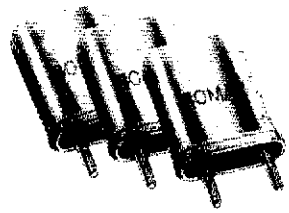

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COLLINS wanted: S-line. KWM2A 30S1. Also Telrex beams, rotor. W9QYH, 1605 Ridge Rd., Green Bay, WI 54304.

WANTED: Dec. '57 CQ or reprint of "Souping the Super Pro." Other 779 update info. Name your price Jim Lashbrook K6CDC Box 70, Black Creek, WI 54106.

ATTENTION Canadians. Want a wireless set W.S. 19 MK II or III and components, also needs W.S. 58 and RAF receiver R1155 What have you? Tony WA4MRR, 5 Rollingwood Drive, Taylors, SC 29687 803-244-0324.

COLLINS 75A4 serial no. 5430; 500 Hz, 2.1 & 3.1 filters, reduction tuning, manual, mint, $525. Heathkit HO-13 Ham-Scan $75. Hallicrafter T.O. keyer model HA-1 $60. Tymeter 24 Hr clock $12. MARS SWR bridge $10. WA3BGC, 247 Coldbrook Rd., Timonium, MD 21093 301-252-8983.

DRAKE TR-4 with nb, AC-4. New PA tubes, $395. Collins R-392 Mil receiver. .5-32 MHz, triple conversion, digital readout, with Pw. $235. Both excellent condition with manuals. W4AVU 804-293-5207. Virginia.

SELL: Realistic PRO-2001, 16 channel, programmable scanner. Good condition. Wanted: LED digital display unit for Atlas RX110 receiver. Contact: Marcus V. Ard, Rte. 2, Box 12, Georgetown, SC 29440.

COMMUNICATIONS receiver — Hallicrafters SX-122A, tube type, 540 kHz — 34 MHz, mint, 30 hours operation, $195, firm. Lou 518-372-5108.

TRANSCO ant relay uht (432 Mc) low SWR isolation 1-kW ($65.) Preamps Janel 432PC ($45) PB-10 ($15) Ameco PT 160-10m ($40) 1330 Curtis Berkeley CA 94702 W6RQZ.

NATIONAL NC-183 general coverage receiver, manual, excellent, $75. Swan-260 ac-dc transceiver, manual, excellent, $250, offers. Shattuck, 1992 Kinneloa Canyon Rd., Pasadena, CA 91107.

WANTED - six type 201A tubes. Must check good, cartons not required. W4MZL, 435 Nieuport Dr., Vero Beach, Fl. 32960.

YAESU 901-DE, Landliner speaker/patch, MT3000A tuner. Mint. Original owner. Sacrifice, $850. (prepaid) KA4E, P. O. Box 75, Hinesville, GA 31313. 912-876-8463.

FOR SALE: Gemtronics 12 channel Scanmaster scanner (vhf Hi/Lo-uhf) = $75.; C.V. 172U frequency shift converter for Facimilie (FAX) recorders = $150.; 2 Muirhead of England D-649-L 18" Facimilie (FAX) recorders, three speed (60-120-180), one perfect — just reconditioned — one for parts, both for $400.; General Electronic Labs tunable receiver model R1070/GL, 55-260 mc. = $250.; Ray Jefferson marine transceiver model 475 = $25.; Drake SPR-4 receiver with all crystals, just factory aligned = $350. Shipping extra. WA2TSQ Robert Schillaci, 1913 Silverton Road, Toms River, NJ 08753 — 201-255-2822.

FOR SALE: SB310 all band communications receiver speaker SB600 with manuals $125. WA1HMW Pinewood Road Bolton, MA 01740.

SPEECH processor kit $29 K2VAH.

ESTATE OF W2WI — Collins KWM-2: wing emblem, plugin relays, Waters rejection tuner, power supply, station contro. 30L1 power amplifier, carrying cases. $1400. 201-543-7552.

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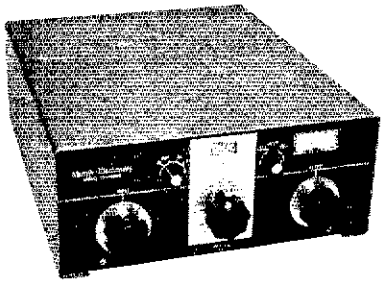

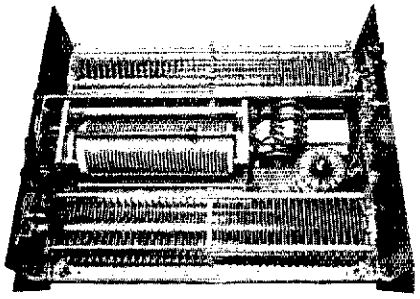

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- Continuous tuning 10-160 meters
- Front panel function switch -in and out - dummy load (not supplied) - ground
- Handles any antenna system, dipoles random wires, verticals whips, beams, open wire line
- Built in heavy duty 4 to 1 balun, 3 cores
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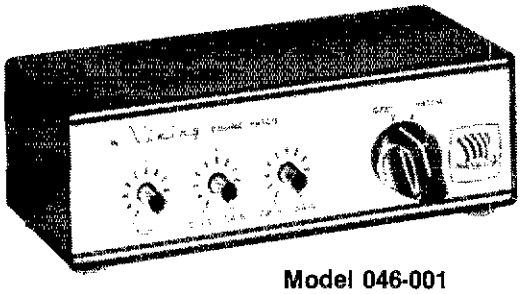

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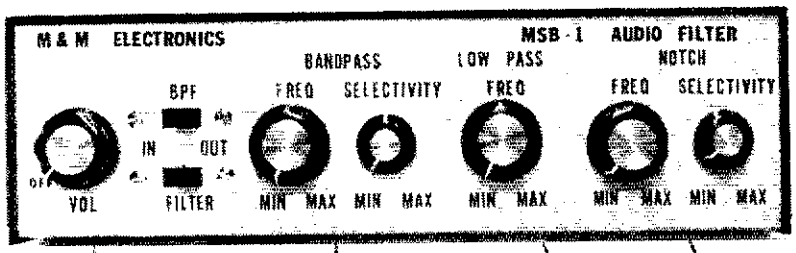

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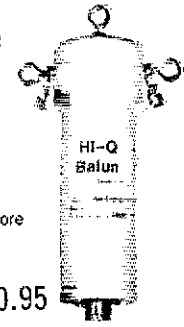
HI-Q BALUN



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- Replaces center insulator
- Puts power in antenna
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- Small, lightweight and weatherproof
- 1:1 impedance ratio
- For full legal power and more
- Helps eliminate TVI
- With SO 239 connector

$10.95

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May be used for

- Guy wire strain insulators
- End or center insulators for antennas
- Construction of antenna loading coils or multiband traps

$4.95

Patent No. 4,091,359

DIPOLES

MODEL	BANDS	LENGTH	PRICE WITH HI-Q BALUN	WITH HI-Q CENTER INSULATOR
Dipoles				
D-80	80/75	130	$[illegible]	$[illegible]
D-40	40/15	66	[illegible]	[illegible]
D-20	20	33	[illegible]	[illegible]
D-15	15	22	[illegible]	19.95
D-10	10	16	[illegible]	[illegible]
Shortened dipoles				
SD-80	80/75	[illegible]	[illegible]	[illegible]
SD-40	40	[illegible]	[illegible]	[illegible]
Parallel dipoles				
PD-8010	80-40-20-10/15	130	[illegible]	[illegible]
PD-4015	40-20-10/15	[illegible]	[illegible]	[illegible]
PD-8040	80-40/15	130	[illegible]	[illegible]
PD-4020	40-20/15	66	[illegible]	[illegible]
Dipole shorteners - only, same as included in SD models				
[illegible]	80/75		$11.95 pr	
[illegible]	40		$10.95 pr	

All antennas are complete with a HI-Q Balun or HI-Q Antenna Center Insulator. No 14 antenna wire or plastic insulators. Our nylon antenna support rope (SO models only 50') rated for full legal power. Dipoles may be used as an inverted V and may also be used by MARS or RACES.

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[illegible] dogbone (type) antenna insulators [illegible]

[illegible] insulators [illegible]

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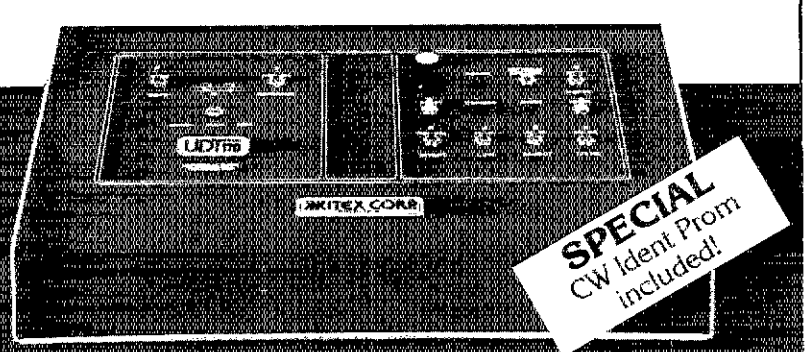
The UDT 170



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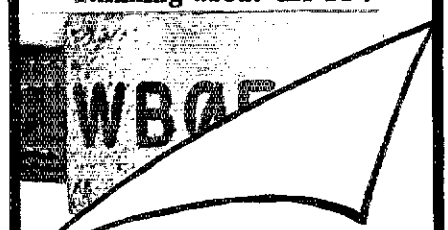

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SELL: Yaesu FT dx560 with matching speaker, 500 watts output ssb/cw. Mint condition, recently checked and aligned $325 including UPS shipping in original cartons. W4OTM 1485 Central Ave., Merritt Island, FL 32952.

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DON AND MIKE goodies; TS830 — call; TS180S/DFC/ssb - call; Icom IC720/AC-call; Swan 102BXA $999.; Astrol50A $799.; 100MXA $499. DSI 5600A/Ant/ac $185.; Robot 800 $699.; Cushcraft A3 Tribander $169.; AEA Morsematic keyer $169.; Bird 43, slugs — stock, Ham 4 $169; Ham X $239; Belden 8 wire rotor cable 24c/ft; Heavy rotor cable 2#16/6#18 38c/ft; Sprague 100mfd/450V $2.; Icom 255A $319.; IC260 $429.; FDK Palm 2 Handie $149. with bp/ac; Cetron 572B $34.; Amphenol silvrplate PL259 $1. Telrex Monobanders — stock; TB5EM $425. Prices FOB Houston, subject change without notice. Madison Electronics, 1508 McKinney, Houston, TX 77002. 712-658-0268.

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WANTED: Parts for homebrew 2kW amplifier and power supply. W5VJG/4, 89 Woodland Hills, Tuscaloosa, AL 35405.

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KW linear 80 thru 10 Heath SB-230 mint, new final; $360. Hank, WA2OVG, 212-796-8817. Days 490-2160.

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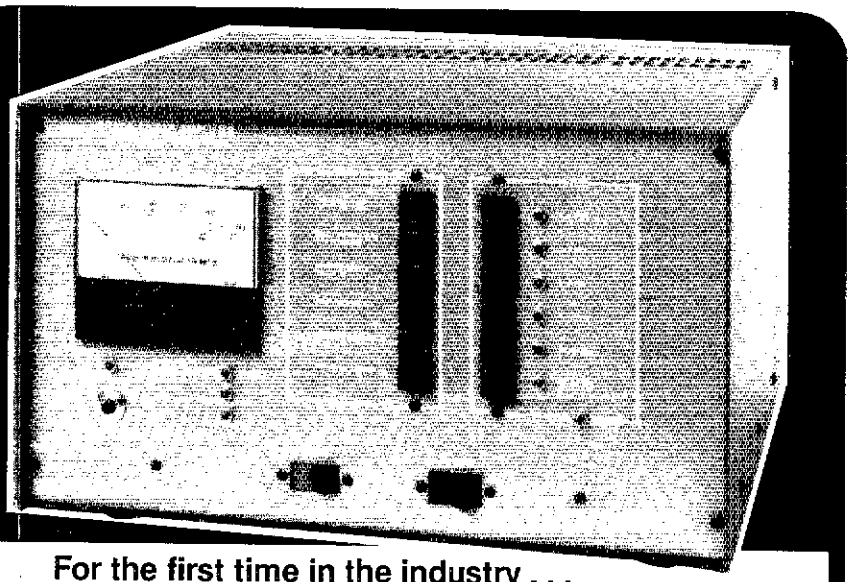
WANTED: Not working; HW-17, IB-1102, IB-1103. Also



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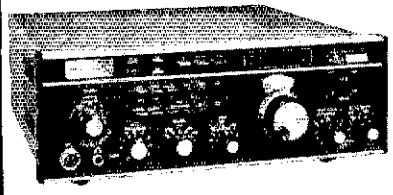
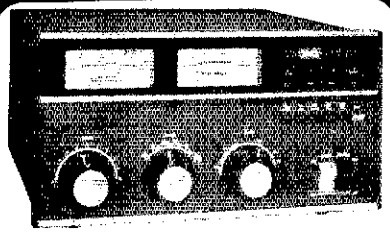
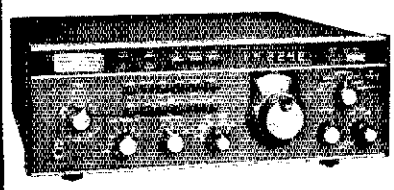


DRAKE TR-7



DRAKE L-7



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ATB34	4 Element Triband Beam	$ 229
ATV4	40-10 Mtr. Vertical	$ 79
ATV5	80-10 Mtr. Vertical	$ 85
ARX2	2 Mtr. "Ringo-Ranger"	$ 30
A147-11	11 Element 146-148 Mhz Beam	$ 30
A147-22	22 Element "Power-Pack"	$ 88
A14410T	10 Element 2 Mtr. "Oscar"	$ 37
A14420T	20 Element 2 Mtr. "Oscar"	$ 52
DX120	20 Element 2 Mtr. Colinear	$ 45
A214B	14 Element 2 Mtr. "Boomer"	$ 53
A214FB	14 Element 2 Mtr. FM "Boomer"	$ 53

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18AVT/WB	80-10 Mtr. Trap Vertical	$ 75
TH5DX	5 Element Triband Beam	$ 195
TH6DXX	6 Element Triband Beam	$ 224
TH3MK3	3 Element Triband Beam	$ 169
TH3JR	3 Element Triband Beam	$ 119

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4BTV	40-10 Mtr. Vertical	$ 79
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Partial Listing of Antennas Available

MICROPHONES (Astatic)

TUP9D104	Transistorized w/Push Bar Base	$ 59
TUG8D104	Transistorized	$ 49
TUG9D104	Transistorized Silver Eagle	$ 69
UGD104	Crystal or Ceramic	$ 47

MICROPHONES (Turner)

EX-500	Desk Amplified Dynamic	$ 59
SSK	Desk Amplified Dynamic	$ 49
+3B	Desk Amplified Dynamic	$ 55
+2	Desk Amplified Ceramic	$ 39

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300	7 band, 50 channel crystalless	$ 359
250	6 band, 50 channel crystalless	$ 279
220	7 band, 20 channel crystalless	$ 279
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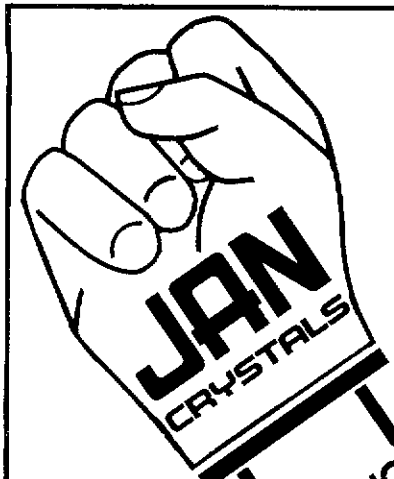

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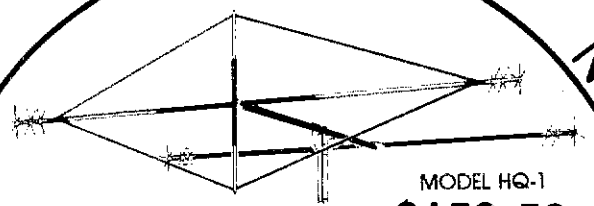

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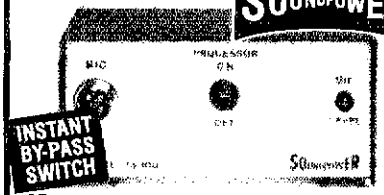

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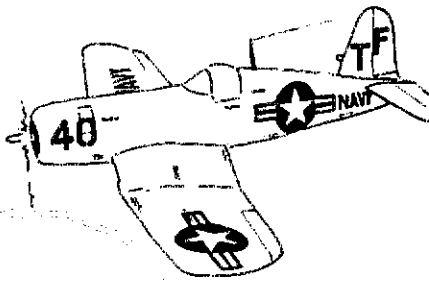

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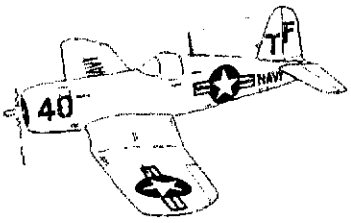

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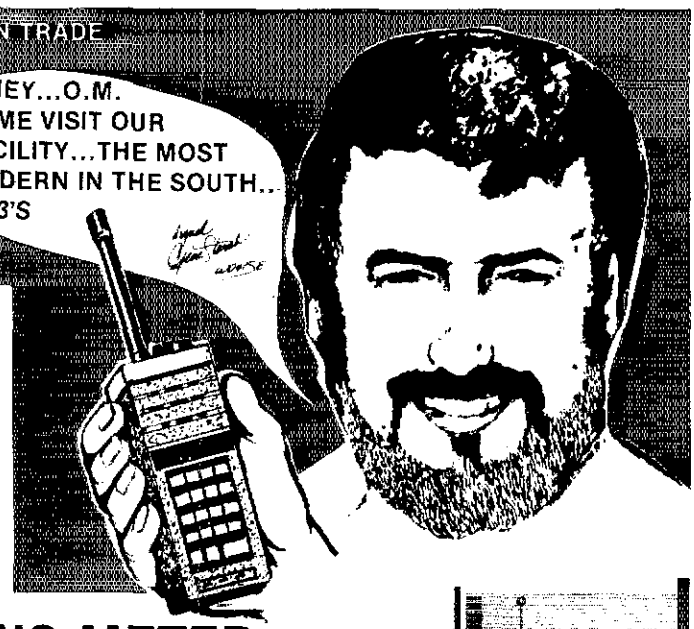

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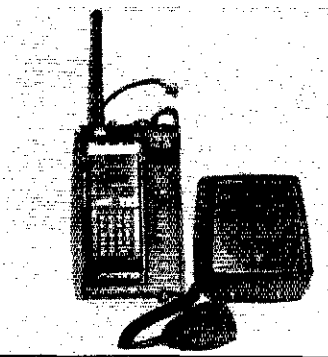

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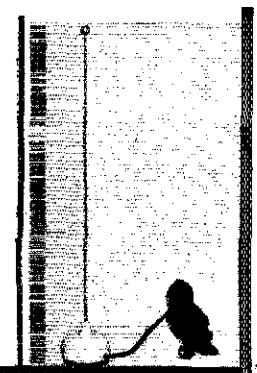

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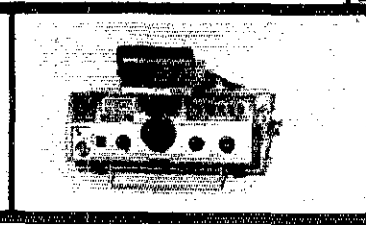

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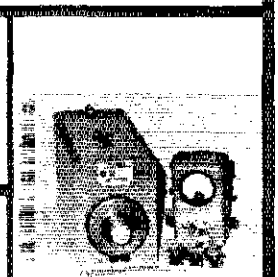

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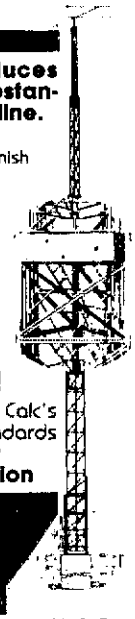

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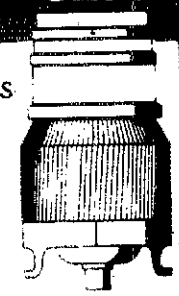

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DRAKE: R4-B, T4X-B, WAC4 ps, MS4-spkr. Henry 4-K-4000 PEP amp. Collins 75-A-4. Central Electronics: 200V, MM-2 scope Johnson kW Matchbox/SWR Yaesu 901-DM, FT-7B, 2-meter Memorizer w/scanner Bearcat 210 scanner. W4KXH 606-237-1212 or send stamped, self-addressed envelope.

KENWOOD TS-820, absolutely mint, used very little. $595. Digital frequency display, for TS-520 and TS-820, $95. Monitor scope, SB-610, mint, $95. Electronic power/SWR meter for low bands, $49. Tape recorder, Roberts, 7 in. reel, 4 track stereo, Tube type, mint, $95. All prices firm. Lou, WB2EKC, 518-372-5108.

S1S1 Collins receiver, latest production, absolutely perfect condition. $1500. W9ZR, 1-414-532-6643.

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COLLINS 75-S1 mint $240. HT-32B excellent $210 plus shipping. Cert or M.O. WA2RFO, 312 Schubmehl Vestal, NY 13850.

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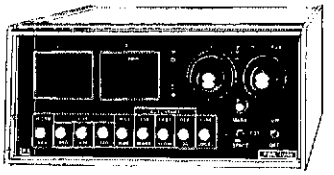

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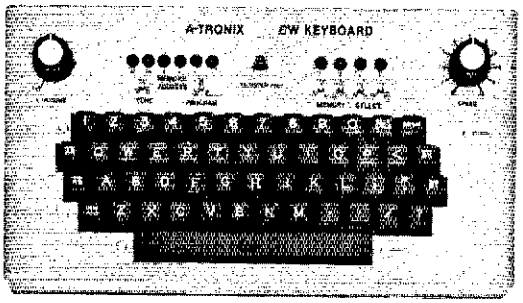

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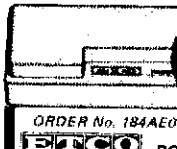

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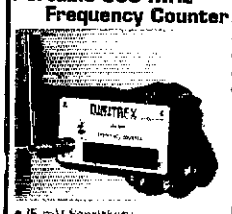

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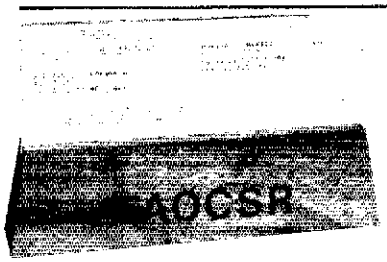

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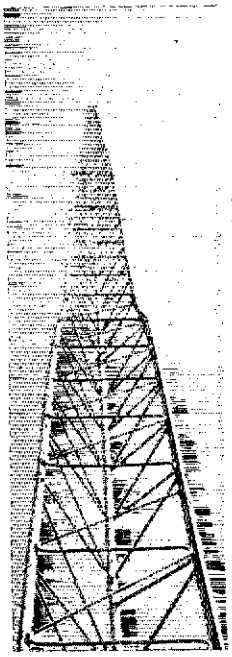

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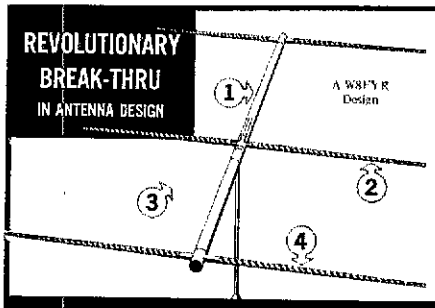

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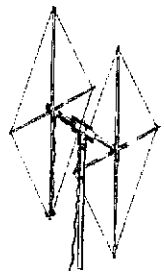

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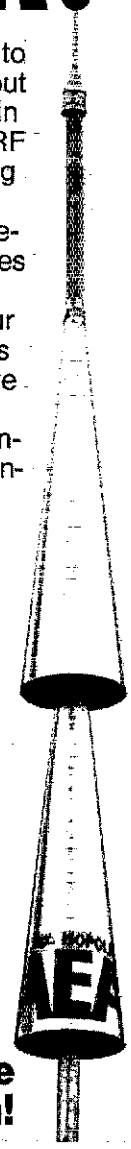

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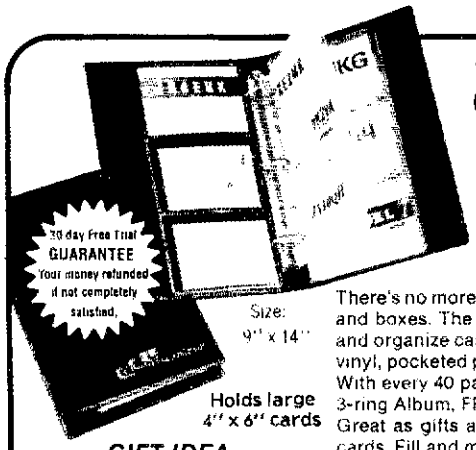

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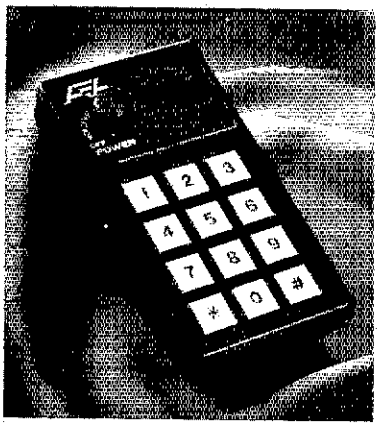

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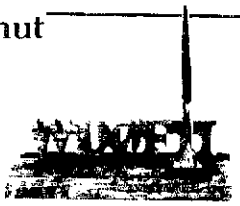

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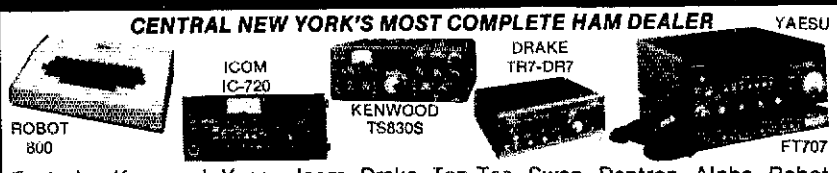

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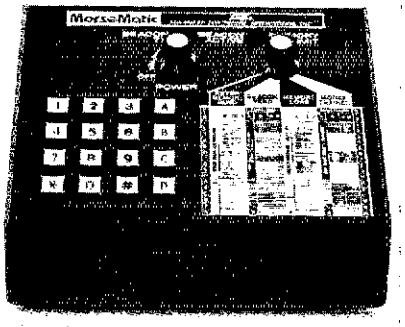

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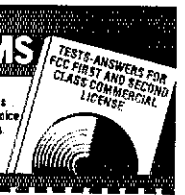

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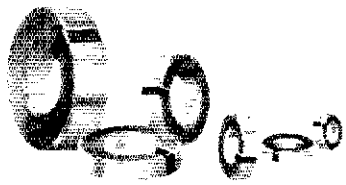

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180S "DFC" Series		List Price
TS-180S	160-10M w/DFC,	$1149.95
TS-180S	160-10M no DFC	984.95
DF-180	DFC	164.95
VFO-180	VFO	179.95
SP-180	External Speaker	69.95
AT-180	Antenna tuner	179.95
YK-88SSB	SSB filter	59.95
YK-88CW	CW filter	59.95
PS-30	Power supply	139.00

TS-830S
160-10M BASE
LIST $929.95

TS-130S
80-10M MOBILE
LIST $759.95

520S Series		
TS-520SE	160-10M base TXCVR	629.95
DG-5	Digital display	199.00
VFO-520	VFO	165.00
SP-520	Speaker	33.00
CW-520	CW filter	59.00

HF Miscellaneous

R-1000	Gen. Cov. receiver, digital	499.95
SP-100	Speaker	44.95
TL-922A	160-15M amplifier, 2KW	1199.00

VHF / UHF EQUIPMENT

TS-600	6M SSB/CW/FM/AM	799.00
TR-9000	2-meter FM/SSB/CW	199.95
PS-20	Base station for TR-9000	74.95
RU-9	System base, power and send switches, mem.	39.95
TR-2400	2-meter synthesized hand-held LCD, 10 mem.	395.00
TR-7800	2-meter FM xcvr	399.95
KPS-7	AC power supply	79.95
TR-8300	70-cm FM transceiver	369.00
TV-502S	2-meter transverter	289.00
TV-506	6-meter transverter	279.00

OTHER ACCESSORIES

HC-10	Digital world clock	99.95
HS-4	Headphone set	19.50
HS-5	Deluxe headphone set	39.95
MC-50	Base mike, high/low	45.00
MC-30S	N/C mobile mike	29.00
MC-35S	N/C mobile mike	29.00
MC-45	Touch-tone Mike	49.95
PC-1	Phone Patch	59.95

YAESU

HF TRANSCEIVERS

		List Price
FT-901DM	160-10M	$1635.00
FT-101ZD	160-10M	942.00

SOLID STATE HF TRANSCEIVERS

FT-107M	w/o DMS/mem	1046.00
FT-707	80-10M, 200W	810.00

VHF TRANSCEIVERS

CPU7500RK	FM mob. keyb.	467.00

YAESU (cont'd)

		List Price
FT-127RA	220 MHz scan	$ 479.00
FT-207R	2m Hand Held	399.00
FT-227RB	2m/4 mem-YM24	380.00
FT-625RD	6m All Mode	895.00
FT-627RA	6m 4 memory	399.00
FT-720RVH	2M, 25 watt	458.00

SOLID STATE RECEIVERS

FRG-7	General Cov.	379.00
FV-707DM	Dig scan/mem	279.00
FP-707	Power Supply	162.00
FC-707	Antenna Tuner	
	100 dummy load	110.00

UHF TRANSCEIVER

FT-720RU	440-450 FM	499.00

ACCESSORIES FOR VHF EQUIPMENT

PB-155S	Tone squelch unit	30.00
FP-4	4amp power supply	50.00
FP-12	12amp P/S speaker	135.00
MU-225	Mem unit 225/625	168.00

MISCELLANEOUS ACCESSORIES

YH-55	Headset	15.00
FF-501DX	Lo pass filter	34.00
QT-8-24D	Quartz world clock	49.00

SERVICE & MAINTENANCE MANUALS

FT-101 Series		25.00
FT-101ZD		25.00
FT-221 Series		15.00
FT-277 Series		15.00
FT-901 Series		25.00

ACCESSORIES FOR 901 / 101ZD SERIES

Note: all items can be used with the 101ZD series except (*) items

FA-9	Fan	22.00
FM-901*	FM adapter	45.00
KY-901*	Keyer unit	45.00
MU-901*	Memory unit	124.00
DC-901*	DC-DC conv.	60.00
SP-901	Speaker	35.00
SP-901P	Speaker/Patch	76.00
FTV-901R	Trans. w/2M	389.00
"	2M adapt. only	154.00
"	6M adapt. only	110.00
"	70cm adapt. only	256.00
YD-901P	Monitor w/scope	515.00
YR-901	Code / RTTY	730.00
FV-901DM	Syn. VFO	415.00
FC-901	Antenna tuner	199.00
XF8.9BC	CW filter	45.00
XF8.9B	AM filter	45.00
XF8.9HCN	350Hz filter	50.00
ZD-1	Digital readout	150.00
FV-101Z	Remote VFO	175.00
DC-101ZD	DC-DC conv	60.00

ACCESSORIES FOR 207R

NC-1A	15hr drop-in chgr.	51.00
NC-2	3hr drop-in chgr.	90.00
NBP-9	Battery pack	23.00
FBA-1	Battery sleeve	3.00
LCC-7	Leather c. case	35.00
TA-2	Telescope antenna	9.40
FTS-32E	32 tone CTCSS	40.00

MICROPHONES

YE-7A	Hand mike 101ZD	17.00
YD-148	Hi-lo desk mike	32.00
YD-844A	Hi-lo desk mike	32.00
YM-21	Noise cancelling	20.00
YM-22	Keyboard scan	69.00
YM-23	Keyboard encod.	69.00
YM-24	Speaker mike	32.00
YM-34	Desk mike 107/707	31.00
YM-36	Scan 107/707	20.00

ICOM

BASE STATION EQUIPMENT

		List Price
251A	2M FM, SSB, CW	$ 699.00
551	6M, SSB, CW	449.00
551D	6M 80W, 12V, with EX107, EX 108	669.00
551D / PS	6M 80W with AC Supply PS20	849.00
720	9 band HF Xcvr, 12V DC/Mic	1149.00
720/PS	9 band HF Xcvr, AC & 12V Sup/Mic-PS15	
	9 band HF Xcvr, AC & 12V Sup/Mic-PS15	1298.00

MOBILE TRANSCEIVERS

22S	2M FM 10W 22CH Programmable	269.00
255A	2M FM 25W Synthesized	389.00
260A	2M MBL, SSB FM,CW	489.00
280	2M FM 10W, Remotable	359.00

PORTABLE TRANSCEIVERS

2A/NiCD	2M 800 CH, HT w/Nicad, Chgr.	229.50
2AT/NiCD	2M 800 CH, HT w/Nicad, TT pad, Chgr.	249.50
202S	2M SSB Portable	299.00
402	430 MHz SSB Portable	349.00
502A	6M SSB Portable	229.00

POWER SUPPLIES

3PE	AC to 12V Supply 3A/Spkr 3A/Spkr	95.00
PS15	12V Power Supply	149.00
PS20	12V Power Supply	180.00

ACCESSORIES

HM8	8 pin mike w/TTN	38.50
SM2	Desk mike	32.50

DRAKE

COMMUNICATIONS RECEIVERS AND ACCESSORIES

R-7/DR-7	General Cov. Rcvr.	$1449.00

2KW AMPLIFIERS

L-7	160-15 M Amplifier	1090.00
3-500Z	Tube for L-7 (2 req.) ea.	120.00

HF TRANSCEIVERS AND ACCESSORIES

TR-7/DR-7	Dig HF transceiver 160-10M	1549.00
NB-7	Noise blanker for TR-7	90.00
SL-300	300Hz CW filter for 7-line	55.00
SL-500	500Hz CW filter for 7-line	55.00
SL-1800	1800Hz RTTY filter for 7-line	55.00
SL-6000	6000Hz AM filter for 7-line	55.00
AUX-7	Auxiliary range program board for TR-7	45.00
FA-7	Fan for TR-7/PS-7 DL-1000	39.00
RV-7	Remote VFO for TR-7	195.00
MS-7	Speaker for 7-line	39.00

LOW PASS AND HIGH PASS TVI FILTERS

TV-3300LP	1000 watt low pass filter	26.60

CUSHCRAFT

BOOMER ANTENNAS

		List Price
37-19	144-146MHz 19 ele.	$ 99.95

BOOMER STACKING KITS

32-SK	Stacking Harness & P.C., 2 Boomers	44.95
PD-2	Power Divider, 2 Boomers	22.95

CUSHCRAFT (cont'd)

MULTI BAND HF ANTENNAS

		List Price
A-3	3 element	$ 219.95
AT6-34	Tri-Band 4 ele. beam	319.95
ATV-3	Tri-band vertical	54.95
ATV-4	7,14,21,28MHz Vert.	112.95
ATV-5	3,5,7,14,21, 18MHz Vert.	119.95
R-3	Tri-Band Ringo	299.95
A-3SK	Stainless Hardware for A3	39.95

FM ANTENNAS

A147-4	146-148 MHz 4 el.	29.95
A147-11	146-148 MHz 11 el.	44.95
A147-20I	144 & 147 MHz 20 el	74.95
A147-22	146-148 MHz 22 el.	129.95
A220-7	220-225 MHz 7 el	32.95
A220-11	220-225 MHz 11 el.	42.95
A449-6	449 MHz 6 element	29.95
A449-11	449 MHz 11 element	42.95
AFM-4D	144-148 MHz four pole	79.95
AFM-24D	220-225 MHz four pole	72.95
AFM-44D	440-450 MHz four pole	67.95
AR-2	135-170 MHz Ringo	27.95
AR-6	50-54 MHz Ringo	44.95
AR-220	220-225 MHz Ringo	24.95
AR-450	440-460 MHz Ringo	24.95
ARX-2K	135-170 MHz Ranger kit	21.95
ARX-220	220-225 MHz Ringo Rgr.	44.95
ARX-450	435-450 MHz Ringo Rgr.	39.95

BLITZ BUGS

LAC-1	Coax lightning arrester, inline	5.95
LAC-2	Coax lightning arrester double female	5.95

VHF / UHF BEAMS

A50-3	50 MHz 3 element	54.95
A50-5	50 MHz 5 element	74.95
A50-6	50 MHz 6 element	99.95
A144-7	144 MHz 7 element	32.95
A144-11	144 MHz 11 element	44.95
A430-11	432 MHz 11 element	42.95

HUSTLER

		List Price
5-BTV	5-band vertical	$139.95
CG-144	2-meter mobile with without mount	28.95
CGT-144	2-meter mobile w/mount	45.95
G6-144B	6 db fixed station, 2 m	68.95
G7-144	7 db fixed station, 2 m	139.95
MO-1	54" mast for fender	22.95
MO-2	54" mast for bumper	22.95
QD-1	Quick disconnect	16.95
RM-10	10 meter strd. resonator	10.95
RM-10S	10 meter sup. resonator	17.95
RM-11	11 meter strd. resonator	10.95
RM-11S	11 meter sup. resonator	17.95
RM-15	15 meter strd. resonator	10.95
RM-15S	15 meter sup. resonator	17.95
RM-20	20 meter strd. resonator	14.95
RM-20S	20 meter sup. resonator	21.95
RM-40	40 meter strd. resonator	16.95
RM-40S	40 meter sup. resonator	24.95
RM-75	75 meter strd. resonator	18.95
RM-75S	75 meter sup. resonator	38.95
RM-80	80 meter strd. resonator	18.95
RM-80S	80 meter sup. resonator	38.95
RSS-2	Res. spring-stainless steel	6.95
SSM-2	Commercial stainless tail mount	18.95

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		List Price
TH6DXX		$ 329.95
TH5DX		269.95
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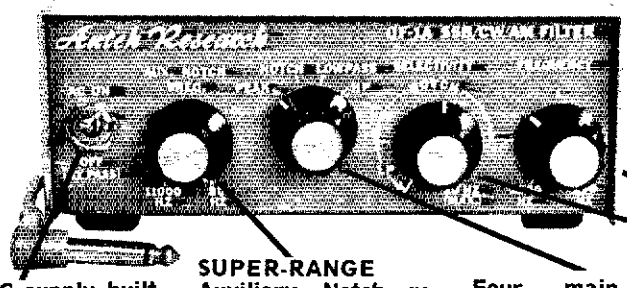

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Autek filters gained their reputation by using a costly **INFINITELY VARIABLE** design. Yet, mass-production (we sell only **ONE MODEL** — the best) makes it a tremendous bargain. You're not limited by a few fixed positions. You vary selectivity 100:1, and vary frequency over the entire usable audio range. **PEAK CW** (or voice) with an incredible **20 HZ BANDWIDTH**, but also variable all the way to "flat." Imagine what the **NARROWEST CW FILTER MADE** will do to **QRM!** Reject whistles with the most flexible **NOTCH** you've heard. Wide or narrow. Depth to 70 dB. **LOWPASS** helps you cope with **SSB** hiss and splatter. Skirts exceed 80 dB. Most above features were in the popular QF-1 (See excellent review in March, 1977 **QST**.) The new "A" model is more selective, adds a **HIGHPASS** mode for **SSB**, and a great **AUXILIARY NOTCH** (35 to 60 dB) to give **TWO NOTCHES, NOTCH/PEAK, NOTCH/LOWPASS,** or **NOTCH/HIGHPASS!** If this doesn't convince you, please **ASK ON THE AIR.** Owners are our best salesmen!

Due to cost and panel-space limitations, even the latest rigs only include a fraction of the **QF-1A** features. We recommend you buy the best rig you can afford, spend $3,000 or more, then add a **QF-1A** and listen to the improvement! **WORKS WITH** Yaesu, Kenwood, Drake, Swan, Atlas, Tempo, Collins, Heath, S/1, etc., **ANY RIG!**

Hooks up in minutes. Plug into your rigs phone jack, or attach to speaker wires. Plug speaker or phones into **QF-1A** rear-panel jack. That's it! Filter supplies 1 watt to fill a room. No batteries rqd. (+12 VDC hookup possible.) 6½x5x2½". Handsome light/dark grey styling. Get yours today.!

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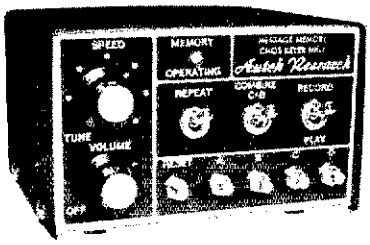

Calls CQ while you relax.

Also remembers name, QTH, contest exchanges.

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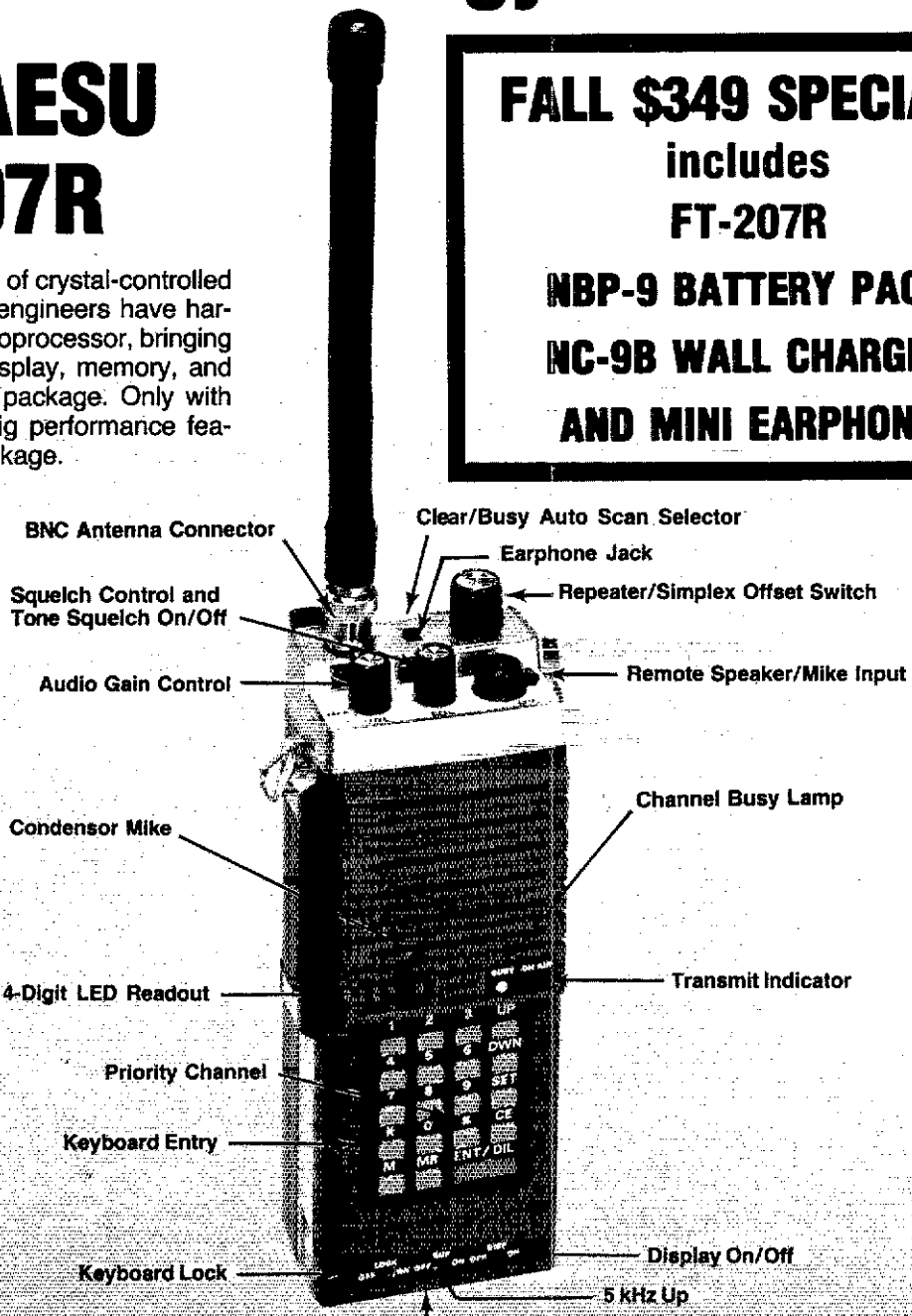

SPECIFICATIONS:

GENERAL

Frequency coverage: 144-148 MHz
Number of channels: 800
Emission type: F3
Batteries: NiCd battery pack
Voltage requirement: 10.8 VDC ±10%, maximum
Current consumption:
Receive: 35 mA squelched (150 mA unsquelched with maximum audio)
Transmit: 800 mA (full power)
Case dimensions: 58×181×64 mm (HWD)
Weight (with batteries): 880 grams

*suggested retail price

RECEIVER

Circuit type: Double conversion superheterodyne
Intermediate frequencies:
1st IF = 10.7 MHz
2nd IF = 455 kHz
Sensitivity: 0.32 uV for 20 dB quieting
Selectivity: ±7.5 kHz at 60 dB down
Audio Output: 200 mW at 10% THD

Price And Specifications Subject To Change Without Notice Or Obligation.

TRANSMITTER

Power Output: 2.5 watts minimum (200mW)
Deviation: ±5 kHz
Spurious radiation: −60 dB or better
Microphone: Condenser type (2000 ohms)

OPTIONS

LC-C7 Leather Carrying Case
YM-24 Remote Speaker/Microphone
Tone Squelch Unit

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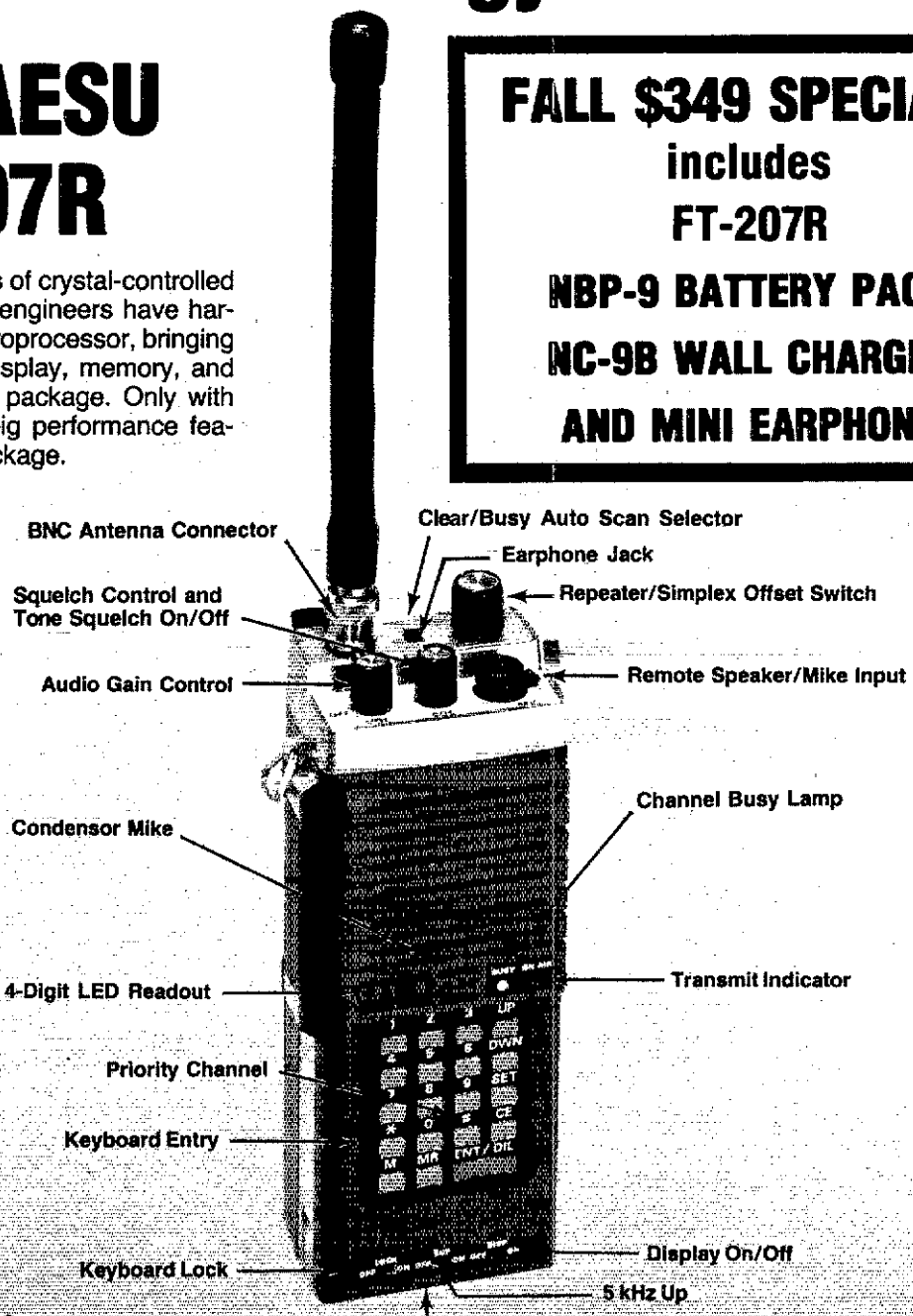

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*suggested retail price

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1st IF = 10.7 MHz
2nd IF = 455 kHz
Sensitivity: 0.32 uV for 20 dB quieting
Selectivity: ± 7.5 kHz at 60 dB down
Audio Output: 200 mW at 10% THD

Price And Specifications Subject To Change Without Notice Or Obligation

TRANSMITTER

Power Output: 2.5 watts minimum /200mW
Deviation: ± 5 kHz
Spurious radiation: -60 dB or better
Microphone: Condenser type (2000 ohms)

OPTIONS
LC-C7 Leather Carrying Case
YM-24 Remote Speaker/Microphone
Tone Squelch Unit

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